PROCEEDINGS 2010

# **MADE** Design Education the Art & of Making

26<sup>th</sup> National Conference on the Beginning Design Student

College of Arts + Architecture The University of North Carolina at Charlotte





**MADE:** Design Education & the Art of Making examined the role of making past, present & future, both in teaching design and in the design of teaching. The conference addressed theories & practices addressing fabrication & craft in all studio disciplines, and to take measure of their value in pedagogies of beginning design.

Paper presentations delivered a set of eight themes derived from the overall focus on Making. The team of moderators drove the agenda for these themes, and arranged paper presentations into specific sessions indicated by the schedule. Abstracts were reviewed in a blind peer-review process.

#### Conference co-chairs:

Jeffrey Balmer & Chris Beorkrem

#### Keynote speakers:

Simon Unwin David Leatherbarrow

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#### **Session Topics**

Making Real Moderator: Greg Snyder Making Virtual Moderators: Nick Ault, David Hill Making Writing Moderators: Nora Wendl, Anne Sobiech-Munson Making Drawings Moderators: Thomas Forget, Kristi Dykema Making Pedagogy Moderator: Michael Swisher **Making Connections** Moderator: Janet Williams, Patrick Lucas Making Masters Moderators: José Gamez, Peter Wong Making the Survey Moderators: Emily Makas, Rachel Rossner **Open Session** Moderators: Jennifer Shields, Bryan Shields

#### Paper abstract reviewers

- · Silvia Ajemian · Nicholas Ault · Jonathan Bell · Julia Bernert
- · Gail Peter Borden · Stoel Burrowes · Kristi Dykema
- · Thomas Forget · Jose Gamez · Laura Garafalo
- · Mohammad Gharipour · David Hill · Tom Leslie
- · Patrick Lucas · Emily Makas · Igor Marjanovic · Andrew McLellan
- · Mikesch Muecke · Gregory Palermo · Jorge Prado · Kiel Moe
- · Marek Ranis · Rachel Rossner · Bryan Shields · Jen Shields
- · Greg Snyder · Ann Sobiech- Munson
- · Michael Swisher · Sean Vance · Nora Wendl
- · Catherine Wetzel · Janet Williams · Peter Wong · Natalie Yates

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SIMON UNWIN UNIVERSITY OF DUNDEE

Simon Unwin is Professor of Architecture at the University of Dundee, Scotland. He has taught and lectured on his work in China, Israel, India, Sweden, Turkey and the United States, and is author of several works, including *Analysing Architecture*, now in its third edition, and translated into Chinese, Japanese, Korean, Farsi, and Spanish. Clear and accessible, *Analysing Architecture* opens a fresh way to understanding architecture. It offers a unique 'notebook' of architectural strategies to present an engaging introduction to elements and concepts in architectural design. Illustrated throughout with the author's original drawings, examples are drawn to illustrate analytical themes and to show how drawing can be used to study architecture. Since its first edition appeared in 1997, *Analysing Architecture* has established itself internationally as one of the key texts in architectural education. Unwin's forthcoming book, *Twenty Buildings Every Architect Should Understand*, arrives in the United States next month.

#### Lecture Topic:

#### MAKING SENSE OF ARCHITECTURE

Architecture is, alongside language and mathematics, one of the fundamental media through which we make sense of the world. Where language deals in words, and mathematics in number, architecture deals in the organisation of space into places. The key challenge for architectural education is to help students understand the powers of architecture and how they can use them in design. Simon Unwin's book, Analysing Architecture, offers a conceptual framework for understanding architecture and its powers. In this lecture, he will give an account of the gestation of the book, identifying the issues and problems that prompted it, and discuss how he has used it in combination with studio exercises to help students begin to make sense of architecture and develop a curiosity about its workings that will sustain them through their careers. Students are encouraged to develop the habit of keeping a notebook to analyse examples and explore ideas through the medium of drawing. Using illustrations from his own notebooks, Simon will describe the ways he uses drawing to explore the workings and powers of architecture.



DAVID LEATHERBARROW UNIVERSITY OF PENNSYLVANIA

David Leatherbarrow is Professor of Architecture and Chair of the Graduate Group in Architecture at the University of Pennsylvania School of Design, Philadelphia, where he has taught since 1984. He received his B.Arch. from the University of Kentucky and holds a Ph.D. in Art from the University of Essex. He has also taught in England, at Cambridge University and the University of Westminster (formerly the Polytechnic of Central London). He is primarily known for his contributions to the field of architectural phenomenology. Questions of how architecture appears, how architecture is perceived, and how topography shapes architecture often direct his research. Among his published works are: *The Roots of Architectural Invention: Site, Enclosure, Materials,* Cambridge University Press 1993, *Uncommon Ground: Architecture, Technology, and Topography,* MIT Press 2000, *Architecture Oriented Otherwise,* Princeton Architectural Press 2008.

#### Lecture Topic:

#### MAKING: INVENTION AND INVOLVEMENT

#### (IN THE WORLD)

Leatherbarrow's basic argument is as follows: making in architecture involves equal measures of involvement and invention. This is because the world in which we live is both the context and outcome of productive work. Creative work in architecture depends on accepting constraints and seizing opportunities. From the very start of their studies students face the difficult task of integrating their newly acquired professional skills and knowledge into their pre-professional experience and understanding, their inherited culture. Leatherbarrow will develop his arguments in favor of "involved invention" by looking closely at a number of buildings, gardens, and paintings.

#### ABOUT THIS CONFERENCE Introduction

JEFF BALMER & CHRIS BEORKREM CONFERENCE CO-CHAIRS UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

As designers, we share the aspiration for a reality in which, as Sennett phrases it, 'contentment with ordinary things made well reigns'. As design educators, we aim for this same state of affairs, both in the hopes of inspiring it within our students, and in fostering amongst ourselves the practice of well-crafted pedagogy.

Over the past twenty-five years, The National Conference on the Beginning Design Student (NCBDS) has aimed to bring together educators from across the United States, and beyond, to discuss issues and opportunities arising from the teaching of design to novice students. Learning design is founded upon the acquisition of special skills, but more importantly, the education of a designer involves new ways of interpreting and imagining the human environment. It thus requires of the student entirely new modes of thinking.

The primary role of NCBDS is to serve as a national forum for the dissemination of emerging and effective models of design curriculum. This annual conference has showcased the work of innovative and effective instructors, and has served to advance the development of pedagogical research. Further, NCBDS serves to build the case for Beginning Design as a unique discipline, characterized by its own particular challenges and opportunities.

MADE: Design Education & the Art of Making sought to appraise the role of MAKING past, present & future, both in teaching design and in the design of teaching. We aimed to examine theories and practices addressing FABRICATION and CRAFT in all studio disciplines, and to take measure of their value in pedagogies of beginning design. Our theme was inspired as much by the tradition of craft and manufacturing characteristic of North Carolina as it was upon one of the primary preoccupations of faculty and students at the College: the exploration of both traditional and emergent techniques of making, in its various iterations and practices.

In addition, we hoped to provide a venue to foster and sustain emerging priorities within the nascent discipline of Beginning Design education. Three years ago, at Georgia Tech's *We Have Never Been Pre-Disciplinary*, when we first learned of our opportunity to stage this conference, the leadership group that organizes NCBDS asked *'what more can we do here?'*  The Encyclopedia sought to get its readers out of themselves and into the lives of artisan craftsmen in order, next, to clarify good work itself. Throughout, the volumes illustrate people engaged sometimes in dull, sometimes in dangerous, sometimes in complicated labor; the expression on all the faces tends toward the same serenity. About these plates, the historian Adriano Tilgher remarks on the 'sense of peace and calm which flows from all well-regulated, disciplined work done with a quiet and contented mind.' These illustrations appeal to the reader to enter into a realm in which contentment with ordinary things made well reigns.

> Richard Sennett, The Craftsman

The first suggestion, which Jim Sullivan incorporated into LSU's *But We Are Also a Discipline* was that each successive conference should pick up threads from its immediate predecessor. With *MADE*, we attempted this in two ways: the first is reflected in the makeup of the session topics, for which we included the issue of pedagogy directly descended from the conference in Atlanta. The second way was to organize a plenary session centered on the needs of beginning design faculty. This attempted to do more than provide the usual lessons that can be passed along to instructors at the outset of the tenure process: it sought to address the common challenge of simultaneously teaching beginning design and building a case for tenure. It also touched upon an issue of ongoing concern for the organizers of this conference: what schools can do to foster recognition for the intellectual contribution of beginning design to the study of architecture.

A third event attempted to develop the threads of future conferences. On the eve of *MADE*, a gathering of past and present conference chairs was convened to discuss the first 25 years of NCBDS, and to speculate on the future growth of the nascent discipline of Beginning Design education. An edited transcript of this conversation is contained at the end of these proceedings.

As chairs, we received many compliments from conference attendees on the apparent success of *MADE*. We thank all who attended for entering into the spirit of our attempt to set an appropriately well-crafted event, one that examined, and celebrated, the emergence of a clear sense of mission: a mission to explore the special responsibilities and opportunities that accompany the sometimes Sisyphean task of inaugurating students into the practices and potentials of Design.

As anyone who has ever organized a conference knows, none of this would have been possible without a small army of angels and acrobats. We dedicate these proceedings to them.

We'd like to thank the School of Architecture for their concerted efforts to help us organize and stage this, the 26th National Conference on the Beginning Design Student. In particular, we'd like to thank Chris Jarrett, our new director, and Dr. Lee Gray, interim director two years ago, when all hell broke loose with budgets up and down the line.

We thank the College of Arts + Architecture, and our Dean, Ken Lambla, who encouraged us to go and get this conference, and then inspired us to surpass our own expectations of what was possible.

Thanks to all of our student assistants, who have displayed tenacity and fortitude on top of all the usual challenges that go with being a student of architecture.

We'd like to thank our moderators, who provided so much of the intellectual infrastructure of this conference, and who helped us to guide the double-blind peer-review process. A special thanks goes to Landon Robinson, who oversaw the production of these proceedings, with the able assistance of Brandon Benzing.

Finally, we'd like to conclude with an additional round of thanks to all of our colleagues at the School and throughout the College of Arts + Architecture, who continue to provide the energy, mentorship, and intellectual engagement that makes this such a great place to be.

NCDBS 2010

#### MAKING FRANKENSTEIN(S)/DIS-SECTING MONSTERS Open

JOHN E. FOLAN, T. DAVID FITZ-GIBBON CHAIR CARNEGIE MELLON UNIVERSITY

Shelley's fictional character, Doctor Victor Frankenstein, learns how to create life and realizes a being in the likeness of man - but larger than average and more powerful. Assembling the creature through the use of chemical apparatus and the stitching together of human corpses, Frankenstein successfully brings the being to life, only to be repulsed and terrified by its monstrous ugliness. Victor abandons his creation, and the monster embarks upon a journey of vengeance that results in the deaths of several of Doctor Frankenstein's family and friends. When the monster returns, he demands that the Doctor create a companion for him. Victor agrees, but later reflects upon implications of the act and decides to destroy the companion monster halfway through creation; resulting in the death of the being's closest friend.<sup>1</sup>

Popular culture consistently recognizes the monster as "Frankenstein" - incorrectly. This displaced association is probably most attributable to the fact that the monster is never named. Throughout Shelley's text the protagonist, Doctor Victor Frankenstein, refers to the artificially created life form with terms that reinforce a lack of identity - "Demon", "Fiend", "Wretch", "It", "Devil", "Vial Insect" and "Abhorred Devil"; all alias' of anonymity. Although anonymous, the characteristics of the beast are understood, there is no need for a proper name in reality; it is popular culture that wishes to assign a proper name to the monster.

If these observations are considered literally and in levels of graduated abstraction, they provide insight to fundamental sensibility and recognition that should be engendered in individuals having an influence on the physical environment. One: in the most base, literal sense, the actions of Frankenstein represent

1 Holmes, 328; see also Mary Shelley's introduction to the 1831 edition of *Frankenstein* 

positive critical reflection in action. He understands that there are flaws in his creation and consciously elects not to repeat the actions even though there has been significant personal and intellectual investment in the development of creative processes. Two: The value of that which is created remains embodied in characteristic, not a projected assignation of value; in this case, representation by proper name. Three: society assigns its own significance and establishes its own relationships with art, regardless of intentional clarity.

In the academic setting, it is very difficult to tangibly reinforce sensibilities brought to light by these observations unless a project has a specific functional program, a budget, and is realized at full scale for a client that will force the issue of conflict between public ad private interest. The best vehicle for this experience is the Design Build environment - but that is only if there is room for catastrophic failure in every dimension.

In the context of a university affiliated Design/Build enterprise, failure is often times not viable. University affiliated Design Build programs rely heavily on external funding, revolving lines of credit, and the faith of clients they work with. The long-term sustainability of a Design/Build Program mirrors that of a viable private practice - it is based on success and reputation. Because of this dilemma, students are often navigated through the delivery process with a heavy hand, never really being provided an opportunity to fail catastrophically. While this ensures the viability of the institution's Design/Build activity in the future, it suspends reality for the individual students, diminishes the potency of the educational format, and places a heavy burden on post-professional development – ultimately perpetuating the constant argument over the relevance of the academy. Moreover, it can create a false sense of confidence in the student's abilities -



FIGURE 1: collaborative student work developed in early iterations of apparatus development representing fragmented and non-comprehensive thinking; (clockwise from top left) full scale CNC milling studies for the development of mold positives developed outside context of most problemmatic conditions; (top right) ergonomic profile manipulation sections for engagement of the human hand, developed in absence of the fundamental parameter; (bottom right) ergonomic force diagrams established for the foot developed outside the context of reactionary elements or bounding context that might inform systemic development; (bottom left) analysis of the initial prototype strictly focusing on positive attributes employed in the development of the initial design.

both from the instructor's perspective and the student's perspective.

#### Calibrating a Laboratory

Alternative Delivery Methods (ADM), a seminar/ laboratory course developed at the Carnegie Mellon University School of Architecture has been developed specifically to enable students the ability to learn from failure, or leverage success, through Design/Build activities that are complimentary to, but outside the parameters and pressures of, the broader Design/Build Program. The course is utilized as a mechanism for developing a clear practical methodology in collaborative design, fabrication, and assembly while reinforcing tangible engagement with the factors that influence the translation from drawing to building. It is intended to perpetuate the success of the Design/Build Program by enabling students to understand and correct negative sensibilities in process that undermine the value and integrity of their work (Figure 1).

Offered concurrent with the second of two sequential Design/Build Studios, the semester is organized as a series of alternating research cycles. The two cycles, *Reflective Research* and

Applied Research are engaged in distinctly different ways. Reflective Research is engaged through Displaced Analysis and Consolidated Analysis. Displaced Analysis is engaged in lecture and seminar format, though the investigation of archetypical emergent practices and their associative methodologies utilized in building delivery and finite fabrication. The case studies focus specifically on the generative representational techniques utilized in fostering shared intelligence, construction modality, and underlying contractual relationships. Consolidated Analysis is executed in as a complimentary component to Applied Research in the commissioned fabrication of finite elements that are incorporated into a collectively developed assemblage. The Consolidated Analysis is intended to inform reflection in action through the four iterative stages of the project development. Reviews of prototype development associated with commissioned fabrication occur each week and the Consolidated Analysis is produced as a critical narrative documenting the process from project inception through commissioned fabrication, and ultimately, onto assemblage.

#### A Bed for the First Monster

In the spring semester of 2009, a group of thirteen fourth year professional phase undergraduate Bachelor of Architecture students who had committed to a year long Design/ Build Cycle were required to enroll in the Alternative Delivery Methods (ADM) Course. This was the first time that the course was offered and it coincided with the development of the pilot project for the newly formed Urban Design Build Studio (UDBS); a university affiliated community based Design/Build entity. While the students were enrolled in ADM they were simultaneously advancing the design and developing permit drawings for the larger Design/Build enterprise as a component of the spring UDBS Studio. The work in the studio was an extension of a larger urban analysis, participatory design process, and programming effort completed in the fall semester of 2008 through a focused section of Carnegie Mellon University's Urban Laboratory. The studio activities in the fall of 2008 and spring of 2009 supported an accelerated summer build cycle that was informed by scheduling and pre-construction activities being executed toward the conclusion of the work in the ADM course.

#### The Experiment

The larger program that the students were resolving as a part of the pilot Design/Build Studio was a Community Center and Urban Farm, the Hamnett Homestead Sustainable Living Center (HHSLC). The site for the project is a consolidated urban lot located in the Borough of Wilkinsburg, Pennsylvania, a once vital urban enclave situated on Pittsburgh's eastern periphery. At the time the students enrolled in the ADM Elective they had just held the third of three community meetings focused on the identification of a catalytic demonstration project that would embody the characteristics of a larger mitigative Urban Framework focused on increasing vacancy rates. Community stakeholders representing the client for the project had just been identified and were just beginning to collaborate with the students on Design Development.

The client for the HHSLC project is a nonprofit 501c3 Corporation focused on promoting sustainable development strategies in urban areas suffering from population loss and outmigration. The mission of the non-profit is to advance the agendas of urban homesteading. Central agenda items of the non-profit include food security, localization, and self determination; all identified as mechanisms to conserve both personal and global resources.<sup>2</sup> Pragmatically, the primary concern of the client in development of the Hamnett Homestead Sustainable Living Center (HHSLC) is the tangible demonstration of maximum efficiencies. With the mission and larger programmatic objectives in mind, a smaller scale project was developed for the ADM Seminar/Laboratory that could effectively, and comprehensively model the

2 Institute of Urban Homesteading Mission Statement: The Institute of Urban Homesteading is a response to current interest in food security, localization and self-determination, We are riding the wave of a massive global movement to change our relationship to food and resources. Necessary components of this movement are small-scale person-to-person, person-to-land based projects. IUH seeks to fill this need and to model sustainable, local direct-action through education. We intend to conserve both personal and global resources by staying home and tending the garden. complex set of issues that would be encountered in the realization of the larger HHSLC Design Build Project.

As with any farm, the site requires significant sustained maintenance, some of which necessitates an elevated platform and stair. There are also activities related to seedling production and value added harvest enterprise. Those activities require a large adjustable work surface for a minimum of six people to gather around. In an effort to establish sensibilities consistent with the client mission, a decision was made to have the students in the ADM Course investigate a hybrid apparatus that could fulfill both requirements on a restricted budget. The following apparatus program was provided to the ADM students:

"Propose a pre-fabricated, field assembled, mobile stair. The stair will be incorporated into the HHSLC adaptive re-use project where it must elevate to a height of 7'-6", provide a platform/landing at the upper elevation, and provide a 7'-0" height clearance beneath the platform landing. The stair must meet all IBC 2009 Code Criteria and can be made of no more than seven pre-fabricated fabricated components (utilized repetitively). The budget for realization of the project is \$1,400.00 with single component typologies, or sets of components within a typology costing no more than \$200.00/typology. One proposal will be selected for collaborative execution through public review on the Due Date."

The program, which was crafted to be intentionally vague, provided multiple pragmatic parameters that often threaten or undermine the success of studio based Design/Build Projects. The statement addressed production methodology, prescriptive code criteria, and most significantly a budget. There are two targeted sensibilities that the program specifically aimed to illuminate through self reflection - or Consolidated Analysis; the first, regard for program; the second, ability to communicate effectively with others embedded in the process. While each parameter was identified explicitly in the program statement, the statement was also suggestive of mechanisms and strategies for innovation. This was done intentionally to understand which students would embrace understanding of condition over adherence to prescription.

In the ADM seminar/laboratory the budget is the fundamental mechanism for establishing the importance of, and regard for, the second sensibility - effective communication. Because the project is small in scale, it exaggerates the significance of veracity in the collaborative design process; there is little opportunity to misrepresent intent. Through three iterative stages of prototyping, the students create mock-ups of the components that will ultimately be commissioned for fabrication. This component of work is relatively familiar to the students and reflects the way knowledge is traditionally built in the academic environment. It is an immediate, or Consolidated form of work; students have the ability to place their hands on the object being manipulated and utilize those mock-ups to influence communication and negotiations with fabricators. While those sensibilities and conditions are still difficult to navigate in a collaborative context, they pale in comparison to the reality of Displaced conditions encountered in project delivery.

The *Displaced* condition of project delivery is addressed through commissioned fabrication, the terminal iterative component of the ADM course. The *Displaced* conditions are those that are characterized by action at a distance, where one has very little contact the artifact of production.<sup>3</sup> *Displaced* conditions are affected dramatically by the architect's ability to communicate graphically, verbally, and in a manner that reveals the full intention of work. *Displaced* conditions in project delivery also illuminate the significance of budget most immediately and tangibly. The concept of "value" is most apparent in this mode of productive activity.

Students enrolled in ADM understand that they are expected to contribute \$100.00 per person to the production and fabrication of the apparatus. The money is not returned to them, and they are required to deliver the final assemblage to the UDBS client free of charge. This policy is implemented specifically to underscore the magnitude of the financial responsibility and privilege afforded to a designer when a client commissions work. In the academic realm of architecture, this is often the most abstract of concepts that a student encounters; it is also one of the most sig-

3 *The Ethical Architect*, Spector, Tom; Princeton Architectural Press, 2001

nificant in diminishing the credibility of the profession at large.<sup>4</sup> By requiring students to pay for the commissioned work, concepts of budget and fiscal responsibility translate move from distant abstraction to immediate reality.

This is a critical sensibility to establish in a Design/Build Studio. Most university affiliated Design/Build Studios work with low income and non-profit clients. Those clients do not have the resources to enable fiscal and fiduciary recklessness. By requiring students to pay for the commissioned fabrication, they are able to make and evaluate decisions with something at stake. (Figure 2)



FIGURE 2: Representative student work from the ADM course chronicling false starts, demonstrated lack of ability in resolving problems iteratively, and blatant disregard for budget, schedule and collaborators: (left) progression of design development from initial concept developed under the hand of one individual through final development of a apparatus that did not meet the programmatic requirements and demonstrated the will of separate parties invested in its production; (middle) demonstration of poor choices in the selection of material and productive modes of prototyping; (right) the Modern Prometheus, the manifestation of behaviors exhibited in the development of design and prototyping.

<sup>4</sup> w, Harries, Karsten; MIT, 1998

#### "It: the Wretch"

The resulting ADM project in the spring of 2009 was simultaneously a tremendous disappointment and a tremendous success. As a representative solution to a program it was an absolute disaster. It met only a portion of the objectives outlined, was incredibly inconsistent in level of craft and resolution, represented a reprehensible abuse of material, was delivered late, and - for lack of a more sympathetic assessment - is aesthetically abhorrent. It was also sixty-seven percent over budge upon completion and the students were so ashamed of what they had produced that they refused to show it or deliver it to the HHSLC client. On May 5, 2009 the students gathered to disassemble the project. They kept some small components as mementos, and placed the remaining parts in an industrial dumpster located near the school of architecture. They had succeeded.

#### Dissecting The Monster

It was important for the students to understand why the assemblage had been such a failure, so the mistakes would not be repeated in the delivery of the UDBS HHSLC Pavilion. One of the most apparent challenges to the project was the fundamental redirection of orientation at mid-semester. While the project had developed a clear trajectory, the execution of the project was significantly hampered by the exodus of five students from the course, and the Design/Build Studio. In the context of their absence, the budget had to be reduced by close to forty percent and the design had to be altered accordingly. At face value, the modifications appeared to be minor in nature, and were predominantly focused on the reduction of unique connections and the elimination of complex mechanical actions. The reality was that the project was evolving into something entirely different. Rather than assess the project systemically to understand how systems might be simplified, elements were removed from the project based on price – a form of reduction that ultimately compromised conceptual clarity. This was consistent with behaviors demonstrated throughout the process.

In performance and constructability reviews the students consistently analyzed flaws in design with great clarity. But rather than agreeing to refine components they were responsible for, the students would establish an entirely new path of exploration yielding a new design. In the end, the students produced another unresolved proposal rather than an iteratively refined design.

Similarly, a majority of the students failed to communicate effectively with fabricators. These failures in communication ranged from not investing necessary time to understand machine and transfer processes to absolute professional negligence in the production of shop drawings and procurement of bids. In many cases the students relayed that they understood an element would be realized in a specific form/finish, but were disappointed to find that the fabrication had manifest something entirely different. While verbal communication with fabricators may have been strong, intentions were not explicitly addressed in shop drawings resulting in mechanical tolerance failures, material substitutions, and gross inadequacies in finish quality. In one instance, the delivery date was surpassed by three weeks resulting in the absence of two critical connections.

The final construction reveals that other negative sensibilities were adversely effecting the success of the project. Specific members of the ADM and Design/Build Studio were consistently operating disingenuously. The students were notified when they enrolled in the ADM course that they would all receive the same grade for their efforts; that the grade would be based on the collective success or failure of the project to meet the programmatic objectives - poetically and within the stipulated budget parameters.

When the trajectory of the project was clearly oriented in a negative direction, three students decided that they would represent their work consistently with the rest of their colleagues while executing the work out of a different material utilizing different parameters. These students were dissatisfied with the strategies collaboratively developed and they decided to make improvements in isolation. For a period of three weeks, during the development of the final prototype for commissioned fabrication, these students produced two prototypes, one consistent with the strategies developed by the entire class and the other consistent with their own aspirations. Behavior became aggressively competitive and destructive. For these students the objective was independent excellence/success over collective excellence/success.

The three students succeeded in their effort, commissioning a complex compound curved continuous bent from an aluminum pipe section of extraordinarily high quality. Segmented, to enable a higher degree of precision in both fabrication and assembly, splice lock connections were developed with careful consideration. The resulting assembly of elements was incredibly fluid, consistent with intent. (Figure 3) It was also inconsistent with the other components of the assembly – not only aesthetically, but in performance.

In order to accommodate fabrication tolerances the bent was produced in a manner that increased its width by over eighteen inches. When collapsed as a table, the width of the bent made it ergonomically impossible to engage the work surface. The form also made the apparatus unmanageable to move; both critical programmatic failures.

More than the programmatic failures, the three students alienated their colleagues and eroded trust. The five other collaborators observed and understood what was happening during final prototyping and it adversely affected the development of their own work. The five students began to devalue their own work/contributions, and decided to limit their emotional and intellectual investment in the project. Unfortunately, this resulted in one of the projects greatest challenges, inefficiency and the blatant disregard for the use of raw material.

The remaining components of the project were all fabricated from high density extruded polystyrene. The polystyrene was utilized as a core for a polymer based composite coating. In the final stages of prototyping the five students were responsible for reducing the amount of material employed in the final apparatus through formal manipulation and optimized programming of the CNC milling process. The refinements in the final phase of prototyping were critical to the success of the strategy in the context of evaluative parameters identified for the students. Unfortunately, the students decided to let the system developed stagnate in place when the process became outwardly competitive. Seventy-seven percent of the raw material employed in the production of the polystyrene core was wasted in production and the forms developed for the cores had almost nothing to do with program or force resolution.

Evaluating the Beast

The work in the ADM course was less focused on the success or failure of the artifact itself and more focused on the ability to engage in process and critical evaluation that would benefit the aspirations of the UDBS project. Each student in the ADM course was required to evaluate the work throughout the process utilizing four principle ethical theories relevant to architectural practice.

 Teleology: Consequences from actions and the evaluation of resultant benefits through utility theory.

- Deontology: Actions based upon
- moral rules or principles of duty.

3. Virtue: The manner in which we do things and the quality of the things that are made.

4. Contract: Agreements about how to co-exist, to pursue common and personal goods with the least amount of restriction.

The evaluation of work in the context of the ethical tenets focused on the development of reasoning skills necessary for rational individual and collaborative decision making. This work was completed on a weekly basis through narrative evaluation and photo documentation.

#### **Exorcising the Modern Prometheus**

The experience gained and remorse felt by all students at the end of the ADM process resulted in a much more refined UDBS Design/ Build Project. Phase one of the HHSLC project, a one hundred and twenty foot long dimensional lumber and steel structure was completed by the students on August 13, 2009. The project was delivered on time, well below budget, and was constructed with relative ease given the complex configuration of the structure. While the students were supervised, they demonstrated a heightened level of maturity in resolving conflicts and arriving at program based solutions. The willful behavior displayed in the production of the ADM apparatus was greatly diminished, and a new ethic regarding the significance of representation in communicating intent was demonstrated. (Figure 4)



angles for the aluminum round pipe pieces. For ease of fabrication, the design was created with two equal, mirrored halves, with a total of 4 different bends through the entire length of the structure. Taking scop pieces, the fabricator would denote the lengths upon the adminum a taket from the suppled construction documents. Initially, bends were done at random intervals and directions for deducing configurations on the Benet: 1000 Arguit bender machine interface.





when the comparisons were assembled, production of intertaints began that adaresses the most crucial ingle in the piece, the connecting member between the landing and the ladder, that walded connect high you long th backside of the ladder's rungs with two hooked protruzions from the ladder latching onto the ructure. As this angle and proper length of this piece was so important, as well as it then progressing into anound angle at the exist loint. this seament was focused on.



The bending process required this much intensive labor and human input, as the bending machine did not hav any means of controlling the position of the aluminum length once set into the die, making manual correction and alignment a necessary step in the creation of the compound angle, as well as making multiple passed me essary for correcting human error. The tools utilized were the Bentee 1000, as well as an angle measurer.



The piece was put into the machine, aligned with the proper measured out points in accordance with the piant giving the location of the bending radiu's beginning point. The piece at this point is then token out of the die, and marked for the next point of contact. Once set in, the angle length control setting, a threaded rad with a positionable block and an automatic stopper switch, is adjusted to stop the curving process at the right degree of bending.



and previous to the bending procedure, rotated to a measured angle that studie match the first half of the compound angle, as it is mathematically divided into two separate additive parts. This would be decement the integration in terms of fieldity to construction document measurements, with the mojority of the reparability right in the hands of the folderation and an adjuratible angle measurer. The process concluded in the double checking of the lengths between specified and point of the straight lengths the straight and and and the straight lengths the straight length and writed directions on the construction





3 separate times in frant of ux, with 3 previous antempts within the arcs. We were not prevent of the time of the flabrication of the actual members, though the process we have the same for flabrication goals half of the aluminum pipe structure. At the time of our departure during our hillion destination of the actual departure during our hillion destinated at 1.2 more iterations away france completes the others. The crucial angle approaching the ladder connection was already finalized, where we visited agains to give a structure and the principal deprine pack by the final product, we went over the degrees of accuracy that we had specified, and they hace been supposed in thems of a coursory. The next tap was the implementation of the single lock spile lock joining mechanism. Altering from the submitted flabrication



he weld joins were replaced by to mechanical fasterens, one at either end. One half af the aluminum ound pipe structure, wild be drilled into for a set screer to be entered. The splice lock would be set into that end of the pipe structure, with a set screer placed into the hole and into the lock, and turned part yours in order to hold the fastener in places. The second balls of the structure system was then placed over the particular structure, you can be used balls of the structure system was then placed over the particular structure of the structure system was then placed over the particular structure of the structure system was then placed over an and invites set by us, all it was different of a use in system set of the structure system of the structure system structure of the structure system of the structure system of the structure system of the structure system of the structure of the structure system of the structure system of the structure system of the structure system of the structure structure structure of the structure system of the structure system of the structure system of the structure system of the structure str





FIGURE 3: Structural aluminum bent, splice locks, and critical evaluation by three members of the ADM course and Design-Build Studio. The extraordinary success of this work underscored fundamental flaws in collaborative behavior, and ultimately caused catastrophic failure of the overall apparatus. Unfortunately, none of the control points agreed upon collaboratively were met, and the connection from the bent to the fiberglass deck and stair was never developed. Ultimately, the interface of the bent induced fracture in a number of the extruded polystyrene core/mold elements rendering final assembly all but impossible. A tremendous amount of animosity amongst the collaborating students resulted.



FIGURE 4: (Top) BIM Construction Document AS2.03 executed by students from the ADM course for the permitting and erection of HHSLC Phase One construction; Bottom Construction photo of HHSLC Phase One Community Pavilion July, 2009

The students involved in the pilot Design-Build Studio and ADM course ultimately elected to stay at the University and re-develop the construction documents for the HHSLC project after the failed ADM apparatus was disassembled. They were scheduled to have a two week break from activity between the end of the semester and the start of construction. We withdrew the set of construction documents that had been submitted to the Borough for permitting and utilized the time to refine the HHSLC project.

The students had a new understanding of consequence in the delivery of a project, and a new perspective on that which is valuable in the collaborative process. As the fictive character Doctor Frankenstein had done in Shelley's novel, the students elected to abort the production of another monster. Instead, they learned from experience and left it to society to decide if they succeeded in the realization of the HHSLC project (Figure 5).



FIGURE 5: (Top) BIM Construction Document AS3.00 executed by students from the ADM course for the permitting and erection of HHSLC Phase One construction; (Bottom Left) Construction photo of HHSLC Phase One Community Pavilion July, 2009; (Bottom Right) Photograph of finite galvanized steel structural and connective elements commissioned for fabrication by students from the ADM course for the HHSLC Community Pavilion Construction.

#### TEXTILE ASSEMBLIES: PRECE-DENT, MEDIUM AND MESSAGE IN AN HBCU UNDERGRADUATE ARCHITECTURE STUDIO Open

SUZANNE F. FRASIER, ASSISTANT PROFESSOR MORGAN STATE UNIVERSITY



Artists and designers as disparate as The Rolling Stones, Jean Arp, and Yves Saint Laurent have used African and African American culture for inspiration.

FIGURE 1:

This paper describes my efforts in creating a pedagogical approach incorporating African design precedents in a beginning design course, entitled *Textile Assemblies*, which uses fibers and textiles from an explicitly multi-disciplinary perspective. This discussion examines the nuances of those precedents, the mediums explored, and design messages communicated in the studio course, which uses techniques

from fine arts and fashion to supplement design problems relating to industrial design, architecture, and structural engineering while deliberately introducing non-Western design precedents.

#### Precedents

My professional circumstance of teaching undergraduate architecture and environmental design to a student body that is 95% African American has led me to be acutely aware of not only the limited number of Black architects-fewer than 1% are African American, making for a total of approximately 1,685 registered African American architects in the United States-but also how remote the conventional foundation curriculum of Western architecture history and design precedents can seem for these designers-in-training. African architecture has had little impact on the dominant paradigm-that being the Greco-Roman, Beaux-Arts Academy and the International Style of the early- to mid-20th century-of the architecture profession. The roiling academic discourse about how to categorize the history of the African continent—Pan-African versus Romantic Hellenism versus Euro-Asian, not to mention the impact of colonialism<sup>1</sup>-makes for uneven documentation of African architectural design precedents suitable for use in an academic setting.

On the other hand, some of the most acclaimed European and American artists, architects, and musicians of the 20th century regularly—and even copiously—used African artifacts to inform the composition, color, construction, rhythm, harmonies, and content of their art pieces. In addition, the design professions have borrowed liberally from the aesthetic culture of the African continent; for example, the European haute couture fash-

1 Nnamdi Elleh, *African Architecture: Evolution and Transformation* (New York: McGraw-Hill, 1997).

ion industry habitually uses African silhouettes, patterns, and textures in their clothing design collections. Furthermore, pop music artists of the past 40 years, both American and European, have appropriated African Americans' artistic commodity by copying songs of the Blues for their rock-n-roll hits (Figure 1).

The Textile Assemblies studio is offered in an undergraduate design program at an HBCU (Historically Black College/University) and this setting demands that the course content include recent scholarship on and about African design so that students can embrace it for their own use to inform not only surface and silhouette, but also the form, space, and structure of their academic design projects.

#### Mediums

In the course, Textile Assemblies, information about recent fashion-manufacturing innovations complements extensive technical instruction about new uses of textiles and fabrics in environmental design while throughout class-time, techniques for working with textiles will be introduced systematically, affording each student a repertoire of manual skills suitable both for practical work and for theoretical explorations in any of the design disciplines. Of special interest is work that stretches the potential limits of fiber and conventional expectations of textile structures' form and function so that challenging and innovative proposals can be explored. "The astonishing new technology in contemporary textiles is narrowing the gap between the worlds of art, design, engineering and science."<sup>2</sup> Design and implementation of composite textile technology requires specific knowledge and expertise and drives progressive design practices in today's global economy. Those who have the experience, sensibility, and technical knowhow to work with membranes and fabrics have a significant impact upon all the design disciplines, including architecture, civil engineering, aerospace, interiors and fashion. Yet those who do not have this know-how are many, and they may have their education to blame.

Design education is highly compartmentalized. Architectural education, for instance, typically presents information about materials within a hierarchical framework, giving emphasis to structural systems and only then to finishes which derive from common professional practice: masonry, wood, and metals. Alternatively, education for Interior Design often promotes materials for their haptic qualities, including touch, acoustics, and even smell. Teaching about materials that are intended for use for the fabrication of clothing may be significantly influenced by those materials' socially determined, iconographic connotation. In all cases, discipline-based teaching may undermine students' familiarity with new, innovative materials and methods, since the nature of their innovation can easily lie outside generally accepted, discipline-based practices.

This paper in an initial attempt to get these issues into a format and a forum where they will be critiqued for their efficacy and relevance, and where feedback will lead to greater refinement of the course. Instruction is to be conducted in a studio lab environment emphasizing non-western design precedents and focusing on material research and development based on assembly methods of textiles. Using a readily familiar materials-fibers and fabric—new applications of architectural form and space are explored that expand the potential materials uses, emphasizing decorative, structural, acoustic, and thermal properties. The research includes the development of full-scale design projects that integrate manufacturing, couture hand stitching, fusing, knotting, draping, coating, and sculpting fabric into the tectonic to achieve freestanding material configurations.

#### Project #1: Quilted Recycled Materials Wall Covering

Relatively standard methods of assembly and readily available materials are used to produce this initial project, a quilted wall covering. The assignment emphasizes insulating, water-repellent, and shading properties of the fabrication. Manipulation of the quilt's materials with heat, moisture, and pressure, can produce unexpected results even when conventional assembly techniques are used. Quilts are not only decorative elements; they provide shelter from thermal fluctuations when laid on top of a person. Similarly, when used as floor coverings they regulate interior temperatures and pro-

<sup>2</sup> Sarah E. Braddock and Marie O'Mahony, Techno Textiles (New York: Thames & Hudson, 1998).



Precedent: African American quilt of Gee's Bend, Alabama





Project #1 Media: Recycled materials for quilted wall covering constructed emphasizing insulation water-repellent, and shading properties.

FIGURE 2:

vide a barrier from insects and dirt when used as either interior or exterior rugs.

Quilts and rugs are readily understandable objects for beginning students. The renowned African American Gee's Bend quilts use "... established, shared, and locally tested [design] templates."<sup>3</sup> These quilts provide examples of African American artists utilizing African, European American, and African American improvisational design precedents. "These Strikingly beautiful quilts from an isolated Alabama town just might deserve a place among the great works of twentieth-century abstract art."<sup>4</sup> Isolated and inward-looking, the African American quilt makers of Gee's Bend, Alabama produced quilts that are regarded as artistic masterpieces, the oldest surviving examples pre-date American abstract art by decades. Combining the fields of fine arts and crafts and architecture presents an opportunity to explore composite technology and performance characteristics of fiber combinations and textile material applications (Figure 2).

"Materials are selected in different societies for their beauty and other physical qualities (sheen, color, shape, finish, size, freshness, iridescence), their odor, their mobility and plasticity, their scarcity and the difficulties in labor and expense to obtain them, their perceived economic value, and their symbolic associations."<sup>5</sup>

### Project #2: Fractal Ottoman

"Fractals can be seen in many of the swirling patterns produced by computer graphics, and...[their] patterns are surprisingly common in traditional African designs..."<sup>6</sup> Project #2, the "Fractal Ottoman", uses conventional two-dimensional flat patternmaking techniques and fractal geometry to create small furniture pieces: beanbag ottomans and cushions. This assignment emphasizes functionality in addition to desirable aesthetics, the value of which becomes even greater when combined with economy of means and structural integrity (Figure 3).

## Project #3: Spartre Shelter

Manual, three-dimensional design exploration is becoming extinct in today's architectural schools and professional offices. Similarly, hand sewing has become "anachronistic in today's society..."<sup>7</sup> Even though today's design students must be fluent in computer-aided design to earn their degrees and successfully secure a position in a design firm, many businesses are now farming out their "low-level" production work to agencies abroad. Acquiring manual skills, especially those that foster conceptual and critical thinking, supports designers-intraining in marketing themselves as a well-

<sup>3</sup> William Arnett, Gee's Bend: The Architecture of the Quilt (Atlanta, GA: Tinwood Books, 2006).

<sup>4</sup> Mark Stevens, "Quilts of Personality," New York Magazine, 12 23, 2002.

<sup>5</sup> Daniel P. Biebuyck and Nelly Van den Abbeele,
The Power of Headdresses (Brussels: Tendi S.A., 1984).
6 Ron Eglash, African Fractals (Piscataway, NJ: Rutgers University Press, 1999).

<sup>7</sup> Andrew Bolton, The Supermodern Wardrobe (London: V&A Publications, 2002).





Ottomans are constructed utilizing 2D flat patternmaking techniques based on African fractals.



FIGURE 3:

rounded commodity. Project #3 uses couture millinery techniques to create organic, threedimensional forms utilizing many of the same tools that three-dimensional CAD programs use in creating building designs; however, manual pattern making techniques have fewer limitations than computer programs. In addition, "hand stitching has many virtues. You can control the construction...more precisely..."<sup>8</sup>

In the fashion industry "...for farsighted designers the real hurdle to progress isn't money or balky corporate honchos. It is creating a fabric that can produce a new, 21st-century silhouette."<sup>9</sup> Similarly, in the construction industry, attaining a new level of performanceoriented design, organized around key characteristics of textiles such as 'pliability', 'structure' and 'fibrosity' provides another approach to solve the traditional opposition of ornament and structure when applying textile technologies (Figure 4).

#### Message

While hand drafting and manual design communication skills are becoming obsolete in the contemporary architectural academy, manual design exploration-including materials creation, manipulation, form and applicationallows the student researcher to delve beyond computer-aided designs' programmatic limitations, producing unrestrained ideas using composite technology. In the course, Textile Assemblies, information about recent fashion-manufacturing innovations complements extensive technical instruction about new uses of textiles and fabrics in environmental design while throughout class-time techniques for working with textiles will be introduced systematically, affording each student a repertoire of manual skills suitable both for practical work and for theoretical explorations in any of the design disciplines.

Always at the forefront of 'green' design, the architectural profession and its representative organizations have long led a vociferous effort to encourage, design and develop, and implement sustainable development practices into the construction industry and society at large. Where it lags behind is in its lack of cultural diversity: for years now the number of African Americans licensed to practice architecture in the United States has plateaued at about 1% of the total architects. The reasons for this situation are many and complex and are beyond the scope of this paper and the academic project described herein. However, this situation is cited to further the rationale that the use of African and African American architectural design precedents is important for minority, beginning design students, particularly when they are applying their design research to advanced, forward-looking material con-

magazine/mens-fashion/13mcqueen.

<sup>8</sup> Claire B. Shaeffer, *Couture Sewing Techniques* (Newtown, CT: The Taunton Press, 1994).

<sup>9</sup> Cathy Horyn, *General Lee*, September 11, 2009, http://www.nytimes.com/2009/09/13/t-

html?\_r=1&adxnnl=1&adxnnlx=1265850573-

XLTyliuOh+EvGeor+qwFGA (accessed September 11 2009).



Couture millinery techniques lend themselves to manually producing contemporary architectural forms based on African precendents.











FIGURE 4:

struction technologies. This proposal encourages these beginning design students to recognize and utilize their cultural heritage in their undergraduate design research. For a young adult to acquire the ability to prove the relevance of their cultural design heritage facilitates their ability to envision themselves joining and participating in a profession where for every 100 colleagues that they meet, only one will be their same race.

The *message* that is delivered to the African American undergraduate architecture students is that their heritage is relevant to advanced research and cutting-edge design in their chosen field of study. In turn, they will be able to forward this message to their peers in the profession of architecture.

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#### HISTORY AND HISTRIONICS: DRAMATIZING ARCHITECTURAL INQUIRY Open

LISA LANDRUM UNIVERSITY OF MANITOBA, WINNIPEG

Suspecting that dramatic modes of inquiry may enliven the study of architectural history, I recently invited a group of students in a history and theory seminar to compose and perform dialogues. In lieu of writing an essay on an architect and their work, each student was invited to study and figuratively *become* a particular architect from the past, and—in this way-converse with one another on topics of enduring architectural concern. Using their architect's own words (as selected from primary sources), the students rehearsed and gradually composed plausible verbal exchanges. Over the course of the term they elaborated these exchanges in written compositions, while concurrently crafting the situation and choreography of an interactive discourse. An edited script, complete with stage directions, was ultimately produced, and the seminar culminated with a live performance before a group of interested colleagues and classmates in the central space of the school of architecture.<sup>1</sup> This single public enactment, together with the term-long preparations, attempted to make certain architectural dilemmas dramatically present both for the individuals involved in the seminar and for those witnessing the event. The seminar sessions and public showing also aimed to make "history" perceivable as vital inventive work-not something readily received from the autonomous past, but an interpretive activity willfully pursued and collaboratively figured-forth with relevance in the living present. While this particular course was devised as a seminar, its premise is adaptable to other arrangements. The pedagogical premise—that dramatizing history is valuable as a mode of inquiry—is itself pertinent since it raises questions concerning the basic aims and expectations of architectural history courses and their assignments. In other words, proposing drama as a mode and model of historical inquiry is one way to reevaluate our relation to and participation with history—specifically, with the history of architectural intentions and topics.

In the discussion that follows, I will describe more fully the pedagogical approach initiated in this seminar. I will also turn, intermittently, to consider some of the theoretical motivations, historical underpinnings, potentialities and problems of such a dramatic approach to architectural history.

#### **Figuring History**

First, the pedagogical approach. As stated above, in lieu of individually writing essays on architects, the central assignment for the students in this class was to collaboratively figureforth dialogues as architects. To this end, the seminar advocated speaking dramatically to and *through* particular architects over writing more distantly on or about them. During each seminar session, then, the students-as architects-took turns posing questions and telling stories to us; we, in reply, asked questions and posed concerns to them; and, they anachronistically conversed with one another. Whereas select readings from primary sources grounded the students' study of individual architects, improvisational activities opened-up vitalizing discursive modes. These improvisational activities, engaged early in the term, involved speaking in persona (prosopopoeia) and in ensemble: in rapid-fire exchange, in unison, in the round, in surprising situations, in ambulating configurations, and in manners diversely motivated. The verbal source material for this situ-

<sup>1</sup> Norwich University, Vermont, Dec. 12th, 2006. I would like to thank Arthur Schaller, Dean of the School of Architecture and Art at Norwich University, for his support during the development of this seminar. Grateful acknowledgment is also made to the students who participated in the seminar: Josh Chafe, Heidi Dobler-Ludro, Gavin Engler, Matt Kozikowski, Matt Lawton, Sam Rank, Danielle Rupert and Cris Salomon.

ated, discursive and mimetic play was drawn from architectural writings as well as from poetry and plays; notably, from the poetry of Francis Ponge (including Soap) and from the stage directions of plays, such as Henrik Ibsen's Master Builder. As Adrian Forty has recently re-emphasized in his book Words and Buildings, verbal discourse is integral to an architect's work, both as a primary way of articulating intentions and as a complementary mode of architectural invention.<sup>2</sup> Thus, at one level, by encouraging verbal play, the seminar offered architecture students an opportunity to exercise their speaking skill-not only as a persuasive technique but as an ethical, interpretive and generative mode of representation; while, at another level, the improvisatory activities invited the students to wonder about the interrelations between an architect's prospective and historical imagination.<sup>3</sup>

Speaking figuratively to and through *partic*ular architects was, however, of equal pedagogical concern. In this regard, I must make an important disclosure about the selection of architects, since the peculiar cast of individuals studied and brought to life in this seminar consisted of a mix of exemplary figuresmythic, fictional and historic. These included: the mythic architects Daedalus and Trophonius (whose stories of creation and conflict were drawn from the poetry of Ovid and Homer, and from the periegetic writings of Pausanius).<sup>4</sup> The cast also included the god Prometheus (whose trouble, upon bringing fire and technĐ to mortals, was taken from the works of Hesiod, Aeschylus and Plato).<sup>5</sup> Certain dramatic protagonists that are figuratively entitled "architect" also entered the mix; specifically, Palaestrio (a cunning slave who outwits a braggart and restores harmony in an ancient Latin comedy

of Plautus),<sup>6</sup> and Aaron (a troubling agent who agitates the plot of Shakespeare's "most lamentable" of tragedies, *Titus Andronicus*).<sup>7</sup> Also included in this cast of exemplary architects were more legendary and historical figures; namely, Eupalinos, Imhotep and a representative Master Mason-the speculative activities of whom were either read from 20th century poetry (specifically, Paul Valéry's prose dialogue "Eupalinos"),<sup>8</sup> or else gleaned from constitutional documents (including, certain Egyptian inscriptions, and the lodgebooks of Medieval masons).9 Finally, Leon Battista Alberti took part in this ensemble as a crucial mediator. He mediated, however, primarily in the guise of "Lepidus" (Latin for "Witty"). For Alberti, "Lepidus" was both a pseudonym under which he wrote an early comic play (called *Philodoxus*, "Lover of Glory"), and a persona—a melancholic figure who speaks-out resolutely in a number of his allegorical Dinner Pieces.<sup>10</sup>

#### Dramatic Discourse

Such a cast of "architects", as was gathered for this seminar, is admittedly eclectic and largely marginal to architectural histories. The particular selection, however, was both cogent and apropos since it involved not only architectfigures, such as Daedalus and the dramatic protagonists, whose stories dramatize certain

6 Plautus, Miles *Gloriosus*. The *comic* protagonist is called "*architectus*" at lines 901-3, 916-20. Four other Latin comedies of Plautus (all from circa 200 BCE) likewise involve architect-figures: *Amphitryon*, line 45; *Mostellaria*, line 760; *Truculentus*, line 3; and *Poenulus* line 1110. In ancient Greek drama, "architects" figure into Euripides' satyr play *Cyclops* (line 477); and, Aristophanes' comedy *Peace* (line 305). My own PhD dissertation (nearing completion) treats these architect-figures from ancient Greek drama in Detail.

7 Aaron is entitled "chiefe architect and plotter of these woes" in Shakespeare's *Titus Andronicus* (act 5, scene 3, line 122).

8 Valéry 1956: pp. 65-150.

9 The Egyptian texts (known from tomb inscriptions and papyri), include: "The Autobiography of Herkhuf"; "The Song of the Harper"; and "The Instructions of Tuauf" (or, "The Satire on the Trades"), as found in Budge 1914. The texts pertaining to the Medieval mason are "The Constitutions of Masonry" and "The Regius Poem", found in Harvey 1972.

10 For an English translation of *Philodoxus*, see: Grund 2005. In Alberti's *Dinner Pieces*, Lepidus speaks out in "The Writer"; "Religion"; "The Dream"; "Garlands", and "Fame". See, Marsh 1987.

<sup>2</sup> Forty 2000: especially pp. 11-16. On the poetic and ethical significance of language for architects, especially its role in allowing us to "make promises", see also: Pérez-Gómez 2006: p. 192, and chapters 5 thru 8.

<sup>3</sup> On historical imagination (the poetic, projective and representational task of historians), see Ricoeur 1984.

<sup>4</sup> Ovid's *Metamorphosis* 8.100-271; Homer's *Iliad* 18.590-605; *Homeric Hymn to Apollo*, esp. lines244-299; Pausanius' *Description of Greece* 9.371-14.

<sup>5</sup> Hesiod's *Theogony* 507-616, and *Works and Days* 47-106; Aeschylus' *Prometheus Bound*; and, Plato's *Protagoras* 320d-323a.

architectural dilemmas, but also architects who themselves worked or wrote dramatically, such as Alberti.<sup>11</sup> It is helpful here to expand on this second category, since one could assemble more architects who, like Alberti, engaged dramatic modes of composition. Such an assembly would include Alberti's contemporary Filarete, whose 15th century treatise on architecture is written as an extensive dialogue. As the primary speaker within this dialogue, Filarete rehearses for a curious patron all of the "modes and measures of building", and further elaborates-over the course of a long meandering conversation-the design for a hypothetical city.<sup>12</sup> In addition to Alberti and Filarete, this assembly of architects composing dramatically would also include Bernard Palissy, whose 16th century treatment of horticultural, magical and architectural topics similarly proceeds as a probing dialogue between a questioning interlocutor and an answering author-who, at one point, rehearses for his questioner yet another animate debate. This debate (within the dialogue) is played out among a set of personified geometrical tools, each vying for honor.<sup>13</sup> Gian Lorenzo Bernini would also join this assembly of architects who wrote dramatically. For, in the 17th century Bernini was not only designing architectural, sculptural and theatrical settings,

11 A number of Alberti's other writings are also composed as dialogues, including: *della famiglia* ("On the Family"); Momus (a political allegory); and *Profugiorum ab aerumna* ("On the tranquility of the Soul"), which involves an architectural allegory, on which, see: Smith 1992, chp. 2.

12 Antonio de Piero Averlino (or Filarete, "Lover of Virtue"), *Trattato de architettura* (1469). See, Spencer 1965.

13 Bernard Palissy, *Recepte Véritable* (La Rochelle 1563). See: Palissy 1988: pp. 174-177. In this debate (set within the dialogue) each tool-compass, rule, set square, plumb bob, level, adjustable square and astrolabe-voices its own claim to honor and preeminence. The "author", in the end, weighs in on their debate. Taking the role of judge, he emphasizes that what is most at stake is not their relative honor or preeminence but the honor of the man who knowingly formed them. Such a debate among personified tools must have been a topos, for the debate in Palissy's dialogue is prefigured by an anonymous 15th c. English poem, in which a variety of carpenter's toolscompass, line, chalk, rule, chisel, saw, plane, file, various axes, and more-debate the virtues not of themselves but of their handler. See: Wilson 1987. A short commentary on this poem is also found in Salzman 1952: pp.340-342.

but was also himself producing dramas, writing comic plays and acting in them. Of the approximately twenty plays he wrote, only one is extant. It is called The Impresario-a commedie dell'arte, in which the desire for spectacle and the making of drama are themselves satirically dramatized.<sup>14</sup> Interestingly, Bernini was himself performing as Impresario at the same time he was preparing to stage, architecturally, the dramatic "Ecstasy of Saint Theresa".<sup>15</sup> In the same century, Guarino Guarini also penned a play intended for the stage and, so, joins this assembly of architects writing dramatically. This play of Guarini's involves over thirty speaking parts, yet its plot revolves around a single man who first loses and then regains his sight.<sup>16</sup> Interestingly, Guarini composed this play just a few years prior to composing his own complex theory of vision, and not long before he began to architecturally negotiate the appearance of light and its opposing substance darkness in the course of designing the Chapel of the Holy Shroud in Turin.<sup>17</sup> In the 18th century Piranesi continued this dramatic tradition with his Opinions on Architecture-a debate played out in words and plates, in which Didascalo (the "Straight Talker"), defends architectural ornament and innovation against a detractor

16 La Pietà Trionfante (Messina 1660). It is my understanding that this play exists as a manuscript in the Vatican Library. For a synopsis of it, see: Meek 1988: pp. 25-6. Meek classes the play as a "tragicommedia morale" (p. 19), and notes that it was intended for performance by members of a boys' choir.

17 Guarini's theory of vision is articulated in his dialogue "De Luce" and in a chapter of his *Placita Philosophia*, "De Vita" (1665), which he began to compose in Paris in 1662. Guarini was commissioned to take over the design of the Turin chapel in 1667. For a discussion of this design in relation to his negotiation of light and material (as well as spirit and matter, appearance and surface, *logos* and flesh), see: Debanné 1999.

<sup>14</sup> Bernini 1994. This play was likely intended for performance during the 1644 Carnival season in Rome. See, Lavin 1980: pp. 146-157.

<sup>15</sup> This sculptural work (for the Cornaro Chapel of Santa Maria della Vittoria in Rome) was likely commissioned in 1644 (completed in 1652). See, Borsi 1984: pp. 160-71, 313-14.

of Piranesi's designs.<sup>18</sup> And, one could go on gathering architects into this dramatically discursive assembly.<sup>19</sup>

Each of the architects named above, who wrote either dramas or dialogues between the 15th and 18th centuries, were, on the one hand, participating in modes of composition that were fashionable at the time. Writing in dialogue form was particularly widespread, having been a common literary genre for centuries. Charles Perrault, for instance, brother to the architect Claude, used the form of a dialogue (set in the gardens of Versailles) when he advanced his rather one-sided views favoring the moderns over the ancients in his influential version of this longstanding "quarrel".<sup>20</sup> Yet, such rhetorical, discursive and dramatic modes of composition had not traditionally served simply as stylistic scaffolds for shoring up predetermined arguments. Rather, they performed as genuine interpretive devices for probing the complexities and potentialities of difficult topics. These modes of composition—of playing-out hypothetical discourses in particularized settings for the sake of vividness and topical suggestiveness, and of speaking alternatively from "different points of view" (*in utramque partem*) for the sake of procuring comprehensive understanding and of finding new insights-these modes were demonstrated by the first Greek philosophers; promoted in the first Latin handbooks on rhetoric; practiced by poets, preachers and others through-

18 Parere su l'architecttura (1765), see: Piranesi 2002; with Wittkower, 1938, and Rykwert 1980, pp. 379ff. 19 For instance, one could add the plays of Sir John Vanbrugh and Nicholas Le Camus de Mézières; as well as the dramatic trick that Brunelleschi is said to have played on his carpenter—a trick that was based on Plautus' Amphitryon, and later turned into a play by one of his Renaissance acquaintances (now published as The Fat Woodworker). On the problematic significance of Brunelleschi's trick for architects, see the preface of Tafuri 2006). One could further include certain architects who collaborated with poets (and patrons) in the staging of plays, particularly: Inigo Jones (whose vexed relation with Ben Jonson is discussed by Gordon 1949); and, Palladio (who staged the plays of his playwriting patron Trissino). 20 Charles Perrault's Parallèlle des Anciens et des

Modernes (1688-97). For a discussion of the significance of the dialogue form (among three distinct speakers) and its setting (Versailles), see: Howells 1983. For the architectural significance of this quarrel, see the introduction of Perrault 1993.

out the Middle Ages; pursued by humanists in the Renaissance; and taught with rigor and wit throughout the same periods in grammar schools.<sup>21</sup> As one scholar of this topic has argued, such modes of rhetorical and dramatic composition peaked in the English Renaissance (with Elizabethan drama), after which a culture of ambivalence, cynicism and disbelief in the value of such inquiry gradually took holda culture for whom (as Joel B. Altman puts it): "the faith in finding out was dying".<sup>22</sup> But, of course, such dramatic manners of inquiry persist. Moreover, the fact that speculative dialogues of various manifestations can be found in the writings of Louis Sullivan, Alvar Aalto, Louis Kahn and Sverre Fehn, shows that dramatic and rhetorical modes of inquiry persist as being especially relevant to architects.<sup>23</sup> Indeed, the enduring relevance of these compositional modes for architects has already been demonstrated above by the topics acted out in the dramas and dialogues of Alberti, Filarete, Palissy, Bernini, Guarini and Piranesi. For, the dramas and dialogues of these architects, though in some ways serving as delightful diversions from their architectural work also act as influential preludes and reflective complements to it. For instance, the dramatic conflicts involving desire and light as rehearsed by Bernini and Gurarini in their plays were also played-out in their architectural works among analogous agents: material and phenomenal, mortal and divine. Similarly, Alberti's manner of dramatically treating topics (in drama and in dialogue) prefigures his discursive manner of treating architecture in his later work on The Art of Building (de re aedificato*ria*). Though obviously not written as a play to be staged, this treatise nevertheless reads as an animated discourse among various agents

23 I am thinking especially of Louis Sullivan's *Kindergarten Chats* (Chicago 1918); Alvar Aalto's imaginary interviews, and his hypothetical dialogue between an architect and a professor (Schildt 1997: pp. 263-265); Louis Kahn's habit of quoting imaginary conversations during his lectures (see, for example: Twombly 2003, p. 76); and, Sverre Fehn's conversational and graphic exchange with Palladio (Norberg-Schulz 1997: p. 108).

<sup>21</sup> For a survey of this tradition and its involvement with philosophy, see: Kristeller 1979, and Grassi 1980.
22 Altman 1978, p. 395 and 267. Altman lays out this argument also chapter 2 on "The Moral Cultivation of Ambivalence".
speaking out from across time; or, as David Leatherbarrow has put it: "The book is a city composed of many voices 'exercising themselves in rivalry'".24 The ten books can be read in this dramatically discursive way because, throughout them, Alberti demonstrates his habit of taking counsel with diverse and divergent sources and advisors on each architectural topic he treats. At different times throughout his architectural treatise, Alberti speaks explicitly to this manner of inquiry; for he finds that taking animated counsel-with others and oneself-is an activity integral not only to his present task as a searching author striving to do justice to complex topics and questions, but also to the projective task of discerning architects striving in the course of design to fully consider the range of competing complexities and potentialities.25

Given all this, it would seem, then, that by writing dramatically and in dialogue these architects (Alberti, Filarete, Guarini, and the others) were not only participating in modes of composition commonplace at the time, but were also engaging modes of rhetorical inquiry appropriate to their architectural work—or, as Alberti would have it, integral to it. What is significant to emphasize here is that architects and dramatists can be said to have shared modes of composition and inquiry—rhetorical, dramatic, and histrionic modes that the history and theory seminar in question also attempted. Now, let us return more particularly to this seminar.

### **Topical Rehearsals**

If drama was the *mode* of inquiry attempted in this seminar, and if a mix of exemplary mythic, fictional and historic architects comprised the dramatic *personae*, what then were the *topics* of discourse? Obviously certain architectural topics were anticipated, and others not. To help initiate and ground the students' own unanticipated discourse, appropriate topics concerning the architect's role and means of representation were introduced at the start of the term. What became interesting, however, is that depending on which "architects" came together to speak, different topics came to the fore as being most salient. Following a series of combinatorial experiments conducted in the seminar room with varying groups of three, the following three groups and corresponding trio of topics gradually took shape and eventually gave rise to the culminating three-act performance. In the first group, Eupalinos, Imhotep and the Master Mason together addressed an enduring topic: the special significance of language and glyphs for architects. In this exchange, Imhotep voiced the significance of these as divine disclosure; Eupalinos, as poetic utterance; and, the Master Mason, as the oral and demonstrative means integral to teaching the lore of the craft. In the second exchange, the cunning Daedalus, the witty Lepidus, and Palaestrio (the comic protagonist from Plautus' Miles Gloriosus), together spoke on a second tenacious topic: the ambiguous status of architects-ambiguous, because their exceptional savvy and soaring ambition ironically contrasts with their vulnerably medial position. For Daedalus, this ambiguity often led to tragic displacements; for the comic protagonist, ludicrous situations; and, for Lepidus, synthetic understanding. Finally, in the third act, Prometheus, Trophonius, and Aaron (the tragic protagonist from Shakespeare's Titus Andronicus), together confronted a third persistent topic: the troubling allure of their peculiar arts-creative fire, affective speech, and other kinds of *technĐ*. Each of the three figures, in this last group, found these alluring arts to be powerful influences by which they not only succeeded in transforming situations for their own (and others') benefit, but also succeeded in getting themselves (and others) into serious trouble. In the course of revealing their troubles-notably, the punishment they each received for overreaching in their arts-these architect-figures exposed the arts of judgment and reconciliation as being requisite complements to the more alluring modes of *technĐ*. These three concerns, then, each dealing in their own way with the peculiar status and agency of architects, comprised the topical

<sup>24</sup> Leatherbarrow 1990: p. 51.

<sup>25</sup> For example, Alberti urges that *all* evidence, including that which is "hidden" and "obscure", be sought, compared and "examined repeatedly" (1.5; cf. 1.1, 2.4, 9.8). Likewise, he advocates for individual "deliberation", internal "counsel" and "mature reflection" (9.10), including weighing matters in one's mind "again and again" (9.8). He also describes one's reasoning process as holding "a secret argument and discourse" in the mind (9.5, Leoni).

grounds for the seminar's rehearsal and culminating dramatic performance.

At this point, I must forgo a more detailed account of how the performative settings and situated choreography (including diverse props, emphatic gestures, timely sounds, and connective transitions) were together crafted by the students with the aim of suggestively extending the architectural topics of discourse. Instead, I will close by addressing some of the embedded problems and theoretical potentialities of this rhetorical, dramatic, and histrionic approach to history.

# Understudies and Understandings

Clearly such an architectural history and theory seminar as I have described is not meant to take the place of an introductory survey class. The seminar's format simply would not work with large numbers of students. Neither would it have much chance of success with students who did not elect themselves into such a participatory option. Further, due to its peculiar focus, the seminar's content lacks comprehensiveness and, by its involvement of drama and myth, the seminar begins to stray from our discipline's own crucial textual sources. Nevertheless, just as drama was both complementary and integral to the architectural work of Alberti, Filarete, Bernini, Guarini and the others, so such a dramatic approach might participate in some correspondingly integral, if partial, way to the inquisitive work of architectural history. Beyond this concern for its partiality (in content and in scope), such a histrionic mode of inquiry may also be problematic for its encouragement of individual audacity. Involving dramatic manners of action no doubt risks biased parody in lieu of open inquiry; and, further, may enable the competitive display of superficial buffoonery in lieu of developing the desired intellectual agility and profound engagement, such as is hoped one might gain by vigorously considering and seriously impersonating alternative positions and points of view.

Bearing such concerns in mind, it is nevertheless helpful to consider the theoretical value of such a histrionic approach to history. For, as a premise for studying architects from the past, engaging drama—even hypothetically as a model of inquiry—puts us into a curious



FIGURE 1: Front page of the seminar's culminating script.



FIGURE 2: Back page of the seminar's culminating script (a collage of scenes from the various rehersals).

relation to exemplary architects: to their topics, troubles and intentions. By speaking dramatically with and through these architects, one begins to act-out what certain philosophers of interpretation have called "reciprocal questioning"—a kind of exchange wherein a questioning interpreter enters into a dialogue with particular sources of the past; sources that, themselves being understood as active questions, also put the interpreter into question.<sup>26</sup> In another sense, attempting to understand architects by studying them dramatically suggests that a researcher would be acting neither as an authority on the architect nor as a spokesperson for them, but more as an understudy to them—a more modest, if ambiguous, relation that nevertheless maintains the potentiality that the understudy might one day be called upon either to play an architectural role *like* the one under study, or else to participate in an agon comparable to that which the exemplary figure's story represents. Finally, figuring architectural history as drama (even hypothetically) brings history forth as actions and agons to be witnessed and interpreted by a present, lively and inquisitive audience, thus opening onto further topics, questions and discursive exchange.

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<sup>26</sup> Weinsheimer, 1991: especially p. 129. On the relevance of this "reciprocity of questioning" for architects, see: Leatherbarrow 2001: especially pp. 94-95.

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# HARDCUT | SOFTCAST Making Virtual

BRAD BELL, ASSISTANT PROFESSOR UNIVERSITY OF TEXAS, ARLINGTON

# Introduction

The use of digital technology in the architectural design process has evolved from a role as a mere representational device to that of a tool for instrumentalized simulation and fabrication. The desire to make buildings look like a rendering or to produce photo-realistic images and walkthroughs has given way to an opening of the potentials of the software to assist the designer with managing complex geometries, parametric organizational diagrams, structural analysis and integrated building systems.

As students move away from a curriculum and pedagogical trajectory squarely grounded in the analog process of development and representation, a critical juncture is encountered. There is a need to recalibrate an understanding of geometry and specifically, the tectonic implications of introducing digital tools into the design process. Each academic year two digital fabrication seminars are offered: The first introduces a historical, technical, and limited production perspective to the topic. The second course takes the same students and affords them the opportunity to apply the issues discovered in the first course to a full-scale project. Issues of fabrication, detailing, assembly, and installation govern the design and development process.

Specifically, students are asked to examine the subtle variation in an iterative system and how homogenous and heterogeneous qualities can exist simultaneously. The ability of 2D and 3D software to facilitate this type of production suggests a new type of tectonic development. Setting metrics, found internal and external to the iterative systems, makes possible the calibration of both adaptability and specificity. For example, an internal metric could be based on parametric modeling rules or geometric complexity whereas external metrics might be based on structural capacity or contextual limitations. The unification of this seemingly paradoxical duality is substantial for how it transforms the conventional tectonic logic and introduces a new way of design thinking.

For the example used in this paper, students were asked to investigate two materials and fabrication techniques for the purpose of evaluating meaning. Installed at the new Center for Creative Connections at the Dallas Museum of Art, this project attempted to challenge the conventional perception of materials by transforming the methods by which familiar materials are formed or installed. Concrete was now rendered soft and even supple, while paper was rendered as brittle and even bone like. Through digital modeling software and a computer controlled laser cutter, students were able to construct walls where no two tiles are the same and materials are easily formed in new ways. This mass customization production method allowed them to build with the same efficiencies as traditional methods but with very unique and innovative outcome. Students experienced a comprehensive process of design and implementation and were challenged to consider how the digital fabrication process might change the conventional understanding of tectonics and construction methodology.

### Pedagogy

As is the case with most new technological advancement, these initial questions of value and control have now been replaced with more nuanced questions of methodology, exploration, and innovation. It is with these questions educators now find themselves establishing a more robust pedagogy of both new and traditional topics that confront architectural issues through digital technology. With the digital playing a broader and more central role in the educational experience, schools of architecture have now established curriculum that intentionally generates a platform for more rigorous exploration.

Educators who were exposed to these issues in the mid 90's while completing their own education saw these issues emerge and propel a debate that provided no immediate conclusion. Regardless of an outcome though, there was a conviction that many of these issues, while finding origin within the digital environment, ultimately needed to be explored physically. This need has now produced a growing interest and focus on digital fabrication within the architectural education process. However, unlike the implementation of new technologies in the past that seemed to initially replicate existing methodologies of production, digital fabrication is typically linked to a more specific aspect of digital technology. Specifically, the relationship of parametric and algorithmic design to methods of material and formal exploration seems to be the most fertile ground currently being developed in schools. Certainly there are instances of the laser cutter replacing the X-Acto blade and the 3D print replacing basswood, but within the curriculum devoted to digital fabrication, there is a larger interest in the transformation of process and product as a result of the new technology. As materiality, assembly, technique, and even aesthetic are all now being explored, the focus on methodology has produced an interest in articulating a digital tectonic. On some level, while initial digital modeling software provided an original avenue to explore geometric complexity at the scale of the building, the introduction of digital fabrication has shifted the scale of focus to that of the architectural component. As such the techniques by which standard and non-standard materials are assembled has led to a greater interest in understanding tectonic and material issues.

It is through this general framework and perspective that digital fabrication seminars have been developed at the University of Texas Arlington. Over the past five years we have established a two-part course devoted to exploring issues of tectonic and material systems production. The first course establishes a broad foundation of both historical and theoretical issues pertaining to digital fabrication. It is upon this foundation that we then focus on various 2D and 3D fabrication methods. Parallel to these issues, a series of software and hardware tutorials are conducted providing insight

on how to apply the content. With these three areas established over the first two-thirds of the seminar, students spend the remaining portion of the semester establishing a small design project and executing it. These projects typically involve some type of light filtration screen using one of the digital fabrication techniques outlined during the class. The second course, typically comprised of the same set of students, is then devoted to a semesterlong group research project, which culminates in the design, construction, and installation of a full-scale project. Within this course there are two main components we focus on. First, we intentionally attempt to investigate how digital technology might transform an existing construction technology. Masonry wall systems, suspended ceilings, and pre-cast concrete construction have all served as a conventional material and assembly system that we have transformed through the introduction of digital fabrication technology. The second component we find critical to this exploration is our ability to identify and work with a community partner. It is through these partnerships that limitations, client interaction, installation venues, and construction funding are all established. In this regard, students are engaged in what we might consider to be an alternative to traditional 'design-build' opportunities. By connecting the curriculum to these two components it has been possible to establish a series of projects that are serving to simultaneously expand our understanding of digital technology issues, construction delivery methods, and funding options for students to learn the complexity of full-scale production

It is worth noting that one additional layer of instruction is typically introduced to the pedagogical outline already presented. As an element of the theoretical lectures and the software instruction, students are asked to consider how the control of geometry is manifest if it is developed outside the bounds of Euclidean axioms and theorems. Legibility of geometric intention is critical to exploration of a digital tectonic precisely because it forces an externalization of the process. Issues of subjective artistry, formal sculpting, and idiosyncratic singularity can be confronted and addressed if the use of non-Euclidean geometry still posses the capacity to communicate precision, control,

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and intentionality. To this end, students are introduced to techniques of repetition, iteration, blending, morphing, transformative array as a means to gain this communicative capacity. However, it is also within these techniques that the need to further understand connection, precision, detail, joint, and continuity are all examined. Therefore, these techniques serve both the purpose of developing geometric intention as well as a method by which a tectonic philosophy can be developed.

# Project

In the Fall of 2007 the Dallas Museum of Art (DMA) approached the University of Texas Arlington (UTA) School of Architecture to participate in the inaugural opening of The Center for Creative Connections. The interactive gallery was to serve as a prototype for national museums seeking to draw younger generations in to experience a range of educational opportunities presented through art. The DMA developed the idea for the new gallery as venue to showcase existing pieces of their collection and to also rotate through community partners that could help craft the exhibit to present local art and design talent. At the time of initiating the partnership it was determined that the school would participate through an Interior Design Studio and the Digital Fabrication Seminar. With this as the framework a semester long dialogue took place to clearly develop guidelines and a specific process for the two institutions to work together.

The DMA came to the partnership having a clear agenda for the opening exhibit. Material and Meanings presented works where the material composition an art piece has a special or unique meaning for either the artist who selects the materials or for the viewers who bring their own associations with those materials to experiencing the work of art. Specifically, the exhibition included related interactive components to support visitors' accessing works of art through their sensory and visceral responses to the materials as well as contextual information. The DMA selected works like Dorothea Tanning's – Pincushion to Serve as Fetish, Gustave Courbet's - The Wave, Janine Antoni's Nkisi - Lick and Lather, and Nkisi Nkonde's - Standing male figure with nails from their permanent collection to establish works



FIGURE 1:

of art with very intentional material meaning. The School of Architecture was asked to consider the same topic but through the eyes of an architect or interior designer. Both classes were given walls intended to define space where certain activities would happen in the gallery space. For the Digital Fabrication Seminar, one side of the wall was set up to sever as a space for social relaxation and interaction, while the other side was to serve as a backdrop to Frank Gehry's Easy Edge Chair, another piece of the DMA's permanent collection. Beyond the footprint, which was determined by the exhibition designer, the class was free to design whatever they wanted as a response to the curatorial position.

As we initiated the design process in the seminar, we accepted a set of parameters to help guide our decision-making. First we established our own response to the curatorial position by asking how materials and meaning could be transformed or changed as the result of introducing digital fabrication into the construction process. Second, we new that all labor, digital fabrication, and installation would have to happen exclusively by our own team



FIGURE 2:

in order to work within the budget. Third, we determined that we would split the wall into two different sides to help focus us on the material expression and not just the singularity of the walls geometry. Last, we embraced the idea of working with a system of individually constructed, iterative components capable of working together as a unified field. This last issue was also critical for the opportunity to examine detail, connection, installation procedure and issues of precision and jointure - all a function of researching a digital tectonic. The design process lasted approximately four weeks with initial material explorations starting about half way through. The simultaneity of this was useful so that as we made important decisions within the digital environment we could test the material properties immediately and then feed the outcome back into the design process, thus creating an active information loop. Our initial decision to work with fabric formed concrete came first out of past seminar research which provided an existing working methodology and second, a recent presentation by Mark West on the work he was conducting at the University of Manitoba through his research program C.A.S.T.<sup>1</sup> By contrast the decision to use paper for the other side of the wall was the result of a series of drawing and cutting exer-

www.umanitoba.ca/cast\_building/

cises performed in past semesters using the laser cutter. We titled each side of our wall to reflect a combined material and meaning intention: Hardcut and Softcast.

The base wall was configured as a flattened 'S' shape at a linear length 24'-0". One end the wall started at a height of 9'-0" and then gradually tapered down to a height of 4'-6" to reveal a window in one corner of the gallery. This geometry was crucial to development of a non-standard set of tiles that would cover both faces of the wall. Dimensions of the tiles were limited to the cutting bed dimension of the laser cutter. This limit also proved useful establishing a manageable size that could be lifted and positioned by one person when working with the fabric formed concrete. The only other contextual consideration was the DMA's desire to incorporate a flat screen TV into the wall for the purpose of showing the design, fabrication, and installation process for all of the UTA work. By placing the TV at the tall end of the wall we were able to splay the tiles into two vectors while still maintaining an over-all continuity in the iterative system of concrete components.

For the concrete tiles we used a hybrid rigid and soft formwork to create the desired material effects. We applied a parametric voronoi pattern to each tile in either a single, double, or triple frequency. We discovered that the higher the number of vorinoi openings the less the fabric material was allowed to displace. The single instances actually provided the largest opening for the fabric to displace from the formwork and therefore had the greatest volumetric magnitude. The subtle variation in magnitude and frequency was a way to calibrate the system to have different zones of expression without breaking the over-all continuity of the surface. We also discovered through a series of tests that the material type and color played an important role in the final outcome of the tile. We settled on a very affordable rib knit fabric that came in a variety of colors and combined it with the framework of the voronoi cut-out to make our tiles. Each tile was also cast with a small piece of chicken wire for reinforcement and four mounting bolts. The result was a controlled perimeter frame that then 'bubbled' out to create a soft protrusion. The fabric and the way it was inserted into the wooden frame produced a series of ripples and





folds in the concrete surface. Because the fabric could slowly drain off excess water through the fabric the surface residue provided incredible detail as it cured. The texture of the fabric was directly transferred onto the surface of the tile rendering them as soft and pillow-like.(Figure 1)

On the other side of the wall we chose to use thick paper to create each multi-layered tile. The purpose of this wall was to serve as a textured backdrop to the platform of the *Easy Edge Chair* utilizing a different material from the socializing side. While material and function were different, there was still an interest in juxtaposing a similar geometric configuration for both sides of the wall. This juxtaposition was established to further reinforce the role of the transformed material properties and to draw a very subtle comparison between the two sides given that they worked with the same tile sizes and similar configurations. The paper was also manipulated and cut using a series of applied vorinoi patterns at four different scales. (Figure 2) By running a script that controlled the scale, density, and distribution of the voirinoi onto the tile dimension, we were able to calibrate density and frequency and thus control the transparency of each layer. Each of the layers were separated by a half inch and thus created a surface that had depth and texture. Unlike the concrete side, there was no TV and so the tiles separation is less articulated and based on proximity the surface can appear either as a uniform texture or a series of textured tiles. By leveraging the specificity of the digital model and the ability to calibrate subtle variation through the file we were able create a series of 144 unique and different tiles that collectively work together as a unified system on both sides of the wall. Each side presents a different material effect but each utilizes the same basic overall geometry. (Figure 3 & Figure 4)

The installation process was actually folded into the design and fabrication process when it was realized that our window for being on site and working would be limited to two days - one day for each side. This required us to create a system that allowed most assembly to take place off-site and then bring chunks of the wall to the museum for more easier and faster installation. The devised strategy for both sides was to divide the 144 tiles on each side into 18 columns, where each column would work as a single assembled unit. For each side vertical structure was integrated so as to hold the tiles in place and facilitate the installation process. While the walls were separated into vertical columns for the purpose of installation, once installed the connection both horizontally and vertically was uniform. Both the Softcast and Hardcut walls remained installed for twelve months with the Hardcut wall continuing to remain a part of the Center for Creative Connections exhibit now almost two years later.

# Conclusion

One of the most rewarding aspects of this process was for the students to return repeatedly to the gallery over time to see how people interacted with what they had designed and



not conclusively resolve issues of digital tectonics. It is probably more accurate to suggest that issues of digital aesthetics was engaged and explored, with a modest level of understanding around tectonic issues and architectural assembly. Rather than seeing this as a failure of the course I think it illustrates the need to engage these issues incrementally and in some way clearly identifies the exploratory nature of the current state of this curriculum. With each semester we have attempted to build upon the previous body of knowledge and arrived, through both success and failure, at a process that provides an opportunity for students to investigate, design, and construct at full-scale architectural components that have been transformed through the CAD/CAM process. Courses establishing a loose framework of academic objectives but which are ultimately customized based on each semester's opportunities and parameters can provide for a very dynamic learning experience.

FIGURE 4:

constructed. People of all ages would slowly approach both sides and reach out to touch the wall with surprised expressions revealing the difference between what they thought they knew about the surface with what was ultimately revealed through interaction and proximity. As well, we have concluded that the experience of installation, detailing, and client interaction as part of the curriculum of this course proves useful to help students understand that the digital technology is not an exclusive silo of exploration, but rather crosspollinates across a series of other courses they are taking.

I think it is fair to say that the example of the DMA project, while demonstrating a reasonable level of ambition and execution to be taken on in a three credit seminar course, does

# SKETCHING WITH CODE: DEVELOPING PROCEDURIAL LITERACY IN EARLY ARCHITECTURAL EDUCATION Making Virtual

NICHOLAS S. SENSKE, DOCTORAL CANDIDATE UNIVERSITY OF MICHIGAN

# Introduction

Programming does not have a good reputation in architecture. Older designers might remember having to learn FORTRAN, PASCAL, or some other programming language when they were in school. For most, it is not a fond memory. Early attempts at teaching programming to architects focused on tasks which were either too mundane (e.g. drawing and spreadsheets) or too esoteric (theory-driven applications such as shape grammars) to hold the students' interest. Besides, in a few years, programming seemed to be obsolete. When software with direct manipulation<sup>1</sup> interfaces became available it seemed to make more sense to push vertices around with a mouse than with code. Moreover, one didn't need to subscribe to a complex theory of design to do it. Most students who had to sit through these early courses never programmed again.<sup>2</sup>

But perhaps it is time to revisit the idea of programming in architecture. In the first half of this paper, I argue that basic computer programming has an important role to play in beginning design education. In the second, I propose a pedagogical framework for improving how it may be taught.

### I. Procedural Literacy

While direct manipulation interfaces have made working with computers easier, they do not leverage the full potential of computation. Most architects today still perform much of their work by hand, drawing and updating every individual line and surface. But this may soon change. The next generation of design software involves *indirect* manipulation, specifying instructions, rules, and relationships so the computer can perform much of the mundane work itself. This is known as computational production and it has the potential to dramatically expand our capacity for mental and creative labor. It is already transforming other professions such as stock trading, biology, and journalism, among others, and is likely to do the same for architecture in the near future. Computational production is not an augmentation of existing practices, but a redefinition<sup>3</sup>; a different way of working than people are accustomed. Moving forward, it is likely to be the dominant method of architectural design. As such, it should be taught to students early in the curriculum, in parallel with other ways of making and considering design. However, in many architecture programs, one finds several examples of computational production - parametrics, generative design, dynamic architecture, data integration, etc. - taught as separate, advanced subjects. There is no provision made for a basic course in computation, a foundation in the concepts and mindset which should be prerequisite for these advanced labs and studios.

Mastering computational production involves learning a particular set of tropes and skills, but most importantly, adopting a different outlook. Computers are machines whose operation is defined by procedures. As such, the key to working well with computation is to understand process. For instance, most of the tools we work with are "black boxes". One can interact with the controls on the outside, but may not know how or why the tool works. With computation, these details are important. The operational logic of a computational system is often comprised of complex chains of cause and effect. Thus, one cannot make

<sup>1</sup> Direct manipulation is the interface paradigm most users experience today. It involves interacting with graphic symbols (i.e. icons) through pointing and selecting.

<sup>2</sup> McCullough, Malcolm. "20 Years of Scripted Space." *Architectural Design* 76 4 (2006): 12-15.

<sup>3</sup> Pea, Roy D. "Beyond Amplification: Using the Computer to Reorganize Mental Functioning." Educational Psychologist 20 (1985): 167-82.

any assumptions about how a program works based on input and output alone. Understanding process, then, is critical to making sense of these systems. To cite another example, because computers can execute billions of procedures quickly and without error, they are capable of feats no human could achieve. Designers must learn to think and act at a different scale of production, beyond what they can touch or observe themselves. Last, designers are typically dependent upon others for their software tools. They are used to having the same tools as other designers and working under a set of inflexible limitations. But, with the proper procedural description, a computer can become nearly any tool. Taking full advantage of computation involves a faculty with abstraction, the ability to improvise with small programs as part of one's personal process.

Procedurality is a unique property of computers as a medium; what every computational artifact or technique has in common. To get the most out of their software and to recognize and overcome its limitations, designers need to be able to think procedurally: to write procedures to create effects and anticipate the effects of a given procedure.<sup>4</sup> Moreover, architects must be able to translate their knowledge of design into the realm of computation, considering how they design and even what design is. Without an understanding of process, designers are limited in their approaches and disadvantaged when learning computational tools. And so, students need to learn basic procedural literacy: how to read, write, and reason with procedures. To achieve this literacy, they must learn how to program.

While it may be possible to learn a kind of procedural literacy using analog means (studying cooking, for instance), transfer of knowledge from one domain to another is difficult.<sup>5</sup> Since students will be applying procedural thinking with computers, it makes sense that they learn it with computers. Moreover, instructions for a computer are different from those among humans. For example, computer code requires explicitness; human language is full of inference and assumptions.<sup>6</sup> In this sense, code is useful because it is a general language for describing process which is both human and machine-readable. However, the particular programming language studied is not important. Rather, the goal should be to learn the concepts and structures shared by all programming languages.<sup>7</sup> The expectation is not for students to become software developers. Procedural literacy is just that; literacy. While most people know how to read and write, not everyone is a professional novelist. But like writing, designers should learn programming in order to be able to express themselves, to navigate their culture, and, most importantly, to think.

An early course in programming, which helps train students to work with process, may serve as a useful foundation, something that will have relevance despite changes in technology. The challenge is that learning programming is difficult. By a rough estimate, nearly 35% of computer science students drop out even in the best programs.<sup>8</sup> Of those who do graduate, many lack a basic understanding of programming concepts.<sup>9</sup> Some would believe that programming is hard because it depends upon humans writing (seemingly) cryptic code. They argue that a better language or graphical interface is the solution. But the details of programming languages don't present a problem for novices very long. Even young children can master them, given enough time.<sup>10</sup> After a semester, syntax is no longer a problem for

<sup>4</sup> Sheil, B.A. "Coping with Complexity." *Information Technology & People* 1 4 (1983): 295 - 320.

<sup>5</sup> Perkins, D. N., and Gavriel Salomon. "Are Cognitive Skills Context-Bound?", 1989. 16-25. Vol. 18.

<sup>6</sup> Larsen, SF. "Procedural Thinking, Programming, and Computer Use." Proceedings of the NATO Advanced Study Institute on Intelligent Decision Support in Process Environments. Ed.

<sup>7</sup> Mateas, Michael. "Procedural Literacy: Educating the New Media Practitioner." *On The Horizon*. Special Issue. Future of Games, Simulations and Interactive Media in Learning Contexts 13 1 (2005).

<sup>8</sup> Guzdial, Mark, and Elliot Soloway. "Computer Science Is More Important Than Calculus: The Challenge of Living up to Our Potential." ACM, 2003. 5-8. Vol. 35.

<sup>9</sup> Clear, Tony, et al. "The Teaching of Novice Computer Programmers: Bringing the Scholarly-Research Approach to Australia." Tenth Australasian Computing Education Conference (ACE2008). Ed.

<sup>10</sup> Kay, Alan. "The Early History of Smalltalk." ACM SIGPLAN Notices 28 3 (1993): 69-95.

most users. It is the procedural errors and the design of procedures that remain an issue.<sup>11</sup>

While better tools can help eliminate unnecessary details and connect computational ideas to domain knowledge, they can't eliminate the thinking required. As Michael Mateas points out, even with the perfect interface— if we could simply tell the computer what we wanted to do – we would still need to be able to design and describe procedures. No matter how intelligent the software, "expressing ideas will always take work".<sup>12</sup> Procedural thinking won't emerge spontaneously from better tools. The problem with learning programming is not technological, it is psychological and cultural.<sup>13</sup> The solution must be educational.

The fact is that students don't learn enough about process in traditional programming and digital media courses. Instead, these courses tend to focus on the surface details of code, the syntax and commands.<sup>14</sup> These details are necessary but not sufficient for procedural literacy. In addition, students are often taught computational tropes using rote tutorials. While following tutorials enables them to attempt more sophisticated projects, the knowledge they learn is brittle. If a student encounters a context which is different from the original tutorial, they may not be able to recall the technique or apply it properly. Moreover, being given the steps to implement something is not the same as deriving those steps oneself. Tutorials do not teach students how to design their own procedures or why the procedures within the tutorial are structured a certain way. Students need commands and patterns, but they also need a higher order framework for making sense of them in the context of their work. This is what is missing from most pedagogy of computational production.

How can architects learn procedural literacy? Perhaps how they already learn visual literacy. Sketching is one of the first courses in the architectural curriculum; a foundation for all courses to follow. It teaches architects how to draw, but more importantly, how to think about form and design. Its rigorous nature and progression from concrete to abstract concepts promotes the development of a robust mental model for representation. As such, I propose that we ought to teach programming like a sketching class.<sup>15</sup>

# II. Sketching in Code

Instead of instructing students how to operate a programming language as one might an industrial tool, educators should teach computation as a flexible medium for thinking. In the remainder of this paper, I will detail how "sketching with code" might serve as a model for achieving such a goal.

### Motivation

Most people find programming intimidating. In my experience, designers often have anxiety about learning it because they don't consider themselves proficient in math and logic.<sup>16</sup> At the very least, they believe programming falls outside of their profession. It is important to address this anxiety early because how a person feels about what they learn can be as important as how they are taught. To a certain extent, students will do whatever is asked of them, but if they lack confidence in themselves and are uninterested in the material, their experience is less likely to be productive.

We learn best when we are in an environment in which we feel capable and supported. Consider how gymnasts practice their routines with guide ropes, pads, and nets. Because they are less afraid of getting injured if they fall, they can place more of their effort on improving their performance. Similarly, in design education, sketching class is a safe environment

16 Nor would they want to be, as those things seem like the very antithesis of creativity to most designers.

<sup>11</sup> Linn, Marcia C. "The Cognitive Consequences of Programming Instruction in Classrooms." 1985. 14-29. Vol. 14.

<sup>12</sup> Mateas, Michael. "Procedural Literacy: Educating the New Media Practitioner." *On The Horizon*. Special Issue. Future of Games, Simulations and Interactive Media in Learning Contexts 13 1 (2005).

<sup>13</sup> Sheil, B.A. "Coping with Complexity." *Information Technology & People* 1 4 (1983): 295 - 320.

<sup>14</sup> Soloway, E. "Learning to Program = Learning to Construct Mechanisms and Explanations." ACM, 1986. 850-58. Vol. 29.

<sup>15</sup> The sketching metaphor is not my own invention. It is part of a tradition of pedagogical programming languages such as Processing, Design by Numbers, and Logo, which are designed to enable users to create visual forms with a minimal amount of code. I take the efforts of these languages and their creators as a pedagogical jumping-off point.

in which one can learn to draw. There is no expectation of perfection. The sketchbook is a place to try things, to repeat them, and to fail without penalty. False-starts and mistakes far outnumber one's "good" sketches. And that's okay. In sketching class, students might lack self-confidence at first, but they are willing to try. This is the earnestness we ought to duplicate in an early programming course.

Calling programs sketches, although it is a small gesture, can help ease students' apprehension. As a metaphor, it connects what they are doing to architecture and sets the expectation that their programs will be short and rough (see: Practice). If students know they aren't expected to be great programmers right away, they may be more willing to suspend their fear and make an effort.

### Practice

To learn a craft — to develop skills and an intuition for a medium — demands a fair amount of hands-on practice. A sketching class revolves around this notion. Students draw and they redraw. Repetition and refinement is the order of the day. They fill entire sketchbooks with the shared understanding that their goal is not a well-refined piece, but rather learning how to draw.

A first programming course should be a similar experience. But instead, students are introduced to programming in advanced labs or studios where they might only implement a few programs over the course of a semester. This is simply not enough practice, and of insufficient variety, to get a feel for the complexities and contradictions of procedural work. The typical pedagogy of lengthy tutorials and multiweek projects implicitly emphasizes product over process; following instructions and getting something to work (by any means necessary) rather than understanding how it works. Students may write programs, but they do not necessarily learn how to program.

As with any craft, the best way to learn to program - and to learn from programming is to do a lot of it. Like a sketching class, an introductory programming course ought to focus on a rigorous sequence of small exercises designed around the fundamentals of the medium. I taught a course at the University of Michigan last fall<sup>17</sup> with this idea which I cite as one example of how to implement this in the classroom.

In a typical hour of my course, I had students write as many as eight to ten small programs in Processing. That might sound like a large number, but these "sketches" consist of only a few lines of code. With careful planning, a sketch can produce sophisticated and interesting visual output which illustrates the concept at hand. Because the programs are so short, students have an easier time following the flow of the code. Also, if a student makes a mistake or has a misunderstanding, it can be diagnosed quickly. Like a drawn sketch, these programs are not expected to be efficient or flawless, but rather an opportunity to learn.

A traditional programming lecture might demonstrate the same number of examples as my class in the same amount of time, but I believe there is a benefit to having students type the code and observe the results for themselves. The experience of coding engages more senses and is more involving than merely watching the instructor. Once students have made their sketch, they can experiment and try different options on their own, testing the limits and potential of the concept. They can't do this if the instructor is merely showing the example to them (and many of them won't do it at all outside of class). This also gives them a bit of room for creativity, which can be more motivating than following along with fully-prescribed examples.

Ultimately, my students wrote far more programs than they might in a typical programming class. While a student working on a tutorial or a studio project might be stuck debugging the same handful of loops, a student in a sketching class, as in my example, could write and experiment with dozens of loops across a multitude of contexts. In my experience, increasing students' practice time gives them a more robust understanding of computational concepts – where and when to apply them; exceptions, etc. – and helps them grasp the medium as a whole.

<sup>17</sup> Course website at: http://arch506-f09.tcaup. umich.edu/

## Cognitive Loading

Many computation courses involve too much design. Students are expected to learn programming and apply it fluently at the same time. Even in an advanced course, this is unreasonable.

Abstraction and synthesis cannot occur while one is still learning to comprehend the medium. It's like learning to drive a car. At first, there are so many unfamiliar details to monitor – steering, gas, signals, etc. – that navigating the vehicle to a destination is often more than a person can handle. Until the new driver is comfortable with the controls, they aren't going anywhere.

In cognitive science, this idea is known as cognitive loading. The more things one has to keep in active memory, the more difficult it is to perform well. One of the reasons programming is so challenging is because it has a substantial cognitive load.<sup>18</sup> Even in basic programs, there are many elements to keep track of: proper syntax, remembering commands, program flow, variable states, and so forth. Adding design (which is also a complex task) to the mix may be asking too much of novices.

With traditional sketching, the constraints of the course allow students to gain familiarity with the nuances of the medium. Students are not expected to think up original work or innovative methods. As such, they can focus on developing skills and learning a set of principles from drawing which they can apply to form and design. In a basic programming course, the same idea should apply.

Cognitive loading extends to lesson plans, as well. Too many details or prerequisites and students can easily become lost and confused. To alleviate this, it can be helpful to remove any unimportant details that might slow students down, especially when introducing a new concept. For example, having students write their programs from scratch might be realistic, but for novices it introduces more details to track and opportunities for errors. Students might so much spend time and effort typing and correcting punctuation errors, that they become 18 Guzdial, Mark. "How We Teach Introductory Computer Science Is Wrong." Communications of the ACM (October 8, 2009). Accessed January 10, 2010 <http://cacm.acm.org/blogs/blog-cacm/45725-howwe-teach-introductory-computer-science-is-wrong/ fulltext>.

distracted from the main idea of the lesson. To help reduce cognitive load, instructors can prepare programs ahead of time and have students modify or add small sections to them. This method of turning complex programs into simplified sketches makes it possible to cover more material with greater depth.

Although programming will never be as simple as sketching with a pencil and paper, to teach it well, we ought to be wary of its complexities and seek to reduce them wherever we can.

## Transfer

An important goal of learning is to be able to apply knowledge and skills learned in one context to other situations. In education this idea is known as transfer<sup>19</sup>. With procedural literacy, the hope is that computational concepts and thinking skills will transfer to any software or design challenges students may face.

The problem is that most programming courses do not successfully promote transfer. As discussed earlier, many of them emphasize surface details of the code and depend upon rote tutorials. These activities often make knowledge inert – locked within the context in which it was learned.

In education, there appears to be an implicit assumption that transfer happens on its own. For example, if students are immersed in writing code long enough, eventually they will figure out how to think procedurally. Research has shown consistently that this is rarely the case. To encourage transfer, it is best to teach with transfer in mind.

Sketching courses tend to do this well (although they may not invoke the theory of transfer when doing so). In these basic studios, it is understood by both teachers and students that more is being taught than merely how to draw. This is important because one of the keys to transfer is priming the student – preparing them to see beyond the surface details and mindfully abstract what they learn. Students know that sketching is not the end, but the means. Drawing is almost secondary to learn-

<sup>19</sup> For a good survey of this topic, see Butterfield, Earl C., and Gregory D. Nelson. "Theory and Practice of Teaching for Transfer." Educational Theory Research and Development 37 3 (1990): 5-38.

ing the basic concepts of representation and form.

How does one actively teach for transfer? There are two commonly discussed methods. First, there is low road transfer, in which the learner practices an activity extensively and deliberately in a variety of situations to the point of near automaticity. Essentially, one over-learns something to the point where they develop a behavioral response, an intuition. But, to be clear, few courses are designed to involve students in the amount of effort this takes. In order for this kind of transfer to occur, it can take a considerable amount of time.<sup>20</sup>

Second is high road transfer, in which lessons are designed to promote a deliberate abstraction of principles. For instance, students might be given several related examples and then asked to come up with a principle they share. Later, the same students would be asked to determine if the principle applies in a series of different situations. In this manner, the students' knowledge is effectively decontextualized, made and not merely given.<sup>21</sup> The trouble with this method is that the material must be presented in a highly specific way in order to trigger transfer. Once again, most programming courses do not have this kind of structure.

I believe sketching accomplishes transfer as a combination of both methods. Students draw a great deal, practicing to develop hand-eye coordination but also internal generalizations about types of form and visual and aesthetic principles. In addition, students' sketches are used by the class to explicate and examine principles. It is this structure, which promotes both low and high road transfer, that I believe programming classes ought to emulate.

#### Feedback

Imagine you are a golfer trying to improve your game. Hoping to fix your swing, you drive a few balls while your golf pro watches. A week later – while you are putting – she calls back and explains why your shots tend to hook. How much do you think the pro's advice 20 Perkins, D. N., and Gavriel Salomon. "Are Cognitive Skills Context-Bound?", 1989. 16-25. Vol. 18.

21 Perkins, D. N., and Gavriel Salomon. "Teaching for Transfer." Educational Leadership 46 1 (1988): 22-32. will improve your drive? Probably not much. And yet, this is analogous to the kind of feedback many designers receive in programming courses.

Most students' only practice with coding is outside of class, in their homework or projects. Because the grading process can take so long, there can be a considerable lag between when they submit their work and receive comments. Often, students won't hear back about their programs until after the next lesson. By this point, they have likely shifted their attention to the new material. They have little motivation or incentive to return to the old work and correct their mistakes.

In a traditional sketching class, students receive active coaching while practicing. Feedback is frequent and timely. The teacher walks around as students draw, assisting and making comments. The low response time between practice and feedback is beneficial to helping students correct their performance. Basic behavioral psychology tells us that reinforcement occurs when treatment closely follows an action. The sooner a student receives coaching, the more likely they are to correctly interpret the material. Ideally, coaching would occur while they are engaged in a task.

The quality of feedback is also important. For example, in a typical programming lab, students may receive timely help, but it is seldom constructive. When the lesson consists of following tutorials, feedback from the instructor is not focused on an individual's understanding, but on making sure everyone completes an instruction so the class can move on to the next one.

In contrast, a sketching exercise, which does not require a sequence of interdependent steps, allows for a greater flexibility of pacing. As such, the instructor can steer students towards comprehension rather than compliance – correcting any misunderstandings in their mental model of the medium.

Sustained practice is essential to developing skills and understanding, but repetition alone is not enough. Feedback, at the right time and of the proper type, is essential to making practice worthwhile.

## Conclusion

Computational production is reshaping professions. To adapt and thrive, designers will need procedural literacy. They must learn – and learn from – programming. Unfortunately, teaching programming successfully is a challenge. While most students can pick up a language, they often fail to learn procedural thinking. The "sketching with code" framework, described in the second half of this paper, is an attempt to address the shortcomings of traditional programming and digital media courses and steer students towards procedural literacy.

The components of the framework: improving students' motivation, reducing task load, teaching for transfer, and providing timely feedback, are not new ideas in education. One could say this is simply what good teachers do. However, I have found through my research and in my own experience that these elements don't often come together in programming classes and this –not poor student aptitude or unintuitive tools— is the reason why most students are unsuccessful.

It is my hope that sketching might serve as a familiar metaphor for design educators; a reminder as to what the purpose and method of teaching programming ought to be. We sketch in order to think and such thinking cannot be reduced to (or induced from) rote instructions. It must be coached and cultivated through deliberate practice over time. The reverence and patience we reserve for teaching students drawing ought to be applied to our curriculum for computation. As manual sketching is to CAD plans and 3D models, so is basic programming to the future of the profession.

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# DIGITAL EVOLUTION: EVOLU-TION OF ARCHITECTURAL EDU-CATION THROUGH DIGITAL MEDIA Making Virtual

Professional practice has been more successful in utilizing new tools and integrating digital thought with architectural thought, creating a new design process with profound results. "Today I would think that you couldn't even run a practice without having advanced performance techniques for understanding the way your projects operate within functional terms, within environmental terms, within technological terms, and for looking at the development of a project in the early stages .... It's not evolutionary ... our clients expect this."<sup>1</sup> Continually evolving digital technologies have begun to pressure the existence of two-dimensional CAD drafting in practice. Building Information Modeling (BIM) systems have already taken ownership of the multidimensional production of the design industry. Digital work has allowed instantaneous interaction between architects and engineers, increasing speed and precision in early phases of the design process.<sup>2</sup> This digital evolution has fundamentally shifted the design process of practicing architects, from global firms to local offices alike, and changed the way we conceive and assemble buildings.<sup>3</sup> Technological evolution is constantly and instantaneously moving around us.

With this rapid transformation in professional practice, how can we prepare and train students to be aware of the current professional environment and to develop their own design process in a digitally oriented world? Regardless of analog or digital tools, beginning design studio is a fundamental course to teach

1 Thom Mayne, Follow-up Assessment: Thom Mayne, "Change or Perish" interview with Robert Smith, AlArchitect This Week, October 9, 2009, http://info.aia.org/aiarchitect/ thisweeko9/1009/1009rc\_mayneinterview.cfm

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3 Tierney, Therese. Abstract Space: Beneath the Media Surface New York: Taylor & Francis, 2007.

SEUNG K. RA, ASSISTANT PROFESSOR OKLAHOMA STATE UNIVERSITY SCHOOL OF ARCHITECTURE

students to understand spatial and compositional aspects of architectural design. At Oklahoma State University School of Architecture, we are still seeking the appropriate path for integrating digital design into beginning design education, as well as the role for the computer in subsequent design studios. We face a challenge: how digital design could be successfully integrated into the core design process in our curriculum.

## **Initial Studies**

In order to begin to implement the computer into beginning design studio, we must consider the change on an individual project level, and a larger curriculum level. This paper describes an ongoing investigation into integration on the small and large scale, by comparing two recent projects and an ongoing experiment. On the smaller project scale, we began by adapting a traditional design exercise to a digital medium. The abstract Tartan Grid project was given to the beginning design studios of both schools of architecture at New York Institute of Technology and Oklahoma State University in different time frames and classes. Having introduced this fundamental design exercise in both analog and digital formats, in separate courses, it generated varied outcomes.<sup>4</sup> The design process itself was altered, in addition to the design product. Through these types of experimental exercises, we can begin to explore digital integration at a fundamental level. A description of the methodology of the two projects follows.

### Tartan Grid \_Analog

The traditional Tartan Grid exercise was given to students in NYIT's Introduction to Visualization course. Students were asked to create a complex three-dimensional figure using a sys-

<sup>4</sup> William J. Mitchell. Forward to *Expressive Form: A conceptual approach to computational design* by Kostas Terzidis (New York: Spon Press2003).

tem of grids as a fundamental design tool. It required understanding a scale, measuring, and making lines. Students drew a series of eight 6" squares, with the first six to be divided into 1, 2, 3, 4, 5, and 6 parts equal grids. They then superimposed two grids (the 4th, 5th, or 6th) on the 7th and 8th square to form two different tartan grids. Using one of these tartans as a matrix, students made two figure/ground studies. Based on the figure/ground study, students extruded a 3D object using only the Cartesian coordinate system and described the object using axonometric projection. Further development required students to create a contiguous solid and a contiguous void within their object, with the void changing direction in the x, y and z axes at least once. Axonometric draw-



**FIGURE 1**: Example of Tartan Grid\_Analog by Jin Jong(NYIT).

ings were created to study the object, and to describe it for presentation. Final pencil presentation drawings on velum consisted of plan, elevation, and axonometric to convey the student's design (Figure 1).

## Tartan Grid \_Digital

The analog Tartan Grid exercise was adapted to a digital medium for the Digital Visualization course at Oklahoma State University in order to explore design thinking for the same project, but using a digital process. Students were asked to draw the same series of superimposed grids, to form two different tartan grids. Using one of these tartans, students created a 3-D matrix, and used various operations which we covered in class to derive a 3-D object from it. Using the presentation techniques shown in lecture such as line weights, hatching, and mapping raster images, students generated drawings of the tartan grid object. They were asked to use innovative, unconventional drawings to explain their concept, and to illustrate both the 3D object and the simpler tartan grid that the object was derived from. While students were likely to use some combination of plan, elevation, and axonometric, they were given freedom to experiment with various layouts to best describe their unique design. For final presentation, students were also asked to fabricate their design in a physical model to express the complex form. Students then uploaded a JPEG version of their board and model to the class blog (http://arch3252fudd. blogspot.com) for documentation and discussion (Figure 2).

### **Outcome of the Initial Studies**

## Process

While the initial process of two-dimensional study was similar, once the figure ground was extruded into a three-dimensional object, the analog and digital processes were more varied. The design process can be thought of as a series of decisions, and the medium influences how those decisions are made. Because the computer is a tool which requires numeric input, ideas become certain more quickly. Computation in digital design translates an ambiguous design (architectural form) into more definite data. The data is interpreted



FIGURE 2: Example of Tartan Grid\_Digital by Matthew Claus(OSU)

into a certain idea to be visualized.<sup>5</sup> For example, the way in which the object was studied changed between groups. A hand-drawn axonometric only shows three faces at a time, whereas a 3-D model may be rotated to infinite views to instantly study the spatial impact of a Boolean operation on all faces. With this limitation to hand drafting, some ambiguity existed throughout the process for students drawing by hand.

# Speed

Overall speed did not vary between the analog and the digital studios as much as expected, but the groups spent their time differently.

5 Terzidis, Kostas. *Algorithmic Architecture* Oxford: Architectural Press 2006.

While the digital formal experimentation perhaps was faster, students were in the beginning phases of learning to use the computer programs. Therefore, they were in general not able to use them quickly or to their full potential yet. Even so, the digital group still spent more time experimenting with spatial configurations, and less time spent in the act of drafting. For the analog group, slightly less time was spent in spatial experimentation and more time was focused on drafting and presentation.

# Complexity

Students in the analog studio tended to stay on a more orthogonal grid throughout the process, while the digital studio tended to wander more from the grid, using free forms. Those within the digital studio who already knew the tools well were able to develop their ideas further, and were less frustrated during the process than those more novice. Students made more complex geometries early on with the computer, but may not have fully understood the forms or how they were constructed. This was further evidence of the need to incorporate fundamental geometry to enable this rapid transition.

The digital studio was able to use the tools to enhance the learning experience in other ways as well. The computer allowed exploring the translatability of digital design; the digitally formatted information was translated into multiple media with infinite possibilities.<sup>6</sup> Students used their CAD models and the laser cutter to create physical models for display. They also were able to upload their work to the class blog throughout the process, enabling class discussions and enhancing communication among the group.

# *Current Study: Geometry & Digital Evolution*

The next evolution in this process is to integrate geometric study into the transitional projects to support this shift in design learning. By introducing fundamental theory in descriptive geometry in the formative years, it will support students' more rapid transition and development in the use of complex digital design tools and their possibilities. The study of geometry

6 Tierney, Therese. *Abstract Space: Beneath the Media Surface New York*: Taylor & Francis, 2007.



FIGURE 3: Example of three-dimensional forms by Jason Traczyk (Top) and Brett Meek (Bottom).

in architecture is necessary to cover not only for digital use, but also as a foundational study. Geometry becomes a language of architecture and design thinking depends on geometric expression.<sup>7</sup>

Before developing complex digital designs through methods such BIM, Scripting, CAD/ CAM, and Parametric Modeling, students must understand the basic structure of geometry. Once we successfully integrate both digital projects and theory into beginning design, students will have the capacity to use digital tools earlier to expand design exploration in studio. This will create a longer timeline for stu-





FIGURE 4: Example of hand sketch by Nick Prather

dents to reach a greater level of digital design integration in their academic career. The following experiment used both hand sketching and digital utilities likes Projections and Planar Transformations to understand basic descriptive geometry during the design process. These tools will be implemented and developed with students new to both digital and analog design.

# Project: Investigating Expressive Form

In order to test this methodology, an experimental studio was created at OSU. This experiment in investigating expressive form gives an abstract design problem to a select group of students. The purpose of the experimental project is to analyze the design process using

<sup>7</sup> Lynn, Greg. 'Probable Geometries: The Architecture of Writing in Bodies.' *Architecture* New York 1 (1993): 44-49.

two separate mediums, while developing an understanding of the basic structure of architectural geometry. This four-week course is composed of lectures, workshops, reviews and a final project.

Students were separated into two groups for the initial analysis and documentation of a found object. The first group studied and documented the object in an analog manner, using hand sketch or photography. The second group conducted the same documentation, using a digital process to create a 3D model of the object to explore its formal properties. The object chosen for the challenge was a studio stool, which displays a transition between circle and square for a basic geometric analysis. When the stools are stacked, they create various geometric elements with linear and curved lines. For Team Analog, perspective projection of the object was documented by hand sketch. For Team Digital,

AutoCAD aided in flattening the 3D model into a parallel projection (Figure 3).

Following Manuel De Landa's notion of abstract diagrams and fundamental geometry, both groups used the technique of framing views to find geometric compositions.<sup>8</sup> Both groups adapted De Landa's abstract diagram operation to extend and shrink lengths and areas of geometric elements. Students then translated the compositions into a series of 3x3 figure/ground studies. Using the 3x3 squares, students composed a 9x9 figure/ground study. Based on these two-dimensional investigations, three-dimensional forms were created (Figure 4).

The exercise gave us an opportunity to study and debate the method and value of both processes. The next phases of this ongoing project will be to document the three-dimensional forms created, and to begin spatial studies of the objects. For both groups, the project will culminate with a design presentation and discussion of process differentiation.

# Preliminary Outcome of the Study

## Process

Team Analog and Team Digital created a similar two-dimensional figure ground product, but the process varied. The digital group was required to participate in a brief software tutorial and to spend time becoming familiar with the program. But the speed of the digital tool quickly overcame the extra step; the computer already translated the found geometry into rational and digitized information. Their thought process was more condensed, with fewer distinct steps. The computer required more input from the digital group, but allowed them to explore more options quickly, while Team Analog could not consider all potential configurations in advance.<sup>9</sup>

On the other hand, Team Analog started the design process right away and each subsequent step reflected the thought process distinctively. Through students' observation and documentation, the objects became more ambiguous. For the analog group, instantaneous decisions were made when they chose a view to sketch and how to configure the each 3x3 square. The degree of abstraction was larger for this group; each distinct step served as another layer of abstraction.

### Speed

The speed of each group and student varied somewhat, as expected, with each person progressing at their own pace. However, Team Analog progressed faster with the two-dimensional figure/ground exercises, but more slowly with three-dimensional studies. But as the 3D exercises evolved, Team Digital was able to conduct more spatial exploration at a faster pace. Feedback from Team Digital suggested that the computer facilitated an easy transition between options, allowing them to overcome cautious decision making.

<sup>8</sup> De Landa, Manuel. Deleuze and the Use of the Genetic Algorithm in Architecture. Edited by W. W. Braham and J. A. Hale. Rethinking Technology: A Reader in Architectural Theory New York: Routledge, 2007.

<sup>9</sup> De Landa, Manuel. Deleuze and the Use of the Genetic Algorithm in Architecture. Edited by W. W. Braham and J. A. Hale. Rethinking Technology: A Reader in Architectural Theory New York: Routledge, 2007

# *Complexity / Impact of Geometric Study*

While both teams initially struggled, the geometric analysis portion proved helpful in engaging them to translate the geometry into their two-dimensional designs. It also raised the question of the role of digital tools in understanding the impact of geometric study. Da Vinci recognized geometry translated into dynamic systems of nature as a tool to achieve stability, order and beauty.<sup>10</sup> Using digital tools to create complex geometries became an efficient vehicle for students to study three dimensional compositions as well. It gave them the confidence to explore expressive form. The complex forms generated with the analog group also challenged us to adapt the thought process of hand making. Hand making as a computation of human mind is necessary to the process of digital thinking.

# Conclusion

Through our initial studies, we have determined a number of benefits of early introduction of digital design tools. First, they may allow more time for conceptual and formal study of design solutions. They serve as an aid to understanding complex geometry, and extend design possibilities. Less time is required to produce drawings, and the computer allows students' designs to be translated to a variety of media for further study and presentation. Through the current experimental introduction of geometry into the curriculum, we will continue to investigate the relevance of this method to the digital evolution of design education.

In Charles and Ray Eames' film *The Information Machine*, they describe the computer as "... A simulation or model of life, where we can see the effect before taking the action.... It is a tool for turning inspiration into fruitful prediction." The computer is a tool to be used as an aid to the design process, as a guide to help us see what's next. We must focus on core process integration to prevent simply adding digital technologies later as an efficient mechanism to represent existing designs.<sup>11</sup> Our ongoing study has shown it to be a powerful tool in beginning design. It is inevitable and necessary for the beginning design studio to broaden digital learning, so that students are able to develop digital thinking in their own design process. To extend our limitation of design thinking, integration between digital and analog design needs to be addressed as early as possible.<sup>12</sup> Understanding the digital impact on design and process is also imperative for students to prepare for professional practice, where integration of the computer has been realized more fully.

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# MANUFACTURING ARCHITEC-TURE: CASE STUDIES OF COL-LABORATIONS BETWEEN DESIGNERS AND MAKERS Making Connections

DANA K. GULLING, ASSISTANT PROFESSOR UNIVERSITY OF NEW MEXICO

There is a growing interest among architects and building designers to embrace manufacturing processes for building construction rather than solely relying on on-site craftsmanship in building construction. There are a number of forces that may be influencing this trend: first, both architecture practices and design educations are embracing interdisciplinary design and design integration as an important goal for today's design processes<sup>1</sup>. It is within this integrated design movement that architects and building designers are collaboratively and experimentally engaging with subcontractors, fabricators, and manufacturers early in the design process. Secondly, there are now a number of recently published books-such as Stephen Kieran and James Timberlake's *Refabricating Architecture*—that highlight the potential for and benefits of appropriating automobile and airplane manufacturing and assemblage techniques for architectural construction. Next, as on-site labor costs continue to rise with little to no increase in construction quality, off site production offers greater precision of dimensions, finishes, and quality with the added benefits of safety and convenience for its workers. Finally, many designers are now familiar with to rapid prototyping equipments, which are often considered to be scaled of versions of full-scaled, computer aided manufacturing (CAM) processes. All of these forces are influencing the current architectural climate and are encouraging designers to work more collaboratively with manufactures for the designing and making of innovative building forms and architectural elements.

This paper will present work by architects, designers, and researchers who engage directly with manufacturers. This paper will present three different case studies that represent three different approaches of designers working with production processes. The first case study is HouMinn Practice's use of vacuumforming plastic for the design and construction of an exterior envelope prototype, titled Drape Wall. For Drape Wall, the designers had a particular intent relative to the wall's performance; they selected vacuum-forming because it best met their prototyping needs. The second case study is Carlos Jimenez Studio's collaboration with a tilt-up concrete contractor to develop custom concrete molds for the load-bearing concrete walls for Rice University's Library Service and Data Centers. For these two built projects, Jimenez examined an existing process and experimented in conjunction with the tilt-up producer to alter the traditional tilt-up processes. The final case study will examine Wahoo Deck's development of two propriety products: Dry Joist and Dry Joist EZ. Both of these products are manufactured utilizing extruded aluminum to form a weather-proof structural spanning system for exterior decks. In this example, Wahoo Decks had particular knowledge of a manufacturing process and developed a new product that utilized that process. These particular case studies were selected as they represented three categorical approaches of designers engaging with manufacturers in order to produce innovative architecture.

Although each of the case study's design processes and conceptual goals are unique, all of them illustrate the potential for the connections between making (as manufacturing) and architectural design. Although the designers are not necessarily working directly with the craft of making, designs that are a result of these partnerships must incorporate all the

<sup>1</sup> In 2006 the American Institute of Architects (AIA) issued a Report of Integrated Practice. Edited by Michael Broshar, Norman Strong and Daniel S. Friedman. Pamphlet. 1 May 2006. This AIA report discusses both architectural practice and education. The "Introduction and Abstracts" can be found at <http:// www.aia.org/aiaucmp/groups/aia/documents/pdf/ aias076760.pdf> Accessed 8 February 2010.

technologies necessary for making. In all three of the case studies, designers describe the projects as collaborative in nature and that the designers relied on manufacturers' process knowledge to influence the designs.

Finally this paper will present the three case studies and will establish the value of manufacturing processes relative to and understanding of architectural making and will define the term 'manufacturing', distinguishing it from 'fabrication'. Information gathered for this research is from direct interviews with the each of the case study designers<sup>2</sup>.

# Manufacturing as Making

Architecture has traditionally maintained a separation between design and construction. Although architecture's design process often engages with making through the production of drawings and models, these artifacts are not the final intended creation, but are instead representations of the final building. Aside from the medieval master masons, a select number of academic design-build programs, and handful of architecture offices that may fabricate building components, the scale and complexity of today's architectural projects necessitate the use of contractors, subcontractors, fabricators, and manufacturers to execute the design. Despite the inherent separation between design and making, architects should not be ignorant of making processes and building construction. They should choose to rely on conceptual knowledge, past experience and current collaborations to best realize their designs in to physical reality.

In the past, architecture was reliant on craftsmen and on-site construction for the majority of its design execution. However, on-site construction tolerances, predictability of products, rising costs, and worker safety has been questioned and there is a growing emphasis to investigate more off-site construction. This is especially evidenced by the successful integration of Computer Aided Design and Computer Aided Manufacturing (CAD/CAM) within such noted projects as Frank Gehry's Experience Music Project and Norman Foster's Great Court at the British Museum. CAD/CAM processes have helped architects design and realize forms that would not have been possible without these off-site technologies. Just as architects have not traditionally constructed their building designs, it is this paper's assertion that these off-site processes do not further remove the architect from making.

# Defining Manufacturing in Architecture

The terms mass produced, manufactured, modular, off-site, fabricated, and mass customized have now become common place within architectural discourse. Although not fully researched, those terms have been arranged according to an assumed hierarchically from least to most valued. This hierarchy of terms is addressed indirectly through a number of papers and is most easily inferred by the following passage from *Refabricating Architecture:* 

[W]e have within our reach methods of mass fabrication the yield custom results. Just as the cpu of a computer can be customized over the telephone... so too can architecture be mass customized.... Modular construction is no longer a slave to mass production, repetition, and sameness. Even the word "modular" has itself been replaced by "off site". Eighty to ninety percent of the work required to building many custom structures can now be performed in a factory off site; slavish repetition of a product is no longer necessary to render this method of production viable.<sup>3</sup>

Although the term 'manufacturing' has a low architectural value as it is often assumed to facilitate mass production, the intent of this paper's title 'Manufacturing Architecture' is not to devalue those who are collaborating with manufactures; instead the goal is to raise the value of the term 'manufacturing' within the building design community.

The actual definitions of fabricating and manufacturing are not dissimilar. Webster defines fabricate as "to construct from diverse and

<sup>2</sup> Interview with Marc Swackhamer, Principal of HouMinn Practice. 5 Feb. 2010, via phone. Notes. Interview with Carlos Jimenez, Principal of Carlos Jimenez Studio. Houston, TX. 2 Feb. 2010, via phone. Notes.

Interview with Michael Lyle, Vice President of Operations and Business Development of Wahoo Decks. Gainesville, GA. 28 Jan. 2010, via phone. Notes. 3 Feb. 2010, Email.

<sup>3</sup> Kieran, Stephen and James Timberlake. Refabricating Architecture: How Manufacturing Methodologies are Poised to Transform Building Construction. New York: McGraw-Hill, 2004. pg 113

usual standardized parts"<sup>4</sup>; and manufacture as "to make from raw materials by hand or by machinery;... especially when carried on systematically with division of labor"<sup>5</sup>. Although it could be argued that these two definitions are changing as process technologies continue to change, the appreciation of the definition of 'manufacturing' lies with the emphasis on systematic production and the focus of transforming raw materials into a product.

Defining 'manufacturing' as processing raw materials, this paper will focus specifically on the investigation into lower-tier manufacturing processes and the potential for design engagement into these processes by architects. Lowertier manufacturing is often used within manufacturing supply chains to process and form materials in order to supply components to upper-tier manufacturers. Upper-tier manufacturers may then assemble those components into larger modules that are then sent to as original equipment manufacturers (OEMs), which manufacture the final product before sale.

Considering architects' standard palette of materials—plywood, structural steel, extruded aluminum, float glass, gypsum board, etc. architects should acknowledge that the vast majority of the building components are already manufactured. These manufactured products can be considered to be lower-tier manufacturing processes with either off and on site constructions taking the place of uppertier manufacturing and OEMs. It is this paper's assertion that building designers have the opportunity to engage directly with lower-tier manufacturers in order to advance architectural making, as demonstrated by this paper's case studies.

# Case Studies: Designers and Manufacturing

### HouMinn Practice + Vacuum-formed Plastic

In this first case study, HouMinn Practice used vacuum-formed plastic to prototype a new exterior envelope system called Drape Wall



**FIGURE 1**: Photograph of Drape Wall Prototype, by HouMinn Practice.

(Figure 1)<sup>6</sup>. As background, HouMinn is an intercity collaborative practice centering on the company's two principals: Marc Swackhamer, an Assistant Professor at University of Minnesota, and Blair Satterfield, a Research Assistant Professor at University of Houston. Drape Wall utilizes vacuum-formed plastic to form panels that are used as a rainscreen. The rainscreen is mounted on an aluminum structural frame with an interior felted drape layer, which acts as both insulator and weatherproof barrier for the wall. Drape Wall won a 2008 R+D Award from Architect Magazine<sup>7</sup>. According to Swackhamer, the design for Drape Wall was mainly derived out of its desired performance<sup>8</sup>. Drape Wall was designed so that the user could modulate natural ventilation across the entire wall surface. HouMinn investigated design options in order to produce a prototype, and the process of vacuum-forming the 4 foot by 2 foot plastic panels was selected as a way to achieve the realization of their design.

This particular manufacturing process was selected because the initial costs were negligible. According to Swackhamer, the majority of 6 Photograph of Drape Wall Prototype, by Hou-Minn Practice. Architect Magazine Site. Hanley Wood, LLC., 2010. Web. 10 February 2010. <a href="http://www.architectmagazine.com/design/drape-wall-cloak-wall.aspx">http://www.aspx</a>

7 Gerfen, Katie. 'Second Annual R+D Awards'. Architect. Aug. 2008: 42-47

8 Interview with Marc Swackhamer, Principal of HouMinn Practice. 5 Feb. 2010, via phone. Notes.

<sup>4</sup> Webster's Ninth New collegiate Dictionary.Springfield, MA: Merriam-Webster Inc. 1988. Print5 ibid

the cost of vacuum-forming is in the construction of the molds; however since Hou/Minn would be working with small initial production run for their prototypes, the molds were constructed out of CNC milled MDF (versus aluminum for large-scaled production runs<sup>9</sup>). With Swackhamer's association with the University of Minnesota (UMN), Hou/Minn had the added benefit of working with Dave Hutman, Shop Foreman for the Electrical Engineering/ Aerospace Engineering and Mechanical department at UMN. Hutman purchased the vacuum-forming equipment specifically for this collaboration. Since the work was through the university, all of the work has been performed at cost.

Hutman, playing the role of the manufacturer for this example, was new to the vacuum forming process. Although perhaps unfamiliar with the process, it appears that the advantages to HouMinn of collaborating with Hutman (instead of a manufacturer) were that his inexperience freed him to experiment with new forms and techniques.

It appeared that the entire team researched the parameters of vacuum-forming before their experimentations for Drape Wall. The processes of vacuum-forming appeared to be flexible to their design and production needs. As Swackhamer noted, that although the parameters of vacuum-forming were often stated as a given, some of the rules could be altered<sup>10</sup>.

In this example, both designers and makers were learning about the process simultaneously. They learned that the quality of the vacuum-forming would be dependent on the draw, or vertical depth, of the mold—molds that required too much draw would often cause folds or pleats to form in the plastic. For the shapes that they formed, a draw angle of 5 degrees was required. Since Drape Wall was the first prototype for this team that utilized this process, the shape-making of the panels was kept fairly simple. In the end, all of these qualities affected the wall's design.

In addition, Swackhamer noted two limitations to vacuum-forming Drape Wall. The first, 9 Lefteri, Chris. Making It: Manufacturing Techniques for Product Design. London: Laurence King Publishing Ltd., 2007. Print. 55

10 This could also be contributed to the fact that the team was experimenting with small-scaled production quantities for their prototypes instead of largescaled production processes. vacuum-forming is primarily limited to plastic and there are inherent limitations of using plastic as an exterior cladding material<sup>11</sup>. To address the issue, HouMinn has been investigating forming the panels for Drape Wall out of metal using either blast molding or stamping. The second is that HouMinn has been working with small-scaled productions for their prototypes and that there may be differences between small and large scale productions for vacuum-forming would need to be addressed.

Despite the fact that vacuum-forming as a process was secondary to the design performance of Drape Wall, HouMinn is now engaging in specific research into this manufacturing process. They are investigating new vacuumforming technologies including a dynamic molding system that could allow the mold to change its shape. HouMinn has been awarded a small grant to work with a small industrial vacuum-forming manufacturer to see how their research may actually affect vacuum-forming productions.

### Carlos Jimenez Studio + Tilt-up Concrete

In this second case study, Carlos Jimenez Studio collaborated with a tilt-up concrete contractor to customize the casting molds for Rice University's Library Service Center (2002-2005) and Data Center (2006-2007). (See Figure 2 + 3)<sup>12</sup> As background to the projects, both storage centers are located on a newly donated campus that houses the university's support buildings and is about 5 miles from Rice's Main Campus. The main Rice University campus has a long and standing tradition of using brick for all of its buildings, and was interested in using a new material for its remote campus. Concrete, load-bearing walls were selected for the buildings' construction—both for its durabil-

12 Figure 2: Rice University Library Service Center, by Carlos Jimenez Studio. Jodidio, Philip. Architecture Now! 6. Hong Kong: Tashen, 2009. Print. 293 Figure 3: Rice University Data Center, by Carlos Jimenez Studio. Jodidio, Philip. Architecture Now! 6. Hong Kong: Tashen, 2009. Print. 291

<sup>11</sup> Plastic is typically UV sensitive, has a high-coefficient of thermal expansion, loses strength at relatively low temperatures. Because plastic is primarily a petroleum-based product, the material is particularly environmentally friendly—perhaps conflicting with Drape Wall's environmental performance.



FIGURE 2: Rice University Library Service Center, by Carlos Jimenez Studio



FIGURE 3: Rice University Data Center, by Carlos Jimenez Studio

ity<sup>13</sup> and cost. Although these storage building's would be rarely visited by Rice University's students, faculty and staff, Jimenez believed that the design of both building should give them dignity<sup>14</sup>. Towards this end, he introduced a profile on the buildings' walls. The profile offered a design refinement not typically associated with either tilt-up construction or storage facilities.

Tilt-up concrete is somewhat similar to precast concrete, in the fact that it is cast in place, but differs because it is allowed to cure before erecting it to its final location. Jimenez stated that tilt-up was used instead of precast for a number of reasons: because of the site's open land, there was ample space at the construction site to stage the tilt-up production; tiltup construction reduced the buildings' carbon footprint over than of that of precast concrete due to lower transportation expenditures; and because the remote campus is near a major road interchange, it may have been too difficult to maneuver the necessary precast lengths required<sup>15</sup>.

Traditional tilt-up construction processes includes site casting the building's foundation and slab on grade. Once the building's floor slab cures, the wall slabs are poured on top of the floor slab, are allowed to cure, and then are tilted into place. Typically in this process, the surface of the wall panels is directly informed from the flat surface of the floor slab. Instead of limiting the load-bearing concrete tilt-up walls to a flat surface, Jimenez wanted to experiment with the possibility of customizing their surfaces profiles. Towards this end, Jimenez engaged with a tilt-up contractor who would be willing to work with him to alter the contractors' traditional process.

Since the contractor was asked to deviate from the traditional process of tilt-up construction, Jimenez believed that the contractor was initially uncomfortable with customizing the profiles of the panels, because it asked them "to leave their habits"<sup>16</sup>. However Jimenez felt that these projects were a successful collaboration because the contractor discovered that this could be a creative process. When the contractor was able to be invested in the results of both the process and the product the contractor became fully engaged in the exploration and testing of the concrete panels.

The first building, Library Service Center, used Styrofoam molds to form the walls. As the architect and the manufacturer worked together, they experimented with the depth and the shape of the profiles. The wall panels needed to be able to be easily removed from the molds with the least amount of damage to both the concrete wall and to the mold. They found that if the molds were too deep or the draw angles too steep the concrete and/or the mold would be damaged in removal. Dur-

<sup>13</sup> The Library Service Center was commissioned after their original library storage facility suffered a flood. According to Jimenez, because of the potentially sensitive information backed up in the Data Center the University was also interested in this facility's security.

<sup>14</sup> Interview with Carlos Jimenez, Principal of Carlos Jimenez Studio. Houston, TX. 2 Feb. 2010, via phone. Notes.

<sup>15</sup> Some of the exterior walls of the Library Service Center were 50 feet tall

<sup>16</sup> Interview, Jimenez

ing the experimental phase, 7 different profiles were tested. The use of the Styrofoam for the molds also was an experiment. During construction the Styrofoam did not have enough durability to be used repetitively, and would often require repair between pours. The Styrofoam also acted as an insulator for the heat generated during the concrete's curing process, causing some surface inconsistencies between pours. On the subsequent Data Center, both Jimenez and the contractor learned from their experiments and construction processes from the Library Service Center and began to use plastic molds in place of Styrofoam.

For both of these buildings, Jimenez made use of the repeatability and modularity of this process. The architect designed the building so that the contractor could reuse the formworks whenever possible, thus systemizing the process. Even the building windows were designed to fit within the building's module. By reusing the formwork the cost of the buildings' construction was not greatly increased in spite of the collaborative experimentations with the customized profiles<sup>17</sup>.

Although the tilt-up concrete panels were not formed in a factory, it is this paper's assertion that because of Jimenez's particular application and embracing the possibility of a repetitive process for this technique, the application of this process qualifies as manufacturing.

#### Wahoo Decks + Extruded Aluminum

In this final case study, the manufacturer, Wahoo Decks, had particular knowledge of a manufacturing process and utilized that knowledge to develop new architectural products. The products are named Dry Joist and Dry Joist EZ and are manufactured from extruded aluminum. (See Figure 4)<sup>18</sup>

As context to the company and the product's development: Wahoo Decks, was started fairly recently from its parent company Wahoo Docks. Wahoo Docks has been manufacturing docks for the past 20 years<sup>19</sup>. According to



FIGURE 4: Photograph of Dry-Joist EZ shedding water.

Michael Lyle, Wahoo Deck's Vice President of Operations and Business Development, about 14 years ago Wahoo began designing and manufacturing all-aluminum docks, using extruded aluminum profiles<sup>20</sup>. As a dock manufacturer Wahoo Docks designs and assembles the aluminum profiles into custom docks, but subcontracts their aluminum extrusions to a nearby lower-tiered manufacturer. Wahoo owns all of its proprietary profiles designs and uses its knowledge of aluminum extrusions to develop new products.

Soon after their production of all-aluminum docks, Wahoo Docks designed a proprietary product called AridDek. AridDek is produced from extruded aluminum; it structurally spans, provides an aluminum deck surface, and provides drainage channels within its profile to keep the areas below dry. Because AridDek offers water-tight construction underneath its deck surface, architectural contractors and builders started approaching the dock company to use their product in architectural applications. As AridDek was specified by more building contractors, Wahoo Decks formed a separate company from Wahoo Docks. Since AridDek, Wahoo Decks has developed Dry Joist and Dry Joist EZ specific to the building industry.

Similar to AridDek, DryJoist is extruded aluminum spanning system and is designed to channel water away from the structure, providing a watertight ceiling surface below. Unlike

<sup>17</sup> According to Jimenez, both of these buildings were on budget.

<sup>18</sup> Figure 4: Photograph of DryJoist EZ shedding water. Image courtesy of Wahoo Decks.

<sup>19</sup> Wahoo Docks Website. Wahoo Docks, 2010. Web. 10 Feb. 2010. <a href="http://www.wahoodocks.com/">http://www.wahoodocks.com/</a> aboutUs/index.htm>

<sup>20</sup> Interview with Michael Lyle, Vice President of Operations and Business Development of Wahoo Decks. Gainesville, GA. 28 Jan. 2010, via phone. Notes. 3 Feb. 2010, Email.

AridDek, DryJoist does not provide an integrated deck surface; instead it gives a fastening surface that any traditional decking material can be attached in any pattern (e.g. diagonal, picture frame, etc.). DryJoist can span up to 8 feet, offers dry channels to run electrical conduit for below deck lighting, and is designed to offer a finish ceiling at its underside.

DryJoist-EZ was developed as a recent refinement to DryJoist. DryJoist utilizes 6 different extruded aluminum profiles for the full assemblage; because of the complexity of assembling with 6 profiles the product's retail application was limited. To make the concept more attractive to standard retailers DryJoist-EZ was designed to reduce the number of Stock-keeping Units (SKU's) from 6 to 2. DryJoist-EZ's also uses less material than DryJoist and subsequently the cost of EZ is less. The spanning capacity of was also reduced from 8 feet to 6 feet. Both products were awarded an R+D Award from Architect Magazine in 2009<sup>21</sup>.

The uniqueness of this particular example is that it was not developed by architects or building designers. DryJoist was developed to meet the need of a particular market segment and was further refined to increase its retail application. Designed by two mechanical engineers within the company, the product's design is driven by practicality and knowledge of a manufacturing process rather than directly influenced by architectural aesthetics<sup>22</sup>. Although not designed by an architect, the design process necessary to refine DryJoist-EZ from DryJoist was certainly similar to building designer's iterative process, with "hundreds and hundreds of different options drawn over a 4 week period"<sup>23</sup>. Wahoo used their knowledge of the processes for extruding aluminum to design the new profiles for EZ. They used

solid modeling software for virtual testing. In conjunction with their lower-tier extruder, the team is agile enough to be able to prototype a particular profiled extrusion within 14 days of design completion.

Unlike Wahoo Docks that manufactures the docks from the lower-tier manufacturers produced aluminum extrusions, it appears that Wahoo Decks in not responsible for the manufacturing of DryJoist and DryJoist-EZ, but instead are responsible mainly for the products' designs. In contrast to Wahoo Docks, Wahoo Decks collaborates with its manufacturer to produce the final products.

The best example of this required collaboration is the finishing required of DryJoist and DryJoist EZ. For architectural applications most customers want to paint the exposed 'beadboard' ceiling on DryJoist's underside and Wahoo Decks asks it extruders to provide an initial electrostatic paint as a primer on the product. Most aluminum extruders do not necessarily provide a paint service as it introduces another process to the extruder. In addition, the most cost effective paint system for aluminum profiles is vertical-line painting<sup>24</sup>, which orients the profiles vertically, thus greatly increasing the space requirements of the manufacturer. Typically, most extruders who vertically paint their profiles limit their paint lines to 12 feet. Unfortunately, in the building industry 24 foot lengths are necessary and so Wahoo Decks needed to find an extruder that could paint the longer lengths. Currently, Wahoo is getting requests for 48 foot lengths and subsequently are working with the manufacturer to see how to achieve those lengths in a cost effective manner. The future of this investigation between Wahoo and its extruders for cost effectively painting longer profiles has yet to be determined.

# Conclusion

In conclusion, Architects, designers, and students are becoming more aware of manufacturing processes and how those processes may be applied to architecture. The promotion of

<sup>21</sup> Gerfen, Katie and Amanda Kolson Herley. "Third Annual R+D Awards". Architect, Aug. 2009: 46-74. Print.

<sup>22</sup> This is illustrated an example that Lyle offered: The underside of DryJoist was designed to have a bead-board finish and for the product's first production Wahoo's two mechanical engineer designers designed their understanding of a bead-board style. Subsequently, builders gave them feedback as to how bead-board is actually to look, and so the profile was altered to meet the aesthetics of the home building industry.

<sup>23</sup> Interview, Lyle

<sup>24</sup> Extruded aluminum can be painted in horizontal orientations; however the cost is approximately two times that of vertical line painting. The increase in cost, often makes this method infeasible for a commercially available product.

design integration, new developments in CAD/ CAM process, and an increased awareness of manufacturing techniques, and the knowledge of architectural practices that are engaging with off-site fabrication are revolutionizing architects' design processes. This paper defined manufacturing as a systematic production of either a product or a process, and intended to elevate the term within architectural design and production.

Armed with knowledge of manufacturing processes practicing designers, design researchers, and manufacturers are utilizing atypical fabrication techniques for the designs of alternative architectural components. The three case studies that were selected-HouMinn Practice's use of vacuum-formed plastic, Carlos Jimenez Studio's customization of tilt-up concrete, and Wahoo Deck's development of new product utilizing extruded aluminum-demonstrate how building designers can engage directly with lower-tier manufacturers. These three case studies also identify three different approaches to working with production processes. The first was HouMinn's particular design intent and their investigation of a fabrication method for the development of a prototype. The second was Jimenez exploring an already existing process and proposing design improvements. Lastly was Wahoo's understanding of a particular process and their designs of a new product that utilizes that process. Through this paper's three examples, we may better understand how designers are engaging in interdisciplinary collaboration with manufactures to develop new and innovative architectural components. Lessons learned from the research of these case studies have value not only for the particular projects and processes but also for the design and manufacturing communities at large.

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# DIALOGUE AND THE ARTIFACT Making Connections

JAMES BASSETT, ASSISTANT PROFESSOR VIRGINIA TECH

The shock of hearing yourself is that you hear an unexpected otherness.<sup>1</sup> Harold Bloom

Although the trajectory and medium of design is often focused on the manifestation of a physical, material artifact, designers don't always make that which they have designed. This is exemplified in pithy, if limiting, phrases like 'Architects don't make buildings; they make drawings of buildings.' And while statements like this carry a modicum of truth, they can be misunderstood as linear and hierarchically oriented towards product. In this paper, design is framed as making in its own right, a practice that is informed by an exchange and communication with the medium of design resembling dialogue, a reflective and inclusive practice that moves parallel to intended artifacts or outcomes.

# **Opening Dialogue**

Student to the Master, 'How does one avoid the duality of summer and winter?'

The Master replies, 'In the summer I am hot, in the winter I am cold.'2

Though dialogue always implies the Other, it is from the first person that we learn to listen, to establish a reference, and to become open to direct experience and the emergence of new information. From the obvious and subtle attributes of material to the insights of col-

1 Bloom, Harold. *How to Read and Why.* New York: Scribner, 2000: 89. Print.

2 Original Teachings of Ch'an Buddhism. Trans. Chuang Chung-Yuan. New York and San Francisco: Pantheon Books, 1969: 44. Print. The quote is a paraphrased version of the exchange between a student and teacher. The work continues: "What Tung-shan [the master] meant is that there is no separation between feeling hot and the summer, and between feeling cold and the winter. When 'hot' is identified with summer, and 'cold' with winter, reality interfuses appearance." laborators, design benefits from a free flowing and open exchange. Dialogue is interplay; it is listening and becoming. But listening is not always so easy; it is a developed skill grounded by the confidence that one is able to respond to and incorporate *any* information or *any* condition without exclusion.

This range of conditions develops as a multiplicity, and while we search for order within the work, a simplification in order to 'overstand' a situation, there is a richness latent in the range of potential influences underlying any work of design at any scale. These underlying influences may range from the direct goals of utility and problem solving to the complicated role of multiple voices marked by varying agendas, ideologies, and values. The designer struggles to make sense of this multiplicity, an experience that can lead to an oversimplification in a rush to solve a perceived problem, or a paralysis that results from being overwhelmed by the extent of associated questions.

In Beginning Design, it is common to find students toggling between over-quick solutions and debilitating choices. And while suspending the rush to solutions might quickly land one in the overwhelmed condition, we might ask, 'How and why would we dwell in an absence of purpose?' It does not dictate that we reject purpose; constraints will always provide some structure to a nonlinear and unpredictable creative process, but utility alone is not it, or at least not all of it. In the same way, any design process solely bound by a single script, ideology, or preconception will be, by definition, limited (i.e., ethical, cultural, phenomenological, material). The suspension of a singular purpose as the sole drive in a work enables a larger space of possibility, reference, and imagination to emerge that includes purpose. Understanding the questions, not looking for the answer, grounds the work of design and enables an open dialogue with the world

around us, ultimately allowing for an eyeopening shift in our perception.

Damp clothes draped over a heater, for example, momentarily shift the function of the heater with respect to its intended use and open its meaning and possibility. Objects of design are aggregators of meaning and use, built upon a foundation not always lin-



FIGURE 1: Improvised sweater potholders.

early derived or intended. The inclusive designer sees material in the same way, free from obliged associations, *not this is for that*, but *this is this* at its essence. Even though the heater is temporarily misused, it allows for it, it has range. Likewise, a sweater, beyond the implications of its name, is a material construct, an interrelationship of parts that behave in a particular way at a particular scale and through a particular presence. After that, all bets are off; the stretched sleeves of a sweater function as an immediate if temporary potholder (FIGURE 1).<sup>3 4</sup>

### Tools, Medium, Maker

Design is often regarded as the form imposed on the material by the designer. But if we, as designers, cooperate with the material, treat it democratically, you might say, we will reach a less subjective solution of this problem of form, and therefore a more inclusive and permanent one.<sup>5</sup> Anni Albers

The oversimplification of a design process, when merely a race to solve, stands in contrast to the burden of complexity. It is not uncommon for students in the early phases of a design project to attempt to make the work more interesting by adding unnecessary complexity. Design is inherently complex, and the context of design is inherently complex. One does not need to over reach early in the process. As soon as the invisible connections and relationships begin to be revealed, complexity will arise. This can happen rather quickly when



FIGURE 2: David Nash, A Useful Pig.

a design project enters a dialogue with a culture of material and making.

Every design discipline gathers around a common, yet unbound, material culture consisting of standards, tool sets, references, and wide-ranging media. While open enough to allow for project specific conditions such as the availability of material, local resources and skill sets, it is coherent enough to be recognized as a common palette and continually emerging body of knowledge. When we look closely at specific materials and tools, though we may find them consistent in isolated attributes, their potential expands when the dialogue allows for misuse, reinterpretation, or a simple reframing. Fabio Morabito writes of the ubiquitous screw:

A screw is morose and circumspect, like oil. It is like a lubricated nail, manufactured to be mindful of other materials and to get along with them, careful not to impose its laws on them. In a screw

<sup>3</sup> Brandes, Uta, Sonja Stich, and Miriam Wender. *Design by Use: The Everyday Metamorphosis of Things.* Berlin, Germany: Birkhauser, 2009: 111. Print.

Improvised sweater potholders: Ibid.

<sup>5</sup> Albers, Anni, and Brenda Danilowitz. *Anni Albers: Selected Writings on Design.* Hanover: University Press of New England, 2000: 38. Print.

the tough monologue of the nail has been transmuted into dialogue and negotiation.<sup>6</sup>

This simple shift and reframing, suggests that even the most common materials and tools can be approached with a sense of wonder. With this intentional opening to a beautiful, if basic, palette, the maker is transformed.

Tools enable dialogue with material, simultaneously sponsoring a more complete image of the nature of material, and moving beyond material attributes to reflect the ubiquity of machines and material culture's adaptation to them (FIGURE 2).<sup>7</sup>

Imagine the full range of impact of the simple screw on our built environment. From ancient beginnings to a ubiquitous presence today (from Archimedes to the router bit in a CNC mill) each new variation of a tool spans a range of hardware and software, steel and scripts and the nuanced space of exploration that opens around them. Coupled with material (titanium screws used in orthopedic reconstruction, or ceramic screws used in nuclear reactors) emergent technologies foster an everexpanding palette with new implications.

## A Complex Palette

When the questions that arise in the design process are focused on an even tighter range, to materials themselves, we find that materials are never neutral; they participate in how things are made and how they are read or received (wood grain and species direct the gouge, dense wood can be machined, wood is warm, etc.). Materials bring attributes and histories to the conversation, whether they are acknowledged or ignored. Their attributes, in part, shape the perception of artifacts during the process of design, and as a further stage of its making, the making of meaning echoes far beyond the author. Materials are alive; how does one handle this, respect it, and engage it?

### Context of Material

When we look at a single material we find it structured with connections, origins, and life, underscoring the hidden complexity of any material palette. Christien Meindertsma's project, *Pig 05049 1:1*, a work that explores the reach of a single domesticated animal in contemporary culture, has been called a work 'from the perspective of an urban designer.'<sup>8</sup>



FIGURE 3: Meindertsma, Christien. PIG05049 1:1.

She herself frames it as an investigation of the invisible 'lines that link raw materials, producers, and consumers worldwide.'<sup>9</sup> (FIGURE 3)<sup>10</sup>

It is unsettling to refer to a domesticated animal as raw material, but perhaps it can be understood as the veracity of connectivity, shifting and amplifying instead a view of the materials and landscapes currently being consumed and transformed into products and buildings.

Seen from the point of view of origins and extents, *Pig 05049 1:1* is a detached look at the broadcast of a single animal. Meindertsma's photographic survey does more than intimate the complexity of issues that arise around the animal's use, some that seem straightforward or necessary, and some that seem superfluous, or less important. It remains difficult to establish what the boundaries are (characterized by dualities of useful/useless, good/bad, ethical/unethical, etc.) in any definitive way. The boundaries nonetheless exist for everyone in some differing form. For designers, it is a worthwhile effort, even if answers remain elusive, to explore one's role with respect to these

<sup>6</sup> Morabito, Fabio. *Toolbox.* Trans. Geoff Hargreaves. New York: Bloomsbury, 1999: 44. Print.

<sup>7</sup> David Nash, *A Useful Pig.* The work contemplates the domestication of the natural, tree, adapted for people's use through tools, and people adapting to machines through the manufacture of a 'useful' object.

<sup>8</sup> Meindertsma, Christien. *PIG05049 1:1. Rotterdam: Flocks*, 2007:394. Print.

<sup>9</sup> Ibid: 392.

<sup>10</sup> Ibid:10-11. The single outline, or a map in the shape of a pig, functions as a global boundary within which the territories of a single animal are broadcast.

questions for it is within this bandwidth of difference that design resides. The context of material is part of the multiplicity and allowing it to enter the dialogue in a measured way can be generative.

### Scale and Materiality

The nature of materiality raises questions at multiple scales, just as the context of a material intimates an expansive network within which one makes decisions. The tools and materials involved in the creation of Richard Serra's, Berlin Block for Charlie Chaplin, for example, suggest that multiple scales operate simultaneously, and that these scales resonate with equal intensity through the work. From one point of view, steel is a condensation of a single attribute of an iron rich landscape, an elemental quality. To forge it is to further compress it, and for the Berlin Block for Charlie *Chaplin*, Serra required a forge that could work with a 70 ton cube of steel, compressing it to a 6'3"×6'3"×6'3" mass. Serra speaks of the scale of the body, pointing out that this 80' high forge was operated by a single hand.<sup>11</sup> Scaling in further, Serra hoped to avoid a 'sugar cube' reading of the work,<sup>12</sup> looking instead to produce a hard edge, beginning with a 10mm radius as a target and ultimately achieving a 5MM radius.<sup>13</sup> Scaling in further, he discovered that the molecular structure of the magnesium and carbon steel, when heated to 1280°F was cubic.<sup>14</sup> About the process he says:

I am not relying on an industrial module (buying a product from a warehouse, for example, which in a sense is very alienating, distancing from the material) I was able to work on the level of immediacy and direct the procedure of production. In effect I was making and forming material from its molecular structure on up.<sup>15</sup>

The orders of magnitude in the work, physically speaking, drift into other realms. The

11 Serra, Richard. Interview with Annette Michelson (1979). "The Films of Richard Serra: An Interview." Richard Serra. Edited by Hal Foster with Gordon Hughes. Massachusetts, MIT Press, 2000: 44. Print

12 Ibid.

13 Serra, Richard. Interview with Gerard Hovagymyan. "Rigging." *Richard Serra: Interviews*, Etc. 1970-1980 by Richard Serra and Clara Weyergraf . New York, The Hudson River Museum, 1980: 127. Print.

15 Ibid: 127-128.

work is politicized, invoking Chaplin and challenging the adjacent National Gallery of Berlin by Mies van der Rohe, while conflating a broad range of material and tool attributes with that parallel realm: the work informing and creating culture. From a single, simple, material beginning expands a broad range of decisions, embedded and layered as sites of intervention and engagement. A single work gathers around itself a multiplicity, especially as it moves away from its maker and into the stream of culture. The nature of this multiplicity, of all these attributes, is its simultaneity. A work of design like art, maintains a state of becoming; this is the life of design.



FIGURE 4: Eggs Wrapped.

### Freedom from Designations

The world presents a broad range of materials that carry ephemeral attributes: cultural reference, attributes of presence, time, vulnerability, and an associated and ever-expanding set of tools. Though these materials and tools may be complicated by the intersection of the contextual questions facing designers (economic, cultural, or ecological agendas and motives), they situate themselves as points of reference within the dialogue and above all ask that the designer approach them with complete openness, to see them as free from designations and prescriptions.

The distinction between material and product is especially important for designers to consider. Products, even more strongly than preconceptions about material, tend to dictate a trajectory, cast as inevitable, towards their use. But to see something as it is, beyond product, names, or the limited directives of use, is to see the true medium.

<sup>14</sup> Ibid.
The carefully wrapped five eggs, 'packaging born of rural necessity'<sup>16</sup> (FIGURE 4)<sup>17</sup>, exemplifies the opportunities of dialogue and the importance of listening to inform a thorough design process. This artifact demonstrates the ability to look at a thing completely openly, to see its attributes that hide behind the name of a thing-in this case the material, rice straw. The product of design here is lucid and open to the degree that it folds back upon itself, it is it, only more vitally as perceived and engaged. Nothing can be added or taken away; it has become, through design and like the plant in the field, complete in itself. The material and dialogue are underpinned not only by material attributes, but by other constraints: the nature of eggs, 5 as a cultural unit, the culture of 'wrapping' in Japan, etc., creating a complete dialogue enveloping maker and material.

Seeing something as it is, we avoid abstractions. In the design process it is common to use a wide range of modeling materials to develop a work. Often they remain entirely neutral, or rather, their effects on the work go unnoticed. Their attributes ignored, we look through them towards what they represent. Cardboard and chipboard site models or foam study models are too often neutral, if in an unconsidered way, left at a great distance from that which they represent, or at times superficially mimicking only the visual qualities of a material. Material is not so simplistic, but actively capable of informing the dialogue and becoming an equal participant in the design process.

## Drawing Photography Close

In some way, drawings behave like materials. They can register the physical actions of their making and they are capable of communicating non-verbally. At the same time, they have an ability to transcend the limits of material they represent. With drawings we can 'see through' walls and floors, abruptly shift scales, and connect space through the section drawing or wireframe. As with the materiality of models, the unique attributes of the materiality of drawing, across the range of form and media, have the potential to substantially inform the design process.

Drawing, as a practice and discipline itself, transcends the limits of shifting values placed upon the medium (i.e. hand drawing vs. digital drawing). When we speak of the value of drawing as a way of seeing, designing, and communicating, we can identify the way in which the specific medium of drawing begins to communicate both outwardly, bringing others into the work, and inwardly, the tool pushing back on the designer and offering something very specific in the process of its becoming.

Like other forms of dialogue discussed here, drawing begins to gather around it a constellation of opportunities, references, and associations. Digital media in particular has altered the way in which drawings, image constructs, can be confused with photographs. And like photographs, drawings are a way of seeing that is mediated by a tool or instrument. As is the case with many disciplines, what describes the disciplines of photography and drawing becomes less distinct along their borders. Painters like Edgar Degas, for example, openly used photography, in the infant stages of photography's development, to advance preparatory work for figure paintings.<sup>18</sup> More controversially, the case has been made that the highly detailed paintings of the Old Masters were influenced by, if not directly constructed with, the aid of lenses and mirrors.<sup>19</sup> In the discipline of photography, the medium is challenged by questions of authenticity given the ease of manipulation and false promise of objectivity, either through framing and staging or through alterations made to direct a narrative. From Robert Capa's seemingly staged photographs of action in the Spanish Civil War,<sup>20</sup> to the more recent digital editing of contemporary images manufactured to support the agenda of the State,<sup>21</sup> photographs remain

18 Schaefer, Iris, Caroline von Saint-George, and Katja Lewerentz. *Painting Light: The Hidden Techniques of the Impressionists.* Milano: Skira, 2008: 86. Print.

19 Hockney, David. Secret Knowledge: Rediscovering the Lost Techniques of the Old Masters. New York: Viking Studio, 2001. Print.

20 Whelan, Richard. "Robert Capa's Falling Soldier: A Detective Story." *Aperture* no. 166, 2002: 48-55. Print.

21 Hadhazy, Adam. "Is That Iranian Missile Photo a Fake? A Q&A with Hany Farid, doctored digital-photo

<sup>16</sup> Oka, Hideyuki. How to Wrap Five Eggs: *Traditional Japanese Packaging*. Boston, Massachusetts: Weatherhill, 2008: 193. Print.

<sup>17</sup> Ibid: 26. 5 Eggs Wrapped.

powerful tools of communication. Within this context of the medium, with its inherent subjectivity, designers have the potential to liberate themselves through creative nonfictions, a form which exchanges coercion and manipulation for creation.

Long before the advance of digital tools, artists and designers employed the visual specificity of the photographic image through collage suggesting light, scale, gravity, and visual reference to engage a direct, physical response. These images, using the clarity of this visual language to help carry a set of ideas forward, became 'a creative trigger of lateral referencing.'22 As constructs, they stood on the border of drawing and photography, a form of collage that did not explicitly dwell on the gesture of collage, in terms of difference, but sought a borderline narrative, briefly inhabiting drawing and photography as a vehicle while dissolving those distinctions in a dialogue extending the disciplines.

These prescient, fictional images predicted the myriad questions that digital media brings to how we construct our places, how we construct our way of seeing, and how we project forward an image of artifacts and effects. In the design process, the role of the fictional image, or creative non-fiction, might be considered as significant as the artifacts they point towards. Acknowledging the role of questions and uncertainty, one exchanges absolutes for the subjunctive. In the space of the image, places are constructed, not entirely unlike dreams or memories, to inhabit and influence a space of imagination. Like direct, physical connection with material, the visual lure of the fictional image communicates non verbally; it attaches itself to its audience in the same way as to the maker, transcending the tool and building upon the foundations of space: light, gravity, scale, and reference, that the projected work of design moves towards, the space that the body understands. The artifactual presence as one mode of making, and the parallel design process as another, allow for this, creating a

unique, yet collaborative, dialogue where consensus is not the goal, only connectivity.

#### Conclusion

When shaping an axe handle, the model is close by.

Sensei Furuya

It is not in the distinctions between the various media of drawing and modeling where measures of value or limits lie, but in the open potential to communicate and make connections. Drawing, for example, is a practice that transcends any specific media, remaining ripe with potential, communicating across time and across disciplines. The tools of the design process enable a shift in the maker's perception and those with whom the work communicates. The Beginning Design student is making a transition into an unfamiliar form of dialogue, a creative making that begins with first shaping and reshaping one's own vision; in this sense, the mind is close by. To focus on the Beginning Design student, from a pedagogical point of view, an openness of dialogue suspends the drive towards consensus. The exploration engaged by students allows for mistakes, detours, false starts, and discovery. This is a dialogue that begins quietly with the medium and broadens to include others and the artifacts.

The Latin roots of the word artifact, 'By art practices or using art, something is made,'23 opens the associations with culture and history. While we try to construct an image of the whole, it remains elusive, emergent, and beautiful in its diversity. Our translations from design process to artifacts diverge, representations from the artifacts, and fall away. Like a well-translated poem, the translator is present and not present, not in the way, not coercing, not forcing, not limiting, but opening a work to the fullest potential within the realm of translation.<sup>24</sup> The idea of a dialogue with material and tools should not be seen as limited to the design process. It is carried beyond the author's intentions into a world where it will

sleuth, on allegedly faked missiles--and tornadoes." *Scientific American.* 10 July 2008

<sup>22</sup> Cook, Peter. *Drawing: The Motive Force of Architecture*. AD primers. Chichester, England: Wiley, 2008. Print.

<sup>23</sup> Oxford University Press. *The New Oxford American Dictionary*. [Oxford]: Oxford University Press, 2005.

<sup>24</sup> Weinberg, Eliot. 'Anonymous Sources.' *Oranges* & *Peanuts for Sale*. New York: New Directions Books, 2009: 170–183. Print.

survive or be overlooked, creating and embedding the conditions for dialogue as gift to others. This is in part the beauty, interaction, and interplay of things, and the resonance of things in the world. The designer creates the conditions for synchronicity across scales, for others to engage in dialogue with the artifact, and from here it moves out into the world simultaneously complete and open, a conversation overwritten time and time again.

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# DEVELOPING A CULTURE OF CREATIVITY: THE MIT MEDIA LAB Making Connections

TONY P. VANKY MASSACHUSETTS INSTITUTE OF TECHNOLOGY

The MIT Media Lab is a unique research institute that has seen marked success in blending industry, creativity, engineering and invention in the research and envisioning of new technologies for everyday life. The Labs impact on society can be found in the creation of E-Ink, now found in e-reader devices like the Amazon Kindle, to the gaming concept used for Guitar Hero.<sup>1</sup> As it "invents the future", the Lab brings together engineers, artists, scientists and designers together in 30 research groups with hundreds of projects considering the future of human-computer interaction at a variety of scales. Beyond its research endeavors, the Lab also enrolls 138 students.

With all of these successes, no other institution including MIT itself, have been able to duplicate the success of the Media Lab model. Thus, it is worth asking what factors have contributed to the continued success of the Lab and what practices can one glean by looking at the Lab through two lenses—its distinctive institutional artifice—through its structure and history—and the dynamic composition and interaction of its people.

#### The Lab's Foundation

The Media Lab began in the Department of Architecture, as the Architectural Machines Group in the late-1960s. Group director, Nicholas Negroponte, began the group to investigate how computer technology could aid in the production of buildings. The focus shifted in the 1980s as Negroponte argued in communication media; he argued that in 2000, the computer, broadcast and publication industries wo<u>uld come together</u> (and indeed they have).<sup>2</sup> Massachusetts Institute of Technology. "About the Lab | MIT Media Lab." MIT Media Lab. http://www.

media.mit.edu/about/about-the-lab (accessed January 31, 2010).

2 Pg. 7. Dillon, Dan. "Interdisciplinary Research and Education: Preliminary Perspectives from the MIT Media Laboratory," *Harvard Project Zero* 13 (2001). As a result, the Media Lab was founded after receiving the support of then MIT president, Jerome Wiesner.

Though the focus shifted away from architecture and the architecture department, a more profound connection remains today. Kenneth Haase, former Chief Scientist of the Lab's News in the Future consortium and visiting associate professor at the Media Lab, argues that the Lab's concerns of "church and state" or the technical and the humane came from architecture. Architecture, in short, is "concerned about complex technical systems with humans among the considerations" while the Media Lab "has the same concerns but lives on a broad technological 'bleeding' edge".<sup>3</sup> This distinction is important as it sets the Media Lab apart from research programs around MIT. To Haase, computer scientists, mechanical engineers and other technologists will say the are concerned with people, but often only consider the human by biometric and psychometric means while architecture (and the Media Lab) also consider the aesthetic and psychological effects of a design.

The Lab also developed as a response to the Center for Advanced Visual Studies (CAVS), founded by Gyorgy Kepes. The mission was to facilitate "cooperative projects aimed at the creation of monumental scale environmental forms" and to support participating fellows in the development of "individual creative pursuits."<sup>4</sup> During Negroponte's time as a student and teaching at MIT CAVS brought in bright, entrepreneurial artists to the Department of Architecture and inspired many socially-oriented projects, not unlike the Media Lab today. Negroponte, however, believed in

<sup>3</sup> Haase, Kenneth. "Why the Media Lab works-A personal view." *IBM Systems Journal*, Fall 2000.

<sup>4</sup> Finch, Elizabeth. "Center History." *Center for Advanced Visual Studies*. http://cavs.mit.edu/MEDIA/ CenterHistory.pdf (accessed February 1, 2010).

a sponsorship model that departed from CAVS and would open channels for commercialization, thus increasing the impact, of the products developed at the lab. The resulting sponsorship model would later deeply connect the Lab and its researchers to industry while still strongly focus on the creative individual.

The Lab is also unique in that it seeks a wide and diverse range of sponsors who provide a fair level of financial stability, even in temporary downturns. Rather than sponsoring a specific project, corporate sponsors donate money to the entire Lab, where it is shared equally among the faculty members.<sup>5</sup> As a result, individual lab members or research groups do not have to justify their work to the funding organizations. This allows for a degree of freedom in pursuing ideas and work. Though MIT retains all intellectual property from the Lab, sponsors receive free license of any property created by the Lab as a whole.

This structure allows the Media Lab to attract a wider diversity of companies, some of whom may not normally find benefit from traditional engineering or scientific research; companies like Hallmark Cards, Swatch AG and Plymouth Rock Studios are among the list sponsors and consortium partners.<sup>6</sup> Beyond the financial support, sponsor diversity contributes to the vitality of the Lab as it forces members to both discuss and learn from an ever-changing audience whose business approaches, contexts and problems vary widely. As such, thinking between the various domains necessitates greater creativity in communicating solutions, approaching problems and defining processes for a research project. Students gain practical communication skills through their discussions with visitors ranging from engineers to government officials and visitors often leave with a changed point of view (and research which they could use for their own companies).

While the sponsorship model of the Lab provides it with ample resources, it also creates tension between the research outcomes and commercial ambitions of the sponsor; this is especially true of projects that are politically or socially-focused. An anecdote shared by a recent Media Lab graduate related to a project where website users could deface, replace or edit online advertisements without destroying the page's content sparked the interest of a media conglomerate who, in the same meeting, considered ways of making it profitable (and missed the inherent irony of their discussion). Similarly, research on autism and communication technology intended to accelerate the pace of research is also being used by a sponsor in the finance sector for use on customers at branch offices. This tension between the academy and industry is present, even when the relationship is close. It also serves as an analog to the conflicts seen between industry and the emerging interconnected economy. With societal debates of network neutrality and privacy concerns, the technologically utopian view of the Media Lab also faces friction with the issues beyond the confines of MIT's campus.

#### The People and Place

The development of this community begins with the admissions process, a unique process of talent profiling. Whereas most institutions rely on a proven record of undergraduate academic achievement, the Media Lab relies heavily on the extracurricular experiences of the applicant to understand how s/he uses their unstructured time in the pursuit of creative exploration (doing/making) and experimenting (pursuing curiosity); perhaps their activities are better evidence of entrepreneurship and performance in the classroom.<sup>7</sup> The aspiration of the process is to create an environment where students do not shy from crossing disciplines and research groups to create potential interdisciplinary collaborations as well as being intelligent in a conventional sense.

This difference is rooted in the Lab's distinction from most research groups where people may have a propensity of pursue a specific field of inquiry at enormous depth rather than lateral inquiry. The nature of research is such where skill sets from a variety of disciplines are required and a researcher needs openness, flexibility and willingness to move beyond the boundaries of the individual research groups and to MIT as a whole. As one example, City-Car project from the Smart Cities group has

<sup>5</sup> Dillon, 17.

<sup>6 &</sup>quot;Sponsor List | MIT Media Lab." MIT Media Lab. http://www.media.mit.edu/sponsorship/sponsor-list (accessed February 2, 2010).

involved dozens of students from the disciplines of urban planning, architecture, mechanical engineering, computer science, electrical engineering, civil engineering, transportation design, business among many more.<sup>8</sup> Simply, the questions raised at the Media Lab are often too large to which one person can have all the answers and expertise.

The composition of the faculty also shares this unique blend of varied talents and willingness to work laterally between the various groups. Some have come to consider a pre-requisite of being a faculty member at the Media Lab is to be a "misfit" whose skills in psychology, design, etc would normally exclude them from consideration at traditional engineering programs. Negroponte asserts that the mark of a successful member in the Lab is "a combination of intelligence, extroversion and openmindedness."9 This openness toward diverse perspectives aids to minimize a risk of, as Haase puts it, "intellectual inbreeding"<sup>10</sup> but also opens the possibility for a sense of intellectual isolation as faculty each have distinct expertise.

Further responsibility is placed on the faculty member as they are principally in charge of the research and interests of their groups. Many professors note that the tradition of hands-off management, begun by Negroponte supported by the egalitarian funding model, has contributed massively to the Lab's creative success. Simply, the policy is to give the researchers the resources they need to do their work and leave them alone. A popular anecdote is that of new researchers sitting down with Negroponte (and now Moss) seeking some type of affirmation for their ideas only to receive neutral and unsettling responses as it was the researcher's role to direct the research, not the director's.

The Media Lab, unlike most research groups, is also a degree-granting academic department. The program in Media Arts and Sciences grants masters of science, PhDs and offers some undergraduates the opportunity to perform research in the Lab as part of the Undergraduate Research Opportunities Program (UROP). Faculty members are also hired directly by the Laboratory. The structure of an independent academic community, versus being housed within another department or as a joint center between departments, allows faculty to be beholden to and the finances to remain within the Media Lab. This allows a greater degree of research and academic freedom, as well as personal dedication, which would otherwise not be available as the politics of the institution largely remain internal.

This autonomy allows the Lab to control the type of student admitted and faculty hired. Essential to the success of the Media Lab is a diverse range of perspectives and viewpoints as mentioned previously. Negroponte contends that this broadness sets the Lab apart as generally "graduate degrees, not to mention tenure, depend upon tunneling into truths and illuminating ideas in narrow areas."<sup>11</sup> As the Lab is solely responsible for its admissions and hiring, it has greater power to craft the human environment. Haase argues that the Media Lab independence, versus being part of another center, allows for more "core energy" rather than "marginal energy" of the department toward its research endeavors.<sup>12</sup>

#### The Demonstration

While the Lab produces a good number of customary academic outputs such as papers and articles, the demonstration is central to the education of the student, as well as the research and design. For many students coming from an engineering background, the notion of producing compelling functioning prototype for discussion, let alone amazing visitors and sponsors, is foreign. Similarly, for some students used to the architectural or urban scales are unfamiliar with producing actual-scale, testable prototypes. The demonstration as a pedagogical tool requires ideas to come to a level of completion and resolution at a one-toone scale. (Figure 1) It is only at the demonstration level can the project be tested against the ambitions of the student.

The importance of the demonstration is codified in the culture of the Lab through Sponsor Week, which occurs once a semester. Here,

<sup>8</sup> MIT Media Lab. "Group Information." Smart Cities. http://cities.media.mit.edu/ (accessed February 1, 2010).

<sup>9</sup> Dillon, 10.

<sup>10</sup> Haase, 426.

<sup>11</sup> Negroponte, Nicholas. "Creating a Culture of Ideas." Technology Review, February 2003.

<sup>12</sup> Dillon, 41.



FIGURE 1: Stressed Outsourced. Photo Credit: Jean-Baptiste Lebrune, Tangible Media Group

success is measured by the ability for concepts to be demonstrable and for the public to understand and be awed. Indeed, such a focused outcome lends marketing success and recognition for the Lab but also gives students concrete deadlines to complete individual projects as well as prepare them for various conferences after the Week.

The process and speed of the Lab's pace has created a weakness in the demonstration model at the Lab; there is little discussion or evaluation of the project's merits.<sup>13</sup> Often, students move quickly on to the next project and do not spend time critiquing or evaluating the merits or issues connected with the demonstration; the question remains in many cases of how one judges the social and cultural relevance and utility of the innovation. As mentioned previously, the emphasis on thinking laterally has caused a culture that in some ways opposes going deeper into some projects. So too, some hold the belief that while the process does not provide formal criticism, the disciplinary depth of the individual offers some grounding in a particular field of interest and place concern with the pace of production. In any case, whether the concern is with process or pace, some students and professors interviewed noted, some projects simply are not going to be very good.

## Learning

Inculcated within is the notion of learning by doing—the importance of making and experimentation. A visit to the lab will stir romantic images of hackers and makers in garages than a research lab one finds in most university sci-

ence and engineering departments. In most cases, students are empowered to develop their own individual projects and spend more than half of their time doing so. Through the iterative design process of making, refining and critique, the students develop new skills in programming, design or electronics through the constant refinement of their aptitudes and critical thinking abilities.

With so much freedom given to the student, one can examine the nature and development of the multidisciplinary culture of the Lab and how the individual may be empowered and developed within a design program. Students are largely free to develop their own projects for research within the banner of their home research group, though often they may collaborate with members from other groups as well as from MIT, Harvard and surrounding universities at large.

Media Lab students are required to take courses as part of their degree programs, but often attract students from across MIT and Harvard as well. In large part, the class topic and work produced in these workshop-oriented classes parallel research being conducted in the research groups. For the most part, students develop individual or group projects through the course of the semester, and rely on functioning prototypes and demonstrations of the concepts being explored. While much of what is produced is technology or engineering intensive, a typical iterative process guides the student through the various aspects, challenges and development stages of the project toward resolution-the final demonstration. Along the way, ideas are tested through creating personas, paper prototypes, animation and videos among many other methods familiar to designers to test the efficacy of their ideas and possible user scenarios. (fig. 2: Social Lunchbox Video Prototype).

Students also build necessary skills and learn by doing both within the research group and the classes, yet the onus to pick up many of those skills falls on the individual. In Neil Gershenfeld's *How to Make (Almost) Anything* class, students are introduced to a variety of manufacturing and fabrication processes including digital fabrication methods, electronics and circuitry and communication technol-



FIGURE 2: Social Lunchbox Video Prototype

ogy. Though the class is structured so students have a familiarity with various tools and skillsets and is intended for a variety of expertise. Throughout the course, students are required to develop their own individual designs and machines using each week's topic. However, a majority of the learning occurs outside of the classroom as students share and seek out instructions and guides on how to realize their ideas. The class is simply meant to provide the basic introduction and aid the students in finding out how to apply and implement the technology on their own. Many students find great difficulty as the class anticipates that not all students will have both the design and technical skills required to easily succeed at every assignment. Students will collaborate and share their individual strengths toward each other's projects and many will build upon projects found on website like Instructables to make projects their own.

With such a strong cultural focus on success and performance, a question of standards arises on how to consider or appraise one's performance yet for student and professor, the metrics as nebulous. Negroponte noted that to him, the prerequisite for advancement is world fame within ones field.<sup>14</sup> As such, even today, the successes and weaknesses of work for both students and faculty are difficult to evaluate except on the merits of press or industrial recognition received. As a teaching method, it becomes completely subjective to assess a project and difficult to provide proper feedback and criticism. Part of the intellectual tension comes from the very asset that makes the Lab unique-its diversity. With projects collaborating with so many disciplines, what or whose 14 Dillon, 32.

standards are appropriate to evaluate a project? As well, the specific focus of each of the individual research groups within the Lab each have their own set of conditions and points of views in which they operate. At this point, the solution remains unclear yet may be necessary to improve the disciplinary rigor of the Media Lab.

## Media Lab as Model & Conclusions

Attempts have been made to duplicate the MIT Media Lab model, yet none have seen the extraordinary success of the original. In 2000, Media Lab Europe opened in Dublin as a partnership between MIT and the Government of Ireland with Media Lab Asia opening short after in 2001 in partnership with the Government of India. However, the Irish went into voluntary liquidation in 2005 with the Indian lab parting ways with the original institution in 2003. Within the United States, Calit2 at the Universities of California San Diego and Irvine as well as Design Machine Group at the University of Washington have shared in the vision of new paradigms of human-computer interaction but have not had the notoriety or perceptive impact as the Media Lab. It is undeniable that the MIT Media Lab has served as a point of inquiry for other similar programs, yet its very uniqueness makes it difficult to draw conclusions or create a template for imitation and innovation.

First, its financial and institutional resources, as well as being situated at a university like MIT have given the Lab the means to be as uncommon as it has—it has been able to afford to take risks. Secondly, the cultural identity of the lab, of which its students, faculty and legacy are part, have yielded an environment where cross-pollination, creativity and risktaking are welcome and expected. Its focus is also broad, which has allowed the lab to adapt and grow with changes with external factors like technology, society, culture and sponsors as well as internal factors like new faculty and leadership. It is worth recognizing the influence of Negroponte and Wiesner as visionaries and powerful advocates, in addition to forming and directing the Lab's development.

Because of the complexities of the Lab's structure, attempts to copy the Media

Lab model may not succeed but lessons in approaching experimentation, creativity and innovation may be found. In teaching, one can find lessons in creating a culture of creativity and experimentation within and beyond normative disciplinary boundaries. In Haase's words, "The lab, in some quiet way, is like a dynamic art piece to which you contribute; like all such pieces, sharing it promises to yield far more than we expect."<sup>15</sup>

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- 15 Haase, 431.

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#### MICHAEL P. ZEBROWSKI, LECTURER MORGAN STATE UNIVERSITY

# THE COST OF MAKING IT Making Pedagogy

# Introduction

Basswood, chipboard, plywood, glue, screws, exact-o blades, parallel bar, insurance, fuel, printing and plotting, the list goes on and on. An architecture education adds up. Making architecture is expensive, scaled and full-scale alike. To what end do we provide the knowledge and guidance in providing a responsible and efficient fiscal approach to making and making it in our schools of architecture?

The US News and World Report, MSN Money and Forbes have all written on the 'hidden costs of college.'<sup>1</sup> The items they see as 'hidden' are everything from electronics and textbooks to beanbag chairs, bed sheets and a mini fridge, excluding only tuition and room and board. Granted these are, for the most part, all 'start up costs' that mostly only incur in the first year of college. What students and parents see in these first few months of college life is that it is much more expensive than first anticipated.

Now what if these parents are seeing their sons and daughters enter into a School of Architecture? Typically, the beginning design student in a school of architecture is hit with a list of tools and supplies that costs \$300 to \$1,000<sup>2</sup> in addition to the \$5,000 already spent on the common "hidden" costs. <sup>3</sup> What they may not know is that as they progress through a curriculum of six credit design studios where students will spend anywhere from \$500 to \$1,000 on materials, printing, software licenses, and more tools each semester. A Dalhousie University architecture student reported that in four years of architecture school, he spent \$3,871.77 (CAD) on materials and supplies, a whopping 25% of the universities 'recommended' budget for all school related expenses for four years, <sup>4</sup>

# Cost and Pedagogy

We know that college is expensive. We know that architecture school is also expensive. How does this relate to beginning design pedagogy and ultimately how these students end up as practitioners and academics? Simon Tomkinson says:

The construction industry has consistently needed more qualified project managers, more technicians, and better business practices. Yet, a primary tenet of

architectural education is that the industry is more qualified to train the student 1 Hannon, Kerry. 'The Hidden Cost College.' US News and World Report 9 Oct. 2006. Pulliam Weston, Liz. 'The Hidden Costs College.' MSN Money 11 Aug. 2009. Coolidge, Carrie. 'The Hidden Costs College.' Forbes 15 Feb. 2005.

2 Zebrowski, Michael. 2010. Informal Survey between author and 53 current and graduated architecture students, 8 February.

3 Hannon, Kerry. 'The Hidden Cost College.' US News and World Report 9 Oct. 2006.

4 Spence, Evan. Wooding, Kjell. 'Architecture School Costs.' Pintday.org 10 Jun. 2008.

in the intricacies of practice. The education about practice is limited primarily due to the emphasis on design education. What is it that we, as educators, teach in design education?<sup>5</sup>

Where design education may have faltered or forgotten is design's role within the larger process of delivering an architectural project and the importance of locating the education clearly within the process... Revisiting other fundamentals of our practice may offer similar insights.

Tomkinson doesn't advocate for us to teach to the profession, especially when it comes to beginning design pedagogy, what he does do is create a link between his definition of design, the content of architectural education (invention, arrangement, style, memory and delivery) and the practical (Schematic Design, Design Development, Construction Documents, and Construction Administration).

This linking of the process of design in school and design in the real world also relates to the issues of cost as it pertains to the 'larger process of delivering an architectural project.' Cost, as a fundamental aspect of designing and making architecture must be better defined and integrated into the beginning design education.

Our accrediting body has a similar concern when it comes to the content of what is delivered in a given schools curriculum. According to the 2009 Conditions for Accreditation NAAB outlines in both *Realm B: Integrated Building Practices, Technical Skills and Knowledge* and *Realm C: Leadership and Practice* the following:

B.7. Financial Considerations: Understanding of the fundamentals of building costs, such as acquisition costs, project financing and funding, financial feasibility, operational costs, and construction estimating with an emphasis on life-cycle cost accounting.

C.5. Practice Management: Understanding of the basic principles of architectural practice management such as financial management and business planning, time management, risk management, mediation and arbitration, and recognizing trends that affect practice.<sup>6</sup>

The AIA also supports the development of skills related to creating:

A realistic project budget estimates expenses, dictates design decisions, and, if permitted, serves as an educational tool for clients. Elements to consider when calculating a project budget include project scope, quality and performance levels, site, schedule, conceptual statement, contingencies, realistic figuring, and key assumptions.<sup>7</sup>

What if 'Understanding of the fundamentals of building costs... and practice management...' were emphasized and a pedagogical part of the habit-forming years of beginning design studios and supporting required courses? What would be the benefit and how would it be integrated?

# Three Factors of Cost in the Design Studio

Cost in any particular architectural studio is largely defined by the project that has been invented by the coordinating faculty. This in all cases 5 Tomkinson, Simon. 'Rhetorical Investigations: A general theory of design and architectural education.' 18th National Conference on the Beginning Design Student Proceedings (2002): 39-43.

6 National Architecture Accrediting Board, Inc. (2009, July 10). Conditions for Accreditation, p23-25. Retrieved Oct. 29, 2009 from http://www.naab.org/ documents

7 American Institute of Architect's. The Architect's Handbook of Professional Practice. New York: Wiley & Sons, Inc, 2007.



FIGURE 1: Michael Mayo – Object Files, ARCH 104, Morgan State University, Fall 2009



FIGURE 2: Kristin Delure & Jeff Wing - Buffalo Scaled, ARC 101, University at Buffalo

presents the studio faculty with a high degree of responsibility as to what costs the students will incur in taking their course. The development of projects for foundation studios focus on skill building, spatial understanding, basic program and intuitive structural understanding to name a few; what if consideration is given to the material pallet, tool pallet and general cost of learning these objectives? The responsibility lies with the educator to create a project statement, which creates an opportunity for high achievement using an economy of means, rather than allowing students to buy himself or herself out of work or feeling that to achieve they must have certain tools and materials. Students at times can have the perception that "if you wanted to do well you spent the money."<sup>8</sup> Are we setting up our evaluation of student work to at times hinge on the amount of money a student spends? What if students don't have the money to spend on acquiring the appropriate tools for the job, or the material of choice for the profession? Likewise, our schools of architecture can provide common resources available to all students, such as industry standard software on public computers, fabrication shops, digital cameras etc. Not only are shared tools and facilities economically beneficial to the students, they also reinforce messages of sustainability and cooperation between students, two areas that programs seek to emphasize throughout the curriculum.

The second factor of cost in the design studio has to do with the material type and logistics inherent in the materials chosen by the faculty. More and more we have to emphasize recycled and inexpensive materials for building models. Students at Morgan State University in their first studio dealing primarily with form, space and order are asked to use recycled corrugated cardboard, toothpicks and 90lb cardstock to design and build a series of topographical studies (cardboard) with trees (toothpicks) arranged on the landscape and finally inserted thoughtfully in the landscape are folded forms (cardstock).<sup>9</sup> This assignment runs the course of eight weeks and only costs the students less than ten dollars. The results are no less impressive and thoughtful than those using much more expensive materials and it is through these models that the students successfully demonstrate their knowledge of the foundational principals of form, space and order.

A couple of opportunities arise when recycled and inexpensive materials are used in the design studio. First, when discussing the craft of architecture with students, they begin to understand that craft is not dependent on the quality of the materials used, but rather is based on the handling of the material, an understanding of its properties and the way it connects with other materials present. Students become very aware early on in the process of working with these materials that the ability to craft resides in their effort and not in the quality of a given material. Secondly, iteration is a constant in the design studio and getting students to expand their design thinking through iteration is of utmost importance. Using materials that are readily available and inexpensive creates a platform for faculty to tout the importance of iteration. The students find less resistance to doing something over and over when the material they have found or purchased was easy to come by. I have often used plain manila

8 Anderson, Michael. Informal Survey emailed between author, 10 February 2010.

9 Figure 1 – Student Exhibit – Autonomous Landscape – ARCH 201, Morgan State University, Fall 2009

file folders for students constructing study models in beginning design studios.<sup>10</sup> Students learn to respect and manipulate the inherent properties of a material, however humble, leading to similar thinking when manipulating more typical architectural materials, creating a comfort in innovation and creativity.

In a project called Buffalo Scaled at the University at Buffalo School of Architecture Freshman Studio, a pallet of free Talking Phonebooks were delivered to the studio. Each student was given a phone book and through the course of one week developed their phonebook into a land-scape by carving away layers of pages to make a base or 'site' for future project development over the course of the semester.<sup>11</sup> The use of an existing/free/recycled object in this case allowed again an opportunity for student to engage design and craft in inventive and imaginative ways.

As mentioned previously coupled with material type is the logistics of any given material. Similar to Construction Administrators, studio faculty need to be versed in material availability, local suppliers, internet suppliers and other ways to lessen the cost of material for the studio. When purchasing large quantities of plaster for a studio it makes sense to bulk buy the material and pass down the discount to the student. A fivepound bag of hydrocal can cost as much as \$10.00 at an art supply store or hobby shop. When purchased from a building materials warehouse, a 100lb bag can cost as little as \$55.00, a savings of \$1.45/lb which when a studio uses 200lbs adds up to a savings of \$290.00 overall.

Now this isn't simply a lesson of saving money and cutting coupons for students. It is not simply the faculty's responsibility to find ways to save students money. It is our responsibility to begin to have them understand how to source materials, and how to be more active in understanding the logistics that surround the 'delivery of an architectural product.' In my Building Materials course at Mississippi State University I introduced cost and time management by requiring students, during a hardwood box fabrication project, to produce project budgets outlining in detail their labor time and capital investment to calculate the total cost of their wood boxes. Much as learning to properly twist a pencil as you draw a line, this awareness and set of skills are integral to becoming a successful architect, builder and businessperson. Students were surprised to learn that their humble wood boxes actually cost hundreds of dollars to produce.

'Calculate' refers to the many different types of accounting and mathematical operations that architects must perform in practice.<sup>12</sup>

Lastly the factor, which at times, we as faculty have the least amount of control over, is the funding source. Student projects in design studios are often mostly funded out of pocket whether it is their own, their parents or in the form of future debt through credit cards or student loans. When asked 'did the 'hidden' costs of architecture school affect your financial standing during school or after graduation?' these former architecture grads answered:

<sup>12</sup> Roger K. Lewis, *Architect? A candid guide to the profession* (Cambridge, The MIT Press, 1985) 195.



FIGURE 3: Student Exhibit – Autonomous Landscape – ARCH 201, Morgan State University, Fall 2009

<sup>10</sup> Figure 2 – Michael Mayo – Object Files, ARCH 104, Morgan State University, Fall 2009

<sup>11</sup> Figure 3 – Kristin Deiure & Jeff Wing – Buffalo Scaled, ARC 101, University at Buffalo



FIGURE 4: Concrete Wall Under Construction – Building Materials, ARCH 417, Morgan State University, Fall 2009

Yes and the hidden costs have been paid off after being out of school for two years, but I didn't let the hidden costs prevent me from doing what I want to do. I would ask the question 'how can I afford' instead of telling myself I can't afford.'<sup>13</sup>

Yes. Student loans are a burden, and they are limited. When you worry about money, and most people do, you are stressed out, and that affects ones ability to function as a student, employee, etc. In undergrad it was the fact that [student loans] were not enough to allow me to not work, and I lived very frugally, even compared to students who were in a similar situation. I made a lot of choices about what I could do, how I would engage in studio and my lifestyle because I was always trying to save a buck. Things like field trips are a great example of this, I drove to Charleston, SC for an 8 hr studio meeting when everyone else stayed in hotels to save money, and so that I could work. Sometimes students are not being asked to just give more, but also to take off of work.<sup>14</sup>

Other funding sources include: donations from local organizations, University, School, Departmental funding, and outside grants or scholarships. These are less dominant in studio as funding sources but are becoming more and more the norm especially when it comes to larger design build programs, for example the Rural Studio at Auburn University solicits donations online. How can these become more available for students in non-building based design studios? Especially where University funds are getting tighter and more tied up in this economy. Potential exists for creative funding opportunities as well, consider the possibility of alumni donations to provide students the means often necessary to fund their architectural education and projects.

For a concrete wall design build project at Morgan State University, students were given a budget of \$500.00 from the School of Architecture and Planning. These students worked directly with the faculty member to source all materials and design a wall that was efficient in it's use of material as well as the process of its construction. Through discussion with the faculty and execution of the product the students were well aware of the time and effort it took to manage the budget, craft the full-scale piece of architecture and ultimately understand the labor cost and value of the final product. Four class times were used over the course of three weeks, one day for design and budget calculations, one day for material acquisition, delivery and construction of the formwork and one day to pour the concrete. Thirteen students worked a total of 156 hours and if we estimated their pay to be \$15.00 per hour the total value of the project would be \$2,840.00.<sup>15</sup>

# Conclusion

The relationship between pedagogy in beginning design and the cost of that pedagogy is an important aspect to creating a well-rounded designer and future practicing architect. It is our responsibility as faculty to also realize the potential fundamental lessons that are intrinsic to the discipline of architecture that are iteratively reinforced over the course of a student's education. If we are aware of the bad habits we may be sup-

- 13 Brucz, James. Informal survey emailed to author, 10 February 2010.
- 14 Battin, Matt. Informal survey emailed to author, 10 February 2010.
- 15 Figure 4 Concrete Wall Under Construction Building Materials, ARCH 417, Morgan State University, Fall 2009

porting then we have a chance to change them. By raising awareness in students to the all-important factors of time, budget and the cost of becoming and being an architect, perhaps they will be more mindful of their own value, as well as the value of other people's money when they are practicing architects.

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# WORKMANSHIP IN BEGINNING DESIGN EDUCATION Making Pedagogy

STEPHEN TEMPLE, ASSOCIATE PROFESSOR UNIVERSITY OF TEXAS, SAN ANTONIO

Design decision making necessarily involves dialog between ideas and materials in the working out of a design - in the workmanship of design. David Pye's axiomatic statement, "design proposes, workmanship disposes" structures these decisions as design intentions materialized in an attitude of work that "completes the design" or otherwise thwarts its intent.<sup>1</sup> If workmanship is essential to design decision making, how can design curricula that rely on abstract representational means correctly teach design if not by students experiencing for themselves first-hand the connectedness between design and workmanship? For beginning design students, realization of the significance of workmanship offers more than judgment of technique or the degree to which intended design efforts are carried out on materials. These are important aspects but are rather thin measures, useful to learning design primarily in the narrow context of classroom dynamics. As an essential aspect of Pye's "disposition" of design, workmanship is more adroitly a fundamental characteristic of the world of objects that comes to significance through our bodiliness. Experiences we come to know through tactility and manipulation are obtained by our vision in a manner that lends it greater substance. Thus, considerations of workmanship offer direct pathways into design decision making that are part of the world and at the same time aspects of our experience of our surroundings.<sup>2</sup>

As a factor of beginning design education, workmanship offers construction of common ground for learning design that fosters greater self-direction on the part of students while readily developing deeper engagement and an "attitude of caring" for the world of objects. This can happen because workmanship raises fundamental categories of design decision making inclusive of material reality and is always understood in terms of project realization. Understood through our embodiment, issues of workmanship entail being close to the work, an aspect that enables measures of critique and design development to be more easily grasped, categorized, and even self evident. Also significant for learning design is that workmanship conveys iterative processes that show first hand that design is a transformative process.

The purpose of this paper is not merely to offer definition of workmanship or to explicate the virtues of workmanship in itself. To some extent that is assumed. Rather, this exposition finds that workmanship in the design studio is within a context where it already exists but is rarely recognized and its significance is even less acknowledged. It is my contention that workmanship is of great value for learning design, especially with respect to two pedagogical conditions. First, workmanship best functions as a tool of learning design when engaged in making, when ideas are realized directly with materials. Secondly, issues of workmanship are most salient in beginning design learning experiences, where projects ask for full scale one-to-one constructions as a result of design efforts. In this context students are most likely to come to the reality that objects of design speak for themselves. Learning in beginning design studios certainly does not begin and end with its projects, as they are, as a matter of studio processes, frequently interrupted with and further developed by verbal discourse, critical discussion, transformative manipulations, and comparative project review and critique, specifically with the intent of learning something beyond the projects themselves. Such is the role of beginning design stu-

<sup>1</sup> Pye, David. *The Nature and Art of Workmanship*. England: Cambridge University Press. 1968.

<sup>2</sup> Highlands, Delbert. As quoted in *Representation and Architecture*. Omer Akin & Eleanor F. Weinel (Eds.). Information Dynamics, 1982.

dio pedagogy. A further clarification of what is meant by "workmanship," will precede an outline of how its engagement can deepen learning experiences in beginning design.

# Design in the World

If you practice playing a particular song on a guitar or piano long enough, your hands practically play it for you - it looks easy and it looks unconscious. However this kind of playing results only from hours of practice and the honing of skills - in other words, workmanship. It may be said that a musician playing well has so much knowledge and skill that the action of playing is second nature - the playing is a part of the body as much as it is part of the music or a part of the instrument from which the sound emanates. That's why we call it "playing" instead of "working" an instrument - "playing" is a more immersive experience that seems to happen more than it seems delivered by a conscious mind or by the musical score.

The perception of the quality of playing is always at stake in musicianship. Is not a well written piece of music is only as good as the quality of its performance? And is its performance only a matter of being well played or does it have more to do with how well it can be listened to - *how it sounds*? The quality of a musical performance invokes a relationship between the music as it is controlled by the musical score as it is played and the listener as it is heard. A well written piece of music can be characterized as a "design for music" and is dependent on the workmanship of its performance as a principle measure of its quality.

Consider cooking. In a manner similar to a musical score a recipe is a 'design for food.' The cook "follows" the recipe by applying workmanship through the combination of raw materials and processes of heating, chopping, pureeing, etc., until it is made into the completed dish. The cooking certainly need not be carried out by the author, or "designer," of the recipe. The very nature of a recipe calls for it to be made by someone other than its author that's why it was written down. However, the designer of the recipe intends a certain relationship of control between the recipe and the specific way it is carried out through the workmanship of the cook. David Pye, in his book, "The Nature and Art of Workmanship," specifies that, "On the workman's decision depends a great part of the quality..." of the outcome.<sup>3</sup> Certainly this is true when a cook prepares food. The cook makes choices and many of these are not simply quantitative carryovers from the recipe. Even when following a recipe (which is a design) to the letter, there are decisions to be made not just about quantity of ingredients but also about the cut of meat, the type of vegetables and how they are to be cut up, the timing of adding ingredients, how long it will be cooked or exposed to fire, and so forth.<sup>4</sup> A myriad decisions about the cooking, rather than simply about the recipe, are made to transfer the recipe's design for food into the tangible reality of the completed dish, none the least of which is the cook's (or the workman's) direct experience with the ingredients as the dish is taking shape, especially and immediately foremost, the actual taste of the food in the cook's own mouth.

Design specifies controls and to a degree design tries to anticipate the limits of the "work" but it is workmanship that ensures these controls. Controls developed from workmanship emanate from a variety of sources from trade practices, from the materials, from the tools, and through the tools, and from the measure of resistance present in the very body of the worker. But decisions are considered and made, in situ, within the immediacy of the worker and the tasks at hand. Design anticipates and assumes the nuance of the completed "work" but is a cloudy version of the agency of workmanship that actually brings it about. It can be easily argued, for example, that cooks are actually obligated to deviate from the recipe as a function of their own personal direct experience with the recipe as it is being realized. The prepared dish is inevitably judged by tasting it, as a measure of both the cook's prior experience and also, 'what it ought to taste like.'

How something is made is as important as how it was designed, because how something is made is as much a result of workmanship as it is a result of design decisions.

4 Wrangham. Richard. *Catching Fire: How Cooking Made Us Human*. New York: Basic Books, 2009.

<sup>3</sup> Pye, 1968. P 17.

In fact, making decisions from the perspective of workmanship inextricably ties the realization of ideas to material form. A design is not really conceived until that moment when ideas become realized in material form. Workmanship is more than a mere category of designed things; it is a way of thinking AND acting with respect to materials and intentions *together*. Workmanship embodies a way of connecting to the world and as such workmanship realizes a counterpoint to the 'world as mere idea or imagery.'

#### If Workmanship is Not Well Considered, Ideas are Not Made Visible.

Design decisions are invariably material decisions. For ideas to become more than representational, a designer must inevitably recognize the designed environment in which we all live is grounded in abstract content that is experienced by way of concrete material physicality. Abstract content and concrete materiality thus become fundamental poles for design decision making. However, the relationship between design ideas and materials is not a one-to-one correspondence. Ideas are transformed as they are materialized. And materials also transform as ideas are made real and readied for human experience in physical form. Design decision making necessarily involves dialog between ideas and materials in the working out of a design - in the workmanship of design.

Restated here is David Pye's assertion that "design proposes, workmanship disposes" as a patterning of design intentions carried out and completed by the work that materializes it. Pye's axiom frames the relationship between design and workmanship as one between designer, ideas, maker, and materials, where workmanship is an essential aspect of design decision making by accounting for the qualities of materials in terms of the skills of the worker, the tooling techniques, and the nature of craft, including its histories, its technologies, and its practices of work.<sup>5</sup>

Pye believes that the qualities of the world commonly attributed to design decision making are actually placed before our perception 5 Pye. 1968. Pp. 17-19.

due to workmanship. In Pye's words, "Good workmanship is that which carries out or improves upon the intended design. Bad workmanship is what fails to do so and thwarts the design."<sup>6</sup> Pye defines design in terms of what can be transmitted or imparted through representational means, through written language, models, and drawings, whereas workmanship, "is what for practical purposes, can not."7 Almost all of a designer's work ends with the representational display and communication of design ideas. Accounting for how well ideas become realized in material terms is the province of workmanship. Much of the visual quality of the designed environment is qualified by acts of workmanship. Pye believes, the whole "domain of quality" attributed to design is rather the result of workmanship and not attributable to the work of the designer.<sup>8</sup> Pye's position is straightforward. It grows from the judgment that a designer could not specify stone or wood construction until a mason or carpenter had developed a way of working with stone or wood.

The domain of quality that can be perceived in how material is utilized in the designed environment is informed as much by being worked (and all that is entailed in such work) as it is configured by design decisions. Pye contends that "good material is a myth," reasoning that what raises a material like marble into classification as good material is not the material itself but the quality of the workmanship performed upon it.9 Attributed in part to a material's resistance to being worked, materials oppose the forces put upon them through the body of the worker. The actions of the body are quickened and focused by use of a tool but are nonetheless defined in this resistance. The relationship between body and material qualified in and through workmanship is not merely as a mechanical response of our bodies but is an effect of our Being. Through workmanship, a maker is able to "materialize a way of experiencing, bring a particular cast of mind

- 7 Pye. 1968. P 17.
- 8 Pye. 1968. Pp. 30-60.
- 9 Pye. 1968. P. 17-19.

<sup>6</sup> Pye. 1968. P 30.

out into the world of objects."10 Workmanship makes tangible extraordinary qualities attributed to the producer of the work, who is often accounted with exceptional abilities.<sup>11</sup> Pye further qualifies acts of workmanship as either those that may "risk" the workmanship or those that accomplish work with greater "certainty" of outcome. Workmanship involving the worker making direct decisions without external guidance of the tool involve greater chance of error. Quality of the workmanship depends solely of the "exercise of care, judgment, and dexterity" by the worker. To increase the "certainty" that the work will achieve the desired result, the worker's actions can be aided by mechanisms, or jigs, that reduce dependence on the caring, judgment, and dexterity of the worker.<sup>12</sup> Well accomplished workmanship carried out directly by the worker without mechanisms that increase the certainty of the outcome frequently carries a higher perception of value, even at times ascribing to them a mystical or reverential status. Good workmanship, then, is a means of creating tangible objects that embody intangible and abstract powers.<sup>13</sup>

## Workmanship Transforms Beginning Design Students

"I would rather have a mediocre idea that is brilliantly executed than a brilliant idea that is poorly executed."<sup>14</sup>

#### - A Businessman

Skills can be learned. Knowledge can be acquired. But neither become of value until realized through the know-how constructed through workmanship. Workmanship realizes knowledge and skill in situ between materials and intentions, but also in the immediacy of the indeterminate, as it makes more specific the relations between idealized imagery and the the realities of material contingencies. More significantly for beginning design students, engagement in workmanship also

10 Helms, Mary W. *Craft and the Kingly Ideal: Art, Trade, and Power*. Austin, Texas: University of Texas Press. 1993.

- 11 Helms. 1993.
- 12 Pye. 1968. Pp. 20-24.
- 13 Helms. 1993.

14 Ross, Wilbur. As quoted on, National Public Radio, Sept 15, 2008.

connects learning design processes with association of self with world, revealing correlations between learning design methodologies and one's own self-development. The following passages explicate how attention to workmanship In beginning design studio pedagogy increases concern both for the act of designing and for things designed while simultaneously engaging newly developing realizations between design intentions, exploratory inquires, processes, materials, and detail. The following result from engaging workmanship:

Workmanship evokes care and rigor -Essential to beginning design pedagogy is getting students to fundamentally CARE about what they are doing. Workmanship conveys a deep attitude of care and concern for the world of objects and thereby, the effect of design on others. Caring is one of the qualities (along with traits such as inquiry, curiosity, and the desire to make) at the core of the development of rigor in design and it is critical to student development that it begin from the first class day.<sup>15</sup> Attending to workmanship as a category of design and a criteria of review literally wakes students up to the potential of workmanship in the development and refinement of design ideas. In taking care we are "handed over to our self-responsibility"16 in a realization that we must be given over to the task at hand in assuming active responsibility as a first step in engaging processes of learning that may inform or enlighten us to a new relationship to the world.

Caring is a self-empowering of the individual at the micro scale of individual and environment and at the inner scale of self and world. In realizing workmanship, the Initiative to care about what one is doing is always balanced against the realization that even with great dexterity and attention to task there is constant awareness of an activity sharing a border with its incorrect performance or accident.

16 Harrison, Robert Pogue. "Robert Pogue Harrison: How does your garden grow?" *ArtScatter* April 29, 2008 <a href="http://www.artscatter.com/general/robertpogue-harrison-how-does-your-garden-grow/">http://www.artscatter.com/general/robertpogue-harrison-how-does-your-garden-grow/</a> >

<sup>15</sup> Temple, Stephen. "First Class/First Project: To Raise Inquiry About Design Through Making." *Designtrain Congress Trailer II: Designing Design Education*. European Commission - Leonardo Da Vinci Programme, 2008, pp. 199 - 208.

Robert Pogue Harrison, in describing the work of tending gradens states that, "Care is accustomed to act, to take the initiative, to stake its claims, yet powerlessness and even helplessness are as intrinsic to the lived experience of care as the latter's irrepressible impulse to act, enable, nurse, and promote."17 The ever present reckoning with the tentative nature of performance that presents itself to consciousness through the work is a measure of the degree of care. Not a matter of how much one is paying attention, care is a measure instead of how much one deeply and intrinsically establishes connection to the task at hand, given that the task is an accord between the tools used and the guidance of the tools as a measure of the resistance of both body and materials. Tools become the interface, as a medium, and the determinant, as a maker, always with respect to material.

**Students are close to workmanship** - Inherent in acts of workmanship is that decisions are made in intimate immediacy with the work. Grounded in direct experiences as it is, design critique stemming from workmanship is more readily grasped and developed in this immediate contact. This critique, then, means more to development of student self-critique and the generation of critical attitudes because students make workmanship decisions (or fail to make them) in direct engagement with material processes. Because they are close, these moments often ring true for students as a kind of proof of design ideas.

**Project review is self-evident** - Material processes in relation to tool use [i.e. mixing plaster; cutting a straight edge, etc.) deliver their own degree of success or failure in a manner that becomes self-evident in comparative review of projects. Seeing your own work in the context of other projects provides an often wordless clarity that no amount of review can replace.

Workmanship offers categorical measures of design critique that emerge as first categories of critique as the foundation of other more broad measures. Because workmanship is evident in first hand experience and direct observation it more readily leads to critical discussion of other more abstract modes of critique. Categories of design decision making and critique such as proportion, joinery, material choice, mechanism, connection to human movement and occupancy, programmatic issues, detail, grow readily out of discussion of workmanship.

**Realization of process** - Engaging issues of workmanship in making design decisions reveals that design is a transformative process. Direct interaction within the material, sensorial realm, reveal discovery of a material's "workability" in revealing design ideation and/or reveal possible transformations of ideas. Making decisions about materials is making decisions about design. Direct investigations and discoveries are brought to light through a heuristic of reflective observation and comparative critique.

Workmanship, and discussion of it, readily gives evidence of failure as much as success and does so right at students' fingertips as they make projects. Poorly considered decisions become readily apparent if poorly executed. For example, parallel elements that are constructed out of parallel are ungrudgingly evident. It is in workmanship that one receives the freedom to fail. However, because there is progress in each successive iteration, engaging in workmanship reveals creative design decision making as a process that involves trials that, in failing to work, either lead to success or a questioning of intent, both progressive for design decision making.

Especially to a student who has never done it before, who may only think of the end product at the outset, there is a great deal of learning in the workmanship, in the transformation through iterations as the unknown course gains clarity. Following this path, the finished object will always be an unknown result of the next iteration. One will not know where the work is absolutely going - there is no picture in the head, but the work triggers ideas as it becomes connected to other things happening, to other forms. Engaging in workmanship leads to the understanding of the world as process rather than fact, and in so doing sets the beginner's mind in a trajectory of finding out rather than seeking an answer.

<sup>17</sup> Harrison, Robert Pogue. *Gardens: An Essay on the Human Condition*. Chicago: University of Chicago Press. 2008. P 27.

Workmanship realizes ideas - Design ideas are fleeting and without substance until realized. Workmanship acts as the critical device on which constructive decision-making occurs, not just as detail (when design MUST engage materials), but at the level of form, when ideas first become manifest and workable and transmutable. The relationship between design and workmanship is to make real before one's perception the ideas within the world of objects. Poorly accomplished workmanship causes human attention to become so transfixed on material maladies as to overtake any concern for the conveyance of ideas. Like the businessman who would rather have a well carried out but poor business plan than a well conceived business plan poorly carried out, designed objects that are well made allow unrestricted access to the ideas that underpin them. If a designed object is poorly made, if its straight lines are bent, if its joinery does not well connect its material parts, if its smooth surfaces are ruddy and uneven, an observer / user gets lost in the poor quality of its workmanship and becomes disenchanted with the object, despite its ideational content. At the very least, Ideas become less significant in the face of poor workmanship. Materials appear not to be worked out, as if the design ideas never made it all the way to the materials - \$the ideas were not made real\$. This is the very definition of realization - for ideas to become ascertainable to perception in material form. Without workmanship ideas are not made visible. It is impossible to get past poor workmanship.

In workmanship students experience the relationship between ideas and their materialization. Students learn that tools and methods are a necessary aspect of giving form to ideas and that the working out of ideas through workmanship transforms and morphs ideas in a manner that representation alone cannot. Workmanship does so according in its own manner and within in its own traditions, and at other times techniques develop anew as they are called by circumstances. Representation can intercede in this relationship - and that is its vital role - but representation cannot materialize and make real design concepts as a finished reality.

Workmanship engages - Workmanship often involves engagement that is meditative and draws one into the flow of the work.<sup>18</sup> Often there comes to a student a realization that engaging in workmanship can be enjoyable and enriching, which in turn, contributes to a sense of personalization [possession] of the working processes of design. This enables beginning design students to realize that rigorous engagement need not be a difficulty and instead enables valuable connection to the work that is well beyond the personal and immature notion of having to like your work to feel motivated. This leads to more serious, sincere engagement where preconceptions about design are abandoned in favor of engagement in one's own development at a more honest level, without need for ego satisfying visions of future prowess and success.

Engaging in workmanship can be an enjoyable and rewarding learning experience. Sure, its failures are frustrating but that only serves to make the successes more enriching and enlightening.<sup>19</sup> To move from a chunk of wood to end up with a finished object - a violin, a window, a chair... is like a magical performance, especially to a student who has never done it before. To the uninitiated, who may only think in terms of ends and means, there comes a great deal of learning in the workmanship, in the transformation through iterations as the unknown course gains clarity. The finished object will always be astonishing.

# Student Development through Workmanship

Workmanship is more a property of the process than it is the medium (material). It is through the dialog of worker and material that workmanship is most manifest in the work (of design). However, design is making decisions and these decisions are a part of this dialog, more succinctly, a part of the process. In the design education setting, good 18 Csikszentmihalyi, Mihaly, and Eugene Rochberg-Halton. The Meaning of Things: Domestic Symbols and the Self. Cambridge University Press, 1981. Also see Dooling D.M. (Ed.). A Way of Working: The Spiritual Dimension of Craft. New York: Parabola Books. 1979. 19 Bruner, Jerome. On Knowing: Essays for the Left Hand. Cambridge, Mass.: Harvard University Press, 1962.

design is a myth, if not brought forth through workmanship.

Engagement in workmanship engenders a personal connectivity, whether it be in the form of worker-tool-material (medium) or in the concentration on the processes and intricacies of the task at hand. In either form, and neither is discreet, workmanship gathers one's being into the work itself by engaging time and efforts into a flow from which one cannot be easily disturbed.<sup>20</sup> At play in the direct experience necessary to engagement in workmanship is a psychology of connectedness, a continual moment-to-moment reflective attitude related to the flow of the work. One need only to consider wood joinery to reconstruct this context - joining two sticks together well requires precise cutting and fitting and refitting and retesting and gluing and clamping, followed by dryfitting and finally, gluing up the final joint.

Connections discovered between the medium and the tool and the effort on the tool produce conditions for reflective engagement in workmanship. A medium may suggest a way of being worked or a tool may suggest a way of working a medium but both conditions are mediated by the effort on the tool, by guidance of hand / mind connectivity.<sup>21</sup> There is discovering to be done in this relationship, for the tool and the medium have something to contribute AND to speak to the worker. Without this discovery, the work is only the carrying out of instructions, or worse, drudgery.<sup>22</sup>

In engaging in workmanship one is "becoming human," developing Being as much as the project at hand. Self development is as much at issue as is development of the work or task at hand. Decisions that must be made with tool in hand are numerous and constant, and are just as much in the realm of ambiguity as they are of precision. If one pushes this way or that there is a different result that sets up the next bit of effort. Each successive decisive eff<u>ort conspires into a</u> flow of efforts and judg-20 Needleman, Carla. *The Work of Craft: An Inquiry into the Nature of Crafts and Craftsmanship.* New York: Penguin Press, 1989. P 139.

21 Needleman. 1989. Pp 88-92.

22 Crawford, Matthew B. *Shop Class as Soul Craft: An Inquiry into the Value of Work*. New York: Penguin Press. 2009. See also, Sennett, Richard. The Craftsman. New Haven: Yale University Press, 2008.

ments. Each very moment of paying attention asks of the self, "What next?" until a pattern emerges as a mirror of self, as a reflection in constant flux. The outer result of work reflects inner constructions of connective creativity. Discovering this in the flow of work is part of workmanship.<sup>23</sup>

Connectivity to the work through continued practice of workmanship can result in 'losing one's self to the work,' an axiom that speaks rightly to an equilibration between worker, tool, and medium whereby none dominates and all give evidence to what is learned in doing the work. Workmanship must be learned but its engagement occurs most deeply when one is teaching one's self - *learning by doing*. Workmanship always involves exploration to find that place where the work *seems to be accomplishing itself*, where guidance from outside the self is not necessary to proceed. In workmanship one is always teacher and learner at the same time.<sup>24</sup>

A designer is a student of objects as much as a creator/maker. In fact, much of the time a student of design is not a maker at all but a predictor of what objects and environments will look like, act like, and most importantly, experience like. In as much as traditional design processes rely on prediction through the abstraction of models, drawings, and mockups, working with the actual realness of materials and processes of tooling and transforming materials has been professionally relegated to the tasks of others, not the designer. Educational models that set up this skewed relationship from the very first design studio experience focus on scaled representations and the production of abstract ideas rather than those connected to or stemming from direct experience. Conversely, hands-on one-to-one making of designed objects from the first experience creatively engages the direct experience of workmanship as the first learning moment. As common ground for learning design, developing the issue of workmanship in beginning design education can ground design learning

<sup>23</sup> Needleman. 1989.

<sup>24</sup> Needleman. 1989, P 112. Needleman's central thesis is that workmanship is actually the development of the inner self as much as the material - in workmanship one constructs a way of being.

in a more rigorous development of measures derived from self-directed material inquiries while simultaneously developing primary categories of design decision making fundamentally inclusive of material reality. Consistent with brain based learning theory, engaging in workmanship enables students to take charge of their own learning and form an attitude allowing oneself to transform through creative pursuits in an opening up to education and self-reliance.<sup>25</sup>

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<sup>25</sup> Zull, James E, *The Art of Changing the Brain: Enriching the Practice of Teaching by Exploring the Biology of Learning*. Sterling Va: Stylus Publishing, 2002. See also, Skipper, Tracy L. Student Development in the First College Year. Columbia SC, University of South Carolina, 2005, and Caine, R. N. and Caine, G. Unleashing the Power of Perceptual Change: The Potential of Brain-Based Teaching. Alexandria, VA: Association for Supervision and Curriculum Development. 1997.

## DIGITAL FABRICATION SHOULD BE TAKEN LESS SERIOUSLY Making Virtual

ERIK D. HEGRE & JENNIFER G. WALL UNIVERSITY OF OREGON

# I:

It is imperative that core curriculum continues to educate students about architectural design while simultaneously responding to the fast paced advancement of design and manufacturing technologies in a meaningful way. Too often, digital design tools render ungrounded theoretical forms while a scant understanding of the nature of manufacturing tools furthers the distance between the designer and the act of making with real materials. With parametric tools being used to create geometry that is conceptually representative, there is no feedback between the boundless exploration of generative applications and actual design execution.

The schism between these conceptual conventions and their existence in physical material indicates a separation between our design concepts and the physical reality that communicates and embodies those design intentions. With handcraft, the maker immediately sees the real and permanent response of the material; with digital fabrication, the feedback is less immediate but also less permanent. Digital making lends itself to iterative investigation, which in itself is a critical part of architectural design. Therefore, it is crucial that students be exposed to the nature of the relationship between machine tools and computation, and be challenged to exploit both the boundaries and the unlimited possibilities of real materials.

#### 11:

What is missing in digital fabrication is intuition. Digital fabrication can parallel the design process in the way it channels natural impulse. As we see it, the current digital fabrication technology found in the majority of design schools in the United States is riddled with an esoteric sequence of software platforms, file types, and interfaces. As a result, students often must traverse through computer-aided design (CAD), scripting languages, computer aided manufacturing (CAM) software and computer numeric control (CNC) interfaces in order to approach making physical objects. Students can understand digital process on an intuitive level through the same methods that one learns a second language or a survival skill: one is immersed in a new process and thus absorbs on a primal level the inherent outcome and function of a process. This language of intuition can be linked to digital fabrication if we can connect our physical actions with our conceptual and theoretical designs.

The nature of how we learn has changed. As educators, we need to drive towards the idea of wholeness, of understanding broad concepts in their entirety. We look to designers and theorists such as Christopher Alexander when considering pedagogical approach to understanding process:

"In each case, we are aware that the future growth of the thing is created from the present by an impulse towards wholeness, somehow, this impulse towards wholeness is allowed to govern the next steps in the creation, the expansion, the formation of details, the formation of the largest and the smallest wholes." <sup>1</sup>

Another relevant view of the condition of contemporary design pedagogy is articulated by Boston-based architect and educator Tim Love, who makes the argument that new professors in design programs "learned design through the lens of scripting logics and who find the methodologies for form-making mostly within the rationales for computer programming."<sup>2</sup> We want to find methodologies for form making through the rationales of form itself, and our physical relationship to it through an actual material.

One effective way to introduce the language of iterative process is to challenge stu-

- 1 Alexander, 13
- 2 Love, 2009

dents to actively make objects. Digital fabrication is often awkward to navigate as the maker because it is usually presented as a lengthy linear process with little room for play or risk. Design pedagogy needs to allow a student to be physically engrossed in the process to demystify its fundamentals with relation to technology. Traditional modes of iterative process such as drawing on paper, hand modeling with clay, and woodworking engage materials and translate an idea into formal language. Parametric design tools represent a new language of idea iteration, and when used in combination with craft (physical process), the generative possibilities are expansive. We can take risks and manipulate the traits of the digital aspects with the same fluidity as the motions we use to work a material such as clay. When we combine a physical process of emergence and the iterative qualities of digital design tools, we can take many paths at once. This is so important in a pedagogical realm because it allows us to navigate terrain more quickly additional knowledge which will contribute positively towards interesting results.

Teaching students to learn and engage in fundamental concepts of digital design through craft can be achieved by working directly with numeric control code (NC) and with machines such as laser cutters and computer numeric control (CNC) routers. Beginning designers can explore and test designs directly through movement variables in code and material properties during milling operations, similar to experimentation through intuitive traditional modes of iterative process. With this pedagogical method, time becomes the only separation between the students and the material because now the student has record of the machines. movements and can edit variables within the code to achieve any outcome.

## III:

Parameters, like rules, control the outcome of a particular input. Combinations of parameters and variables predicate this outcome. Our contemporary dialog has roots with Alexander's research: he states that we should, "embrace the rules of the machine, and use those conditions along with our intuition to allow emergence...to prosper future growth as a whole, and not by application."<sup>3</sup> In essence, we want to reproduce the physical act of making by recording human movement through parameters and variables. This gives students the option and ability to attain a direct knowledge of design through non-intellectual perception or apprehension. To have the freedom to use anything perceived or learned without conscious attention, reasoning, or concentration allows all design elements to become alterable. This is because the student is able to generate through a system that has the capabilities of varying alterable and mutable values.

The exploration and application of a formally driven playful design process is well documented through contemporary works of commercial firms like Gramazio & Kohler, who employ a system of logic that relies on rules to "define relationships and intentions," but who also continue to push the limits of what architecture can do and in what format. As part of their design process, they ask "which parameters control design and which do not, but still have an effect on form and function." <sup>4</sup> We use this same methodology in a pedagogical application to making physical objects via digital fabrication in order to allow for emergence and iterative exploration. This sentiment echoes the ideas of contemporary thinkers such as Rem Koolhass, who speak to the evolutionary potential of architectural design: "Once you are interested in how things evolve, you have a kind of never-ending perspective, because it means you are interested in articulating the evolution, and therefore the potential change, the potential redefinition."5

Another particularly interesting model for using a combination of parameters and variables in conjunction with hand making is the recent work of science writer Margaret and Christine Wertheim, who founded the Institute for Figuring to "advance the aesthetic appreciation of scientific concepts."<sup>6</sup> Their recent research, dubbed "coral reefs," utilizes crocheted forms as a way to communicate the spatial and dimensional qualities of hyperbolic functions. The forms very much emulate the growth patterns and formal qualities of their

- 3 Alexander, 13
- 4 Gramazio & Kohler, 10
- 5 Koolhass, June 2004
- 6 Wertheim, January 2010a

namesake; they examine the nature of hyperbolic functions and allow those systems to generate vast and emergent objects that are unexpected, diverse, and impossible to design or predict. When paired with the intuitive and tactile act of manual production, the resulting objects provide a reflective and reproducible imaging of a complex three-dimensional concept.

We collaborated with fiber artist Rob Mertens, a teaching fellow at the University of Oregon, to explore more about hand craft and its relationship to the structural logic of hyperbolic forms in an effort to understand the nature of both the material and the mathematics generating the pattern that forms the material. His perspective is particularly interesting, as the shapes formed by imposing a hyperbolic function onto the crochet process are often considered mistakes in traditional stitching: they usually represent a doubling or tripling of a stitch that is supposed to be singular. According to Mr. Mertens, fiber arts as a craft medium did not intentionally use this type of math to generate forms like these until 1997. However, the combination of the two systems of logic yields beautiful and surprising outcomes, even though the creation of the final object was accidental in many ways.

These crocheted objects can be viewed as the result of a combination of parameters and a range of variables such as yarn color, diameter, and tension. This work has the potential to communicate much through endless iterations and fortunate accidence. As educators, we can teach the nature of parameters and variables through digital fabrication, especially if we understand that, "the highest levels of abstraction, things like mathematics, logic and computing cannot just be engaged with cerebral, algebraic, symbolic methods, but by literally, physically playing with ideas."<sup>7</sup>

#### IV:

We can play with digital precision through the knowledge and serendipity of handcraft by fostering experiments with quick feedback loops between machine and material results. We strive to develop curriculum that creates digital fabrication interface strategies that are approachable and fuse the interactive process

7 Wertheim, 2009

of material engagement with digital fabrication tools. The ultimate desire of this fusion is real time interaction and feedback loops in which a student makes a physical motion that is directly translated to a physical material via digital technology. Contemporary examples of this kind of making can be found in research at LAAS (Laboratory for Analysis and Architecture of Systems) in Toulouse, France, which synthesizes human interactions with CNC machines through Wiimotes. This type of research is going to become increasingly relevant as the relationships between designers and machines continue to evolve. In order to exploit this evolution, we performed different experiments that immediately associated our physical input with the machine's actions.

To begin, we went to the beach. The Oregon coastline is windy and wild, and the materials that form the landscape are in a constant state of flux. We were inspired by the way the sand moved around our fingers as we pushed them through endless grains, and couldn't help but notice the formal parallels between the mark our hands left and the mark a round router bit makes in a piece of wood. Based on our knowledge and proximity to CNC technology, we synthesized the motion of a hand raking through sand by authoring numeric code, and created a wood carving with the CNC router. This method formed a one to one relationship between our physical action and digital fabrication in which the toolpath was analogous to the original generation of the form. We were excited to understand the power of this connection, and to further control our actions to refine and explore the design and its capabilities.

Since we believe that the goal of beginning design pedagogy is to make the relationship between design and execution closer, we developed further strategy to create a tighter link. At the University of Oregon, the laser cutter is our most utilized and basic digital fabrication machine, and is bound by the limitations of its functions. For example, once the physical material is in place for a fabrication operation, the process becomes fully automated and makes interaction with the material impossible as the laser ceases to function when the door is opened. As with the hand to router connection, we wanted a more direct

hand to machine control and we also wanted to be able to record and playback motion through physical programming. We collaborated with UO Digital Arts department faculty member John Park, who worked with us to program an Arduino circuit board that allowed us to physically control a servo motor to which we attached material, and also to record and play back the details of our physical motion so we could visualize our experiments through a range of data displayed in graphic form. Since we physically controlled the material in the laser cutter bed through a set up that was essentially a hand controlled lathe attachment, we could actually move the piece during the laser cutting operation, which opened the door to emergent, iterative explorations that were of a more immediate and direct nature than the process by which we had formerly used the machine.

Our relationship to the machine is still separate from the way we self-identify as designers. Design ideas and material manifestations can be immediate and exciting, and as educators we must push to constantly evolve our understanding of and relationship to digital design technology and physical output processes. Design can be part of a process that puts the beginning designer in control of her actions; our hope is that beginning design students can recognize and exploit movements that come naturally and translate into a physical form.

Digital design is important and necessary to manage complexity; like children, learning how to move, speak, and react to our environment, we learn through our physical world. Glenn Adamson, Deputy Head of Research and Head of Graduate Studies at the Victoria and Albert Museum, investigates and analyzes our relationship to craft in a way that can further articulate the importance of learning design through a physical methodologies. He makes the connection between a crafted object and its process: "crafted objects are by their very nature evocative of the way in which they were made."8 These objects are subject to the limitations of the material combined with the motions of the maker. Translating the intermediate parts of a digital process into a formal language that can relate to actual physical movement creates potential for balance 8 Adamson, 168

between risk and certainty by bridging the haptic nature of traditional craft to specificity of digital fabrication. We educators can take a risk and do what it takes to make digital fabrication exciting: explore prolifically with the simple goal of making something innovative.

## V:

The conditions of digital design and physical manufacturing are on the cusp of change, and it is imperative that beginning design students understand the expansive possibilities and the language of the range of processes available in contemporary design education in order flourish in these evolving conditions. We believe that core curriculum can communicate that design and manufacturing processes are both fleeting and have historical precedents, we can understand that because things are always in flux, we need to expand digital pedagogy to help students develop methodologies to exploit the nature of contemporary fabrication.

Theoretical speculation, especially related to architectural design, is rooted in necessity, while playful exploration "allows us a contractual relationship suspension of the gravity of need," according architectural theorist and professor of theory and criticism at the Harvard University Graduate School of Design.<sup>9</sup> He goes on to mention that playful exploration,

"allows us to posit hypothesizes that will not undergo verification by referees...only in play to we find the lost universe of pure truth. The product of true play has nothing essential to do with the objects and proclamations that appear to ensue from it, but rather with the invention of entire alternative world from which those objects and proclamations are drawn."

By removing theoretical speculation as the sole groundwork for pedagogy and making the design process about making and broad, contextual understanding of digital fabrication, we can encourage design students to render grounded design solutions in the studio environment. Theoretical speculation alone cannot yield interesting design results or great possibilities because it is only part of the larger equation that always includes the human element.

Digital fabrication should be taken less seriously. The potential for play and emer-

<sup>9</sup> Kwinter, 137

gence increases as the tools of production are approached with less apprehension and more acceptance. We will benefit professionally and pedagogically by looking at the relationship between design and fabrication through a wider lens with enthusiastic intention.

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## MATERIAL IMAGINATION IN DIG-ITAL CULTURE Making Virtual

MARK N. CABRINHA, ASSISTANT PROFESSOR CAL POLY, SAN LUIS OBISPO

## Introduction

Only 8 years ago when I began teaching, integrating digital media in the design studio was hampered by institutional politics and lack of hardware accessibility. Now students come to my studio with dual monitors and are multitasking maniacs with a host of distractions and a subtle reluctance to explore and test ideas physically. As design culture becomes more and more a digital culture, perhaps the fact so much digital work looks the same is not only due to a fairly basic understanding of tools and skills, but a lack of material imagination. Digital fabrication in association with the virtual prototype and parametric modeling are powerful tools for design development, but the growing conventions of use can thwart the material development these tools were meant to engender. Perhaps obvious in hindsight, digital fabrication requires not only digital dexterity but a robust material sensibility that precedes digital mediation. To this end, I have focused on a materials first approach to developing digital skills to excite the material imagination.

This material imagination is more than a pragmatic means to develop digital skills, but a more epistemic way of operating - an engagement with the world. My interest is to position the material imagination as a reciprocal creative intelligence to the dominant formal imagination enabled through the fluid geometric precision in digital tools. In the end, nurturing this material imagination in concert with the formal imagination may have a strong influence on the conceptual horizon that students draw from.

# The Graft: Developing a Synthetic Sensibility

In *Water and Dreams*, Gaston Bachelard focuses on the imagination through the eyes and ears of poetry.<sup>1</sup> In poetry he sees the aesthetic component of language derived from material causes, such as the fluidity, reflection, and depths of water. He highlights two aspects of creative inspiration: the formal cause and the material cause, or the formal imagination and the material imagination. In particular he sought a "dual participation" between the two. For Bachelard, form gives structure but material is the inspiration - the springtime. The material imagination doesn't simply describe or represent (as in realism) but it projects. Through poetry, Bachelard seeks to cultivate the projective image sprung from the material imagination.

To encourage the reciprocity between the formal and material imagination, Bachelard puts forward the materialist metaphor of the graft insisting the graft is more than simply a metaphor:

"To me this is not simply a metaphor. The graft seems to be a concept essential for understanding human psychology. In my opinion it is the human stamp, the specifying mark of the human imagination...

It is the graft which can truly provide the material imagination with an exuberance of forms, which can transmit the richness and density of matter to formal imagination. All metaphors aside, there needs to be a union of dream-producing and idea-forming activities for the creation of a poetic work. Art is grafted nature."<sup>2</sup>

According to Bachelard, the graft is a synthetic sensibility between the formal and mate-

2 Gaston Bachelard, *Water and Dreams*, page 10.

<sup>1</sup> I thank Kyna Leski at RISD for sharing with me the role of the "material imagination" in the core curriculum at RISD. I then came across Juhani Pallasmaa's reference to Bachelard's material imagination while, ironically, I was looking up the Korean Presbyterian Church by Lynn, McInturf, and Garofalo, and finally, too see this same Pallasmaa reference appear in the first chapter of Branko Kolarevic and Kevin Klinger's Manufacturing Material Effects.

rial imagination connects to the whole of the human psyche. Without this material imagination, ultimately our engagement with the world suffers.

While the graft develops a reciprocity between the material imagination and the formal imagination, Bachelard further decomposes the material imagination as a "paste" composed of earth and water.<sup>3</sup> While matter extends from the earth, the combination of water gives the paste fluidity to the substance of the earth. He describes this paste in association with the working of geometry as a kind of kneading and modeling. Like his French contemporary Henri Focillon, Bachelard is critical of the idealization of the formal imagination observed after the fact of creation, but rather seeks to look at the point of creative inception and the role of material imagination in this. Through the paste in particular, he emphasizes the experience of fluidity and pliability in creative development. In the beginner's hands, digital tools are rigid and uncompromising. On the other hand, with the pliability of NURBS based software, geometry is all too frequently kneaded without the paste of the material imagination grafted onto it. Bachelard's concepts of the graft and the paste are not simply materialist metaphors, but are concepts rooted in the understanding of creative development, and therefore an essential understanding for any design pedagogy. Materiality gives resistance to the geometrical flexibility of software, and yet material flexibility is needed to inspire the material imagination.

# Pedagogical Goal: Tactics/Strategies

The reciprocity between two causes of creative development, the formal imagination and the material imagination, aligns with another great French thinker Henri Bergson, one generation Bachelard's senior. Thinking, for Bergson, is thinking through matter, in which duration cannot disassociate the "theory of knowledge" (general concepts) from the "theory of life" (action). Duration is a circular process between action and representation that "push each other on unceasingly" reciprocating between instinct and intellect in which our actions do not play out our thoughts any more than our

thoughts evolve from our actions.<sup>4</sup> Intuition is central to Bergson's method as the go between of instinct and intellect in which instinct pulls intuition to material action, and yet, the intellect pulls intuition toward a conscious reflection of its actions. Bachelard's concept of "the graft" seems to follow closely from Bergson's interrelation between general concepts and material action, and furthermore Bachelard's concept of "the paste" within the material imagination aligns with Bergson's intuition. The fluidity of water gives material its pliability exciting the image from within the material imagination. This image is not simply a reflection of reality, but a projection that "opens eyes which hold new types of visions."<sup>5</sup> For Bachelard, this projected vision is not a passive view but is actively formed from the material imagination necessarily preceding the formal imagination.

Some 40 years after Bachelard's Water and Dreams (but in fact coincident with its english translation in the 1980's) the developmental psychologist James J. Gibson demonstrates that action precedes cognition.<sup>6</sup> Gibson's theory of active perception is coupled to his theory of affordances. In short, affordances direct attention toward particular actions while concealing others and therefore the theory of affordances represent certain opportunities for action with respect to an individual in an environment. My research has focused on the affordances of digital fabrication in design education, but pedagogies have affordances too - they direct attention to certain aspects while concealing others. To focus only on the affordances of tools and technology leaves too much instrumentality on the part of technology without the pedagogical social-conveyance of the importance, that is the intention of these affordances in the context of a practice.7

<sup>3</sup> ibid, page 13.

<sup>4</sup> Henri Bergson, *Creative Evolution*, page xiii. At the NCBDS Intersections conference, 2006, in my paper "Technique as Method" I went into more detail on Bergson and see this paper as a further development of some of the ideas in that paper.

<sup>5</sup> Bachelard, ibid, page 16.

<sup>6</sup> James J. Gibson, *The Ecological Approach to Visual Perception*.

<sup>7</sup> Harry Heft, "Affordances and the Body: An Intentional Analysis of Gibson's Ecological Approach to Visual Perception".

My intent in bringing in this philosophical frame is not as a kind of philosophical buttressing, but to suggest our inherited cognitive models of constructing knowledge privilege formal/linguistic knowledge leaving intuition and the material imagination by the wayside. This becomes manifest in curricula and design pedagogies in which "skills" become isolated events and courses outside of what might otherwise be considered content. At the same time, this is not to glorify or substantiate skillbased pedagogies. Rather, the success of any skill-based learning is how it can connect back to the context of a practice.<sup>8</sup> Rather than a technological *push* with the expectation and hope that it will do more, this technological skill-based development can be pulled through content interrelating action and intention. My interest in digital fabrication developed from my material sensibility nurtured in my undergraduate education long before digital fabrication was commonplace. After several years of my own tool-driven research in digital fabrication and teaching focused studios and seminars on digital fabrication, I have come to the realization, perhaps naively, that digital fabrication is not a substitute for the material imagination, but rather sits at the opposite end of a spectrum, if not a totally different analytical and intellectual faculty that must be grafted onto the material imagination (Figure 1).

This grafting requires translation that is at once both a projection and an abstraction of the material imagination. Perhaps the weakest conventions with digital fabrication are because there is so little translation, so little abstraction is involved.

# Digital/Material Sensibility

For this reason I take a material's first approach to developing digital skills. Below I present two approaches, one beginning with the physical basswood spline and the other with the constraints of sheet material. Rather than simply the development of digital skills, as if skills were isolated from the development of content, my approach is to cultivate a digital/ material sensibility. After all, what is sensibility but sense plus ability? The development of skills, that is ability, should be taught in relationship to the senses they cultivate. As Mal-

8 See Lave and Wenger, Situated Learning.



FIGURE 1: The intersection of two modes of development, the material imagination and the formal imagination, illustrating path of development from conceptual to analytical and the translation from material imagination to formal imagination.

colm McCullough has observed, "usability, identity, desire, and intent tend to relate."<sup>9</sup> No doubt the formal image has dominated digital discourse due to the geometric structure and screen-based interface of digital media. Through the inseparability between identity and skill, it should be no surprise that architecture has become so focused on visual imagery, and likewise, the identity of the design student as the image-maker. In beginning with materials first, my intentions are to cultivate a material sensibility enabled through the precision and geometric development in NURBS-based tools.

# Material Primitives: the Forming of Form

In the 18th Century, splines were drawn analogous to the material resistance of wood planks

<sup>9</sup> Malcom McCullough, Digital Ground: Architecture, Pervasive Computing, and Environmental Knowing, page 160.

in ship building.<sup>10</sup> In other words, the tools developed were in relation to material properties. In the 1960's, mathematicians such as Pierre Bezier abstracted the geometry from these material splines but abstracted out the material properties. Bezier's intentions were not to develop a more efficient means of existing methods, but to create a bi-directional link between design and manufacture.<sup>11</sup> Despite these intentions, ironically these material constraints must be brought back in by the designer.

The first approach emphasizes a physicaldigital-physical cycle. I begin with the literal basswood spline discussing its capacity and tendency to take shape.<sup>12</sup> The *capacity* of materials includes its material composition, for example how the higher grain density in basswood is superior to the looser grain structure of balsa. In discussion with my students, many have already experienced how balsa will snap somewhat unpredictably. The *tendency* of material to bend a certain way has to do with a material's geometric cross section, such as the weak and strong bending axis (bi-axial versus uni-axial), which students can identify with from their structures courses.

Students are asked to create a simple structure from a minimum of 12 basswood splines developing the most spatial variation with the least number of basswood splines. The structure must past two tests, the fist test and the finger test. The fist test requires that a closed fist should be able to get into the majority of spaces created. The finger test tests the behavior when pressing on one stick effects the others, thus requiring the sticks to be assembled in a network like fashion rather than discrete individual sticks. (Weaving is prohibited due to the difficulty of translating this in a digital model.) From this material primitive, a number of principles of NURBS based geometry can be introduced including degree of curvature, surface development, and surface panelization through ruled surfaces completing the cycle from material primitive, to 3d form, to 2d cut files.

# Degree of Curvature

The technical understanding of curvature degree (1st, 2nd, and 3rd) is important as students begin to transcribe their physical sketch models into digital splines. At first students have a raster mentality thinking the more points they transcribe the more accurate their model will be. In fact, the opposite is true. Students begin to develop a vector mentality understanding that a minimum of points creates a smoother curve. A grid can be drawn to plot these points or the use of a 3d-digitzer greatly streamlines this process. As digital tools become more parametric, this vector mentality is essential.

### Surface Development

Many students are already familiar with lofting. This quickly becomes a bad habit generating random surfaces from random curves with little understanding of neither how they got there nor where to go from there. Flexible form becomes rigid. Based on the network arrangement of their physical splines, lofting doesn't work. Instead, students have to work into selectively skinning the model introducing a range of surface modeling approaches from lofting, railing, from boundary curves etc. The principal point in this is to understand the surface as a jig. That is, they can construct a preliminary surface from which they can extract isocurves to then develop a new surface, discarding or hiding the original surface. Using the surface like a jig is akin to the kneading of geometry that Bachelard referred to working and reworking their geometry such that their skills become fluid, not just the form.

#### Surface Panelization

From these digital surfaces, surface panelization through ruled surfaces is introduced to come full-circle from physical input, digital development, to physical fabrication. Rationalizing these surfaces through degree reduction requires a judgment call on the amount of surface subdivision - the more subdivisions the more accurate the surface but the complexity and time in fabrication. Although rudimentary, the real world material and time constraints of fabricating complex shapes balances their idealized non-material digital surfaces. Students also quickly realize that at each surface seam a

<sup>10</sup> Farin, Gerald E. *Curves and Surfaces for Computer-Aided Geometric Design: A Practical Guide.* 

<sup>11</sup> Pierre Bezier, "A View of the CAD/CAM Development Period."

<sup>12</sup> See Manuel Delanda, "Material Complexity".

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back-up structure is required from which surface normal is introduced to develop structural ribs from the surface panels.

While clearly a skill-oriented approach for a digital fabrication seminar, beginning with the material spline allows the students in the first four weeks of this seminar to develop exceptional digital skills while developing a flexible translation process from physical input, to digital development, to developed physical fabrication from the original input model (Figure 2). As their mid-term project, students have both a refined physical model and are asked to project a larger image of their structure through developing skills in digital representation.

# Material Organization: Epigenetic Landscapes

I have employed a less technical basswood spline approach in my design studio using 2d basswood material organizations rather than 3d form based approaches. Developed through a tryptic of 2d drawings with basswood splines, a physical vocabulary of bunching, pinching, bifurcating, is intuitively discovered (Figure 2).

These also follow the same requirement of a simple structure with complex behavior tested through the finger test encouraging the interrelation between splines, not simply isolated graphic lines, thus becoming a performative rather than graphic model. Through a vector then raster approach, students digitize these models then develop graphic hierarchy of lineweights in Illustrator, and then apply raster blurring techniques to create a smooth gradient. This linear spline based gradient is brought back into Rhino and developed as a height field 3d topography which are then milled in foam or MDF as their studio sites. In this one-week charrette, students are introduced to a basic material system through which the interoperability between a more familiar software, the Adobe suite, helps them with a completely new software, Rhino, and the CNC router. While less technically oriented than the previous process, this project has deeper conceptual roots as epigenetic landscapes in which the site conditions the evolution of forms set upon it.<sup>13</sup> The site is presented as a large distributed network of water retention swales

13 Sanford Kwinter, "Landscapes of Change: Boccioni's Stati d'animo as a General Theory of Models."



FIGURE 2: From physical basswood splines, a performative material system is developed from which digital splines are digitized and developed as topographical landscapes.

bringing ecology into the discussion through a series of what would be massive earth works projects or constructed wetlands. With the majority of students having no previous 3d skills, this materials first process pulls them through an interoperable digital workflow while maintaining the studio discussion around waterflow and the relationship between landscape and the concept of nature.

# Material Constraint: Economy of Means

While the pliability of the basswood spline is an excellent introduction to the paste of the material imagination, in the previous examples the material imagination is not required for their surface panelization or actual fabrication. While effective introductory tools, there is inherently a great deal of material waste in their fabrication. Most digital fabrication develops from sheet goods. Despite the flexibility of form enabled through digital fabrication, little if any attention is paid to the sheet as a material in and of itself. Developed in the course of several studios from Spring 2006 to Spring



FIGURE 3: Full-scale installations require abstraction and translation from initial material play while allowing students to situate themselves in their collective work.

2009 (Figure 3), these examples explicitly focus on an economy of means through full-scale installations. By beginning with flexible paper, focus is placed on developing a material system from sheet goods minimizing or eliminating off-cuts. Through this explicit criteria the material constraints of sheet material become operative through cutting, scoring, and folding. Three approaches are given to direct this material play: expanding pattern, folding, and pattern tessellation. Pattern tessellation packs specific geometric objects on a sheet eliminating the margin and therefore material waste. While known to work for example through Philip Beesely's installations, <sup>14</sup> this approach has been less effective thus far.

Like expanded lath, the expanding pattern develops from a simple pattern of staggered cut lines allowing flat material to stretch and even develop three-dimensional shapes. This approach can be seen from SANAA's aluminum rainscreen for the New Museum of Contemporary Art<sup>15</sup> or Reiser and Umemoto's Vector Wall for the MoMA's Home Delivery Show. Folding as an approach needs little explanation but the goal to eliminate waste all together focuses this familiar approach.

Both approaches begin with zerox paper to allow the material imagination to play. This play is developed in brief one hour charrettes as a form of common materials research allowing students to borrow from each others' techniques. The incremental shift toward slightly more rigid materials such as manila file fold-

15 See Irina Verona, "Engineered Surfaces: Toward a Technology of Image," in *Praxis* 9: Expanding Surface.

ers, index cards, and bristol board allow this material play to slowly work into material constraints. Developed toward full-scale installations, this initial material play required a scalar shift which also necessitated more rigid material such as a cardboard. Both the shift in more rigid materials and the shift in scale require a translation from the initial material studies. I have previously presented the role of scale in these installations.<sup>16</sup>

## Material Systems: Design for Assembly

In looking back to the paste within Bachelard's material imagination, it would seem that something more literal like clay would be most akin to NURBS-based development. On the contrary, this only extends the formal imagination. Based on the scale of architecture, as distinct for example from the fluid geometry of small scale sculptures or industrial design objects, the material imagination in architecture continues through the rigorous configuration of material systems. Toward this end, material constraints focus the material imagination. In these installations, it was the constraints of these basic material operations along with the criteria to eliminate waste altogether that excited the material imagination. Constraints are operative for the material imagination not imposing upon some presumed if mythical unfettered imagination. Even the capacity and tendency of the basswood spline includes material constraints. In these assignments, the development of a material system requires translation and abstraction from the initial material studies. The availability of sheet sizes along with their associated means of fabrication are criteria incorporated into the design development. Along with these material and fabrication constraints, focus is placed on the joint and the assembly process. Students must anticipate the fabrication and assembly of the piece through their design. Although straightforward criteria, focusing the material imagination on these criteria requires both a fluid and flexible material process as well as very physical and explicit constraints.

For example, the expanding pattern installation employed the laser cutter focusing

16 Mark Cabrinha, "Life-Size: Environmental Knowing through Full-Scale Installations."

<sup>14</sup> See Philip Beesley, Hylozoic Soil.

the basic unit size on the 18"x30" bed size using an inexpensive and somewhat flexible white poster board. On the other hand, using the same technique of expanding pattern for a moveable feast, the rigidity of cardboard required a scale translation while the 4'x8' bed size of a CNC tangential knife cutter established the unit size. At the same time, these inexpensive, temporary, and very quick two week installation projects can extend into more permanent and rigid materials such as aluminum or steel, as illustrated in a 4'x10' full scale mock-up of the expanding pattern technique from water-jet cut aluminum (Figure 4). Regardless of the fabrication tool (laser cutter, CNC tangential knife, or abrasive water jet), what preceded the technology was the cultivation of the material imagination through the flexibility of material and focused constraints. This requires translation and abstraction from the initial material play to the design of material systems enabled by the precision of digital fabrication. Simply put, digital fabrication is not a substitute for the material imagination, nor necessarily does it inspire it. The material imagination is cultivated through the fluidity of material play and focused through constraints. Through a rigorous process of translation and abstraction, digital fabrication enables the development of material systems which may be derived from the material imagination. This process of translation and abstraction is a pedagogical opportunity to connect the material imagination with a disciplinary development of material systems.

#### Desire: Economy of Intent

Bachelard captures the "image" within the imagination focusing on the material imagination as a connection back to material experience. This image is not simply a reflection of how things appear, but a projection into the depths of experience. Ultimately, the material imagination is to cultivate projective images that are in touch with human experience. If developing a young designer's sensibility is the combination of sense and ability, skills then should not be isolated from the senses they engender. The geometrical structure of digital modeling tools effectively biases form rather than a more critical question of what informs form. Taking a material's first approach biases the material imagination as a projective method requiring translation and abstraction as this material experience is grafted onto the formal imagination. Even while encouraging the fluidity of material play, material constraints focus this material imagination. Through the



FIGURE 4: Material imagination writ large: from material play with index cards to full-scale aluminum prototype through an incremental development from conceptual technique to material system.

graft between the material imagination and the formal imagination, my larger interest is how developing an economy of means might lead to an economy of intent. Design "concepts" are not developed as abstract ideas, but rather develop from material experience as contemporary studies in embodied cognition show.<sup>17</sup> As design culture inevitable becomes more of a digital culture, a more robust model of design conception must be paired with the develop-

<sup>17</sup> Vittoria Gallese and George Lakoff, "The Brain's Concepts: The Role of the Sensory-Motor System in Conceptual Knowledge," in *Cognitive Neuropsychology* 2005, Vol. 21.

ing parametric sophistication in digital tools. Sophisticated tools must be met with a more sophisticated model of design conception. The graft between the material imagination and the formal imagination is just such a model, and moreover, introduces a bias from which the projective image springs from the material imagination. Developing a designer's sensibility is, in part, a graft between the material senses pulled through the development of digital skills through a process of translation and abstraction at the core of architectural thinking.

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## MAKING FEEDBACK Making Virtual

## MATT BURGERMASTER NEW JERSEY INSTITUTE OF TECHNOLOGY

## Digital Mockups in the Design-to-Construction Process

...we like to think that we navigate a smooth space, but can't help sensing that we are actually swerving from near-collision to near-collision, with the occasional wreck thrown in. But isn't this what it really means to believe in the experimental?<sup>1</sup>

– Ben van Berkel + Caroline Bos, UN Studio : Design Models

This research paper describes an alternative pedagogical approach to teaching architecture students introductory building technology by integrating digital and material techniques in a manner that reconfigures normative design-toconstruction processes. It focuses on the use of digital mock-ups as an iterative technique for simulating integrated, process-based relationships - feedback loops - between architectural design, technical thinking, and constructive action. As a pedagogical device, the digital mock-up is intended to catalyze a more expansive and inclusive reconsideration of construction's role in design thinking and technological production. The digital mock-up shares affinities with the traditional site-built mock-up in building construction for its ability to operate as a feedback mechanism for making (more) informed decisions regarding a project's production. Such empirical and provisional testing simulates a preliminary design's capacity to materialize abstract concepts, organizations, and effects prior to - and during - the construction process. These material mockups aim to expend a minimal amount of physical and economic resources to maximum effect in the construction of a full-scale portion of a building-to-be. The digital mock-up - a virtual version of this 'dress rehearsal' - takes advantage of its comparative freedom from such constraints in its simulation of the 'real thing'. Its

1 Ben van Berkel + Caroline Bos, UN Studio : Design Models. p.10-11. immateriality more readily facilitates iterative testing than its material counterpart. This, in turn, enables the mock-up to be executed not as a singular instance in the design-to-construction process, but deployed repeatedly as an active agent in design. While the digital mock-up is less cumbersome in design thinking, it still depends on the exacting terms of actual construction to produce feedback and material evidence to respond to. These domains are not mutually exclusive, nor are they directly transferrable. Instead of 'either/or' propositions concerning the autonomy of the virtual environment from material reality, the digital mock-up aims to take advantage of both, finding new synergies between them, and producing new feedbacks from them.

## Feeding Making

The making of feedback in design practices is very much a story of organizing inputs and outputs between tools and their users. With the aim of catalyzing design thinking, the instrument traditionally used in the production of such feedback - architectural drawing – is considered here as more than just a visualization tool.

Architectural representation and production have often been odd, but productive, bedfellows. It is common practice in architecture that a drawing is taken as a surrogate for the object itself, occupying a virtual space that precedes the work's materialization. The architectural critic Robin Evans recognized this difficulty as the "peculiar disadvantage under which architects labour, never working directly with the object of their thought, always working at it through some intervening medium".<sup>2</sup> Given such a seemingly innate and defining contradiction, it might be said that practices of architectural

<sup>2</sup> Evans, Robin. 'Translations from Drawing to Building'. Translations from *Drawing to Building and Other Essays*. Cambridge, MA: The MIT Press, 1997. p. 156.

design operate in the spaces between ideas, representations, buildings, and their intended effects as a means of materializing a design. This seemingly paradoxical distinction between architecture's immaterial means and its material ends – translations from drawings to buildings as Evans characterized it – places significant agency on techniques of representation to facilitate, to catalyze, to 'feed' such processes.<sup>3</sup>

As intermediaries between material and virtual environments, discipline-specific techniques of representation structure not only interaction with the architectural object, but its own material formation. This multi-media schema prioritizes the architect's participatory role in orchestrating the array of information transfers that occur between virtual and material terms as a fundamental activity of design. Although often regarded as a 'smooth space' indifferent to contingent reality, the 'real world' conditions within which practices such as architecture operate is a vital, but messy reality. A pre-condition of the digital mock-up techniques' successful use in making feedback is an acceptance of this playing field as such. The capacity to productively manage the asymmetric correspondences between an architectural object's representation in media and its construction as material reality is an essential part of the architect's 'design intelligence'.<sup>4</sup> This use of iterative digital testing and the material evidence gleaned from direct, hands-on learning creates a feedback loop between design and production processes.

To this end, the designer is challenged to proactively engage and negotiate this space of translation between media as a fertile ground for creative design and technical thinking. The coupling of digital and material techniques helps to synthesize traditionally autonomous domains of architectural production - thinking and making, design and construction, virtual and material - within the same creative production process.

## Provisionally Real, Actually Virtual

The open, looped process used to visualize design scenarios in design thinking is common. It is not as common in technical design. Design and technical thinking are often considered mutually exclusive practices, with either/ or lines clearly drawn between them. On the one hand, design thinking: creative, generative, speculative, lateral. On the other, technical thinking: productive, conclusive, finite, linear. These dichotomies, however, are unproductive and outdated misconceptions that need to be addressed as we endeavor to more successfully integrate design and construction practices in the 21st century. To do this, the linearity of traditional 'design-to-construction' as a one-way (feedback) process needs to be reconsidered.

To this end, the digital mock-up is deployed within a design-to-construction environment to provisionally test one in the context of the other, collapsing terms of design or construction, digital or material, abstract or real, actual or virtual, etc. For a moment in time, 'real' construction and technical concerns are brought forward in the process to scenario play within the traditional domain of schematic design. The aim here is not in finding a 'correct' solution faster per se, but to produce the material evidence needed to make informed decisions about what the pros/cons of the various paths towards such a solution are. This virtual simulation develops *just enough* technical data, represented with *just enough* technical accuracy, to be plausible as 'real'.

These provisional couplings locate the digital environment's effectiveness for fast visualization and iterative testing - but often totalizing exactitude - within the context of the often unpredictable exigencies and circumstances of real design and construction situations. Such hybridization seeks a responsiveness to these material conditions in both the tool and its user. It aims to resist the deterministic tendencies of singular media and the invisibility of their operation that Malcom McCullough describes in Abstracting Craft when he notes that: "A tool directs your attention. Its function becomes your focus; as the saying goes, when you use a hammer, all the world looks like nails".<sup>5</sup> As such, the digital mock-up technique seeks a mutual synergy that takes advantage of the vicissitudes of both media. This affiliation of digital tool and material process restruc-

<sup>3</sup> Ibid, p.156.

<sup>4</sup> Speaks, Micheal. 'Design Intelligence and the New Economy.' *Architectural Record*. January 2002: 72-79.

<sup>5</sup> McCollough, Malcom. *Abstracting Craft - The Practiced Digital Hand*. Cambridge, Massachusetts: The MIT Press, 1997. p. 59-81.

tures the design-to-construction process as a fluid, non-linear continuum in which technical knowledge and construction parameters can effectively and experimentally inform early design decision-making by making feedback.



FIGURE 1: Digital mock-up and design-build.

#### **Evolving Technological Teaching**

The digital mock-up is issued in the form of discreet technical design exercises in two core building technology courses taught at the College of Architecture and Design at New Jersey Institute of Technology: ARCH 226 Element/ Assemblage/System and ARCH 525 Contemporary Case Studies in Integrated Design. This paper outlines the former's focus on issues of assembly, as paired with design build activities, and the parallel efforts of the latter focused on issues of systems integration. To more effectively meet the challenges of 21st century design education, these recently reorganized courses evolve the traditional pedagogy and structure of core building technology courses by supplementing their typical lecture format with a project-based model of learning that uses design-oriented, digitally-driven techniques. As opposed to the traditional 'standand-deliver' educational model of technical courses, these classes disperse information and incorporate it as applied knowledge iteratively across lecture and workshop formats. These two venues are structured as a feedback loop between alternating weekly class sessions. This approach emphasizes project-based learning in both formats - in the lectures via extensive use of case studies to demonstrate concepts in the context of specific project-based situations and within the workshop environment via the use of the digital mock-up exercises to apply technical knowledge and rehearse it 'hands-on' in design practice.

Though varied in the particulars of its application, the digital mock-up technique is used in both courses as an important vehicle for evolving technological teaching. To this end, the broader meta-objective of its use in both courses is to cultivate an attitude that building construction is an integral part of architectural design. To advance this seemingly innocuous, but nevertheless challenging claim, these two courses posit that integrated thinking about design and technology begins with a *qualitative sensibility* - one that values the agency of material intelligence and construction knowledge in design thinking. Furthermore, they position the professional and pedagogical ambitions of such integration not as a disciplinary end in-and-of itself, but as a means of evolving technological practices towards a more inclusive and synthetic mode of architectural production.

## **Material Process**

Element/Assembly/System's coursework develops introductory knowledge of key terminology, properties, and performance criteria of the constituent elements, assemblies, and systems used in building construction and the methods used in their organization and application. It emphasizes the integration of this technical knowledge into design problems by focusing on assembly practices and their application to the circumstances of a building's conception and realization. The protocols associated with material organization and building assembly are studied via two methodologies - parametric and operations-based thinking. As such, this process-oriented exploration focuses on both intrinsic material attributes and the extrinsic operations applied to them to catalyze technical design problem solving as a model of thinking-making that is engaged in the actual material circumstances of practice. The course considers part-to-whole relationships of building assembly in the context of material and construction processes. It first maps intrinsic relationships between constituent elements being assembled (column, beam, etc.) and their material properties (wood, concrete, etc.) and then re-imagines these construction 'primitives' as having synthetic capacities beyond the material and structural typologies (wood vs. concrete, wall vs. frame, etc.) that traditionally organize the content of technical design cours-

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FIGURE 2: Examples from 4 iterations of digital mock-ups, ARCH 226

es.<sup>6</sup> Instead of orthodox adherence to such absolute principles and typologies, the course shifts emphasis towards a responsiveness to process, performance, and extrinsic parameters associated with synthetic integration. The emerging pedagogical emphasis in academic curricula and professional mandates towards integrated practices of design and technology necessitate a reconsideration of such absolutes. With this shift, a building's constructive anatomy is understood as a dynamic proposition whose intrinsic capacities for integrated organization and performance are contingent upon the designer's ability to synthesize the often conflicting requirements and interactions that emerge in their application.

# Digital/Mock-up, Design/Build

This shift of emphasis towards material process advocates for its greater agency in the activities of building assembly. The digital mockups' appropriation of the design-build projectdelivery model serves as an operative means to assert such material agency in an academic context. To this end, the course is closely coordinated with ARCH 264 Architectural Design Studio and its nested design-build project, the Masonry Build Competition. In this class-wide project, eight teams of second-year design students collaborate with construction industry professionals from the Masonry Contractors of New Jersey to build a discrete part of their design studio projects.<sup>7</sup> This process affords the unique educational opportunity for every student to be immersed in the totality of a project's development from design thru construction at the early stages of their education.

The digital mock-up supplements this 'hands-on' studio-based experience with the project's virtual assembly in the building technology class. These discreet exercises are conceptualized and delivered in terms of the scope and sequence of the Masonry Build Competition. This full-scale construction project is used as a pedagogical 'portal' through which the traditionally supportive role of a technical design class takes on greater agency in the design studio environment. The pivotal vehicle for this curricular cross-over are the digital mock-up exercise.

In each of these four weekly exercises, the students' task is to design a small structure/ enclosure that tests the parametric constraints and potentials of singular elements as constituent parts of larger constructive assemblies. These exercises limit project size to a

<sup>6</sup> DeLanda, Manuel. *A New Philosophy of Society: Assemblage Theory and Social Complexity*. London: Continuum Books, 2006. p. 10.

<sup>7</sup> NJIT's Masonry Build Competition is sponsored by The Masonry Contractors of New Jersey, the International Masonry Institute, the Bricklayers and the Allied Craftworkers of New Jersey, local Numbers 4 and 5.

prescribed geometric envelope of the same dimensions as the Masonry Build (10'-0" L x  $8'-0'' W \times 8'-0''$ ) with the aim of promoting a comprehensive understanding of project scope. Students deploy a 'kit-of-parts' consisting of a standard set of construction elements and evaluate their internal compatibilities, efficiencies, and effects within the virtual environment of the digital model. Each of these exercises focus on a specific process of assembly presented in the previous class lecture. The specifications for each exercise are strategically designed to have inconsistencies between material and assembly parameters. For example, in the first exercise, specific components of unit masonry are assigned to be deployed with a required joint spacing, within a prescribed horizontal dimension that does not correspond to the cumulative dimension of the masonry units as they course out. Students are allowed to cut these elements, but must identify each location where this 'corrective' operation is performed within the digital model. The intention of staging these dissonances is to encourage evaluation of the constraints and potentials of the given parameters in relation to the technical and design-based criteria, whereby the 'corrective' act performed on these seemingly irreconcilable conditions is understood as an act of design. This process of iterative testing initiated by the digital mock-ups is extended into the design studio to include an expanded range of media and techniques - physical modeling, full-scale material mock-ups, more digital mock-ups, material specifications, discussions with industry representatives, etc. Each one is used to actively direct this extended, multimedia process towards co-relating the construction project's 'means and methods' with its 'design intent'. As such, the documentation traditionally used for communicating the project to the builder is here supplemented with an expanded range of studies and documentation involving material procurement, tinplating, construction sequencing, and site staging to name a few.

Following the conclusion of the Masonry Build, the 'completed', material object and the 'real-world' knowledge acquired during its construction are staged as the beginning of a new learning process. This reverse engineering of the traditional linearity of the design-



FIGURE 3: Completed Masonry Build structures.

to-construction process now locates technical design at the beginning of the design process for the course's final project. This project calls for the technical development of a discrete part of each individual student's previously completed studio project from which the built part originated. This is done to dislodge the material 'authority' of the actual construction as a finite conclusion. A parallel change is the introduction of the Autodesk's Revit information modeling software as a follow-up to the initial sequence of digital mock-up exercises focused on the development of parametric thinking within the virtual modeling environment, but did not require use of parametric software. This sequencing of the exposure to software tools is intended to enable the use of information modeling by preceding its use with the students' direct construction experience in the field. With this novel combination of 'hands-on' experience and software capability, these introductory students then proceed to address questions of technical development in response to the complexities associated with the scale and scope of a comprehensive building design - the design of a situated, integrated whole.

# **Rehearsing Integration**

The practice of integration is taken up more directly and expansively later in NJIT's technology sequence in the course ARCH 525 *Contemporary Case Studies in Integrated Design*. Paralleling the pedagogical mission of ARCH 563/564 *Comprehensive Design Studio* 1 / 2, its primary objective is to develop students' facil-



FIGURE 4: Examples from 6 iterations of digital mock-ups, ARCH 525

ity with systems integration practices and the technical resolution of design intent. The challenge posited in this upper level class is to overcome the compartmentalization of specialized knowledge developed in intermediate level technology courses (i.e. structural and environmental system design) from matters of design. As these advanced students are novices at integration, this approach rehearses the architect's agency and responsibility in selecting, evaluating, and synthesizing flows of often unrelated – sometimes even unknown – technical information towards an equally disparate array of design-based selection criteria. With the intention of converting such information into knowledge, the course uses the previously discussed combination lecture and workshop format. The lecture component focuses on case study analyses of integrated design practices that locate technical problem solving in the context of specific project-based circumstances. The workshop advances and internalizes this objective via the application of such practices to the students' studio projects through the use of the digital mock-ups.

The task of integrated design lies between the objects in question - in their inter-relationships. As such, effective systems integration practices must embrace the complexities of designing the interfaces of multiple systems and their differences that must be dynamically hosted within an integrated whole. This is a fundamentally different kind of problem solving process than the design of a single system. In such systems design, consideration of individual design criteria may be internally 'correct', optimized as individual parts, assemblies, or systems, but nevertheless result in disjointed interfaces, conflicting performance criteria, insufficient space allocations, and irreconcilable distribution routes - integration failures when placed in context of each other. Systems integration, on the other hand, must necessarily respond to different design criteria and situations as this form of integration is at the level of the whole not its constructive parts. This is a more difficult form of practice because we are typically more accustomed to analyzing, quantifying, and designing singular parts, not complex systems. As such, the practice of systems integration is more synthetic and interpretive, requiring knowledge, not only information. Students - even upper level ones - are unaccustomed to working with doubt and risk that are commonplace in professional practice. They are especially uncomfortable when dealing with technical matters previously handled using finite analysis methods to find equally finite answers. Resolving questions with known quantities requires information. Resolving problems with unknown or divergent quantities requires intelligence.

It is in this alchemic problem-solving context that the digital mock-up is used as a 'redherring' that provisionally simulates all design conditions all at once. It is a technique used to expose singular problems as situated in variable, multivalent contexts. This set of digital mock-ups – grouped under the project thematic 'Variations and Evidence' – are issued as six weekly exercises that directly parallel the content of the studio projects. Preceding design work undertaken in the studio, these technical design exercises attempt to shift the agency of this course from a *supportive* role to a *catalytic* one.

These exercises focus on the technical development of individual student's design studio project. Each one is an intensive 'charrette' focused on a specific aspect of integrated design development - integration diagramming, component design, exterior envelope design, structural systems design, MEP system design, construction sequencing – using a range of digital software including Autodesk's Revit for information modeling and Ecotect for performance simulation. In each exercise, multiple solutions to the given technical design are produced and tested as evidence of the potentials and constraints of a given variation. What is at stake is the capacity to synthesize the often conflicting requirements and interactions that emerge in its application to an expansive range of design situations and architectural applications. The pedagogical intention is that, within the space of this staged discomfort, student's technical knowledge is applied thru the digital mock-ups and the feedback produced is reflexively and recursively incorporated as knowledge.

# Digital Technique and Material Intelligence

Digital technology's emergent capacities to enfold techniques of representation and production open new opportunities for architecture to restructure its historical relations between practices of design and construction. As such, these digital mock-up exercises test a potentially productive affinity between the displacement of construction issues into the early phases of design thinking and the emergent impetus for increased material engagement via new digital design and fabrication technologies.

As contemporary digital techniques increasingly enable a new efficiency in accurately envisioning, analyzing, and documenting a project before construction, it is important to be cognizant of users' tendency to substitute quantitative abstract information for qualitative material intelligence. An embedded and reoccurring assumption of digital methods is that through their exacting description of material reality, all aspects of the architectural object are easily quantifiable and therefore directly translatable - that what you see is what you get. Despite this commonly held claim, the messy reality of building construction seems to have an uncanny ability to demonstrate that this is often not the case. While the conceptual space of abstraction and translation is often characterized as an indeterminate space of professional 'error', it is often also the space of creative experimentation, and even architectural invention. A feedback-producing process that recognizes - and seeks - such asymmetric working conditions as a positive attribute is one that cultivates what David Pye has referred to as the "workmanship of risk".<sup>8</sup> This open, inclusive, and experimental methodology posits that there is usually not, and perhaps cannot be. an exact 1-to-1 correlation between architecture and its representation without an iterative process of approximation during the design-to-construction process. The digital mock-ups' coupling of digital technique with material intelligence facilitates a 'toggling' between these environments as a necessarily 'both/and' model of practice that acknowledges that architecture often exceeds its own representation, and productively turns such asymmetries into feedback.

# Just Waste: Notes on Technological Production

"...we are exhibiting an archive, that is, a physical accumulation of the documents that we have produced in order to initiate and accelerate mental processes or, on the contrary, to arrest and propel them in another direction...in some cases buildings have actually emerged as a result....these archived objects are nothing but waste products, since the immaterial, mental processes of under-

8 Pye, David. *The Nature and Art of Workmanship*. London: The Herbert Press, 1968. P.20.

standing, learning, and developing always have priority."  $^{\!\!\!^{\rm P9}}$ 

- Herzog + De Meuron, "Just Waste"

To what end are architecture's technologies directed and what are their effects? While the philosophical nature of this type of question is not normally the purview of core building technology courses, its implication of a correspondence between technology's 'means' and 'ends' is integral to the development of the architect's design intelligence. Fundamental information and skill sets are conditioned by, and give shape to, the modes of the production that they enable. For the beginning design student, the understanding on *how* technology works must be considered in the context of the motivations behind its use - why technology matters. As such, these courses seek to position technological production not as an autonomous disciplinary project, but integral to architecture's qualitative, performative engagement with the natural and social systems that constitute the built environment. This aim is to locate technology as a means to an end - an end that lies beyond architecture's means of production.

In both courses, the digital mock-up is a technique that enables - if only in a limited way - the synthesis of traditionally autonomous domains of architectural production - thinking and making, design and construction, virtual and material - within the same creative process. This technique seeks to emphasize and leverage technology's capacity to synthesize the often conflicting requirements and interactions that emerge in its application to the expansive range of design situations in practice. As such, its objective is to couple building technology and digital technique in an integrated *design epistemology*.

This objective proposes that these realms are not only not irreconcilable, but that their compartmentalization is unproductive and unsustainable amidst contemporary changes to the architectural discipline, construction industry, and culture at large. Indeed, the discipline's unique instrumentality is in its capacity to effect the broader conditions within which the work is situated, and as such we cannot afford to treat practice as a controlled environment

9 Herzog + De Meuron, 'Just Waste'. *Herzog + De Meuron: Natural History.* p.74.

nor apply new technology in old ways. If educators, students, and professionals are to operate in a more integrated – and experimental – manner, these shifts necessarily include a series of disciplinary re-alignments between architectural design techniques, building technology, and material effects.

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# A CRAFTED ANALYSIS OF PLACE Making Real

# **Creating Place**

Architecture, as a result of cultural and technological shifts, has drifted towards internally focused, compositional exercises rather than expressions of the contemporary human condition. It is the responsibility of designers to create culturally and physically responsive architecture that can begin to heal the scars perpetrated by an approach to design that is insensitive and removed from the experience of the user. In 1994, architectural theorist Juhani Pallasmaa posited a series of questions facing the architecture profession, in a critique of this trend. 'Can architecture define a credible social and cultural goal for itself? Can architecture be rooted in culture in order to create an experience of locality, place, and identity?'<sup>1</sup> These questions and responses were articulated in his essay, "Six Themes for the Next Millennium," published in The Architectural Review.

Using this essay as a basis for an analysis of place, a seminar in Placemaking seeks to both engage in a critique of the normative architectural practice responsible for image-driven buildings proliferating across the global landscape, as well as to study built work that exemplifies Pallasmaa's themes as a means of fully engaging the inhabitant in their time and place. Each week we explore vernacular and contemporary projects that are rooted in their cultural, temporal and physical contexts. The lectures are structured on the dualities inherent in Juhani Pallasmaa's "Six Themes for the Next Millennium":

- Slowness
- Plasticity
- Sensuousness
- Authenticity
- Idealization
- Silence

In addition to the dissection of each theme, supplemental readings include essays within

JENNIFER SHIELDS, VISITING LECTURER UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE

the realms of Phenomenology and Architectural Regionalism.

The act of making plays a critical role in the analysis of place: just as a sense of place is only fully created and comprehended through bodily engagement and the activation of multiple senses, physical collage provides the medium to both elicit and embody a multisensory experience and understanding. As Ben Nicholson states in *Appliance House*,

Like all maps, collage can exist as a guide to what exists on the ground or it can prompt a new set of thoughts suggested by interconnections of terrain and cities. When considered from this angle, the collage becomes a transcription that can accelerate the way one understands the everyday world and how it comes together...<sup>2</sup>

This collage-making process is a venue for weekly analysis in which students examine a built work through the lens of each theme, giving them a greater understanding of the qualities inherent in place.

As an alternative to the typical precedent analysis that is focused on formal aspects of a building, this approach to analysis allows the beginning design student to evaluate a building from the perspective of the inhabitant, encouraging a design methodology that considers the visceral experience of a project.

## A Phenomenological Lens

Our connectedness to the world, our very existence, is inextricably linked to the buildings and cities we inhabit. This concept is tied to the theories of Phenomenology and Architectural Regionalism, both of which stem from the writings of Martin Heidegger in the first half of the 20th century. Juhani Pallasmaa, a Finnish architect and theorist, has written extensively on the imperative for architecture to be grounded in its physical and cultural context so that its inhabitants will have a richer experi-

<sup>1</sup> Pallasmaa, Juhani. 'Six themes for the next millennium.' *The Architectural Review*, July 1994: 74-79.

<sup>2</sup> Nicolson, Ben. 'Collage Making.' *Appliance House*. Cambridge: MIT Press, 1990. 16-29.

ence and a greater sense of connection to their place in both space and time.

The philosophical perspective of phenomenology as it pertains to architecture has its foundations in the writings of philosopher Martin Heidegger. In 'Building Dwelling Thinking' published in 1951, Heidegger asks two significant questions: 'What is it to dwell?' and 'How does building belong to dwelling?'<sup>3</sup> Heidegger prefers the terms building and dwelling as opposed to architecture, emphasizing inhabitation over aesthetics. Buildings shouldn't be seen as objects or mere products of the construction process, but as part of the ongoing human process of building and dwelling. Heidegger defines place as space appreciated through human experience.<sup>4</sup> Heidegger's model has its foundation in human perception a call to reintegrate building with dwelling, which had been separated with the division of labor necessitated by modern technology.

A critical concept in Heidegger's writing is that of the bridge: a thing, not an object – experienced and used rather than observed. Like a building, the bridge alters the relationships between individuals and their environment; it changes patterns of everyday life. Dwelling informs building and vice versa. 'A place comes into existence only by virtue of the bridge.'<sup>5</sup> The bridge was built where it was deemed appropriate – this is the moment when dwelling is inscribed in place through building.

Heidegger postulates that the identification of place is not logical or systematic, but rather subjective and personal. Edges and boundaries are critical concepts to Heidegger: 'the boundary is that from which something begins its presencing.'<sup>6</sup> Space is parceled into places by human activity and experience. Boundaries are created in our minds – they can be physical and defined, such as by a wall or a row of trees, or vague and imprecise, like a horizon – it is a threshold but it cannot be marked or precisely located. Heidegger's writing supports a critique of the architecture profession serving only itself – ideas and concepts prepared and consumed only by professionals; that architecture has placed too much emphasis on aesthetics and overlooked the people that inhabit these spaces. Professionals involved in building (architects, mortgage lenders, surveyors, engineers, etc.) have conspired to separate building and dwelling. For Heidegger the act of building isn't a means to dwell – 'to build is in itself already to dwell.'<sup>7</sup>

One of the first architectural theorists to draw on Heidegger's writing was Norwegian theorist Christian Norberg-Schulz who avows, 'the existential purpose of architecture is therefore to make a site become a place, that is, to uncover the meanings potentially present in the given environment.'8 This transformation can only occur, and meaning can only be found, in human interaction and perception. Also stemming from Heidegger's writing on a phenomenological approach to building is the theory of Critical Regionalism. This theory was made popular by Kenneth Frampton in the 1970s as a critique of the prevalence of meaningless and placeless architecture. This placelessness could be countered by the influence of context on architecture. These theories speak to the importance of human experience heightened by a responsiveness to physical and cultural conditions, in order to create a sense of place.

# Collage as an Analytical Tool

Collage is a potentially powerful method to analyze how human perception and experience give meaning to a place. A collage, as a work of art, consists of the assembly of various fragments of materials, combined in such a way that the composition has a new meaning, not inherent in any of the individual fragments. According to Diane Waldman in *Collage*, *Assemblage, and the Found Object*, a collage has several levels of meaning: the original meaning of the fragment, the new meaning it achieves by association with other fragments, and finally

<sup>3</sup> Heidegger, Martin. 'Building Dwelling Thinking.' Poetry, Language, Thought. translated by Albert Hofstadter. New York: Harper Colophon Books, 1971.

<sup>4</sup> Sharr, Adam. *Heidegger For Architects*. New York: Routledge, 2007.

<sup>5</sup> Heidegger, 'Building Dwelling Thinking.'

<sup>6</sup> Heidegger, 'Building Dwelling Thinking.'

<sup>7</sup> Heidegger, 'Building Dwelling Thinking.'

<sup>8</sup> Norberg-Schulz, Christian. *Genius Loci, Towards a Phenomenology of Architecture*. New York: Rizzoli, 1980. 18.

its meaning as a result of its transformation into a collective composition.<sup>9</sup>

Collage, as an art form unique to the modern era, allows 'an archaeological density and a non-linear narrative through the juxtaposition of fragmented images deriving from irreconcilable origins.'10 This focus on process over product and the necessary bodily engagement with this process is clearly analogous to the architectural design methodology advocated by the Phenomenologists. In this seminar, a specific collage methodology is identified with each of Pallasmaa's six themes. The collage methodology, understood through a specific collage artist, was selected based on technique and aesthetic intent, typically suspending any social or political motivations. The artists' work is used as inspiration, while the students are encouraged to develop their own techniques for representation in two-dimensional multi-media.

#### Slowness

The first theme addressed in Pallasmaa's essay is Slowness, about which he asserts, 'Great architecture petrifies time.'11 Each work of architecture should mark its place in history, evidence of the place and time in which it was built. This approach stands in contrast with fashionable, novel, or image-driven architecture commonly found in architectural publications today. A work of architecture that embodies Slowness is simultaneously timeless and rooted in its temporal condition. By considering a building's physical engagement with the ground, we can understand an inscription of the progression of time, juxtaposing the scale of geologic time with the scale of human life. By marking a specific moment in space and time within the palimpsest of physical and cultural conditions, while maintaining or perhaps revealing these conditions, we create a place; much like Heidegger's bridge.

The Collage methodology that speaks most directly to the concept of Slowness is one that employs both additive and subtractive methods, in which the finished collage is illustrative of the process of aggregation. The Cubist collagists achieved a deconstruction of form through an additive process. According to Robin Dripps, 'Figures of all kinds were carefully taken apart just to the point at which the resulting fragments were the most open to external relationships but not so far that reference to the original whole was lost.'<sup>12</sup> This concept of breaking down form to accommodate new relationships between architecture and site/ground is a common characteristic in works of architecture that embody the theme of Slowness.

Aggregation and accumulation of seemingly independent and varied architectural artifacts



FIGURE 1: Student collage, Taylor Milner

create an atmosphere of continuity and simultaneously a sense of timelessness and the progression of time. Slowness, as the capacity to illustrate a temporal condition through an aggregation of elements interwoven with physical context, can be achieved through creating a palimpsest of human history, a juxtaposition of the temporal and physical conditions of geologic and human scales.

# Plasticity

Pallasmaa advocates Plasticity, or a threedimensional, sculptural consideration of space. This theme is a critique of the current planimetric or sectional extrusions resulting from designing with the computer. Working within the infinite digital space, a scaleless medium,

<sup>9</sup> Waldman, Diane. *Collage, Assemblage, and the Found Object.* New York: Harry N. Abrams, 1992. 8.
10 Pallasmaa, Juhani. 'Hapticity and Time: Notes on Fragile Architecture.' *The Architectural Review*, May 2000: 78-84.

<sup>11</sup> Pallasmaa, 'Six themes for the next millennium.'

<sup>12</sup> Dripps, Robin. 'Groundwork.' Burns, Carol J. and Andrea Kahn, eds. *Site Matters*. New York: Routledge, 2005. 59-91.

reduces the potential for dynamic spatial volumes considered through the human body. The resultants reside in the domain of vision, specifically focused vision, disengaged from the other senses. As Pallasmaa attests in *The Thinking Hand*, all senses are an extension of the sense of touch; when we look at something, we gauge its tactile qualities.<sup>13</sup> This process allows us to 'touch' objects both near and far. Sculpting light and space, comprehended by engaging our peripheral vision, is critical to a three-dimensional, embodied experience.

In order to evaluate the plastic qualities of a work of architecture, we refer to the Russian Constructivist movement, specifically the collages of El Lissitzky. In his approach, the canvas is seen as an infinite three-dimensional space, with the potential to investigate possibilities for plastic, sculpted spaces and volumes. His collage entitled '*The Constructor (Self-Portrait)*' from 1925 illustrates critical dualities that the Constructivists, and Pallasmaa, have questioned. He addresses the integration of a mechanical aesthetic with handcraft, and the dualities of the eye/hand, vision/touch, surface/ space, and composition/construction in this and other photomontages.

There is a clear translation in Lissitzky's work from collage as two-dimensional composition to three-dimensional space. He developed an extensive series of paintings, collages, and assemblages under the nomenclature 'Proun' or 'project for the affirmation of the new,' meaning the new society emerging after the Bolshevik Revolution of 1917. He saw Prouns as a mediator between painting and architecture, as maps or designs rather than purely pictorial. 'The forms with which the Proun makes its assault on space are constructed not from aesthetics, but from material.'14 The exploration of three-dimensional space using the layering of two-dimensional media and photos is an apt method by which to analyze the theme of Plasticity.

Pallasmaa contends, 'As buildings lose their plasticity and their connection with the language of the body, they become isolated in the



FIGURE 2: Student collage, Shannon Weekley

distant and cool realm of vision.'<sup>15</sup> An understanding of Plasticity, or the sculpting of space and light, creates opportunities to bodily engage the user with the place, offering a more complete understanding of one's physical, temporal, and cultural context.

## Sensuousness

While both Plasticity and Sensuousness are based in the engagement between our bodies and surface/space in the experience of a work of architecture, plasticity primarily addresses the distinction between three-dimensional and two-dimensional architecture. Plasticity necessitates a sculptural, embodied spatial immersion manipulated using space and light, understood through our peripheral vision, while Sensuousness addresses multi-sensory versus purely visual architecture articulated through the haptic qualities of materials. Sensuousness goes beyond solely looking at the tactility of physical materials. Engaging multiple senses also includes ephemeral qualities perceived through the skin, such as light, airflow, temperature, and humidity. Blurring the threshold between interior and exterior is one means of allowing a greater haptic experience of space. These indistinct boundaries, or *fragile form*,<sup>16</sup> are often visible in architectural interventions into existing structures - there is a great potential in revealing the palimpsest of culture and time through materials to facilitate an embodied experience.

<sup>13</sup> Pallasmaa, Juhani. *The Thinking Hand: Existential and Embodied Wisdom in Architecture*. Chichester: John Wiley & Sons Ltd., 2009. p.102.

<sup>14</sup> Lissitzky, El. Lecture at Inkhuk in Moscow on October 23, 1924.

Pallasmaa, 'Six themes for the next millennium.'Pallasmaa, 'Hapticity and Time: Notes on Fragile Architecture.'

The collage methodology suited to an analysis of Sensuousness is that of the Surrealist Max Ernst. His collages embody this theme in two ways: his interest in the human body and in materiality. In the majority of his collages, he represents the human form, either as an investigation of scale, sensory experience, and/or bodily perception of or relationship to the environment. Materially, Ernst utilized a number of techniques to create textures that would allow a haptic engagement, including etchings,frottage, and grattage (techniques by which textures are transferred from objects to canvas or paper). Ernst's collages reveal the



FIGURE 3: Student collage, Timothy Geier

manual processes and techniques by which they were created. "Collage invigorates the experience of tactility and time."<sup>17</sup> Collagemaking that seeks to investigate the role of the human body, as a multi-sensory entity, in the

17 Pallasmaa, 'Hapticity and Time: Notes on Fragile Architecture.'

experience of architecture can best express the theme of Sensuousness.

Understanding the body's relationship to building through a physical and perceptual interaction is evidenced in a resultant fragile form – inspiring works of architecture are built around the bodily, multi-sensory perception of place, rather than abstract formal concepts. Architecture must be capable of creating a multi-sensory experience, not a purely visually one, in order to be relevant.

# Authenticity

Authenticity, to Pallasmaa speaks to an architecture that allows an individual to find a source of identity that is so difficult in the context of the universalization of culture. This can only be attained through a considered interaction between a building and its temporal and cultural conditions. A work must provide multiple readings, allowing each user to identify with their context autonomously.<sup>18</sup> Our personal perception of a place is entangled in our memories and lived experiences of other places. According to Gaston Bachelard, memories are associated with space rather than time. 'We are unable to relive duration that has been destroyed.'19 These memories are associated with sensory, bodily experiences of place subconscious aggregated experiences affect our perceptions and reflections on new encounters with works of architecture. In order for a building to reveal a deeper and broader meaning to us, we must identify with it on both personal and cultural levels.

The Abstract Expressionism movement in the US intended to merge elements of reality with imagination by combining the familiar with the unknown, the personal with the universal.<sup>20</sup> Romare Bearden was considered the nation's foremost collagist at the time of his death in the late 1980s. He began to work in collage during the 1960s civil rights movement, in order to draw attention to this vital cultural struggle. Unlike the abstract figuration of other artists in this movement, Bearden

Pallasmaa, 'Six themes for the next millennium.'
Bachelard, Gaston. *The Poetics of Space*. Boston: Beacon Press, 1969. 9.

20 Waldman, Diane. *Collage, Assemblage, and the Found Object*. 229.

turned towards representational work, but held true to the nature of the subjective. 'He used collage to piece together past and present, old and new, and fused his knowledge of African tradition with Western culture to give his subjects new meaning.'<sup>21</sup> Bearden's integration of personal and cultural phenomena with the intent of promoting a greater social understanding aligns with Pallasmaa's articulation of the theme of Authenticity.

Pallasmaa describes Authenticity in works of architecture as constructs that support 'a confidence in time and human nature; it provides the ground for individual identity.'<sup>22</sup> A building must simultaneously identify with its cultural and physical context while remaining tangible to the individual, provoking a greater sense of connectivity to his/her position in space and time.

## Idealization

The intent of Idealization in architecture is to represent the best qualities and goals of a culture. In The Architecture of Happiness, Alain de Botton describes the purpose of idealized architecture as 'not to remind us of what life was typically like, but rather to keep before our eyes how it might optimally be, so as to move us fractionally closer to fulfillment and virtue.'23 On a personal level, De Botton speaks about beautiful architecture as that which fills a void, supplying us with qualities that we are lacking in our lives. In this sense, works of architecture embodying the quality of Idealization are a response to cultural context, first and foremost, rather than physical or environmental conditions.

The Hungarian artist László Moholy-Nagy, influenced by the Dada and Constructivist movements during his time at the Bauhaus, used photomontage in conjunction with tonal collage and line drawing to capture the dynamic nature of the modern world. He intended to 'reconcile art and humanity with the machines of the technological age.'<sup>24</sup> Moholy-Nagy advocated the engagement of the senses, often overlooked in the rapid modernization of society, creating a barrier to social reform. In Vision and Motion, he affirms, 'The remedy lies in the enhancement of our spiritual education by a sensory education, a nurturing of the senses, by the readiness to articulate senses through the media of artistic expression.<sup>25</sup> Moholy-Nagy's photomontages, or 'photoplastics,' showing clear formal associations with El Lissitzky's Prouns, endeavored to elucidate an underlying social or personal truth. His vision for an integration of the authentic, sensory human experience with the modern, mechanized world is made manifest in his photoplastics, paralleling the values in the theme of Idealization.

Pallasmaa suggests that '...Architecture makes concrete an ideal view of life.'<sup>26</sup> It should not seek to typify superficial or fashionable desires, but rather deeper, fundamental values and goals of our culture. A physical embodiment of these principles gives us a glimpse of what we personally, and as a society, should strive for.

## Silence

Silence, to Pallasmaa, is a quality inherent in all great works of architecture. Silence exists in a building when it facilitates stillness, contemplation, and self-reflection. It is the emotional response evoked by a rustic barn or cottage, a building that was constructed as an inherent response to function and context. These places allow us to reflect on our own identity, our place within our physical and cultural milieu. Zumthor describes it as a 'perceptual vacuum,' in which 'a memory may surface, a memory that seems to issue from the depths of time.'27 At these moments, we are able to view ourselves in the continuum of time that lies beyond the scale of an individual life. Buildings achieve this by allowing us to read the inscriptions of the human hand involved in construction, and human inhabitation over the life of the building, written on its surfaces.<sup>28</sup>

<sup>21</sup> Waldman, Diane. *Collage, Assemblage, and the Found Object.* 229.

<sup>22</sup> Pallasmaa, 'Six themes for the next millennium.'
23 De Botton, Alain. *The Architecture of Happiness*. New York: Pantheon Books, 2006. 105-168.

<sup>24</sup> Fiedler, Jeannine. *Laszlo Moholy-Nagy* 55. London: Phaidon Press Limited, 2001. p.3.

<sup>25</sup> Fiedler, Jeannine, *Laszlo Moholy-Nagy* 55. p.14.
26 Pallasmaa, 'Six themes for the next millennium.'
27 Zumthor, Peter. 'A Way of Looking At Things.' *Thinking Architecture*. Basel: Birkhäuser, 2006. 7-27.
28 Leatherbarrow, David. *Architecture Oriented Otherwise*. New York: Princeton Architectural Press, 2009.

The collage methodology that reveals the theme of Silence is that of the American artist Joseph Cornell. Famous for his boxed constructions or assemblages of objects, he also produced a number of compelling two-dimensional collages. Drawing from Cubist themes, Cornell explored fragmentation and new relationships and understandings that might be revealed as a result. 'Cornell often spoke fondly of buildings in the process of demolition, finding beauty in the fading colors, in the warmth of human association, and in the fragments of decay and destruction.'29 His collages have a sense of mystery and poetic calm, moving the viewer to create his/her own narrative, encouraging individual reflections to inform perception. The silence concretized by Cornell's collages is a microcosm of an architectural experience of Silence.

'Ultimately, architecture is the art of petrified silence.'<sup>30</sup> A silent architecture contains the latent potential for personal reflection, a stillness that accommodates a dialogue between our physical reality and metaphysical ruminations. Silence results from a humble, authentic approach to design, inspired by site, culture, and sensory experience.

## A Comprehensive Analysis

'A city is never seen as a totality, but as an aggregate of experiences, animated by use, by overlapping perspectives, changing light, sounds, and smells. Similarly, a single work of architecture is rarely experienced in its totality (except in graphic or model form) but as a series of partial views and synthesized experiences. Questions of meaning and understanding lie between the generating ideas, forms and the nature and quality of perception.'<sup>31</sup>

In *Questions of Perception*, Steven Holl illuminates the true nature of the perception of cities and buildings. We perceive them as an <u>amalgam of sensory phenomena understood</u> 84.

29 Waldman, Diane. *Collage, Assemblage, and the Found Object*. 213.

30 Pallasmaa, Juhani. *The Eyes of the Skin: Architecture and the Senses*. Chichester: John Wiley & Sons Ltd., 2005.

31 Holl, Steven, Juhani Pallasmaa, and Alberto Perez-Gomez. *Questions of Perception: Phenomenology of Architecture*. San Francisco: William Stout Publishers, 2006. through personal experience and memory; not completely and objectively through a formal evaluation. More succinctly, places are lived rather than observed.

The final project for the seminar, a comprehensive analysis, asks the student to consider the multi-sensory experience of a work of architecture from the vantage point of all six themes. The student begins by identifying a project that he/she would like to evaluate from a phenomenological perspective, a work that has had a profound impact on the student in understanding a sense of place. As a place can





FIGURE 4: Student work, Devki Gharpure

only be fully comprehended through a bodily, physical interaction, allowing the engagement of all senses, first-hand experience with the work is required. This intimacy between the student and the work provides experiential, sensory information about the place. How specifically does this work of architecture embody a sense of place? How are Pallasmaa's themes made manifest through the work? Within a catalogue of six collages, each serves as an analysis of place viewed through one of six lenses.

A deeper understanding of architectural precedent and acquisition of new skills in representational techniques has the potential to influence a student's work in both academic and professional design settings. The process of carefully constructing collages as a physical expression of a bodily, haptic architectural experience creates a more profound awareness of the characteristics that contribute to a meaningful experience of place. A sense of place offers potentialities to understand ourselves as individuals, in this place and at this time, within a greater spatial and temporal framework.

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# THE FOUND OBJECT IN DESIGN Making Real

## CHRIS FORD, ASSISTANT PROFESSOR UNIVERSITY OF NEBRASKA

While artists have an established record of scholarship about the role of found objects in their work, there is a disappointing lack of scholarship that considers the role of found objects in design. Perhaps this can first be attributed to the different motivations by which an artist and a designer choose to incorporate a found object.

## **Discipline-Centric Motivations**

If we generalize, artists are creative thinkers who produce aesthetic objects that respond to problems of their own creation. However, designers are both creative and analytical thinkers who produce functional objects responding to performance-based problems demonstrated by the needs of others. Despite the similarities and differences between the realms of art and design, the defining characteristic between them is this level of utility found in the artifacts produced - While both require creative thought, it remains that objects of fine art are considered with aesthetic attitudes, and objects of design are considered with pragmatic attitudes. Between these two realms however is a thin threshold that places equal weight upon both the aesthetic and pragmatic qualities of a specific object. As this threshold is enjoying an increasing amount of scholarship, designers are renewing an interest in the discipline of Craft. Members of this discipline whose work is particularly expressive of Craft principles include Octavio Paz, George Nakashima, Dale Chihuly, and the Teutul family.

With regards to our interest in found objects, this difference in attitudes illuminates that primary reasons for selection are rooted in the source disciplines themselves. The found object in art has no responsibility to perform beyond its aesthetic affect, and the found object in design has no further responsibility beyond its pragmatic (i.e. mechanical, structural) affect. Across all design disciplines, the solutions that designers propose require the deliberate processing of raw materials to produce a new idealized solution that is performatively consistent throughout its entirety. This holistic approach enables designers to combine the desired structural and performative attributes together thereby finding an economy in design that is not burdened with extraneous and superfluous parts. In turn, the integrated aesthetic dimension of this designed object can either be of deliberate consideration or of collateral effect.

# The Impact of Found Objects

In more traditional acts of design, design problems are shaped by constraints that oftentimes include aspects such as site, purpose, user, cost and schedule. Although this design problem remains ill-defined, these constraints play an informative role in first structuring a design problem so that a creative and analytical design process can begin. In these cases, there is an emptiness in the middle of newlydefined design problems that maximizes the number of heuristic devices a designer might employ to generate possible solutions. However, the incorporation of a found object in a design solution presents interesting generative opportunities that are not otherwise available in more traditional acts of design.

While some designers are personally comfortable with, and effectively operate within, the openness afforded by traditionally-formed design problems, the decision to incorporate a found object suddenly impacts the structure of the design problem with a high degree of new information. No longer does design generation begin in response to an assessment of constraints, but now there is a physical artifact within the larger design problem that exudes intelligible information regarding its own structural, mechanical and compositional qualities. In many ways, this starting point for design thinking suddenly advances the maturity of the final design, which emphasizes the importance of good decisions about the actual selection process of found objects in the first place. While the found object effect can oftentimes positively disrupt the performative and aesthetic expectations of end users and find new resonance for appreciation, it can also bomb where the merit of the final designed craftwork fails to transcend the incorporated found object on its own terms, thereby revealing a kitsch appreciation for the found object incorporated and exuding an unhelpful reverence for the original found object.

Because the incorporation of found objects is non-essential to all design solutions, then as designers, there is a need to explicitly understand the benefit of incorporating found objects, the criteria for their selection, their impact on design thinking, and their ramifications for use. This paper identifies four generative strategies for how found objects are / can be used within the design discipline: Resource Availability, Political Heuristics, Creative Heuristics and Aesthetic Heuristics.

#### **Resource Availability**

Adhocism is a popular term to describe a type of interest in found objects. First coined by Charles Jencks in 1968, and popularized again in his 1973 title with Nathan Silver, "Adhocism: The Case for Improvisation," their case returns to the issue of resource availability and how this impacts the finished aesthetic character and pragmatic operational attributes of the finished work.

For non-designers solving their own problems of need, using found objects in an ad-hoc manner is the most popular strategy found in contemporary society. While the examples featured on websites such as *www.thereifixedit. com* is not the result of professional design services, the solutions are very much the result of an act of design by non-designers, however precarious, short-sighted, or ill-advised. For these ad-hocist solutions, found objects present a means for practical solutions to problems rooted in necessity. Resource Availability is also the strategy featured most often in popular culture. In terms of Hollywood movies, we see this in the genre of post-apocalyptic films where new resources are no longer available, and society must survive using a honed sense of ingenuity in the ad-hoc repurposing of found objects. Consider Mad Max (1979), Waterworld (1995) and the more recent The Book of Eli (2009). This ad-hoc design strategy is also central to the popular ABC television series MacGyver (1985-1992). In this weekly one hour drama, the lead character was constantly faced with challenges that required improvised design solutions resulting from creative thinking and unconventional found materials.<sup>1</sup>

Resource Availability is typically a strategy found at the lower end of the economic spectrum, and the work of the Rural Studio at Auburn is particularly expressive of this. While I do not want to deny this group any Creative Heuristics that were also in play, it remains that this group of designers sought to achieve the most architectural design with the limited resources that were available to them. Whether it be dumped tires, road signs, glass bottles, wax-impregnated cardboard, or donated replacement windshields, these resources have themselves become obsolete and have found new use in an architectural application. However, resource availability may also be in play in architectural design under non-economic circumstances.

Since 1991, RoTo Architects has developed an approach to architectural design that welcomes uncertainty and openness. For RoTo, the final design solution is not conceived in an idealized state in which additional design energy is invested in exhaustively-thorough documentation, but rather is conceived in a comparatively loose way which allows for the joint shaping of the final solution by their conception, by other stakeholders such as the client and builder, and by the availability of new resources that were not known at the time of original project conception. While their internal office design process works to eliminate individual authorship, RoTo oftentimes achieves this with final solutions that capitalize upon the "availability of recyclable materials and skills that are within the comfort level of the builder."<sup>2</sup> RoTo

- 2 Carter, Brian. "[re]garding RoTo," ROTOBOOK
- Michigan Architecture Papers One. Ann Arbor:

<sup>1</sup> The challenges that MacGyver faced were only sometimes life-threatening.

Architects' designs for both the Sinte Gleska University in South Dakota and the Carlson-Reges residence in downtown Los Angeles express this.

The Carlson-Reges Residence design was for a couple already living in a once electric company cabling structure amidst an industrial salvage yard with an inventory accumulated over two generations. This design provided an expanded ability to publicly showcase a collection of two and three dimensional art, but without impeding upon their more private living spaces. The solution was one that incorporates many components found throughout the salvage yard, and was dependent upon the construction skills of the client / builder. While industrial steel sections were plentiful for reuse as architectural columns and beams, cylindrical gasoline tanks from the client's materials yard were also modified to serve as a second floor pool. According to Michael Rotondi, "all non-structural steel detailing [for the Carlson-Reges Residence] occurred on site in an improvisational fashion and was determined by the availability of materials and labor,"3

For designers solving problems of need, using found objects from a generative strategy of Resource Availability requires a suspension of the level of control typically found in professional design service. However, for those willing to entertain design solutions that are both uncertain and open at the time of conception, then the opportunity-based incorporation of a found object will achieve heightened design economy in the absence of new raw material resources and the means to deliberately process them.

Furthermore, Resource Availability is the strategy of interest in the already-low amount of scholarship about found objects in design, and as such, the remaining three generative strategies have not been considered on a proportional level. Fortunately, these other three strategies present more meaningful and deliberate methods for the integration of found objects into a designer's larger design thinking.

## **Political Heuristics**

When a designer chooses to incorporate a found object to signify a larger political position, whether it be in protest to a politicosocio system, or a personal position in support of a larger political context, then Political Heuristics are in play. For Charles Jencks in 1973, adhocism provided a vehicle for combating the standardization and limitation of choice by large corporations and was believed to trigger a "rebirth of a democratic mode and style, where everyone can create [their] personal environment out of impersonal subsystems..."<sup>4</sup>

For us in 2010, we find a number of designers who are incorporating found objects prompted by their respective position on environmental issues and who seek to reduce their larger design footprint for requiring new resources. These green-minded designers intentionally recycle found objects and reclaim other materials that have outlasted their original usefulness as it relates to their self-perceived role in a larger handling of waste.

While the repurposing of a found object requires the least amount of embodied energy for materials for design, this strategy oftentimes leads to solutions that have no larger holistic aesthetic agenda. When taken to an extreme, this design strategy can produce aesthetically-schizophrenic solutions that lack an overarching design vision for wholeness. However, this is perfectly acceptable for the designer using political heuristics, as the resulting aesthetic is of circumstance to the larger politically-charged act of designing with recycled and reclaimed material.

Mr. Dan Phillips is the principal of Phoenix Commotion homebuilding based in Huntsville TX and has successfully built (14) residences that incorporates found objects from a political heuristic sensibility. While Mr. Phillips will acquire approximately 80% of his construction materials from other builders' construction sites, "to him, almost anything discarded and durable is potential building material."<sup>5</sup> Found materials already incorporated into his residences include picture frame samples for

University of Michigan, 1996. p.23.

<sup>3</sup> Carter, Brian. "Carlson-Reges Residence," *ROTO-BOOK - Michigan Architecture Papers One*. University of Michigan: Ann Arbor, 1996. p.45.

<sup>4</sup> Jencks, Charles and Nathan Silver. "The Spirit of Adhocism," Chapter 1. *Adhocism: The Case for Improvisation*. Garden City: Anchor Press, 1973. p.15.

<sup>5</sup> Murphy, Kate. "One Man's Trash...," Home & Garden, *The New York Times*. September 02, 2009.

an interior ceiling, misshapen bricks, broken ceramic tiles and mirrors, wine corks, worn DVDs, and cattle bones from a nearby cattle yard. While the overall look and feel of these residences are quirky and circumstantial, they are completely code-compliant and have already proven their resale value to a more affluent audience.

For those designers using founds objects as a Political Heuristic, there is a lessened appreciation for wholeness, clarity and legibility of use, and a heightened satisfaction from knowing they have lessened the respective footprint of waste for its design field. Furthermore, the resulting aesthetic achieved is one that, however holistic or not, cannot be pre-conceived independently from working with the actual found materials at 1:1 scale.

## **Creative Heuristics**

Whereas designers will typically first assess all of the known informative constraints in a new design problem, and then formulate a design strategy to produce solutions, the found object as a creative heuristic "*flips the script*." Instead of having information as the only basis from which design moves forward, the designer who incorporates a found object from a sensibility of creative heuristics is looking to launch a creative process in response to the fullness of a selected found object.<sup>6</sup>

In this instance, the designer is looking to exploit the generative potential of found objects that stem from an assessment of the found object's mechanical and/or structural properties, and then allow that assessment to determine the program or use for a forthcoming larger design solution. If a Creative Heuristic is in play, then no longer is the final design solution in response to an articulated need. Instead, the use and function for the final design is only determined after the designer has entered into a dialogue with the properties and qualities of the found object.

For furniture designer Scott Baker, the moment of design conception occurred immediately upon viewing the found object. More specifically, Mr. Baker was browsing the only remaining publicly-accessible military aircraft salvage yard in Tucson AZ when he came upon

 $6\;$  The decision to begin designing in this way is itself an act of design.

an aileron bracket sitting amongst other components and began handling it. As he rotated it in space, he began visualizing the aileron bracket as a single support for a long shelf on a wall condition. Mr. Baker designed three new components to be made from cherry wood, and he fabricated the final Aileron shelf himself. Although the shelf was a personal endeavor for Mr. Baker's own satisfaction, it is currently on the market as a consignment piece in his art gallery, Metroform Ltd.

If we recall that found objects incorporated from a resource availability sensibility present a means for practical solutions to address problems of necessity, then found objects incorporated from a creative heuristic sensibility guarantee a desired condition within a larger final solution to problems not yet identified or are engaged only after the creation of the new designed object. While this generative strategy holds the most promise for creative design solutions, it also explains why it is the rarest of types. The selection of a found object for creative action does not permit an adequate level of analytical consideration necessary in generating solutions for end users.

## **Aesthetic Heuristics**

A designer who decides to incorporate a found object from a sensibility of an aesthetic heuristic is one who believes a found object is either beautiful or cool. In short, this explains why designers will incorporate a found object for its own sake. In this scenario, there is believed to be larger design value in the ability for end users to read the found object, and recognize its respective origin while simultaneously appreciating its new role in a larger design solution. While it is possible within this generative strategy to allow nostalgia into one's design thinking, it can also establish the underpinnings of distinguished architectural practices such as LOT-EK in New York City and Richard Goodwin in Sydney Australia.

# ARCH 597x: "Introduction to Craft"

Upon joining the faculty at the University of Nebraska in Fall 2005, I was surprised to find a relatively weak Culture of Making when compared to those cultures from other schools of Architecture. In contrast to my experiences at UNC-Charlotte, North Carolina State University,

and the University of Arizona, I had assumed that all schools of Architecture would have a developed ethic in working with, and experimenting with, "live" materials at a 1:1 scale. In light of this, I created a new three credit hour course titled "Introduction to Craft," which is open to students of fifth year, sixth year, and PhD standing. The course examines Craft as its own creative discipline at the threshold between Fine Art and Design, and is composed of equal parts lecture, seminar and lab. While there are now other UNL faculty who also offer graduate-level electives that bolsters our College's culture of making in other ways, it remains that our undergraduate curriculum is one otherwise invested in forms of representation rather than working with physical materials in an idealized state.<sup>7</sup> Although "Introduction to Craft" is a 500 level course, it effectively offers Architecture students their first curricular opportunity to consider material-based investigations in an explicit way for sixteen weeks.

# FOCO: The "Found Object Craft Object"

Since first seeing the Aileron shelf by Tucson designer Scott Baker in 2003, I am becoming increasingly interested in the creative heuristics that found objects provide when incorporated into a larger design problem. To this end, in Spring 2009, I issued an eight-week design project titled "FOCO: The Found Object Craft Object." My intentions were to issue an assignment in which student designers would polemically argue how found objects *ought* to be used in design, and would discover their effectiveness firsthand through the conception, development and execution of a new craft object.

Per this assignment, all FOCOs must:

- Incorporate a found object that is chosen only after careful consideration. The selection of the found object must not be circumstantial.
- 2 Incorporate a found object that has structural or mechanical merit. Found objects with emotional value are prohibited.
- 3 Be designed using the observable properties of the found object as a point of departure. The purpose and use of

7 These other UNL faculty include Tom Alismaa, Jeff Day, Tim Hemsath and Peter Hind.

the FOCO shall be determined only after the found object is selected.

- 4 Incorporate a found object that plays a performative role within the larger FOCO solution – The craft object incorporates the found object, yet the found object does not equal the craft object.
- 5 Re-purpose the original found object within the intentional and deliberate design of a new craft object.
- 6 Commit to a particular type of site (i.e. stands on floor, anchors to table, wall-mounted, suspended from ceiling) *without* committing to a site-specific Place.
- 7 Recognize their role as craft objects in the 21<sup>st</sup> Century, and consider their own materiality.

Across the enrollment of eight design students, there was a genuine enthusiasm for this assignment, as it presented an opportunity they had not yet experienced in their respective design studios. To begin, I asked the class to do some found object reconnaissance over their Spring Break in salvage yards, pawn shops, antique shops, auctions, yard sales, or their grandparents' garage. Each student was required to bring three found objects to class for discussion, and the group then took turns speculating upon the various ways in which each found object in the room could function in larger structural or mechanical applications. Found objects ultimately selected include an engine dolly, a 75-lb steel caster, a cast aluminum combustion chamber from a Mazda RX-7 rotary engine, a pair of suspension swingarms, a clutch assembly, a pair of ice skate blades, a poker chip holder, and a hand-operated apple peeler.

Since the purpose or use of the larger forthcoming FOCO was to be determined after the selection of the found object, students were dealing with a design problem in which purpose or use no longer preceded their search for design solutions. In turn, they must enter into a dialogue with the found object, assess its structural and mechanical abilities, and only then design uses for the found object. However, enthusiasm waned. To combat the group's uneasiness with the openness of this assignment, it was necessary to have a Saturday afternoon design charette in which a prolonged amount of design thinking could occur. Across the course enrollment, the final FOCO solutions varied widely in terms of their utility, level of found object incorporation, and overall compositional complexity.

# John Dodson: Front-End Suspension Swingarms

Mr. Dodson was attracted to both the structural and compositional qualities of these swingarms. As kinetic structural horizontal supports found in a vehicle's front suspension, these swingarms can resist considerable weight and force. Compositionally, these cast steel swingarms have several large "lightening" holes within its profile, and also features sev-



FIGURE 1: John Dodson: Front-end suspension ingarms

eral bolted hole connections.

During preliminary design, Mr. Dodson would position the swingarms in an upright position, and it became possible to perceive the swingarms as structural supports that would allow the circular ends to become the actual bearing points for the forthcoming assemblage. Once this observation was made, the use of the FOCO was determined to be a low coffee table.

After considering some design options with a blockish symmetrical proportion, Mr. Dodson decided to elongate the proportion of the structural gesture in order to showcase the table elements that would require new construction. The structural spine was shaped from a single piece of maple, and was accentuated at both ends with walnut bearing points. Whereas one end is a modest shaped footing that comes in contact with the ground plane, the other end is a shaped connector stout enough to receive the ½" diameter bolted connections with both swingarms. Mr. Dodson subcontracted a local glass supplier to provide a shaped tempered glass profile, and this glass rests on three new rods. While these rods were conceived as appropriate attachments to the found compositional qualities of the swingarms themselves, an identical rod was used in an identical geometry and attached directly to the maple structural spine.

# Karl Mielke: Engine Dolly

While Mr. Mielke produced three found objects of varying scale for consideration, he was drawn to working with his largest since this was the scale he was most comfortable. The found object is a dolly for lifting and storing pulled engines from automobiles. The dolly



FIGURE 2: Karl Mielke: Engine dolly

is essentially three pieces of tube steel butted and welded together to form "T" configurations in both plan and side elevations. The dolly meets the ground with three ¾" diameter rolling casters and interfaces with engines only through a pipe fitting that caps the top of the single vertical tube steel member. This particular dolly became obsolete when one of its small steel casters jammed, and no one took the initiative to service or repair it.

The dolly originally had a bright orange painted finish, but this finish has weathered from both heavy use and lack of care. Mr. Mielke decided early that he was interested in retaining the weathered finish quality of the dolly, and wanted to creatively contrast it with highly refined new construction.

From its side "L" profile, one will notice the composition of this dolly anticipates cantilevering the engine over its lower half. In response to this, Mr. Mielke projected regulating lines from hard material edges found on the dolly and allowed these 2d lines to act as planes to demarcate the extents of two large three dimensional volumes. Furthermore, just as a suspended engine would have airspace trapped below, then so do these volumes hover over the dolly assemblage and connect back only at the vertical support. These two persimmonswood volumes are physically identical to each other in overall dimensions, and both work together as saddlebags to balance the load about the high structural support arm made of steel flatstock. However, one volume is a chest of drawers with full extension glides, and the other is a single vertical drawer with adjustable shelving. To the best of my knowledge, that one small steel caster is still jammed.

# Brandon Reimers: Industrial-Grade Caster

Mr. Reimers won over his colleagues as soon as this 75-lb steel caster was rolled into the room. While the form and operation of this found object was similar to other casters we have seen, the immense weight of this one made it otherworldly. It was actually one from a set of four identical casters that supported an automotive sled used by body repair services to move car chassis to others places in the garage.

At a curb weight of 75 lbs., it was difficult to conceive of a complete re-purposing of the caster from its original operation. The caster could continue to roll, swivel and lock, but by convincingly making it an integral component to new forthcoming construction, it would then effectively sever itself from its original context of use.

Mr. Reimers started his process with a series of sketches of upright furniture pieces that integrated the caster as a heavyweight footing and bearing point with the ground plane. After considering the likely physical awkwardness of moving these upright pieces, the proportion of the furniture piece then became low and long. This proportion was found to offer more leverage and ease to the user, and would allow for moving the piece with less effort and greater control. After diagramming a wheelbarrow-like proportion to the FOCO, Mr. Reimers determined its purpose would be a new desk. Beyond knowing that this desk would require a prominent horizontal surface to accommodate various desk-based actions, Mr. Reimers found it difficult to explore design options without using a photograph of the caster's side profile as a point of departure for his larger design thinking.

The final desk design is characterized by two steel bases with white painted finish which are rigidly attached to an orange shaped desk surface with either hardware directly or pipe spacers. Although this orange desk component appears as one piece, it was fabricated from a solid-core door and laminated plywood shapes for the downturn. Both of these pieces read as



FIGURE 3: Brandon Reimers: Industrial-grade caster

one due to several layers of bondo work and several coats of automotive-grade painted finish. While the desk surface has integrated handles for moving and repositioning the desk itself, the ironic aspect of this built design is that it is now so heavy, it requires two people to lift and steer the desk into another room.

## Chris Williams: Iceskates

Mr. Williams' found object with the best creative potential was a pair of antique iceskates. These iceskates possessed a number of attractive material features including the worn leather iceskate envelope, the excessively-long cloth laces, the shaped steel iceskate blades, and their nailed connection to the underside of the skate's sole.

During preliminary design, in the pursuit of needing to re-purpose the iceskate, Mr. Williams would perceive the open shapes within the ice skate blade proper to be a handle in which the human hand would engage. This was creatively problematic first due to the uninviting sharpness of steel edges in which our hand would come in contact. Second, the found mechanical attachment of the iceskate blade attachment to the iceskate sole was still influencing Mr. Williams with regards to the means of mechanical attachment to an otherwise holistic and separate object.

Upon further evaluating the skate blades, Mr. Williams became interested in the creation of a FOCO that would become structurally codependent with the skateblades themselves. In order to best focus upon this compositional expectation, he was encouraged to work in a scale relatively smaller than his colleagues, and he then decided to design an occasional table.



FIGURE 4: Chris Williams: Iceskates

The first iteration of this table design was drawn in marker pen, and was dismissed by the author due to its resemblance to a woman's shoe. However, the second iteration had a changed proportion and still possessed the trait of structural co-dependence between the two found objects and the new construction. Mr. Williams began fabrication of this table by laminating a series of plywood shapes to then be shaped using electric and hand sanding methods. Once the iceskate blades were attached to the new wood construction, this assemblage served as the table base. The table surface itself was a single piece of 16 gauge sheetmetal shaped in an ovular form, and was connected to the neck of the wood base with a series of piping connections that intentionally

resembled the eyelets found on the original iceskates. All steel edges at this connection were brought to align with the outer surfaces of the wood.

## Conclusion

Across the course enrollment, the polemical arguments for how found objects *ought* to be used in design also varied, but otherwise reveal the impetus in which each student found the incorporation of a found object to be personally meaningful. In turn, it was an analysis of their written responses that helped to forge the four larger design strategies presented earlier in this paper.

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# MAKING THROUGH KNOWL-EDGE- BUILDING, INTENTION & CREATION: INTERPRETING THE JAPANESE TEA CEREMONY Making Real

DARRYL W. BOOKER, ASSOC. PROF. & JOAN VORDERBRUGGEN, ASSIST. PROF. NORTH DAKOTA STATE UNIVERSITY

# Introduction

In teaching beginning design students, it is imperative to assist them in developing an understanding of the knowledge-building creation process. Through the making of things students are open to see the interrelationships of knowledge, intention and creation. The act of making serves as the liquid medium that allows these to flow together fluidly, as compared to a linear progression of learning.

As instructors of beginning architecture students, we introduce our studio class to a project that is simple in its spatial concept, with form following not only human purpose and needs, but also a close kinship with place. This calls for a project that requires a strong relationship with its natural surroundings, and spaces that reflect simple, yet ritualistic connections with the users. We have chosen a Japanese Tea House and Garden as an introduction into architecture studio.

How does the Tea House project address the knowledge-building creation process? After several years of evolution and implementation of this project, we are encouraged by the results. The Japanese Tea Ceremony, along with the Tea House and Gardens, carry with them a long history of tradition, ritual and individual interpretation, steeped in connections to place, nature's rhythms, the creation of spaces, and the understanding of movement.

Through the making of things – artifacts related to the Tea Ceremony - the students begin to translate the qualities of the real into the qualities of the perceived, and vice versa. The project is explored and expressed through several means: knowledge (readings & site), intention (poetry & painting) and creation (drawing, modeling, constructing).

Our teachings of space and form-making begin with the simple notion that architecture exists for the human mind and body; therefore, design approaches by students are envisioned as a process of personal experiments guided carefully by the instructor. This is done through metaphor creation, site experience and interpretation, and discussions of spatial understanding and organization of the particular project, realized through the making of artifacts that may reveal insight into the problem itself.

# Understanding through Knowledge-Building

'The whole art of teaching is only the art of awakening the natural curiosity of young minds for the purpose

of satisfying it after words.'

Anatole France

What knowledge do students entering a design program need to know, and how do we create long term value so that this knowledge gained is purposeful, satisfying and remains for the 'after words'? While we all might conceive of different starting points to emphasize, there is most likely consensus that teaching beginning design students includes assisting them in developing an understanding of the knowledge-building, creation process.

Interpretation and translation of a Japanese Tea Ceremony by students enrolled in beginning architecture at the North Dakota State University (ND/MN border) has been a successful means of introducing the act of making in our design studio. The majority of these students, primarily of Euro-American ethnicity, are not familiar with the concept of the Japanese Tea Ceremony. They begin their path on a relatively level landscape, with no strong preconceived notions regarding what they believe architecture for this type of project to be.

# Reading as Knowledge-Building

To establish an understanding of the ritual and history of Teaism, the Tea House Project begins with reading *The Book of Tea*, by Kakuzo Okakura, and Wabi-Sabi for Artists, Designers, Poets & Philosophers by Leonard Koren. These readings introduce the students to concepts that are not recognizable, yet provide a rich canvas from which to draw.

The notion of 'wabi-sabi' is itself one that most students are not comfortable with, yet it is critical to understanding the nature of the Japanese Tea Ceremony. Koren defines wabisabi as 'a beauty of things imperfect, impermanent, and incomplete.' <sup>1</sup> This notion alone goes against what most of our beginning design students thought architecture to be, yet the Tea House project becomes a way to open their world view: '[Teaism]...is essentially a worship of the Imperfect, as it is a tender attempt to accomplish something possible in this impossible thing we know as life.' <sup>2</sup>

Supplemental readings, such as Analysing Architecture by Simon Unwin, and Architecture Form, Space and Order by Francis Ching assist students in integrating the poetic notions of the Tea Ceremony into meaningful expressions of architecture and design.

# Site Visits as Knowledge-Building

While reading Okakura's *Book of Tea*, students are simultaneously making visits to the site for the Tea House problem – a park or park-like setting chosen by us. They are asked to spend time alone there (without the interruptions of cellphones, I-Pods, or other people), to take in the surroundings and record their feelings through sketching, writing and documenting qualitative and quantitative impressions. This piece serves multiple purposes: The site visits assist the students in their understanding of knowing the site through direct experience.

The Site Mapping exercise asks students to become familiar with the 'Four Layers of Landscape', as introduced by Margaret Colquhoun, PhD, a Goethean Biologist:

The Four Layers of Landscape

The solid objects, the physical facts, the bedrock of the place.

That which is constantly changing, flowing and growing.

That which lends character to a place, gives it uniqueness, atmosphere and appeal. And that which is the essence or inner reality.

Discussing their site impressions in studio, as interpreted through the lens of the 'Four Layers of Landscape' assists the students in solidifying their knowledge and feelings about the site.

## The Path to Illumination

The Site Mapping exercise and visits also serve another intention for the students. Immersion with the site, and riddance of the extraneous begins to parallel the concept of the Roji related to the Japanese Tea Ceremony:

The roji, the garden path which leads from the machai to the tearoom, signified the first stage of meditation, - the passage into self-illumination. The roji was intended to break connection with the outside world, and to produce a fresh sensation conducive to the full enjoyment of aestheticism in the tearoom itself.<sup>3</sup>

Our feeling is that for students to even begin to know both site and intention for this project, they must gain it through mental and physical separation of their everyday lives to be open to the subtleties the site experience has to offer.

# Understanding through Intention: Sumi and Haiku

Knowledge gained from readings, site visits, and recording of impressions is translated into Intention through the making of poetry and painting. To be clear – we realize that for beginning Midwestern architecture students to accurately translate what they've read and experienced into a pure understanding of the tea ceremony is, at best, only an attempt. Even the Okakura admits similar:

Translation is always a treason, and as a Ming author observes, can at its best be only the reverse side of a brocade, - all the threads are

there, but not the subtlety of colour on design.<sup>4</sup> We begin with the students practicing the various traditional Japanese art forms of Haiku and Sumi painting. This work focuses the begin-

<sup>1</sup> Koren, Leonard. *Wabi-Sabi for Artists, Designers, Poets and Philosophers*. Berkeley, Stone Bridge Press, 1994. 7

<sup>2</sup> Okakura, Kakuzo. *The Book of Tea*. New York, Dover Publications, 1964. 1

<sup>3</sup> Okakura, Kakuzo. T*he Book of Tea*. New York, Dover Publications, 1964. 34

<sup>4</sup> Okakura, Kakuzo. *The Book of Tea*. New York, Dover Publications, 1964. 19

ning designers to think in terms of *essence* – at once a summarization and an abstraction of knowledge translated into intention. These traditional forms of art are meant to reveal the interrelationship between man and nature, through subtle yet bold conveyance of word and picture in abstract representations.

The followers of Zen aimed at direct communion with the inner nature of things, regarding their outward accessories only as impediments to a clear perception of the Truth. It was [the] love of the Abstract that lead the Zen to prefer black and white sketches to the elaborately coloured paintings of the classic Buddhist School.<sup>5</sup>

These pieces are presented to the class in a group setting, to assist them in gauging their own skill at making, and to set the tone for the remainder of the project.

# Understanding through Creation

The primary emphasis in the studio environment is to assist students in understanding that design stems from a creative and thoughtful integration of intention, space, form, and place, all inspired by some human purpose. There is great opportunity for students to recognize that the act of creating architecture is not just reiteration of what already exists, but rather their personal reinterpretation. It is this moment that we focus on the development of the creative self in parallel with the project itself – a process of making.

#### The Teacup

After the Sumi paintings have been hung on the walls of the studio, and the Haikus have been read, the students are asked to create and make a Teacup. The embodiment of the essence of their design is to be held in this cup for tea, which introduces the notion of human purpose, experience and scale. The Teacup serves as a metaphor, the generative concept that translates into the design of forms, spaces and ordering of Tea House and Garden.

# The Tea House and Gardens

Transformation of Intention occurs throughout the entire process, but is fully realized in the designing of a teahouse and gardens itself. Understanding of space, form, site, move-

5 Okakura, Kakuzo. *The Book of Tea*. New York, Dover Publications, 1964. 28

ment and human intention all come together in sketches, architectural drawings, and models. These elements demonstrate the student's accumulated experiences of making into something real and perceived - a final project that embodies the interpretation of the tea ceremony, the selected site into a Tea House and Garden project.

Just as Okakura tells us 'There is no single recipe for making the perfect tea...' 6, individual interpretation through the process of creating - of making - is the fluid medium where each student can see the interrelationships of knowledge, intention and creation uniquely expressed in his/her own design. What has been gained through knowledge-building and understanding intention is translated into the creation and the making of an artifact. This creative act instills knowledge and intention through that process of making. The Book of Tea allows us another correlation between the acts of making of architecture and the making of tea: 'It was the completing, not the completion, which was really vital.' 7

'It has been said that art is a tryst, for in the joy of it maker and beholder meet.' Kojiro Tomita

# Understanding through Critique

'I have never in my life learned anything from any man who agreed with me.'

Dudley Field Malone

During the entire process of the Japanese Tea House project, critique is a regular and continual method of assisting the students in their knowledge-building skills, with instructors and peers discussing design intentions, and providing both feedback and questions related to the poetry, writings, models, and drawings that are being made along the way.

Feedback is generally focused on how well the student is integrating poetic and abstract thought with a made representation of those ideas. These discussions, many times held in small groups, allow the students to understand that through critique they become more insightful designers, and their work naturally improves. The students seem to need to know

6 Okakura, Kakuzo. *The Book of Tea*. New York, Dover Publications, 1964. 10

7 Okakura, Kakuzo. *The Book of Tea*. New York, Dover Publications, 1964. 15

that they are doing well on a particular aspect of the process as motivation to continue.

The final act of 'making' is when students are asked to show resolution through final drawings and models. Knowledge is gained and intention developed through the designing of the presentation pieces themselves. Critiques of the student work by outside reviewers provide the students the critical feedback as to the intention/creation/making of the project itself; providing for more knowledge-building to be gained from the process.

The final critiques occur in multiple forms after the formal reviews. Each student meets privately with the instructor to discuss the project, which allows for a more candid discussion of the student's performance, process, self-evaluation, and craft of the made artifacts.

Projects are then displayed in a gallery or other public space within the department. This generates much discussion among students, allowing for both designer and viewer to learn from that which has been made.

From these various forms of review and critique, students are able to make physical and mental notes, moving forward to subsequent projects with greater understanding.

## Conclusion

As with any project, we as instructors learn more from the *making* (and re-making) of the Tea House project every year. Having never traveled to Japan to participate in the Tea Ceremony ritual, we too have limitations to our understanding of it. Visits to Japanese gardens, conversations with Tea Garden designers, and a continual interest in personally understanding the concepts of wabi-sabi and Zen philosophy into our personal lives has given us the continual interest in this project for our beginning architecture students. We believe that the students do gain knowledge through the making of the things mentioned in this paper, which contributes to their own creation process.

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# MAKING PEDAGOGY Making Pedagogy

CHRISTIAN DAGG, ASSOCIATE PROFESSOR JUSTIN MILLER, ASSISTANT PROFESSOR AUBURN UNIVERSITY

Every school of architecture must find a balance between myriad pedagogical models. The roots of these models are familiar to most involved with academia and center around the degree to which Architecture must be taught in a University setting. Whether Architecture can best be taught in the field on job sites, or in the office of practicing Architects, or in the studio is open to debate. In a school where all these options are available to students: design build studios, study abroad studios, or internships in offices for academic credit, it is necessary to consolidate blocks of academic units in order to facilitate optimum academic impact.

In coordinating this strategy of consolidation we had to ask ourselves the following questions. What should students know in order to foster future success in the program and profession? In which sequence should students learn the material of the support classes? How do we establish reciprocal learning environments with Structures, Environmental Controls, Materials and Methods, Architecture History, and Design Studio? How does Studio recognize what the students are learning in these associated classes? How can we remake a studio culture in the first year of design school that until this time not been concerned with these issues?

This paper describes the results of two years of effort by a school faculty to coordinate and pace student learning through a five-year undergraduate program. The results of this effort are now emerging. There are two tactics employed: consolidation and integration. The first is to consolidate studio-based learning in two years of the curriculum and to consolidate two years of service learning and study abroad. The second is the integration of and coordination of course content among studio and associated classes. The paper will focus on the integration of course content during the second year of curriculum, as the faculty attempted to create a block of eight required classes with overlapping objectives and goals. We will conclude with observations from the second year faculty on these current efforts to establish a beginning foundation of intellectual and technical skills.

## Prior Curriculum Model

Auburn University's School of Architecture located in Auburn, Alabama is a NAAB accredited five year Bachelor of Architecture first professional degree Program. Like many schools of architecture, the faculty established a curriculum model that has been flexible enough to allow for a variety of educational experiences, but prescriptive enough that we continually met the requirements for accreditation. Students enrolled in the school (SoA) were presented with a curriculum model that affords a diverse set of programs including designbuild, international studies, urban studies, dual degree options (interior architecture) and Masters degree programs in Landscape Architecture and Community planning. This menu of options had provided students with multiple paths through the school. For some students their primary memory of the school was at the Rural Studio, for others it was the semester they spent living in Rome, for others it was an experience entirely framed by the Auburn campus.

As a faculty we realized that these different experiences were essential to the character of the school and should not be discouraged. However, we also realized that in supporting all of these ambitions it was necessary to intensify the experience of students while they were on campus. Additionally, the specific flexibility of this curricular model also compromised the ability to effectively coordinate associated (*support*) courses into the design studio. As students were able to chart paths that made the prescribed sequence of classes fall out of sync, opportunities for year level coordination were limited. History and theory courses, seminars, and construction technology courses were not co-requisite with a specific year level sequence. This situation presented numerous problems in terms of coordination of course content among the design studio and associated courses. This situation presented both a pedagogical problem and an administrative problem.

As recently as three years ago the following curriculum structure was in place at Auburn. It was the result of individual faculty initiative developing undeniably important moments in the education of our students. Students entered into the professional program one of two ways, through the traditional First Year Program or through an intense 10 week summer studio. 60-70% of students come through the summer program. It has been very competitive as less than 50% of the students who begin the summer studio are accepted into the professional program. One could argue that their design education began during the summer, however to paraphrase one summer student: "I learned that if I wanted to survive I needed to glue together weird shapes of cardboard". Despite the fact that the work of the first year program is important, we decided as a faculty that we had to start from scratch.

In the fall and spring of sophomore year, students had the option of attending the Rural Studio. The merits of this community based design-build studio are well documented, and continue to be a strength of the program. However the question of when participation in the Rural Studio was most beneficial for the students (and the studio) had not been asked in some time. At the inception of the Rural Studio the late Samuel Mockbee had requested that third year students participate in the program. The reasoning behind this request centered on the experience and fundamental design skills students had developed by their third year of education, but because of other constraints students began attending immediately after their acceptance into the professional program.

Students in the spring of their fourth year had the option to participate in an international studies program (Rome or Istanbul) prior to selecting the course of study for their fifth year (Auburn, Rural Studio, or Urban Stu-

dio). The consequence of this model is that while between half and two-thirds of all students participate in international study, Rural Studio, and Urban Studio, the prior curriculum made building upon these experiences in any meaningful way in subsequent studios difficult. Students charted their own course of study, which may have involved Rural Studio, International Studies, Urban Studio, and a dual degree path in Architecture and Interior Architecture (ARIA). In other words, we would see the students on campus for 4 semesters in an 8 semester program. The moments they were on campus there was no guarantee that they were operating with the same knowledge base as their peers.

## Current Curriculum Model

Rearranging a set of classes is a relatively easy task; doing so with a pedagogical goal in mind is more difficult. Samuel Mockbee described the idea of the citizen architect. It helps us establish three aspirations for our program: to operate ethically in the world, to realize that looking at the local and specific turns our attention immediately to the nature of global practice, and that architects can provide us with exceptional spaces, buildings and cities. These goals have far reaching consequences. To operate ethically talks to issues of sustainability and social justice, of participating in society. To look at the specific nature of locality involves an understanding of context, which is more than just orientation and topography, it is social, cultural and historical, and it positions us globally. Finally, we cannot forget the fantastic, the joy of being amazed, and the joy found in the beautiful which continues to be an important cultural aspirations for our profession. This idea of the citizen architect helped us establish goals:

- 1 Every student should have an international study experience
- 2 Every student should have a service-learning experience
- 3 Every student should have an intense design studio experience.

As faculty members who have collectively taught in the prior curriculum model at all year levels we were positioned to make some specific observations regarding the integration and consolidation of companion classes and architectural studio. These goals may not be appropriate for every school of architecture, they are specific to our circumstance. The good news is that we were able to achieve complete support from the faculty. The reconfigured curriculum model will be discussed as it relates to the challenges of the second year. The faculty has sought to teach these 'support' or auxiliary courses in a manner that provides students the ability to leverage this content in their design studio proposals and to tether the course content such that a reciprocal learning environment is created among studio and support classes.

The model for our curriculum that was adopted and put in effect last fall (2009) is organized such that every year has the potential to be framed as a complete year of study. As said before, the primary strategies for achieving this new studio and support class synthesis was oscillating between consolidation and coordination. Instead of spreading travel opportunities over all the year levels, now the rural studio opportunity has been moved from second year to third year, and the travel opportunities have moved from fourth year to third year. Now, second year becomes a year-long comprehensive studio foundation; focused in the studio, looking down at the drawing board, making prototypes, and learning new skills and tool sets.

We will return to the specific block of eight classes now making up this first year of the professional education and how we capitalized on integration. Third year becomes an opportunity to observe firsthand what they have studied in second year and are afforded many options for off campus study. Students may study at the Rural Studio; abroad in Rome, Florence, Istanbul, or Quito; or are encouraged to chart their own National or International study program. Fourth year is conceived as a complete year of study centered on the practice of architecture in urban environments. This translates into an academic year with an emphasis on studio learning, which will build upon and utilize the students travel experiences in studio projects focused on urban environments. Fifth year again opens to a suite of curricular alternatives; one may either enroll in the Urban Studio, the Rural Studio, or return to Auburn for directed thesis studio. These curricular alternatives are a strength of the program, and it is imperative to maintain a range of learning environments, while providing a solid foundation from which to chart a plan of study. The experiences of the faculty teaching at the Rural Studio and Rome also demonstrated that having all the students together, taking the same classes provided a very intensive learning environment. This success provided compelling evidence that a coordinated studio experience would not be limiting or too narrowly focused.

## 2nd Year Curriculum Model

In the new curriculum model, the second year is be considered a complete year of study that prepares students for both continuation and success in subsequent year levels. The Second Year Program is comprised of one cohort of faculty responsible for teaching the students all their classes. The curriculum affords great temporal flexibility turning lectures or studio into lectures or labs as required. The courses that comprise the second year include studio, history 1 & 2, materials and methods 1, environmental controls 1 & 2, and structures 1. In a manner the studio becomes the lab for testing ideas that the full second year faculty set out and introduce in studio and companion courses. The second year sequence is focused upon the fundamental skills required during the design of a building.

An important skill for each student to develop, during this pivotal second year, is the ability to distinguish between foreground and background issues. Each project type assigned has a clear foreground problem that students will be expected to solve, however that does not eliminate the need to deal with a variety of background issues as well. While each problem deals with spatial sequence, geometry, formal/sectional problems, conceptualization and composition, other ideas may be pushed into the background (technical, programmatic, budgetary). The four problems of second year will be: Façade: A problem that deals with the design of a building façade foregrounds issues of context, composition, and human-scaled occupation. This project deals with background issues that look at construction, character, materials, pattern, systems, section and code. **Plan**: A problem that prioritizes plan making foregrounds issues of geometry, sequence and

spatial definition. It deals with background issues such as structure, proportion, the use of poche, the framing of views, the distribution of program and rooms, and the definition of exterior rooms that mediate between inside and outside. Section: A problem that deals with a building's section foregrounds issues of constructability, depth and thickness of materials, and spatial thinking. It also tackles background issues such as landscape and ground plane development, interiority, and lighting. Structure: A problem that deals with the relationship between spatial development and structure foregrounds issues of ceiling plane design and ground plane design as well as structure. It deals with background issues that explore how a system can be modified according to human occupation, local context, and building performance.

There have been several important consequences to this distillation of the second year objectives. By stating that one of the four second year projects must deal with the design of a façade, it does not limit the second year faculty to a specific program type or site. There is still an opportunity for the faculty to address alternative conceptual foundations for the project and to tailor the various interactions between studio and other classes. It does not rely on individuals or personality, it is flexible ideologically, and can be adapted to the strengths of the faculty assigned to teaching this year level. It also provides a basis for faculty in upper year levels to gauge their expectations of student experience and student's skill level. With this simple designation of project focus (façade, plan, section and structure) we believe we have established a mechanism for securing faculty involvement and competent student work.

## One Example

It is necessary to provide one example of this integration of studio and technological classes in our new curriculum model (see figs 1-4). As an example we will use the Section problem. In the fall semester of 2009 every student was registered for four classes; Studio, History 1, Materials and Methods1 and Environmental Controls 1. 1 simply designates the first in a series of similar classes. Of the four faculty members teaching Studio, one was also teaching Materials and Methods, another was teaching Environmental Controls. In every Second year faculty meeting, the professor teaching History was invited to participate in the meetings. To fulfill this notion of a project that dealt with section, we selected the project of a modest house (2000 sf.) on a small property (50' x 90' lot) with a steep slope. The site does not exist in the real world. In Studio, the faculty was intrigued by the formal possibilities inherent in the project, the slope, a change in angle on the property, the compactness of the site, and the difficulties in doing a house for a project.

But it needed to be more than just a formal problem. In Environmental Controls, the use of this imaginary site allowed the professor to focus on all of the ways one might analyze a site scientifically. Students were given latitude and longitude information, from which they generated significant site analysis; sun path diagrams, and prevailing wind diagrams utilizing multiple simulation software. They also covered many passive energy design strategies and evaluated their effectiveness for this potential project. In History, there were a series of lectures delivered in studio by the History professor that dealt with the canonical homes of modern architecture, the change in emphasis from object to façade and back again. Due to availability, students and faculty traveled to Washington D.C. to visit the Solar Decathlon. In Environmental Controls students analyzed the various projects they visited at the Washington Mall, and in History students learned of the development of baroque city planning from Rome to Versailles to the MacMillan Plan for Washington. In Materials and Methods students provided drawings of their design project with detailed lists of material specifications for every element in one room.

The project students were developing in studio became the basis for final projects in two of their other classes. In studio itself, students created analytical drawings of famous 20th century homes, they created inhabitable pieces of furniture that were built around our building, we traveled to the Solar Decathlon, they each designed a house on this very unusual site. Through all of this work, the lessons of the project were being reemphasized in history with directed lectures delivered in the space of studio, reemphasized in environmental controls where the design strategies were being modeled and tested under an additional set of requirements for energy efficiency, and also reemphasized in materials and methods where the specific nature of the building was being elaborated upon in the final project requirements. At the final review students had a great deal of work, because they were using the work of three classes to support their proposal.

## Summary Conclusion

In an effort to maximize the student's ability to take full advantage of the curricular opportunities afforded the students in their third and fourth years of study the second year and fourth year has been coordinated such that all classes taken by the students have been integrated. While the fourth year curriculum has not been tested, the second year model is in progress. In the second year curriculum lecture and seminar classes have been coordinated and when appropriate, integrated into the design studio, providing the opportunity for studio and auxilary courses to reinforce fundamental concepts to the design questions being foregrounded.

As design faculty we are concerned with the making of architecture - both the intellectual skills required in making a building and the craft skills required in making of architectural proposals. Second year students are quick to recognize that architectural projects are by their very nature complex. Therefore projects are structured to foreground and background certain issues, this foregrounding and backgrounding of issues provides opportunity to create links between parallel courses that allow the studio and support class to have a mutual influence upon one another.

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# THE MAKING OF THE OPUS: TEACHING STRATEGIES + RUMI-NATIONS ACROSS THE FIRST YEAR DESIGN CURRICULUM Making Pedagogy

PATRICK LEE LUCAS, ASSOCIATE PROFESSOR SUZANNE CABRERA, LECTURER UNIVERSITY OF NORTH CAROLINA AT GREENSBORO

# Abstract

Without question, students entering college today bring digital experience through social networking, texting, and a "can do" attitude toward technology (Howe & Strauss, 2000). As teachers of these millenials, we must tap into this accumulated reservoir of personal experience. As design faculty, we assert a greater importance in linking to digital interfaces because we recognize they help teach the lesson that design is everywhere - even on Facebook. In this constructed digital world, students increasingly blur lines between public and private in adding far-flung friends to demonstrate their prowess as social networkers (Junco & Mastrodicasa, 2007; Nielsen, 2009). Last year, we harnessed this honed networking ability to unleash the energy of blogs with first year design students. Our goal: to transform social networking by adapting its foremost premise of relationships to an academic setting.

Students in the second semester of our program take studio, a freehand drawing course, a drafting intensive, and their first history/theory class. In the past, while succeeding in individual classes, students and faculty have failed at connecting lessons from each of these classes to others. In implementing the opus project, a single digital reporting structure/sharing space across ALL first year courses, we combated the tendency toward segmentation and emphasized continuities and opportunities among the courses. This strategy not only provided focus for the students, the opus project required greater coordination among faculty with divergent teaching strategies and challenged us to manifest cohesive learning throughout the semester, literally asking us to re-make our teaching.

Positioned around a blog, individual students reacted weekly to ever-evolving visual and text prompts in an active digital public journal, a place to reflect on their own work and to comment on the work of others. We linked individual blogs together in a class blog, a group enterprise to which 65+ students and a faculty team contributed in regular, measured ways. While getting people reading and raising awareness represented the chief outcome of the opus project, we saw that students did better work in part because they compared their own progress with others through this public forum. Importantly, checking in online also encouraged dialogue about design, conversations both in and out of class.

Through discourse analysis (Rose, 2007) of student surveys and blogs, we trace progress of weekly analytical work; sophistication in interweaving text and visuals; and changes in design vocabulary during the semester. We show how the opus project yielded a greater degree of professionalism in language, drawing and writing skills, and how the multi-course approach fostered more meaningful connections through conversations on and off line. Because the power of social networking truly represents at least one potential basis for broad-based learning, we assert that as teachers of design we must embrace the savvy command of technology by our students to enhance our teaching and their learning. In helping students see connections between studio and other courses, we enable them to understand that design does not operate in a vacuum, challenging them to become engaged citizens in a global - and increasingly digital - world.

#### **Reconstructing the Experience**

The common saying "hindsight is 20/20 vision" certainly applies to the Spring Semester 2009, where three faculty and nine teaching assistants undertook "the opus project" – an online presence bringing together insights from more than sixty interior architecture majors and nonmajors. As we prepared this paper for you to read, we had ample opportunity to again

reflect and learn from the experience. Without question, we came away from this process energized again by the work of our students as well as the continued conversations and intellectual machinations that originally resulted in such a constructed world for our students largely in the second semester of their design program.

One of the reviewers of the original proposal wrote that he was "not at all charmed" by the premise of *the opus project*, implying that such a highly structured teaching approach surely would squelch the creativity of students in their work, and maybe more importantly, hamper a faculty member's academic freedom to teach in the way they desire. We assert here that, in spite of the structure, or perhaps BECAUSE of it, our students as a whole, wrote more prolifically and regularly. In reflecting on their studio projects, drafting class exercises, communication strategies, and concepts introduced in history and theory, these students outperformed students in past semesters, where different reporting and sharing strategies characterized each of four independently taught courses. In having students communicate in ONE place to construct their own collection of work, the opus project suggested a different type of semester altogether...one that resulted in increased learning through higher level thinking for students and more effective teaching reaching from knowledge acquisition, through application, towards synthesis and evaluation (Bloom, 1956).

The space for this project was borne of necessity. As the three instructors in charge of four first-year courses, we recognized that we were teaching past one another, missing significant opportunities to cross-fertilize course content and experiences, and thus increase student learning and retention. Reinforced at a conference we attended just in advance of the semester's onset, participants from a wide range or backgrounds and perspectives responded to common ideas, building a comprehensive network of information; one that would not have existed if not afforded the opportunity and structure. As such, in the terminal of a Florida airport after the conference concluded, we generated the teaching pedagogy of the opus, fleshing out that initial idea as we returned to campus.

Building on previous experience with blogs (Cabrera & Lambeth, 2008) we theorized the idea of linking the four interior architecture courses around common themes and a systematic reporting strategy. Upon returning to campus, we pitched the idea to the third faculty member and fleshed out the potentialities of the experience for all members of the teaching team, which included two graduate students, two seniors, and six third year students assisting in the various courses. Meeting with some resistance but with the eagerness that comes in a new approach, the overall plan for the semester included weekly meetings to determine prompts for the students and strategic discussions about projects and exercises within the various courses, always looking for moments of connectivity.

Getting buy-in represented an exercise for not only the teaching team but for the students themselves, who, in periodic moments of weakness-and stress - resisted such a public and transparent way to record their work. While most students had at least one semester's experience utilizing a blog as a reporting technique for their studio class, the intensity increased dramatically with requirements to report across the curriculum. Professors jettisoned previously held assignments in physical form for presentation on the opus, and also traded an easy ability to hide behind papers and drawing assignments delivered in physical form, bringing themselves to the opus for commentary on student work. The students soon discovered that the delivery system offered the possibility to organize their work and their thoughts systematically across the courses, at the very least overcoming the challenge of tracking physical work in an open studio and in the transit of work in their backpacks to and from their residences. Notwithstanding some technical issues with both scanning and posting of work through the blogging software, students (even the non-majors in the history + theory class) learned short cuts and techniques from one another, and from our savvy digital studio technician, about life in the blog-o-sphere.

## **Teaching Strategies**

Though all of the instructors had taught the four courses a number of times before, and

thus knew the likely end products and experiences the students would encounter, the shifting landscape of melding the four courses under one pedagogy suggested major overhaul of learning goals and teaching objectives. That brings us to a snapshot of the first and last week of the semester. As students began the term, their studio project FOUND IN TRANS-LATION provided the forum for them to take a fairy tale story and translate it into graphic and then three-dimensional form. In their perception and communication course, the ILLU-MINATED OBJECTS exercise opened the possibility to find stories in objects and represent them. With the idea that this approach demonstrated the enterprise of elucidating stories from material culture, this project stood as a neat bookend for their studio work, where they translated stories into physical forms. In drafting, students gained an introduction to LET-TERING and to LINE WEIGHTS + QUALITIES, both fundamental skills toward the representation of buildings and spaces. Similarly, in the history + theory course, students learned about APPROACHES to the study of the built environment and the objects contained within, intentionally theorizing around the metaphor of design as a nautilus shell (Roth, 1977), material culture approaches (Prown, 1980; Prown, 1982; Hebidge, 1979), the design cycle (as adapted from Gray, 1958; Gray, 1966; and Kroeber, 1944) and the oft-quoted triumvirate of commodity, firmness, and delight (Wotton, 1624). The opus project prompts, five vocabulary words to help frame the recording online, included MULTIPLE VIEWS, ARTIFACT, STORY, TRANSLATION, and CYCLE, reinforcing and underscoring the explorations in each of the four classes.

At semester's end, the teaching team adopted the four core values of the department, COMMUNITY, AUTHENTICITY, STEW-ARDSHIP, and INNOVATION in COMING FULL CIRCLE in the four courses. In studio, students wrapped up the 3, 2, 1 : SACRED SPACE project, where they utilized three assigned materials, two senses, and the element of light to manifest a sited interior space within our studio building. Students revealed their solutions at a final review during the last week of class. In both perception + communication and history + theory, students explored form and content in making two illustrated 18x24" boards to serve as their PRECEDENT ANALYSIS for a building or space of the twentieth century. Students presented these boards, counting for a major grade in both classes, at an oral examination period at the end of the semester. In drafting, reinforcing the complex drawing montages of the precedent analysis, students undertook the COMBINATION drawing exercise to demonstrate their facility with multiple views learned throughout the semester.

The middle section of this paper profiles the first and last week of the opus project for two students, the steady improver and the top performer, to show the range of their entries as representatives of the larger class. In sharing excerpts of their student work, we aim to explicate the greater values underlying a teaching pedagogy that seeks connection and critique of design as a daily enterprise, where ideas become material as designed objects, spaces, and places, and where emerging young designers contribute to a critical, regular, and on-going dialogue with peers and mentors as they work out the complexities of such a world.

The steady improver represents well over two-thirds of the class, because in her work, like that of the majority her classmates, we experienced a deepening in thought and in communication about design as the semester unfolded. The top performer's contributions, the type of student we all aspire to have in droves in our studios and classrooms, signal the verdant potentialities of innovative and deep thinking we hope of all learners, with this one also drawing on world and life experience and bringing to her blog a cogent recounting of relationships with the design realm and beyond.

# WEEK 1 : THE OPUS PROJECT

*multiple views, artifact, translation, cycles* Our steady improver began her blog experience in simply describing activities in her courses and in defining prompts, with little effort to reach more deeply to internalized reflection. In dealing with the prompt, STORY, she noted "different types of architecture tell different types of stories," a somewhat circular speculation, topped by the selection of a butterfly as an illustration for MULTI-VIEW because "it can get a view from anywhere whether on top of a blade of grass or high up
in the sky." Other words and work from that week suggested a similar approach with short descriptive sentences, and very little exploration beyond the initial surface of the prompt.

In contrast, our top performer took the prompt, STORY, and penned digitally:

With very little effort, one can find a story in everything around them. Of course there are obvious resources like a book, a photograph, a song, a painting or a sculpture, but if you look a little closer at something as simple and mundane as a twig, you could find multiple stories.

With this writing, this young designer referenced a perception and communication exercise to encounter the STORY in both a twig and a cell phone, bringing those disparate objects into close relationship despite their obvious differences as object of nature and object of technology.

One of the top performer's strengths related to her honed ability to make connections among the prompts, thus linking STORY with ARTIFACT in noting that "artifacts not only tell a story but behold a history and add on to that history everyday," leading to the idea that every ARTIFACT has a number of ways to encounter it, each a type of opinion. Thus MULTI-VIEW "allows expression" where:

a song or a painting becomes successful because it is viewed in different ways by many people, forcing them to think about it, to express themselves through their opinion or even inspire a painting or song of their own.

Citing the idea of design CYCLE, introduced in the history + theory course, our top performer likened the chaotic and unpredictable design process as "a bunch of voices screaming in your head... direct reactions and resonances to preceding periods, regional influences and variations, views in and out." With this prompt, she then recounts her own emerging design philosophy:

Personally, I love taking advantage of design cycles - I'm a very eclectic person and I consider myself an eclectic artist/designer as well. I adore a mixture of clothing, housewares, music, and other objects from the Victorian era, to the retro 1950s and 1960s, and my favorite, the 1970's.

We believe that what is significant here is that the top performer uses her blog for reflection to her own world, linking to the final prompt, TRANSLATION, where she reminds us that "sometimes an object's history is obvious or somewhat easy to guess, but even when we think we know its tale, we still must look at its every aspect and translate each one to a possible story," suggesting that as designers, "our job is to translate, or convert, a client's personality, interests, and experiences (each a separate story) into a space that binds all of those stories together, or an artifact that further helps them tell their tale." She then importantly links to her own studio project, FOUND IN TRANS-LATION, where she traces the translation of "key elements from a fairy tale into a more abstract idea," in turn translating "that main idea or essence into an expressive artifact."



FIGURE 1: The steady improver's butterfly and top performer's interpretation of a fairy tale showcase the different interpretations of the Week 1's prompts.

# WEEK 14 : COMING FULL CIRCLE

# community, stewardship, innovation, authenticity

By semester's end, the top performer continued to shine in her reflective, well written prose and her crisp and interesting imagery for each blog post. As the final week of the opus project suggests, COMING FULL CIRCLE, asked students to speculate about the four core values of the department: community, stewardship, innovation, and authenticity. Our top performer did not disappoint, for COMMUNITY quoting Frank Lloyd Wright in saying "What the people of our country need most is beauty of environment," calling into question the placement of her precedent analysis project, the Centre Georges Pompidou, in its Parisian neighborhood. At the same time, she observes the lively space of the building's interior, as a place of both exposure to art and gathering of community in the act of observing art. While

the top performer understood that the Centre Pompidou succeeding in its AUTHENTICITY in exposing its structure and systems to the exterior, its juxtaposition to the medieval surroundings represented a challenge for capturing the special sense of place in Paris. Working on reconciling the interior experience of the building within its exterior milieu fed into her characterization of STEWARDSHIP, defining design as "servant of the human spirit," borrowing again Wright's observations and tying it to her own. In reflecting on material use in her studio project, she "took advantage of wood's warm hue, texture, and character and used it in almost every inch of my space, floor to ceiling, to create the warm, natural settings," drawing the outside in. In casting light on this material, she recounted the design for a large divider "that filtered light and transformed it into a material as it hit the interiors," further shaping light through the placement of operable shutters and movable benches, which also served as a semi-permeable sound barrier. Clearly, our top performer continued to excel at synthetic, deeply connected concepts as design ideas. In her graphics, she not only demonstrates her growing skills in Photoshop, she also shows her design eye in the organization of these graphic elements within her passionate writing.

For our steady improver, whose early work we characterized as a surface exploration,

innovation -[in-no-va-tion] a. introducing something new b. invention, conception, design, excogitation, creation [1]



"Shadows were the 'brushwork' of the ancient world. Let the 'modern' now work with light, light diffused, light reflected - light for its own sake, shadows gratuitous" [4].

Technology took a huge leap in the last couple of centuries. Innovations of transportation, industry, trade, communication, and machinery, even innovations in careers like interior designers, all impacted innovations in architecture and design...

FIGURE 2: The top performer's skills carry over to her graphic sensibilities.

barely moving beyond description, each blog post throughout the semester seemed to provide a forum for her to test out her design ideas and her voice in articulating them. By semester's end, her blog entries, though far from perfect, revealed a far deeper understanding of design, citing content from the history + theory course and studio, telling us more about her background growing up, and recognizing the moments along her life's pathway as validating experiences for her life as a designer centered within a community of designers,



FIGURE 3: The steady improver and top performer's final precedent studies bridge together lessons of history + theory with perception + communication

architects, and others close-knit to one another in achieving good design. As evidence of good design, she explained that her "project deals with both meditation and celebration in one single moment" where the "glow of color radiates when hit with direct sunlight," a celebration of the circle as a unity. Understanding that the meditative quality of the sphere shifts with the quality of light, the steady improver likens this experience with a meditative state and with the symbology of the circle as a universal figure, particular in Asian culture where form and light "come together to create harmony."

Citing both local and international examples of design, course content from history + theory, populates her final blog post, suggesting that she is beginning her journey of developing both design vocabulary and a confidence in expressing her design ideas in both writing and, graphically, as images. In pondering about STEWARDSHIP, she links to a local LEED project (a field trip for second year students) as well as the Ice Hotel in Sweden. Through her exploration of AUTHENTICITY, she meanders to an autobiographical account of Italian cuisine for this native New Yorker for which we do not fault her, as we are great fans. She reminds us, though, that INNOVA-TION is "what keeps the world thriving," without which "we would still be trying to replicate the Parthenon a million times." Rather, she enjoys The New Acropolis Museum as "a playoff of both innovation and authenticity" in the structure of glass and steel that reflects on present day materials that stand in contrast



FIGURE 4: At the semester's end, the steady improver comes full circle in words and design.

with the stone of the ancient world, and the archaeological site encapsulated in the build-ing program.

In COMING FULL CIRCLE, she wrote:

This semester has been a rollercoaster of ups and downs. What I have learned is to live by all of these words. I am now in a close-knit community called IARC, where ideas can be exchanged, friends are made, and all-nighters are pulled. This community is preparing me for the larger community that I will be entering: the real world. I must learn how to use stewardship to give back to my community through design. Learning about building construction, materials and LEED is important in my potential to give back to the community. I can come out of here smarter in order to built for the community instead of against. One thing my teachers always taught me is not to lose myself. My heritage, background, and personality all shape what I am and my design approach. With community, authenticity, innovation, and stewardship, I can become a successful designer and make something in this world better.

#### Ruminations

With these two students, we attempted to demonstrate the wide range of abilities for learners within a structured and specific pedagogical strategy – the public display of work online. With as many varying degrees of success as well as challenges along the way for their peers, the two representative students stand as bookends for more than sixty who entered the opus project. We conclude that by having an online portfolio, students take the enterprise of learning to a whole new level. And because they bring social networking skills with them to college, we highly recommend tapping into that reservoir and deploying a digital portfolio of the entire class from which we as instructors and they as students may draw pages. In doing so, we express the belief that design can become an everyday enterprise for students, bringing the strands from four courses and life experiences into one "conversation" with oneself, with the opportunity to expand that conversation to a diverse peer group who are living the same rubrics. By having a consistent system of reporting, *the opus* project highlights the fundamental differences among these peers and articulates the view that many acceptable paths take a designer to

an end result...in this instance, the PROCESS of the opus rating higher importance than the eventual product. *The opus project*, even with its limitations, suggests a useful strategy for teaching students developing skills as life long designers in the foundation courses of their program...and in recognizing the connections among studio, lab, and classroom....and in drawing, sketching, making, writing, thinking, conversing, editing, posting. Through their own opus and the larger body of work accumulated by their peers, we show students their responsibility to acquire and disseminate knowledge about the promise of design.

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# LEARNING, MAKING, AND ANALOGY Making Real

# HELENE RENARD VIRGINIA POLYTECHNIC INSTITUTE

If we reflect on our own learning experiences, many of us can conjure up an instance in which we felt frustration rather than enlightenment, or conversely, a shift of awareness in the space of a moment. Something that was unclear is suddenly clear. Another order of experience occurs when iterative practice evolves over time from a noble attempt into a skillful manifestation of something made. Finally, we know the engaging satisfaction of making things with our hands.

Moments like these from personal experience allow design educators to recognize the markers of learning in our students. Pedagogical positions take root in such moments, and are redefined or further refined through teaching experience and research. In my current role as a second year interior design studio instructor, I develop studio curriculum founded upon my conviction in the essential role that three separate but interrelated events play in effective learning and in the creative process: hands-on making, shift in awareness, and practice or iteration.

I believe strongly in the primacy of handson experiences in human learning and development, and in the vital relationship between interacting with materials and acquiring the mental flexibility to shape our lives in an adaptive and innovative manner.

A focus on the dialogue between making and analogy is useful in highlighting mind and body as our primary creative tools. What follows is an argument for the necessity of developing creative ability that engages the "tools" of mind and body directly, and balances the products of these efforts in the creative process.

### Second Year Studio as a Case Study

During the fall semester of their second year, students in the design majors at Virginia Tech's School of Architecture + Design take their first studio within their professional program. For aspiring interior designers, this studio marks a transition between the melting pot of foundation studio, where all design majors are combined, and the technically rigorous and more specialized third year studio. As a faculty member in the interior design program responsible for crafting the projects of this transition studio, I focus on laying the groundwork for effective communication, and on providing experiences that quickly demonstrate the value of repetitive practice, and begin to reveal a connection between iteration, shifting awareness and skill development.

The skill-sets with which the students arrive in and are expected to leave the second year establish one set of parameters for the studio. Combining this more pragmatic agenda of competence with broader learning imperatives that allude to the potential for excellence, I construct the narrative arc of the student over the two semesters.

Measurable learning objectives as stated in the course description are as follows. At the completion of this course, the student will be able to:

- 1 Develop interior spaces with an emphasis on the quality of spatial relationships.
- 2 Develop spaces that demonstrate basic understanding of human factor needs.
- 3 Communicate ideas in model, hand drawings, and computer drawings.
- 4 Render drawings using a variety of media.
- 5 Communicate ideas with words – spoken and written.

The learning imperatives that I have additionally defined for the studio are in some cases expansions or qualifications of the objectives listed above, and in other cases, are simply different but complementary. They imply an emphasis on the value of process, and are based on the principle that individuals have different learning styles and thus benefit from multiple modes of access to knowledge. My goals for the students are that they will evolve their ability to communicate verbally, to "see," to make things with their hands, and to make them well. I attempt to help them lay the groundwork for a sustaining dialogue between thinking and making, or critical making.

Through the studio work of three groups of second year design students, I continue to assess the effectiveness of a sequence of projects based on these goals and principles. Design exercises and projects provide a range of time constraints and parameters to hone specific groups of skills, which the subsequent projects build upon. Abstract forms as well as existing buildings serve as project sites. Every opportunity to engage materials, whether chipboard, plaster, wood, metal or felt is incorporated. Projects are structured to allow experiences to cycle back in a different format. Iteration takes place, but within a new context. Discussions are framed to allow students to observe their development and improvement. They are able to reflect on the cumulative effect of their learning, and on their evolving perceptions of themselves as members of a discipline.

### The Narrative of the Studio

In my role as storyteller, I provide a narrative framework against which the students can measure and assess their own progress. I work to clearly communicate expectations and criteria for evaluation, so that the students' focus can be on exploring, taking risks, and learning on all fronts. Monique Dufour, formerly of the Center for Excellence in Undergraduate Education at Virginia Tech, has advised me on specific practices that can support this intention. I have incorporated moments for reflection through group discussion and use techniques such "minute cards" where students are given one minute to provide feedback in the form of answers to verbal questions posed. The effort to inject structured pauses into the design process and to allow students to assess the value of a particular design exercise in the context of their learning often creates more informed decision-making moving forward through the semester. The students slowly develop an understanding of their learning trajectory throughout the semester that helps contextualize specific learning experiences, and can add a sense of relevance to what they are learning.

As I frequently tell my students, I believe that communication is one of the hardest things we do as human beings, and it plays a very big role in their chosen profession. I champion directness and clarity at all times. It is my intention to be as clear with the students as possible about the learning objectives of each assignment, and its context within the semester. At the same time, I use group discussions as an opportunity to encourage selfawareness and taking ownership of one's educational experience. This is a shift of awareness that occurs in the auditory mode of learning, using words to figuratively turn an idea in your hand.

# Get It Out of Your Head and Into the World

The value of making a thing as a manifestation of an idea is significant as an opportunity for creating new perspective. It becomes an object outside of the self to which the maker can respond. Hands-on making sets the stage for tactile/kinesthetic learning, and the development of tacit knowledge and muscle memory. Thinking and making become interwoven and inseparable in the creative process. The next step in the cultivation of dialogue between the student and their work is the extension of this moment of making into a method and a discipline of practice. They can then experience how both skills and ideas evolve and benefit from multiple iterations.

# Analogy and Pretending

The power of analogy as a learning tool is clear to anyone who has taught or been taught the tying of shoelaces by making an S or figure eight with the laces. The roots of the word in Latin and Greek in the words 'proportion' and 'proportionate' qualify the definition as a comparison based on a similarity. Analogy is about drawing relationships, making connections, and so changing one's understanding of something by changing its context. It is a form of mental collage. This concept has a particular relevance in design education. Projects and exercises in design studios are often in some sense practice runs, replacements, or substitutes for the "real" professional task while having their own integrity as educational experiences based on a set of pedagogical goals.

# Iteration and Motivation/ Sketchbooks

Drawing inspiration from my own experience of learning to see and draw from Sue Gussow during my first year as an architecture student at The Cooper Union, I give weekly sketchbook assignments. In my introduction and subsequent coaching, the emphasis is on really looking at the live subject (shoes, green peppers) and trying to understand what marks made on the paper will result in a true representation of what the artist is seeing. I show the students different ways to break down or abstract what is in front of them. Basic geometric shapes, topographic lines around the peppers, enclosing planes, areas of light and dark. Here is an instance of analogy resulting in a shift of awareness. Placing the object, mentally, in a different context allows the student to "see" it and translate that vision to the paper. These mental filters take the "seeing" to a level of diagramming or abstraction that enables access to the problem that perhaps the student had struggled with before. I think of this approach as a kind of mapping, linking this thought process to other creative translations from 2D to 3D. It represents a desire to "know" something. In all design work, we imagine ultimate solutions before they become real, and on the way to envisioning those solutions, we use various forms of making to help us see and respond to an evolving idea.

The visible progress that the students make within five weeks of weekly sketchbook assignments quickly demonstrates the value of practice. They have learned techniques that constitute a change in perspective, or a re-contextualizing of information.

Large drawings of directly observed subjects done with charcoal on newsprint are executed both during class and as homework. The focus on drawing strictly areas of light and dark in this assignment is reinforced by the nature of the charcoal medium. (Figure 1)

This semester, my colleague and I have chosen to begin the studio with the Sketching Olympics, which organizes freehand drawing into different "events" that relate directly to the use of sketching within the professional



FIGURE 1:

arena. Diagrams, perspective vignettes (called Live Interiors), and axonometric sketching (Talking in 3D) are among the events, and demonstrate the application of their newly acquired sketching abilities in the forum of design in the working world, with clients, with a design team, for thinking through an idea.

# Foundational Language / Photo Panels

The inert/living photography panel assignment is adapted from an exercise initially taught with Kim Steele in the first year design studio at Arizona State University. Students are asked to take a micro approach to things in their environment, to document texture, color, and pattern, and make two columns of photographs that draw relationships, or formulate visual analogies, between living and inert subjects. This exercise is the first common experience in the studio, and begins to establish an understanding of the basic elements and principles of design. These initial forays into two-dimensional compositions and use of positive and negative become three-dimensional expressions of mass and volume, solid and void in the next design exercise.

# Material Interaction, Analogous Drawing: Container for Light

The attention to light in drawing exercises and compositional principles in the photo panel assignment ushers the students into the first design project: Container for Light. This project is adapted from one I was assigned during my first year in the architecture program at the Cooper Union by Raimund Abraham. In the amended project, I ask students to make a cube void within a cube mass, and to make passages for light, movement, and vision from the exterior of the mass to the interior void. Dimensions of the solid and void are given, and students are asked to determine the relationship to the ground plane in section. Orientation relative to the cardinal directions (plan) is given.

In various iterations of the project, students have either been asked to begin with sketch models or orthographic drawings to explain and explore their schemes. Invariably, the first round of drawing reveals the beginner's struggle to understand the conventions of a drawing method that contrasts significantly, both in objective and approach, with the experiential drawing they are asked to do in their sketchbooks.

Orthographic drawing is an example of the pervading presence of analogy in the design process. Scaled drawings are a form of representation that allows precise communication of a desired, projected reality, but requires a different perspective than life drawing or perspective sketches. The first is an abstracted language of projection and proportion while the other is occupant-centered.

A series of three chipboard sketch models is required to reveal either three iterations of a scheme or three different ways of rendering the scheme in terms of solid and void. (Figure 2) The more successful set of orthographic drawings has been produced when the sketch model assignment has preceded the orthographic drawing assignment. It is easier for the students to "see" and understand a space when they have built it and held it in their hand. It could be argued that the orthographic drawings require a kind of abstract interpretation and suspension of experiential reality that removes them one step further from the space. An interesting by-product of the use of Sketch-Up as a tool for visualizing spaces and objects in three dimensions is the appearance in the shading of orthographic drawings of mistakes that are specifically attributable to the use of the software. Students copy the projected shadows they see in sketch-up without realizing they are in perspective versus parallel projection.



FIGURE 2:

For production of the final model, which is a sectional plaster cast set within an MDF base, the students are organized into teams based loosely on level of comfort and previous experience with either power tools or pouring plaster. (Figure 3) The teams of four are responsible for coordinating, organizing, and streamlining the common aspects of building molds, pouring the plaster, and fabricating MDF bases in the woodshop. This teamwork allows the students to identify what strengths they bring to the table, how they can contribute to a successful building endeavor, and, with the help of their teammates, how they can expand their palette of skills.

In fabricating the molds for the plaster pour and the wood bases, the students learn much about working with materials, including the need to account for the thickness of the material. The analogous learning that occurs here relative to tolerances of various materials and cast material versus sheet material has the potential to develop in the student a better understanding of how spaces are built at full scale. The first-hand experience of engaging with materials will translate into a clearer understanding of how to communicate the assembly of a space that they have designed to fabricators or builders. As the instructor of the Building Systems course for the same group of students, I have the opportunity to draw these connections for them and reinforce the relevance of these principles in building logic.

While students of interior design may never be asked to go to the table saw and cut anything in the course of their professional careers, many of them will have gained a sense that they can do something they couldn't before. This sense of competence and accomplishment is empowering, and sets the stage for future adventurous and inquisitive approaches to life and experience.

Shaded orthographic drawings are also a final requirement, (Figure 4) combining some of the sensibilities developed in freehand drawing exercises with the new language of orthographics that the students have learned. In the most recent iteration of this project, my colleague and I have added a sketch-up rendering to the final requirements. This addition is an attempt to integrate analog and digital modes while exploring how they might best inform and influence one another and lead to a more fluid design process. We have found that, as in the example above, the delving into various media serves as a positive check-and balance system, so that mistakes in one's initial attempts to use certain tools are made clear or corrected by work made in another medium.

# Armory Building / Intervention in the Real

The project that follows the Container for Light offers a real building shell as a site that the students can respond to. An existing historic building is visited, measured, and documented by hand. The students are asked to create a montage that expresses something that they find appealing or inspiring about the building as a site. They are then asked to create a number of "rooms" and a number of "thresholds," for example, 5 rooms and 8 thresholds. Further parameters are imposed on the intervention, to encourage the making of engaging, considered volumes and spaces. After drawing the building in section, plan, and elevation by hand, the students move into drawing on the computer, but with an understanding of the act of drawing as a manual act. Professionals that appreciate the importance of drawing by hand describe the repetition of drawing something



FIGURE 3:

again and again as both a way of getting to know it, ingraining it in the mind, and of establishing a circularity between drawing and making and back again. <sup>1</sup> The building of physical scale models of the project proposals results in further awareness of existing elements that must be contended with when adding an intervention. In the case of the Armory building, students needed the models to realize and appreciate the impact of exposed roof trusses on the spaces they had envisioned.

# Chain of Events

From two-dimensional design exercises and freehand drawing of trees to three-dimensional occupiable compositions of solid and void, light and dark, to a loosely programmed intervention in an existing building, the sequence of problems and projects attempts to balance new territory with repetition of learned skills. Skills begin as bodily practices and technical understanding develops in partnership with the imagination.<sup>2</sup> The intention is to foster the continuous evolution of the critical making process.

<sup>1</sup> Sennett, Richard. *The Craftsman*. New Haven and London: Yale University Press, 2008.

<sup>2</sup> Sennett, Richard. *The Craftsman*. New Haven and London: Yale University Press, 2008.



FIGURE 4:

# **Current Popular Discourse on Craft**

As evidenced by the popularity of such publications as Shop Class as Soulcraft, by Matthew Crawford and The Craftsman, by Richard Sennett, the current economic climate has fueled a resurgent interest in the idea of craft and in finding satisfaction in one's work. Critics of what is often referred to as the "knowledge worker" economy<sup>3</sup> propose that a solution to our current economic problems and the alienation many people experience when concrete practices are separated from thinking about those practices could be provided by reuniting conception and execution.

As designers, we create a dialogue with tools and the models we generate in our efforts to make or to see our ideas. The importance of this process is recognized in contemporary scholarship across many disciplines. Margaret Wertheim, Australian scientist, author, and pre-

3 Pink, Daniel H., A Whole New Mind, New York: The Berkley Publishing Group, 2005.

senter at TED 2009 shares the example of crochet models, developed by Latvian mathematician Daina Taimina, as the most accurate way to model hyperbolic space. She speaks of these models of 'feminine handicraft' as abstraction engaged physically.<sup>4</sup> In his book, The Craftsman, Richard Sennett, author and professor of sociology, speaks of the practice of craft as an opportunity to 'engage with difficulty, accident, and constraint.<sup>5</sup> These are two thinkers at the forefront of their professions that understand the value of craft not only as the pleasure of making something well, but in its potential to act as a tool in honing our powers of imagination and innovation.

## Conclusion / Implications for **Design Education**

One view of the current higher education for the design professions might frame what begins as an intimate dialogue between the maker and the finished space that becomes several steps more removed in many current models of practice. A body of literature has recently emerged on the importance of cultivating the return of holistic thinking to the workplace. Cerebral or intellectual activity as separate from making is ultimately unproductive from a human point of view. As Sennett states, a balanced view would suggest that thinking is contained within the process of making.<sup>6</sup>

The idea of making through analogy pervades design education and professional practice by convention and necessity. By recognizing the value of the process of mental collage, not just in enabling one to read a set of construction documents, but in becoming more facile with generating and manipulating ideas, we take advantage of a skill that is a necessary part of design as a language. The nature of design is both speculative and empirical. It is the practice of projecting forward into future realities.

Given this state of affairs, how can beginning design educators best prepare students to become excellent designers and capable citi-

<sup>4</sup> TED talk: Margaret Wertheim (April 2009) http:// www.ted.com/talks/lang/eng/margaret\_wertheim\_ crochets\_the\_coral\_reef.html

<sup>5</sup> Sennett, Richard. The Craftsman. New Haven and London: Yale University Press, 2008. 6 Ibid.

zens? The sequence of studio projects that I have outlined continues to be a test case that I adjust with each group of students. So, what do the outcomes tell us? Although it is difficult to assess the impact of some of my initiatives, which may best be observed over the long term, feedback from fellow faculty members indicates that student work reflects a greater understanding of building technology. There is also a sense among faculty and students that the incorporation of more analog making processes is helping to avoid some of the traps that over-reliance on virtual media can create. The students tell me that they feel empowered by knowledge developed through the hands, and I am encouraged by the interaction between students that have moved on to third year and current second years. Former students feel compelled to share their perceived wisdom with their younger peers relative to a particular project that they have worked on themselves, and are always intrigued by changes that have been made to the assignment.

As in my own experience, students seem more able to appreciate the relevance of their education with distance and passing time. I believe design education could better serve students by finding ways to allow some of this awareness to occur earlier, when students still have the opportunity to use such insight to shape their educational experience. The sooner this practice is put into place by the student, the better it will serve them upon graduation, where they will need to make decisions about themselves as members of a discipline. The emphasis on mental flexibility should accompany a focus on providing experiences with hands-on making, and establishing a rhythm of making that becomes a practice. The quality of the work that the students have produced in the second year studio, and the evolving collaborative culture that I see in the program convinces me of the value and potential in my methodology. With the aim of encouraging habits that will becoming sustaining for a creative professional, I will continue to base my curricula on the important relationship between thinking critically and making well.

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# AS IS STRUCTURE SO IS SPACE Making Real

### ISABEL BAESE GARCIA SAN ANTONIO COLLEGE

Would you dare to walk across a paper bridge underneath a man made sky? Would you dare to hold the ends of things that sing instead of stand ready at any moment to fly into space? Then look at the way flowers grow ask goldfish how they breathe in water And think of animals and things that could exist if you were God or invincibly brave and question question question every thing.

In the second semester of their architectural studies, design students begin to explore the educational realm that exists between the abstract and the pragmatic. Through studio projects, they begin to investigate the relationship of mass to void as a three dimensional experience that defines occupy-able space. While up to this point, the design ordering principles have been the predominant means of shaping and informing space, "concept" as a design generator is now introduced. In this project, the concept grows out of the students' study of the movement(s) and structure of a specific system of joints in an animal that they select. They examine the ways in which the joints move and the parts work together as a whole to allow a certain range of motion(s). From this examination. an abstract model of the "structural system" is created and used to further inform the design of a full scale project; one, of which, will ultimately be built.

After conducting research on their animal that includes habitat, physical characteristics and locomotive aspects, students select the "structural joint system" that best illustrates that animal's unique manner of movement.

Through a series of drawings, they analyze the physical properties of each joint – does it work in tension or compression? How does each joint work in concert with other connections in the system to allow a specific movement? What is the structural design of the joint(s) - is it a ball and socket joint, a hinge connection etc? How does the design of the joint correlate to the movement it produces? What is the role of the connective tissue or musculature that surrounds and/or supports the joint? From this investigation, they come to a pragmatic understanding of how tectonics and function interrelate in the structural system they are examining.

This knowledge is then translated into the creation of an abstract model that demonstrates the range of motion(s) studied and the joint systems that make those movements possible. Through the use of hardware components and other everyday materials to make this model, students form a new appreciation of the roles that these common items play in the world of building and construction. Additionally, a nascent understanding of how things must structurally connect to achieve a desired result and how stresses act on materials is planted in the minds and memories of the students. Moreover, through the manipulation of their models to demonstrate "movement." students experience the inherent rhythm and cadence of the joint system studied.

In the second part of this project, the students experience the realities that inform, shape and change a design as it moves from inception to actuality in the physical world. Given a specific site and a building program, the students are introduced to the tool of "site analysis."

Through an analysis of the definitive characteristics with which all sites are imbued (sun and wind orientation, access/egress etc) as well as an exploration of the unique facets of a specific site (in this case, a long narrow site with a

century old pecan tree located at its mid point, the presence of barking dogs on the other side of the chain link fence, and the clucking of unseen chickens beyond a screen of scruffy bushes), additional contextual meaning and importance is unearthed. The program for this space/place is that it be an occupy-able construct that embodies the structural properties/ elements and the kinetic movement/motion of the joint system studied by the students. At this point in the project, there is an inherent danger of the students reverting back to preconceived notions and stereotypical ideas of what design and making are rather than what they can be or need to be given certain parameters. The students, in having a basic program and an actual site, are tempted to forget the process in favor of what they believe they already know – the product. Because of this tendency, the works of kinetic sculptors such as Theo Jansen and Reuben Margolin are studied and discussed in studio. Both of these artists are well known for creations that push the boundaries of both physics and art. Since 1990, the Dutchman, Theo Jansen, has been working on huge mechanical creatures called "strandbeests" that are made of plastic tubes, recycled plastic bottles, and a type of bicycle pump and powered by the wind. His vision is to release herds of these kinetic creations onto the beach to live their own lives without human supervision. His creatures possess an ethereal grace and poignant beauty that he states "push the boundaries of what we know and what seems possible to us at this moment in time." Reuben Margolin, on the other hand, while just as intrigued by the possibilities of movement, chooses to explore its potential through the creation of elegant techno-kinetic wave sculptures that are often composed of found and salvaged materials. Through studies of these artists and studio discussions of the conceptual process that has taken place to date, the students reach an awareness of the methodology they have gained through their investigations and models. In turn, they begin to comprehend how it can be continued and utilized to inform real world design in a meaningful way.

So then, study models are employed, critiqued, reworked and then used to guide the final solutions to the challenge of designing an occupy-able construct. From the solutions generated, one is selected by studio peer review for actual fabrication. Through sketches and the generating of construction drawings, the students refine concepts, connections and spatial relationships of the parts to the whole. They discuss materials, methods of construction, budget, and work schedules. Since electricity is not available at the site, any pieces that must be cut and/or fabricated with the use of power tools must be prefabricated off site and then transported to the site for assembly. The lessons learned during the fabrication and erection stages of the project are invaluable as the level and type of skill each student possesses finds an outlet and expression in the overall result. Students come to understand that a drawing and a full scale construct exist in different dimensions and require problem solving approaches that do not always coincide. They discover that a project comes to fruition through shared governance of effort and responsibility and that what often works in the conceptual world does not work at all in the real world where the pragmatic and poetic lessons of physics, human error and the elements insist on being acknowledged and addressed.

In conclusion, through the process of this project, the students learn *making* at the level of the abstract, the full scale and the level of human intention, interaction and result. In this way, through *doing*, the concepts and realities of structure are introduced in a way that engages their imaginations and challenges their talents and skills.

# THE MAKING OF AN IDEA Making Real

### JUDY O'BUCK GORDON GEORGIA INSTITUTE OF TECHNOLOGY

## Introduction

When the way of the world has turned to the point that the information age is becoming devoid of human experience<sup>1</sup> and consequently the experience is not of the phenomenal world but of the virtual, such as when Second *Life* replaces life<sup>2</sup>, and when the blockbuster film "Avatar" tantalizes us with a world that is hyper-real and more engaging then the one we know, so much so, that we are depressed that we cannot visit this "new" place3. Or for activity, we physically simulate the acts of playing tennis or bowling with Wii, but we do not feel the resistance of the tennis ball against the racquet's strings or hear the sound of the ping, nor do we feel the weight of the bowling bowl in our hand or the slippery wood floor on our feet and yet we say we played these games. And at a time in the field of professional sports when the current crop of recruits for the NFL have played more Madden NFL football then real football<sup>4</sup> - the question can be or must be asked - where, or is there, a place for architecture? Or architectural thought?

Architecture is the place of potential because it has the opportunity and ability to engage our phenomenal world by *what it is*. Through our everyday observations and empirical knowledge (i.e. software programs such as Autodesk's *Ecotect*) we still believe that we understand our world and for us, it is still seemingly the most familiar environment, even as we become more and more remote from it.

Thus the call to engage our everyday phenomena is the part the exercise under discussion in this paper as mentioned in this studio exercise brief, "*Making the Invisible, Visible: An apparatus that documents phenomena.*" This call for engagement is presented precisely because often this phenomenal world is taken for granted.

From the brief:

The sun shines, the full moon glows, the breeze is felt upon our face, the visual pleasure of a beautiful view, the compulsive stare of an ugly view, the passage of the day/month/seasons/year, the sound of the leaves rustling, the call of the birds, water rushing, sparkling, reflecting, all seen/felt/ perceived and exceptional in their own way, yet an everyday occurrence...

### Make

The apparatus is a device that amplifies - reveals - transforms the phenomenal experience into a phenomenological/ontological experience. In someway a person must interact with the device and "experience" its results. It is an interaction that physical. The device activates the phenomena..."

The intention of the apparatus, or ideation model which is a device that provides a way for ideas to come into being (existence), is to transform an idea into a reality, a physicality, a thing - etymologically speaking an assembly or meeting<sup>5</sup> - in (with) the real world. The apparatus transforms the idea into a reality. Something seemingly unrelated taps into the students' psyche and relieves them of the "burden" of the architectural "concept."

#### Thinking-Making

### Thinking

Where are we when we think? Hannah Arendt, *The Life of the Mind*, 1977

This is the title for the fourth and final chapter of Part One in Hannah Arendt's seminal work *The Life of the Mind* with the title of Chapter 19 being "Tantôt je pense et tantôt je suis (Valéry): the nowhere."<sup>6</sup> Arendt translates Valéry quote as, "At times I think and at times I am."<sup>7</sup> and she thinks that the remark "...would be right if our sense of realness were entirely determined by our spatial existence"<sup>8</sup> because "The everywhere of thought is indeed a region of nowhere."<sup>9</sup> It should also be noted that the quote under discussion by the French essayist, poet and philosopher, Paul Valéry, is a satirical comment on René Descartes seminal quote, "Je pense donc je suis." (I think, therefore I am.), found in his treatise, *Discourse of the Method*, published in 1637.

Arendt describes this position/place - the "thinking experience" -a the "nowhere" -ashift from the present to the present-less. This is not a new or unexplored or unknown condition. She points to two of the earliest records of people being in this "place" or state or condition; the first example is of Socrates about whom she wrote that it was his habit, to suddenly turn "his mind into himself"<sup>11</sup> and the second is of Xenophon when she reminds us that he remained immobile for nearly twenty four hours "deep in thought" concerning a military strategy. <sup>12</sup> This place - of nowhere - is timeless and a-spatial precisely because we are inside ourselves. But are we disconnected from the world?

Leslie Kavanaugh, in her essay, "Thinking / Making: Aristotle's Notion of the Creative Intellect," says, "Our body in not "'gross matter' to be calculated by our brain. Our world is not outside of us."<sup>13</sup> She reinforces this notion by saying that for "Aristotle - the psyche - de anima, the soul was a rich and integrated entity that included functions of the not only the intellect, but also feeling, sensation, perception, intuition, judgment, spatial sensibility and continuity in time, powers of discrimination, as well as, "common sense" which a faculty that is "common" i.e. the unity that binds all perception together."14 Aristotle saw the experience of thinking as a whole - as one with a "commonality" <sup>15</sup> - "the soul never thinks without a vision."16

Perhaps we can also turn to Edmund Husserl, the German philosopher and founder of phenomenology, for this "unconsciousness" (which is opposite to his idea of consciousness and intentionality, that thought is directed toward an object), the effort to understand essence, the meaning, has in his words, "a certain degree of naïveté."<sup>17</sup> Or perhaps it is the whisperings of "wordless consciousness."<sup>18</sup> In the end this may be what is necessary to "think," to suspend all disbelief in order to fall into another way of thinking.

This thinking is a private activity of the mind and body. I can think all day and while it may seem productive (at least to me) and may be productive *for* me, it can only be shared, if I make – *something*. I can think and think and think all day, but these thoughts are ephemeral as they are truly mine alone. The voice is my head is always mediated by the hand. The hand cannot keep up with the voice. However, when the hand and the mind are separated - it is the mind that suffers<sup>19</sup> for it is the hand that sets the mind free. Or it is it the tongue?

For Hannah Arendt, "Mental activities, invisible themselves and occupied with the invisible, become manifest only through speech."20 Language serves as a bridge.<sup>21</sup> For our everyday communication, speech is a familiar pattern. We are comfortable with words. The spoken word is more efficient than written instructions.<sup>22</sup> The ease of explaining and re-explaining (iteration) through words with actions increases our understanding. It is the familiarity of speech and it's the introduction since our birth (and before), as well as, its pre-school use that points to a faculty that seems secure. Thus we are familiar with speech and it seems secure to us. As with thought, speech is also ephemeral and its counterpart - writing - its making - is its evidence. Writing endures.

The ease that we might have with this type of making - writing - is very different than building a model. The decisions that are made are not the same – speech is linear while spatial thinking is multi-dimensional.<sup>23</sup> Writing is made with words and they have a particular, accepted order. Models are assembled materials, in a particular order, but not in a common or necessarily accepted order. The assistance that is offered to writing is also different. A computer program will "thumb" through the dictionary to correct spelling errors or offer words by the use of an electronic thesaurus. Such devices are not available for model making.

We can do *so much* with words. But we cannot do everything with words.

In the17th century when engineering texts were being disseminated throughout Europe with the advent of the printing press – it was discovered that even the best description cannot match the information that is transfers through an image. In John Evelyn and William Petty's *History of Arts Illiberal and Mechanical* they noted that "Bare words being not sufficient, all instruments and tools must be pictured, and colours added, when the descriptions cannot be made intelligent without them."<sup>24</sup> Denis Diderot's Encyclopédie of 1751 to 1772, was comprised of seventeen volumes of text and eleven volumes of plates. It had over 3,000 full pages of illustrations to augment the written text.<sup>25</sup>

Images were to supplement the text and then the three dimensional images - models became the text. In the 18th century, a Swedish engineer in Christopher Polhem, went beyond the book and created a "mechanical alphabet" a series of vertical cases that held wooden models for aspiring engineers to "read." Polhem created a total of eighty "letters" with the vowels or actions being the lever, wedge, screw, pulley and winch with the remaining seventy-five models being the consonants.<sup>26</sup> Polhem's effort went beyond the book and the illustrations - models became the way to learn. The United States Patent Office also saw the benefits of models, for until the 1870's each patent was required to be accompanied by a scale model. This was so "...aspiring inventors could inspect them at will."27

When we touch - make - we learn differently, we "construct knowledge" through "intelligent hands."

#### Making

For the modern architect, making is the ritual, in the sense it is a form of self knowledge. Alberto Pérez-Gómez, *"The Myth of Daedalus,"* 1985

In some ways the model is a physical form of the imagination. For Hannah Arendt, imagination was a "re-presentation, making present what is actually absent. It is the mind's unique gift...this gift is called imagination."<sup>28</sup> This is one purpose of a model - making present making an *idea* present. Through the thoughts of Martin Heidegger we understand that - letting the idea appear as in techné through poiesis – production / making<sup>29</sup> - is to bring it into existence by shaping material (by magic if we consider the Old English *macian*) and the idea (from the root *ideîn* - to see) will appear. We then witness the act of translation from thought to thing (Middle French - that which is assembled). We let the idea appear through (as if by) magic.

But this is not an easy endeavor. Visual thinking has very little to do with seeing reality (in the mind's eye.) It is not "the thing" that we are envisioning, but a vision of some thing or things. Albert Einstein stated that "he rarely thought in words at all" - it was his "muscular" images that had to be "laboriously" translated into common symbols of understanding (words and numbers).<sup>30</sup> It is this vision of some thing that is so difficult to translate, or in our case, make.

In the words of Harry Callahan, the photographer, "... the only real answer that I know of - is to do it. If you don't do it, you don't know what might happen."<sup>31</sup> Harry Callahan shot over 40,000 negatives and from that amount, he determined that only 800 would be shown (shared.) For him, it was the doing that mattered.

The artist Francis Bacon, however, saw the situation of making as follows,

You know in my case... (it) is an accident. I foresee it and yet I hardly ever carry it out as I foresee it. It transforms itself by the actual paint. I don't in fact know very often what the paint will do, and it does many things, which are very much better than I could make it do..."<sup>32</sup>

For Bacon the work was in the paint, for Callahan it was quantity - what do we make of this? If the act of doing literally transforms the act of thinking – the difference of vision of the thing to the thing - is only known to the "thinker," as the "maker" can only produce what he is able, as the hands and the mind with the given medium, unwittingly become one - perhaps they are all co-conspirators to the idea. This hand-eye cognition is also supported by the two main arguments proposed by Richard Sennett in The Craftsman that skills have their beginnings in "bodily practices" and that technical understanding is developed through an incompleteness that taps into our imagination for information or a solution - a discovery.33 These "bodily practices" or more specifically "hand habits"<sup>34</sup> are reinforced by touch and movement and are similar to the explanation given by Bacon. The paint - the hand - the mind - all know what to do.

In architectural education, often the models that are made are not scale models intended for building studies - they are made for other purposes. At the Bauhaus, under the direction of Walter Gropius the three instructors for the Foundation Course (Vorkurs) each had similar but different approaches to these types of models. The Foundation Course was first taught by the Expressionist, Johannes Itten, followed by László Moholy-Nagy who was a Constructivist and finally Josef Albers, the painter and theorist (perhaps best known for his work in color theory and his series, Homage to the Square) who was also a former student and assistant of Moholy-Nagy's. Under Moholy-Nagy the students were instructed to build spatial models using a minimum of material in order to explore spatial relationships.35 Itten worked mainly with texture and composition, although some spatial models were made. In the work of Moholy-Nagy's students, the voids - the spatial inferences - were of particular importance. Josef Albers took a slightly different tact in having the students use found material to construct spatial models based on geometric interpretations. As relayed by one of his former students, Howard Dearstyne:

We were supposed to do something with these (materials) – just basteln (tinker), or play around with them, to see of we could make something out of them or discover something about them... we discovered values in unexpected places.<sup>36</sup>

These models were not of ideas – they were an opportunity to "find" spatial relationships without preconceptions. However, Moholy-Nagy's Light- Space-Modulator built in 1930, is probably the closest device in spirit to the ideation model. As it moves and modifies light by revealing it through shadow and color, it inspires wonder and we interact with it; thus it meets many of the criteria of the previously defined "apparatus."

The "apparatus" is an ideation model, the joint or crossover between thinking and making – a way for an idea or ideas to come into existence. The model itself is really not the importance – it is the idea or the ideas implied by the model that matter (verb) and are the matter (noun). For it is this idea(s) that in turn informs the architecture - the artifact.

# Ideation Model and the Artifact

While much has been written about scale models, the first known reference about the necessity of scaled working models is found in Leon Battista Alberti's, 15th century treatise, *On the Art of Building in Ten Books (De Re Aedificatoria).* Here Alberti discusses the value of making a scale model in order to achieve the desired result. To validate the building of a scale model, Alberti cites the great expense incurred by the demolition of a newly built villa, due to the fact that the reality, in this case the built work, did not correspond to the expectation (the mental image) of the owner, Julius Cesar.<sup>37</sup>

Albert C. Smith's Architectural Models as Machine: A new view of models from antiquity to the present day, discusses in great depth the role of the model in relation to the definition of the French word, maquette<sup>38</sup> and its benefit to the process of architectural making. However, this is still in the realm of a scale model. In this context of architectural making - the scale model - very little discussion has occurred concerning the in-between step of the idea to the artifact – the actual making of an idea – which is the ideation model.

Perhaps the best description to date is found in the context of art, in particular conceptual art, with Sol LeWitt best articulating this idea: In conceptual art the idea or concept is the most

important aspect of the work... *The idea becomes the machine that makes the art.*<sup>39</sup> (Italics mine)

### In the Studio

The joint... is the place where both construction and construing of architecture take place. Marco Frascari, "The Tell-The-Tale Detail," 1984

My architectural interests lie at the juncture of poetics - the act of making /revealing - with phenomenology and tectonics. For me "tectonics" represents the intent to build with beauty, meaning and usefulness by joining site, program, forms, ideas, details and materials. This joining is the basis for architectonic poetics. The interrogation of these junctures, these "joinings," constitutes the basis of my studio projects and instruction.

Often studio instruction emphasizes the design of the project at the expense of the idea, which for many students is the most intangible part of the design process. In order to introduce "ideas," I have encouraged the students to engage a given problem by forming the conceptual platform of their projects though words and etymology. By finding and using a word that is both a noun (thing) and a verb (action), a dialogue begins of words, ideas and things. And while the idea may first reside in words or in memories, the physical "explanation/exploration" takes the idea into the realm of being thorough the use of sight, touch, sound and smell. I have found that an "explanation" of an idea thorough model making such as described in the exercise brief , "Making the Invisible, Visible: An apparatus that documents phenomena" mentioned in the introduction of this paper clarifies the students' thoughts by making the intangible tangible. The ideation model transforms the idea into a reality. Something seemingly unrelated - the phenomenal world familiar, yet unknown - taps into the students' psyche and relieves them of the "burden" of the "concept" - the belief that is the foundation or the construct for the project

As explained in The New York Times article, "How Nonsense Sharpens the Intellect," Benedict Casey writes, "An experience that defies... expectation...may prime the brain to sense patterns it would otherwise miss...disorientation begets creative thinking."<sup>40</sup> In 1969, Rudolf Arnheim suggested that, "one may have to remove one's attention from a particular event in order to find a solution to that event." <sup>41</sup> While disorientation maybe the short term function, finding a particular way of thinking is the true objective. The "experience that defies explanation" is the aim, as it is this that defines architecture.

Thus the "new" reality of the idea, the ideation model, becomes a framework for the studio project. The poetics of making comes full circle with the  $\frac{1}{2}$ " = 1'-0" spatial/detail tectonic model. The importance of making is central to the studio ideology. It is through these types of exercises that the students start to develop "intelligent hands" that aid in their cognitive development.

## The Idea that Makes

The duration of the "*Making the Invisible, Vis-ible*" exercise is two weeks and it is conducted and introduced simultaneously with other studio assignments. The student is multitasking

between empirical data gathering and creative thinking in order to give time to the student to think/do/make. In other words while performing the task of data gathering the student can also contemplate the ideation model, allowing time for a new way of thinking.

# Examples of Student Work: Two Projects

### Project One

(See Figure1: The Ideation Model and Figure 2: Final Project) Ideation Model: The Light Box Project: Catholic Community Center, Doraville, GA Concept: Light(ness) (roof) counterbalanced by Weight (earth/building)



FIGURE 1: Project One: The Ideation Model-The Light Box

#### In the words of the student:

Located in Doraville, a suburb of Atlanta defined by its ambivalence towards its neighbor to the north (suburb) or neighbor to the south (urban center), this center adapts light as the catalyst for community engagement. Entered in the Velux Competition, the definition and application of light motivated a space dominated by a single plane of light. While the volume and character of this light becomes defined by baffles, program and circulation is directed by stereotomy. Light and weight are often defined in opposition; however, it is their very presence that defines the other. Similarly, in this community center, hierarchy developed though collapsing and overlapping components.



FIGURE 2: Final Project - Catholic Community Center, Doraville, GA

The Light Box, as named by the student, – the ideation model – with its brightness of light and denseness of solid was the catalyst for the overall concept. The alternating light and dark in the ideation model expresses itself literally in the alternating spaces delineated in plan. This layering of space is finally articulated in the form.

For most students the direct translation of some aspect of form from the ideation model is common. Once is it made there is a desire to "use" it "logically" whether that is a direct translation of some aspect of the model itself or the effect the model may have. In this case the student does both. As discussed, the layering of light and dark (space and wall) can be easily identified in the final project, as well as, the next level of abstraction from the ideation model: the literal lightness of the roof compared to the heaviness of the building. Perhaps the most abstract idea decoded from the ideation model is that the character of the space is determined by light. The hour-by-hour light study model reinforces this proposal.

For this student, the fascination with the ideation model – the Light Box – began with the idea of layering light. Quickly it was dis-

cover that in order to read/see light, darkness was needed; therefore translucent plastic layers were alternated with layers of wood. The equal layers - the ordering system - were the choice of the student as the articulation of the model could have been alternating layers of unequal dimensions, but it is clear that the initial selection of equal layers influenced the plan. Another strong idea found in the ideation model - the two interlocking pieces - revealed itself in a more subtle way - as it can be found in the overlapping spaces of the program in plan. However, the most striking effect of the model is the light and it luminescence - it is absolutely beautiful (Figure 1). This effect was reproduced by a translucent glass roof in the project.

The ideation model – the Light Box – in its simplicity had a strong effect on the student's imagination and the resultant project.

# Project Two

(See Figure 3: The Ideation Model and Figure 4: Final Project)

Ideation Model: Reflection, Translucency, Shadows

Project: Catholic Community Center, Doraville, GA

Concept: The Manipulation of Light



FIGURE 3: The Ideation Model - Reflection, Translucency, Shadows

In the words of the student:

The project is located in the city of Doraville, a suburb of Atlanta. The program calls for a variety of functions, including a meeting hall, educational facilities, day care center and a chapel. The design seeks to bridge the differences in the program parts, as well as site composition, such as the political/civic uses vs. personal/private uses and urban spaces vs. more natural spaces. Dealing with a large immigrant population, the issue of translation became a catalyst for courtyards of various size, function and texture, all of which can vary throughout the seasons. The courtyards aim to provide places for people to catch their breath, as well as to spend time with friends and family, by being somewhat removed from everyday life.

The main focus of the design competition was to investigate the use of light as an integral part of the building. While the courtyards are surrounded by masonry walls, resulting in stark shadows, the buildings themselves evoke a feeling of openness towards the community and are made up of double-skinned walls, which manipulate light through reflection, translucency, and adjacency to the courtyard walls.



FIGURE 4: Final Project - Catholic Community Center, Doraville, GA

In this project, it is the effects of the ideation model, the play of shadow and reflectance that are of interest to the student and became the generator for the ½" detail. It is also noteworthy that the student made a correlation between the effects of the ideation model and "natural" effects. The photographs that were chosen for the collage of images that augments the model - green leaves in sunlight, water reflecting and refracting, stark tree trunks and snow falling - all point to an expansion of references relating the project impetus to the phenomenal world.

Each building element also echoes the effects found in the ideation model – the masonry walls of the exterior courtyard cast shadows on the ground plane while the double skin wall reflects and refracts light. The double skin wall that encloses each of the programmatic elements speaks of transparency - or openness - and also allows for a double shadowing. The dance of light and shadow that is found in the ideation model is again found in the ½" detail model. This only furthers the student's argument that the premise for this project is the manipulation of light and shadow through translucency and reflection. The power of these model photographs is extraordinary and its relationship to the ideation model is clear. The artifact is articulated by the effects learned from the ideation model.

Finally, the photographs of the final model in Figure 4, indicates that the author intended the building itself to be seen as a shadow or a mirage. The poetic nature of the ideation model and thought process is reflected not only in the final project, but in its presentation as well, as these photographs suggest. The presentation reveals the impact that the ideation model had on the student's thinking and making from the concept, to the project, to the detail model, and ultimately to the presentation.

In the first project, the ideation is an abstraction of representation of light and "layering" and it was used as "made." The model itself inspired the plan and the form of the building. The second project reveals how the ideation model can be used to produce "effects" and it is these effects that become the generator for the project and not the ideation model itself.

# Conclusion

In some ways the making of the ideation model allows the student to find a new beginning for architecture. It asks them to engage the phenomenal world that surrounds them and has yet to envelop them, as well as, words and things - things that are most familiar in some ways and yet the least valued. Thus the intention of the ideation model is to open the students to "unseen" ideas and give them a confidence in their understanding of their concept. It makes make the intangible tangible the concept a "reality" - it privileges the concept and elucidates the students' thoughts. As discussed in the two examples of student work, the influence of the ideation model on a project is unmistakable and in some ways immeasurable. The ideation model - the new "reality"

of an idea - gives inspiration, and etymologically speaking, encourages the project to "breathe freely."

In addition, this process has broader implications that are applicable to the built world of architecture. A building - a project - can be experienced based in its design – an experiential building with phenomenal effects or qualities. But the introduction of the ideation model allows for a new process - the abstraction of the experience which gives license to the maker and then the user to poetically reflect on the both the experience and the abstraction - thus possibly heightening the experience, as well as, the intellectual understanding of the experience.

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# GENRE AND TRANSFER IN THE WRITING OF DESIGNERS Making Writing

DAVID SMIT, DEPARTMENT OF ENGLISH RICHARD HOAG, DEPARTMENT OF ARCHITECTURE KANSAS STATE UNIVERSITY

It is true, as the Call for Abstracts for this conference asserted, that writing can be used as an instrument, a design tool, to explore and develop design work, and writing can also be shaped into a carefully crafted object that can enter into dialogue with other made objects, such as images and architectural designs. However, any given piece of writing may effectively fulfill its purpose and not be a design tool or a carefully crafted object. Writing comes in a wide variety of genres. Writing is never just writing. People always write in specific genres, and each genre comes with its own set of discourse conventions for style, organization, type of evidence or support, and even rules of editing. And there is a great deal of evidence that skill in writing one genre does not necessarily transfer to writing other genres (Anson and Forsberg, Foertsh, McCarthy, Perkins and Salomon, "Are"; Perkins and Salomon, "Teaching"; Smit). If we want to promote writing in our curricula, we will have to decide what genres we want our students to be able to write, and we should be studying how those genres are written. Our view is that we should be teaching our student to write the genres actually used by the profession, rather than schoolbased genres such as the personal essay.

We are currently engaged in interviewing designers from a range of firms to determine the genres they expect their staff to be able to write. Interestingly, one genre that is reported repeatedly is the Award Submission. The characteristics of this genre vary across the design professions, but are clearly similar along a number of dimensions. We have argued elsewhere that the Award Submission as a genre is primarily persuasive and multi-modal, that in Award Submissions images and written text enter into a dialogue, and that the best way to introduce students to the kinds of rhetorical thinking related to Award Submissions is in beginning studios, when students present their design work to their peers and their instructors. The strategies for effective presentations, both as written and oral persuasion and as multimodel argument, are very similar to those for Award Submissions.

In the fall of 2008 while teaching Architecture Design 1 we learned a number of useful lessons about our beginning students' ability to transfer what they learn from one instructional setting to another. Students in Architectural Design 1 are sophomores in their first year of the architecture curriculum. As freshmen they took a basic design course delivered to all freshmen in a multidisciplinary college, housing architecture, interior architecture, landscape architecture, and regional and community planning. In Environmental Design 1 students learn basic design skills and are given basic information on the professional programs they expect to apply to in the second semester of their freshmen year. These students are among the highest performing students in the university with cumulative high school grade point averages between 3.8 and 3.9 on a four-point scale. Fifty two percent are women.

The second exercise in Architectural Design 1 is a case study of a house, a masterwork, that is, a house designed by a highly regarded architect. Students work in teams of two and select houses from a list of houses identified by their instructors. They are asked to find and read books and articles on the architect they select. We expect that working in teams, students will find it useful to talk about what they learn, thus have opportunities to share and discuss their discoveries about their houses and the architects that designed them. They use scaled drawings to create as-built models of their houses. They are also responsible for creating drawings that include, plans, elevations, sections, axonometrics and a site plan at the scale of a quarter inch to a foot. The students are also responsible for diagramming the architect's main ideas. Required diagrams include, but are not limited to, structure, circulation, spatial hierarchy, day lighting and privacy.

After completing their drawings and models, students are asked to persuade an audience of their peers that the house they selected is a masterwork. They are asked to write an argument that persuades their instructor and their peers that the house is exceptional in a way that elevates it to the level of masterwork. They use their written arguments to prepare for their oral presentations. The written and oral arguments give them opportunities to reflect on what they learned while modeling their houses. Students are told that their written masterwork arguments will be used as models for thinking and writing about the house they will be asked to design in the third and final exercise of the semester. The prompts students are given for writing their arguments are similar to the prompts for writing arguments in English Composition. Students identify the architects main design ideas and make claims about the architect's design ideas. Students use what they learn from their reading, their drawings, diagrams and models to substantiate their claims. That is, they are asked to support their claims with reasons and evidence, both visual and verbal.

In preparation for formal reviews, students submit written arguments. The arguments are used to rehearse their presentations with their peers. We found that preparing written arguments greatly improves their ability to explain their work. During their presentations they are clearly thinking about the relationships between what they are saying and how they might best use their drawings and models to support the claims they make. When making claims they frequently used gestures, pointing at and touching their drawings, to direct the jury's attention form one drawing to another. It was apparent to us that they were thinking about the their drawings and models as visual evidence to support their verbal claims.

Following successful oral presentations, we thought they were ready to combine their drawings and their writing into multimodal arguments. We asked them to use their access to relatively inexpensive copying technologies to make digital images of their drawings and models. We then asked them to combine their written text with their digitized images as well as digitized images from their readings. We expected that they would have little difficulty in organizing the text and the images in a form that would approximate the multimodal genre: Award Submission. We were wrong.

A third of the class of eighteen submitted their arguments as double-spaced text, ten to fourteen-point font, on eight and one-half by eleven-inch paper with text running from left to right along the shortest page dimension. In all cases the images they used to support their claims were attached to the back of the argument text pages on additional eight and onehalf by eleven-inch pages. The submissions from the rest of the class, used the same double-spaced format with images positioned in the body of the text, but only loosely corresponding to the verbal claims, evidence or reasoning they were set forth to supplement or explain. The images were in close proximity to the text they supplemented or reinforced, but the reader was left to figure out the relationship between the image and the text.

Initially this was a surprise to us, in that up to this point in their curriculum all of these students had taken two basic design studios where they completed dozens of exercise in which at least a component of each exercise asked students to consider the graphic organization of the work they presented. In addition, we had just witnessed their ability to carefully craft and artfully present drawings and models of a masterwork. They performed successful in their reviews, connecting what they said verbally with the visual information they had pinned to the wall.

What we discovered was that our students were not easily able to transfer their considerable graphic skill to the task of bringing words and images together in two dimensions. A two-dimensional formatting strategy we did not expect to transfer, transferred. They were asked to "write" and their practice was to write using the format that many of their teachers request because it makes reading, marking and grading papers easier. Their default setting was to submit their work double-space on pieces of eight and one-half-inch by eleven-inch paper. It is interesting to note that this group of high performing students did not think to question us on format even though the information world surrounding them is more often then not, multimodal; their text books, their design journals, and the websites they surf daily.

Notwithstanding their inability to effectively organize their images in relation to their text, our student's abilities to present their ideas both orally and in writing improved markedly when they used argument prompts as a structure for writing and delivering their presentations. Although now more successful in using their drawing and models to make persuasive oral presentations our students still required additional instruction in order to effectively bringing their words and images together.

In the fall of 2009 we modified our pedagogy to include strategies for teaching our students to combine their visual and verbal arguments. Because we understand that first and second year design students, continue to prize their drawings and find it difficult to mark on them, even to have an instructor mark on them to indicate an error or to make a correction to a plan or section, we again used the readily available digital copying technology to scan and, in this case to print their 20" x 30" ink on Mylar drawings. We then asked them to put the written argument they prepared for their final review together with their drawings by writing or typing (e.g., taping, cutting and pasting) their argument directly on to the copies of their Mylar drawings. This exercise immediately followed the formal presentation of their house. The successes and failures (miscommunications and misunderstandings) were still fresh in their minds. Our objective was to remind them of the specific connections they made between their persuasive writing and their drawings in their formal presentations. This, we told them, was a way to create a record of the visual-verbal connections they articulated orally and by gesture in their presentations. Their hypothetical audience for this exercise was a professor who could not attend their presentation. This instructional device resulted in students discovering that they were able, through reflection, to give even greater precision to connections between their claims about their house and the visual evidence they used, or in some cases failed to use in their presentations.

We supplemented this exercise with readings from *Visual Notes* by Crowe and Laseau. Crowe

and Laseau record a variety of note-taking and note-making strategies designers and scientists use to think about and write about their work. Looking at these strategies one is struck by the diversity of both the notational form of designers' notes and their possible uses. The notes Crowe and Laseau's collected have a variety of uses: as aids to memory that not only document observations and experiences, but also reflect on and record abstract ideas and concepts. Notes that move from the form and material of a window mullion to the abstract relationships between a structural system, and strategies for using natural light to illuminate a complex of rooms. In this compellation we see designers using notes that are frequently multimodal and are clearly instruments of both design and communication. Instruments used by designers to explore, develop and reflect on their work and the work of others. Most of the multimodal writing in this very useful book are carefully crafted annotated drawings that might easily find their way into galleries framed for purchase and therefore useful examples for students learning to explore and craft visually compelling and effective multimodal writing techniques. Many examples show designers using text as image, and clearly giving as much thought to text placement as they give to image placement.

We were now ready to use the examples in Visual Notes along with examples from professional design publications to teach our students to combine their graphic skill with their developing abilities to make persuasive and visually compelling arguments about their work and the work of others. We wanted to students to transfer what they already knew about graphic design to making effective multimodal arguments. To this end, we designed another exercise that required students to think about text placement in the same way they were taught to think about image placement. The outcome of the exercise would be a multimodal argument on their masterwork. All arguments were to be presented on a two-dimensional surface. The two-dimensional format was unrestricted. That is, they could make an argument that could be presented on a computer screen or in book, journal or brochure format. All students choose to use a paper

based format and this time with surprisingly positive results.

At this point the students knew the important connections they hoped to make between their argument text and their images. Their problem was to direct the reader's attention to these important connections. We asked students to analyze images from Visual Notes and from several professional design journals and to describe the strategies they thought were being used to direct and redirect reader attention. By asking students to block text and to think of it as image or figure, we were able to teach students to transfer what they knew about figure/ground to the problem of thinking about the basic relationships between figures on a page (Figure 1. Baker-Ross; Marika-Alderton House, Figure 2. Baker-Ross; Marika-Alderton House, Figure 3. Garcia-Houb; Villa Savoye, Figure 3. Garcia-Holub; Villa Savoye). Seeing text as image enabled them to transfer and apply their knowledge of basic design principles as a beginning to the difficult process of learning to create a dialogue between multiple sets of figures on a page: images to blocks of text.





FIGURE 3:



FIGURE 4: Works Cited

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# ONE SKETCH, ONE SENTENCE, ONE POEM: THIRTEEN WAYS OF LOOKING AT AN ARCHITECTURAL THEORY CLASS Making Writing

GLENN NP NOWAK, ASSISTANT PROFESSOR/ FOUNDATION PROGRAMME COORDINATOR UNIVERSITY OF NEVADA LAS VEGAS

This past fall saw my first opportunity to teach our school's fundamentals of design course. It might officially be described as an introductory theory course, but during this semester it was conceived as an architectural concept class...

Words are concepts, and writing requires the careful consideration of several concepts (words) working together to create more complex concepts. Similarly, design constantly deals with minute abstractions integrated with one another to communicate larger than life ideas. In this new introductory course, beginning design students were exposed to some of the most sophisticated architectural projects in the world, yet they explored these through the simplest of mediums: one sketch, one sentence, and one poetic stanza. Instead of surveying hundreds of works and memorizing thousands of details, the designers in this class carefully contemplated aspects/abstractions of works described in our course textbook, Thirteen Ways: Theoretical Investigations in Archi*tecture* until they could transpose the author, Robert Harbison's prose into conversations about their own experiences in the built environment. Once conversant with an architectural concept and comfortable with identifying representations of that concept, students were charged with the task not of writing an intimidating term paper but a few impactful lines of poetry and prose. The students would analyze the work of Wallace Stevens and conclude that the spaces he had them occupy were far greater than the margins of their book. *Thirteen* Ways of Looking at a Blackbird allowed for a number of parallels to be drawn in each week's lecture and discussion. Not only did the language influence the students' writings, imagery from Stevens' poem informed their drawings, too.

Having seen more senior students struggle with architectural writing and thesis development, it was interesting to see how freshman focusing on the essentials of form, concept formation, and sentence formation could make simultaneous strides in general education and independent thought. It was at this point I recognized that the class as a whole and its products could warrant closer inspection and broader attention. A colleague encouraged me to write a book, yet I could only think of all the things this class could do differently before I should write about it. I figured I might be so lucky to teach it at least twelve (12) more times... Hence Thirteen Ways of Looking at an Architectural Theory Class. Maybe thirteen books could be written over the next decade and a half.

Then, I heard about the National Conference on the Beginning Design Student, and I thought there just might be twelve other architectural educators lucky enough to be in attendance interested in sharing their pedagogical approach to relating writing and design. Maybe thirteen schools could come together over the next year or two to produce a single volume of thirteen books on their respective educational offerings.

This paper offers a closer look at the writing and design opportunities afforded in the concept class and opens discussions on collaborative publication. The following is an excerpt from a prospective chapter, and the paper concludes with the manuscript proposal describing how schools of architecture engaged in a similar paradigm might work together to further their disciplines.

### Excerpt (prospective) Chapter Three – Detailing Machines

...We started this week's class discussion by trying to explain one of Harbison's opening statements of the chapter, "...machines are more powerful than sculpture." Since it was recognized that machines are concerned with the issue of use or function, students were quick to place machine-oriented architectural thinking higher up on the architecture/building continuum discussed in week two's chapter. Sculpture tended to be more ornamental while machines were simultaneously concerned with use and the communication of that use. For communication purposes, sometimes



FIGURE 1: Imagery from lecture presentation – by author

the mechanistic aspect of the architecture is in the elaboration of a task or the intensity of the articulation surrounding a detail, a façade, or an architectural component. A common misconception was that designs driven by concepts of machines would be mobile architecture or architecture with moving parts. More often, the architecture mobilized people or dealt with moving surroundings (air, sun, wind) in a dynamic way.

Although the exemplary works presented in Theoretical Investigations in Architecture contain the dynamism discussed above in a way that learned scholars might appreciate, it was important to show beginning design students these examples from distant places alongside architecture that exists in our university campus' backyard. By positioning architecture from around the world next to local projects which the students were somewhat familiar, the class began to reconceptualize the familiar world around them with their newfound abstractions from architectural theorizing.

The Wollaton House is like a machine, Harbison says, "with a number of parts... as if they could creak into life." With that and his metaphor of the potential energy stored in the articulation of the façade like the explosions to come from fireworks, we discussed Las Vegan counterparts. What is the comparable machine-in-architecture ...ephemeral, yet fortifying? The Bellagio was offered (Figure 1). The expansive elevation repeats as if continuously marching off an assembly line. The "village" at the tower's base is emphatically articulated. The entire composition is in flux as the energetic fountains change our perspective on what the building is.

An obscure reference to the Vesnin brothers' stage-set for The Man Who Was Thursday left me wanting to jump right in to a discussion about any one of the six Cirque du Soleil performance venues in town, but with ninety percent of the freshman class coming right out of high school we focused on a little known gem, The Las Vegas Academy Theatre. As one of the preeminent teaching theatres in secondary education in the United States, the academy's venue safely and sophisticatedly weaves student technicians, student and guest-star performers, and the larger community audiences through a highly orchestrated system of catwalks, stage traps, and orchestra pits among others.

Long before there were white tigers on stage and gondoliers in shopping malls, the biggest show in Southern Nevada was the Hoover Dam. In Theoretical Investigations in Architecture, the 'impossibly lavish' factories by Chernikov were said to be even more theatrical than the Vesnin brothers' set. For the students in this class, they began to see the value placed on spectacle even in some of Las Vegas' public works projects. The dam was a machine in every sense of the word.

When the spectacle of the Centre Pompidou's staircase was held up as an ideal stair, mechanized, the class looked at some of the architectural components which Las Vegas mechanizes better than all other cities (save New York and Hong Kong on occasion)... signage. One of the newest reincarnations of signage for our analysis is the façade-turned-digital-billboard at Planet Hollywood. Like the Pompidou, the amount of detail that goes into the machine is quite gratuitous. While roughly half of the composition advertises shows, restaurants, and other pleasures waiting inside, the remainder of the building envelope further elaborates the digitization of desire in architecture.

While this chapter doesn't ask the reader to become a machine, the students were urged to embody them when writing. After reading a couple hundred loosely handwritten poems, I was concerned that the legibility of letters might hinder some letter grades. Architectural lettering aside (by chapter three or four nearly everyone had mastered the technique), architectural language was more carefully scrutinized in the lecture this week because no matter how perfect the letters are if the sum of those letters do not add up to complete, thoughtful ideas about architecture, nobody would care to read them.

Reading Wallace Stevens' poem was one thing, but effectively reacting to it was another. Some students were able to pick up the style of Thirteen Ways of Looking at a Blackbird and others were content copying some key words to make a connection. In this chapter, students began experimenting with intertextual relationships between the book, the poem, and their own design investigations. Parody and ekphrasis begin to appear in their writings as the student designers internalize meanings and question the precision of those meanings.

As students began to read their textbook more carefully, they realized that single architectural examples could be reconceptualized and carefully re-presented through drawing and text to suggest a differing conception of the space. The chapter's description of the Toledo Aqueduct as a machine spread across an entire landscape made the students wonder if the design would be more appropriate in the chapter two weeks from now, Landscape. The Fortification of Florence with its limb-like flexibility had them questioning whether Michelangelo was more in tune with machines or The Body (chapter four). We wanted to categorize Calatrava's forms as organic, but the material palette was undeniably of machines.

# Manuscript Proposal

The remaining portions of the paper are meant to serve as references for discussion. The summary below gives an indication of how the course bridged the two texts. Table of Contents Chapter One: Week 1 – Introduction Chapter Two: Week 2 – Traces of Sculpture Chapter Three: Week 3 – Detailing Machines Chapter Four: Week 4 - The Body in Perspective Chapter Five: Week 5 – Exterior/Landscape Chapter Six: Week 6 – Modeling Models Chapter Seven: Week 7 – Plan Ideas Chapter Eight: Week 8 – Politics, Elevated Chapter Nine: Week 9 – Sacred Section Chapter Ten: Week 10 – Sketchy Subjectivity Chapter Eleven: Week 11 -Parti from Memory Chapter Twelve: Week 12 - Public Presentations Chapter Thirteen: Week 13 - Sustainability in Axonometric Chapter Fourteen: Week 14 – Economy and Pictographs Chapter Fifteen: Week 15 – Academia via Figure Ground Chapter Sixteen: Week 16 - Final Review

## Chapter Outline/Summary of the Manuscript

The arc of this book traces the evolution of the beginning architecture students' abilities to see and make seen, the world around them. This book unfolds itself along the same exploratory path that incoming students at the University of Nevada Las Vegas took during their introductory course in the fundamen-



A silhoutte of varied intention, As in all things, Purpose, Vitality, Grace.

The Falkirk Wheel is an articulate passage, an extraordinary journey from precedent to potential, with a powerful message of efficiency and complexity of movement within a stalwart form.

-Chris Motley FALKIRK WHEEL RMJM FALKIRK, SCOTLAND

FIGURE 2: Sketch, Caption, and Poem - by Chris Motley (student)

> tals of design in the School of Architecture. By adopting poetry and an unorthodox theory book as required texts for the class, students were invited to create intertextual relationships between class discussions and their weekly research assignments. The sum of their guided research propels each chapter into galleries (pages of illustrations and short written expositions) that offer a glimpse at alternative understandings of the built environment afforded by reading into the theories of design and design methodology. (Figure 2)

The theories on which the students are reading come from Thirteen Ways: Theoretical investigations in architecture (MIT Press) by Robert Harbison. Colin Davis of The Architectural Review said of this book, "There is more poetic truth in this agile prose, these vivid, metaphorical descriptions and surprising juxtapositions than any amount of scholarly research could possibly unearth." The book coupled with the poem Thirteen Ways of Looking at a Blackbird by Wallace Stevens affords the students the opportunity to recognize the effectiveness in cross-referencing ideas in order to reinforce new ones. The chapters in this manuscript proposal not only reinforce the fact that Harbison's book mirrors the path taken by Stevens' poem; the manuscript suggests that all conceptual developments follow a similar direction. The main concern of this manuscript is to produce a chronicle of the class that reaffirms theoretical underpinnings (in architecture or other disciplines) are inextricably linked to integrating broad knowledge bases. The integration of knowledge takes place incrementally through each chapter's analytical gallery.

While analyzing contemporary architecture through small sketches, these galleries provide the reader with complementary captions and poetic stanzas that weave concepts from Wallace Stevens' Thirteen Ways of Looking at a Blackbird and Robert Harbison's Thirteen Ways: Theoretical Investigations of Architecture into a condensed picture of architectural criticism in its infancy. Since Harbison's book mirrors the trajectory of Stevens' poem, moving from the concrete/enduring/objective to the conceptual/ ephemeral/subjective, the students grow from innocent bystanders to engaged and insightful critics. Near the end of this book, some readers may find that the students have, in a sense, become the teachers. (Figure 3)

Each chapter (presented as the sequential meetings of the class throughout the semester) begins with excerpts from the instructor's weekly lecture, class discussions, and supplementary examples of Las Vegas architecture. These introductions summarize the ideas explored in Harbison's text, and they interpret subtleties in the language appropriated in Stevens' poem. By integrating the architecturally descriptive analysis of Theoretical investigations with the poetic succinctness of Looking at a Blackbird, the instructor's graphic demonstrations equip the students (and the reader) with the tools to formulate their own opinions of architecture.

Every week, the content builds in complexity, and the resulting scholarship seen in the book's galleries reaches higher levels of sophistication. Although a quick flip through the book, with its carefully crafted drawings and accessible poetry, is sure to delight the most casual reader, the full value of this piece is attained through multiple readings and appreciated through understanding its referenced texts.

By way of writing only ten chapters in his book (mirrored by chapters two through eleven in this manuscript), Harbison provides the opportunity for others to offer at least three of their own means of theorizing about architecture as they reach the end of the book. Before moving on to subjects brought forth by the instructor, chapter twelve captures the exchanges between members of this class and the larger community. Through presenting work in a gallery-style replication of the physical presentation of the work, this section of the book celebrates the accomplishments of the first ten chapters and capitalizes on the effectiveness of reviewing work (both the process and the product). Insights from fellow students, questions from English professors, comments from philosophy faculty, and critiques from the graduate programme in architecture provide ideas for reevaluating thoughts presented in past chapters and repositioning one's self for increased effectiveness in communicating ideas in the final chapters.

The final chapters illuminate ideas not explicitly covered in the textbook that can be seen as highly influential in their capacity to generate architecture or at the very least, to steer the architectural process which yields our built environment, today. As the works begin to navigate independently from the text, the chapter galleries exhibit more self governance, and the students' words exude self assurance. In the end, students in the class and readers of the book formulate their own methods of theorizing about architecture. Concluding statements summarize the progress made by individual contributors and the class at large. By revisiting the notion of the poem's trajectory, conclusions that address the book's theme are



In three dimensions, Intertwined in leaves and pipes, Is a stage for life in its basic mechanical form.

The waters' forceful current races through the spout to saturate the vertical eco-system that provides its inhabitants with new breath.

Elizabeth Duncan

OFFICE COMPLEX NO. 57 RUA HARMONIA SAO PAULO, BRAZIL

FIGURE 3: Sketch, Caption, and Poem – by Elizabeth Duncan (student)

divulged, and the plot thickens as the author acknowledges that this may be one of thirteen (or more) ways to look at an architectural theory class. As a tenure-track faculty member, Professor Nowak initially imagined having the opportunity to teach a class like this thirteen times or more over his career... each time striving for a unique learning experience with the potential of a publication highlighting each educational process. However, shortly before submitting the first manuscript proposal to a publisher, Professor Nowak recognized that several other schools may be interested in sharing their foundation level courses with prospective students, past alumni, and people from their respective areas of the country or the world. As many as thirteen schools might somehow work together to produce an entire collection of similar chronicles exploring architectural education.

# Length, Number and Type of Illustrations

Each chapter features the best thirteen works submitted each week by the two hundred students in the class. The works are comprised of three parts: a small pencil drawing, a carefully crafted caption, and a poetic stanza. In addition, each chapter will also contain approximately four images from the instructor's lecture, which interprets concepts from the textbook through models found in the architectural world of Las Vegas. The twelfth chapter will contain the same number of images as the others, but instead of grayscale drawings, the images will be black and white photographs from the public presentation.

# The Book's Intended Audience

This book is well-suited for three primary audiences. First, it will appeal to those in Nevada that are involved with the humanities. Students, faculty, practitioners, and supporters of art, architecture, literature, and philosophy should find the subject matter (modern architecture and the architecture of Las Vegas) and the means of presenting it through drawing, poetry, and prose to be of interest.

Second, the book will speak to audiences in the architecture community across the country and around the world. Several architecture programmes have kept a close watch on the architectural scene of Las Vegas since the early 1970's when Robert Venturi, Denise Scott Brown, and Steven Izenour published Learning From Las Vegas. This proposal illustrates that the lessons in Las Vegas are still shifting architectural paradigms. Often considered the testing grounds of our built environment, Las Vegas plays host to several traveling design research groups every year. While such has been the trend for nearly forty years, a newer tendency has emerged... universities coming to Las Vegas are collaborating with The University of Nevada, Las Vegas' School of Architecture. As our school has gone through a period of growth and maturation, others are now keenly

interested in the works produced by UNLV School of Architecture. In just the past four semesters the UNLV School of Architecture has collaborated on Las Vegan soil with architecture groups from Cal Poly, San Luis Obispo, Cornell University, and Syracuse University.

Third, this book may reach out to younger audiences, their parents, and teachers of secondary education. By providing a transparent view into the workings of a college lecture and identifying the expectations of a research institution, this book can offer the larger audience an appreciation for the importance of preparedness and academic perseverance in our society. As this freshman class arguably offers a representative cross-section of the in-coming college student and the instructor offers commentary on shifting pedagogies to meet the needs of the students, readers might gain a sense of how demanding any college curriculum may become and how one must constantly and (with the help of support structures in the school or university level) creatively integrate knowledge from past curriculums into current challenges.

# WRITING ARCHITECTURE: THE ROLE OF PROCESS JOURNALS IN ARCHITECTURAL EDUCATION Making Writing

SHANNON M. CHANCE, ASSOCIATE PROFESSOR HAMPTON UNIVERSITY

This paper explores research and theories related to journaling. It relates findings to architectural education and proposes methods that may be useful in evaluating cognitive development of architecture students. The intention of presenting this paper at the National Conference on the Beginning Design Student is to foster dialogue about the role of writing in architecture and to explore avenues for future research.

Manolopoulou (2005) says that note-making in architecture "shifts between writing and drawing, and takes advantage of both" (p. 517). Many architecture professors encourage students to explore ideas and record their thought processes in design process journals (see Figure 1: Excerpt from an architectural design scroll). These process journals can take the form of



FIGURE 1:

bound sketchbooks or continuous scrolls of paper. Such journals incorporate text, annotated diagrams, sketches, overlays and collages, tracings, maps, formal measured drawings, and the like.

Arrendondo and Rucinski's (1994) two-year qualitative study found that college courses that incorporated a workshop approach along with reflexive journaling promoted meta-cognition and fostered self-regulated learning. Journaling facilitates critical thinking, deep learning, and purposeful design; it fosters reflective judgment and conscientious decision-making (Hiemstra, 2001; Rawes, 2007; Tanner & Le Riche, 2000; Vojnovich, 1997; Winter, Buck, & Sobiechwska, 1999).

Architectural education seeks to develop students' ability to think critically and autonomously in the manner described by Mezirow (1997) as "transformative learning." It causes a transformation in the way students see the world and understand their role in it. Architectural education uses problem-based learning to promote critical reflection and transformative learning. Clark (1997) asserts that educators can initiate transformation by prompting students to write, to imagine, and to exchange ideas through open dialogue.

Individuals can use journaling to "re-story their lives," construct new interpretations, and transform the way they exist in the world, explains Rossiter (1999, p. 84). Journaling incorporates contextual, retrospective, interpretive, and temporal dimensions of narrative and story telling. Rossiter insists these dimensions are critical to developing meaning and giving it order. Since architects design places that are embedded with meaning and environments that structure our lives, it is important for students to master interpretation, analysis, and thoughtful decision-making.

Journaling is employed in education for all sorts of professions because it fosters a "trans-

fer of learning" from classroom to practice (Davies & Kinloch, 2000). Writing helps professional students interpret situations they encounter in the field and uncover meaning (Winter, Buck, & Sobiechwska, 1999). Like other practitioners, architects use journaling to enhance their efficacy. The firm *Resolution: 4 Architecture* (1997) describes using a "continuous process of layering, copying and tracing information" (p. 8) to produce architecture.

Journaling holds particular relevance in architectural education. Designers employ representational devices to imagine, construct, and manipulate experience (Craig, 2002). These devices include sketches and models, as well as narratives and metaphors that help designers structure and solve problems.

Dogan (2003) says architects use conceptual diagrams to mediate between problem structuring and problem solving. A design problem emerges and gains definition in the process of seeking solutions. The full extent of the design problem is not known from the outset of the design process; it emerges through a process of critical inquiry and active engagement.

Design students learn to use representational tools to explore, compare, and communicate design ideas. Record keeping facilitates the development of well-synthesized designs. It allows students to review previous conclusions in light of new information – to evaluate their own thought processes and tweak them over time.

Journaling also seems to increase student engagement, by helping students connect course content to their own memories and perceptions. Astin (1999) asserts that students who are actively engaged in curricular and cocurricular activities learn far more than students who aren't. Although not all architecture students embrace journaling and record keeping, thoughtful writing and diagram making clearly promote higher levels of student learning. The National Architectural Accrediting Board's policies support this claim. NAAB (2004) includes written and graphic communication at the top of the list of required abilities for graduates of professional architecture programs. Architecture programs must demonstrate that their students' writing meets professionally acceptable standards.

Written records such as the design process journals that students create provide ideal resources for study. Researchers can analyze such documents to evaluate how students make decisions and how students' cognitive processes change over time. El-Sabbagh (1997) conducted such an analysis of architectural process documents. He analyzed journals and design sketches that architect Le Corbusier created in the process of design (as both a student and a seasoned practitioner). El-Sabbagh identified patterns in Corbusier's work and compared these with documents created by students today. He found that as students learn to organize and construct knowledge, they move from representations that are empirically based to those that are more conceptual. He identified three specific stages that typically occur in this transition:

- 1 initiation into the domain
- 2 building expertise and mastery
- 3 critical creative actions

## Fostering Synthesis and Engagement

Journaling fosters reflective thinking and conscientious decision-making. Record keeping aids in the process of synthesis because it allows students to review previous conclusions in light of new information and to evaluate their own thought processes. The level of engagement with the journal seems to correspond with the degree of student learning.

Astin (1999) insists that with any educational program, student learning and development occur in direct proportion to the quality and quantity of the student's involvement. The educational effectiveness of any program, policy, or activity is related to its capacity to increase student involvement. He argues that students learn more when they connect new ideas to the things that concern them most deeply. Simply put, students learn more when they invest energy – be it physical or psychological – in objects or activities. Sustained engagement appears central to achieving high levels of cognitive development.

Educational experts laud the architecture curriculum for its remarkably high levels of student engagement (Boyer & Mitgang, 1996; Koch, Schwennsen, Dutton, & Smith, 2002). The process journals that architecture students create provide an ideal resource for gauging student involvement, growth, and intellectual development. These journals can help scholars understand how architecture students formulate decisions and how an individual's cognitive processes change over time.

Astin (1999) has recommended using diaries to "assess the time and energy the student devotes" to various activities (p. 527). Although he suggested using time diaries, architectural process journals provide a source of data that is more authentic (and thus more credible) than data recorded for its own sake.

### Fostering Metacognition

Architecture professors encourage meta-cognition (or thinking about thought). Educators encourage students to consciously consider the processes they use to make decisions and the way they think. Students utilize a wide range of approaches to problem solving and learn to flexibly modify decisions in light of emerging information. Journaling and record keeping are important parts of learning to balance disparate (and often shifting) concerns. "Reflective actions and thinking," Rawes (2007) indicates, "are inherent in the education of the architectural designer and in the individual student's experience of inhabiting the built environment " (p. 74).

Architectural education seeks to promote humanist and renaissance ideals that include understanding vastly different but interrelated realms of knowledge (Boyer & Mitgang, 1996). Students must think iteratively in order to design complex objects and interconnected systems. Architecture professors require students to explain the rationale for, and processes of arriving at, each design decision. This is particularly true for controversial decisions or positions with which the faculty member disagrees. Architecture studio courses involve very high levels of interaction with professors and peers. In this interaction, faculty and upperlevel students model behaviors of analysis and self-critique for incoming students.

The studio format involves the sort of action learning and inquiry that Cree and Davidson (2000) recommend. Kvan (2001) has identified four steps fundamental to the learning process in studio-based courses. As cited in Ellmers (2006) these fundamental steps are: (1) formu-



Adapted from: Evans, Forney, & Guido-DiBrito (1998); Kolb (1984) FIGURE 2:

lating the design problem, (2) exploring solutions using hands-on activities, (3) re-examining the problem and repeating this cycle before (4) presenting the work to a jury for examination. These steps are similar to Kolb's decisionmaking cycle (see Figure 2: Kolb's Decision Making Model overlaid with preferred Kolb's Learning Styles chart). Kolb's work will be described in more detail later in this paper.

Vojnovich (1997) found that reflective journaling, critical thinking, and collaborative learning improved motivation among high school students. Students' levels of participation increased when these techniques were implemented, and behavioral problems decreased. Problem-solving exercises resulted in measurably higher levels of critical thinking. Journaling activities enhanced reflection as well as metacognition. Burbach, Matkin, and Fritz (2004) support Vojnovich's (1997) claims. They identified three key instructional strategies linked to development of critical thinking skills:

- a small groups, scenarios, case studies, and questioning
- b service learning
- c journal writing.

These strategies are popular among architectural educators.

Students begin to question the process and meaning of learning – and thus develop metacognitive abilities – through the act of reflection (Cole, 1993; Pilling-Cormack, 1997). Providing prompts can enhance learning and reflection, indicate Berthold, Nuckles, and Renkl (2007). Hearn (2006) evaluated writing submitted by 16 twelfth-grade students and found that most instances of metacognition occurred in situations where prompts were given. Hearn's qualitative study found, however, that some students use prompts to simply produce what they think the instructor wants.

Cole recommends using questions that are generated by the learner. Getting students to generate their own questions is important for architectural design. Pilling-Cormack indicates that the ability to self-direct is essential for transformative learning in any discipline.

Coates (1974) encourages educators at all levels to create non-conventional learning environments. The educational goals he recommends include helping students to:

- learn *from* and *about* life
- view the world holistically, and see interrelated parts rather than fragmented disciplines
- become aware of how the natural and built environment is influenced by human values, actions, and decisions
- develop an action orientation. Journaling, he says, can support these goals.

# Graphic Note-Making

Journal writing encourages personal reflection and conscientious problem solving (Hiemstra, 2001), and in many situations, journaling includes images in addition to text. Reflective journaling and graphic note-making promote intentional observation, enhance the development of skills, and facilitate the transfer of learning in professional education (Tanner & Le Riche, 2000).

Architectural process journals include texts and illustrations of many types. Designers intermittently employ writing and drawing and this helps them connect critical thinking and imagination. "Sketches work as intuitive devices," Manolopoulou (2005) asserts, "stimulating the imagination, entailing spontaneous action, but also posing questions and tempting one's curiosity to explore things through longer processes" (p. 517).

The firm *Resolution: 4 Architecture* (1997) juxtaposes and transfers layers to create "a text that becomes a (destabilized) foundation for the projects' conceptual landscape." These architects uncover "a new network, or matrix, of information... through the 'art of making copies' from other forms of information" (pp. 8-9). Successful diagramming requires intellectual skill, argues Manolopoulou. It facilitates abstraction of space and time.

Like architects, social workers are also encouraged to make diagrammatic notes. Gould (2000) describes the use of matrices or *repertory grids* in social work professions, to promote reflection and to spur learning. Making these grids involves organizing and diagramming important constructs. The grids are similar to the grids, matrices, and annotated diagrams that appear in architectural process journals.

An increasing number of social work educators are using reflective journals as pedagogical tools. Davies and Kinloch (2000) believe that critical, reflective analysis of incidents can help students transfer theories into practice. They encourage social workers to record:

- unusual incidences in the field
- · their emotions during these incidences
- the thought processes used to address such situations (Clapton, 2000).

Winter, Buck, and Sobiechwska (1999) stress that art is an important aspect of reflective writing. They see writing as a way to spark investigative imagination. Writing helps students in all sorts of professional fields interpret situations and uncover meaning. Winter et al. believe that professional education today reflects a "strange absence of creative imagination" (p. 180). They suggest that using a range of techniques (many typical in architectural education) that include journal writing.

Defining and Solving Design Problems

Although ideas about time and space are difficult to explore or explain in word-only or image-only formats, hybrid formats facilitate quick investigation and communication of concepts. Informal notes, sketches, and diagrams help the designer develop and communicate spatial and architectural ideas. Manolopoulou (2005) explains that architects use such tools to imagine, to understand relationships, and to "construct and communicate what is important." She adds that diagrams are used to "extract the fundamental issues of a scheme and visually articulate them in the form of signs" (p. 517).

Designers' representational devices include narrative and metaphor in addition to physical models, sketches, drawings, and diagrams. Craig (2002) researched the use of analogy in designers' study models. He found that designers construct and manipulate experiences that help them structure and solve design problems.

Similarly, El-Sabbagh (1997) suggests that over time an architect constructs a unique and coherent point-of-view through (a) a process of negotiating various historical and critical conceptions related to architecture and (b) by differentiating and integrating various personal experiences. In evaluating architectural design methodology, El-Sabbagh draws from Piaget's constructivist theories of knowledge development.

Craig (2002), Dogan (2003), and Bay (2001) all incorporate social sciences approaches and frameworks in their discussions of design process journals. Dogan (2003) has evaluated how conceptual diagrams were used to develop three very well known buildings. Process documents for these buildings reflect iteration: the designers continually formulated, evaluated, changed, and refined their design ideas. Dogan has developed what he calls a cognitive-historical method of analysis. In studying specific cases of design, he has found that architects use conceptual diagrams to mediate between (a) problem structuring and (b) problem solving. Problem structuring involves conceptualizing situations. Problem solving involves searching for meaningful spatial configurations that enhance that conceptualization. Successful design requires continually shifting between the two realms.

Bay (2001) also used a cognitive science approach. He incorporates methods from architectural theory and environmental engineering. Bay analyzed design errors resulting from cognitive biases. Based on Tversky and Kahneman's (1974, 1981, 1982) studies of heuristics and biases, Bay identified that cognitive biases of assumed similarity (or assumed representativeness) often result in biases of allusion. Ease of recall can promote another sort of assumption, which Bay calls *biases of imaginability*.

Bay (2001) proposes future development of a *rebuttal mechanism* to enhance the accuracy of design thinking. This would control for biases that lead to dysfunction in a designer's built work. Although Bay's work remains inconclusive, it might enhance the study of students' design journals. Bay's work could help identify, define, and/or operationalize various dys-

functional design strategies evident in students' design journals.

# Student Development in Architecture

Architectural education builds skill in all areas of Kolb's (1984) decision-making cycle (as shown in Figure 2). The cycle involves active experimentation, concrete experience, reflective observation, and abstract conceptualization. Architectural education requires students to use all of these modes of thinking. Students make objects, test or experience results physically, critique what they see and experience, create abstract representations, and use these to create new and/or revised objects... thus continuing the cycle. Students in some majors can work in just one or two of the quadrants (usually the ones where they feel most comfortable), but architecture requires agility in all four areas. Most studio assignments require at least one full cycle, and each smaller decision benefits from holistic analysis as well. Linear thinking just doesn't work for architects.

Students learn to analyze, synthesize, and evaluate in order to complete assignments beginning at first year. These are all listed as high-level abilities in Bloom's well-known taxonomy, developed in 1956. Bloom described


a progression from lower-order to complex thinking (see Figure 3: Bloom's Taxonomy).

To produce comprehensive design responses, students must be able to see how various parts and perspectives relate to the whole object. They must also be able to evaluate various options in context. This context changes as various alternatives are tested and then adopted, discarded, or stored for future consideration.

Most architectural design projects require students to use all levels of Bloom's (1956) taxonomy. As students progress through the years, the complexity of design assignments increases. Students learn to reconcile conflicts, integrate numerous sources of information, consider multiple points of view, and synthesize a wide array of concerns.

Perry (1970, 1999) was the first to identify how college students develop these cognitive abilities. Perry defined the transition that college students make as they shift away from dualistic thinking (where they assume there are fixed "right" and "wrong" answers). Students begin to understand that there are many possible answers to a given question, and the best response varies depending upon the specific situation and its context. Perry's schema of intellectual development is shown in the top row of Figure 4.

Perry (1970) calls the highest stage of cognitive development *relativism* and commitment to a relativistic way of thinking. Relativism represents the ability to make decisions in context. Perry sees this ability as essential to being able to formulate an independent identity. To reach the level of relativism, an individual must experience a *revolutionary restructuring* in the way he or she conceptualizes authority, knowledge, and truth, as well as his or her role in defining them.

Perry Dualism		Multiplicity			Relativism	(Commitme	ent to Relativism)
Baxter Magolda 1992	Absolute Mastery or Receiving	Transitional Impersonal or Interpersonal		Independent Individual or Interindividual	Contextual		
Belenky, Clinchy, Goldberger & Tarule 1986	Received	Subjective		Procedural Separate or Connected	Constructed		
King & Kitchener							
1994	Pre-Reflective Quasi-Ref				lective Reflective		
Kogon 1004	Durable Categories Cros			Cross-Categorical Constructing			
Regail 1994	Durable Cate	gories	Cros	s-Categorical Thinking	Cross-Cate Cor	egorical nstructing	Transsystem
Love & Guthrie	Durable Cate	gories	Cros	s-Categorical Thinking	Cross-Cate Col	egorical hstructing	Transsystem
Love & Guthrie	Durable Cate	gories Ra	Cros	s-Categorical Thinking ubjectivism	Cross-Cate Con	egorical nstructing nerative Kr	Transsystem

FIGURE 4:

Jan Henriksson describes the development of architecture students in a way that is similar to Perry (1970). Henriksson, a member of the project called Psychoanalysis Meets Art and Architecture, is also a professor of architecture. In an interview with Ulla-Britt Parment (2009), Professor Henriksson explained that the working process in architecture includes research, penetration and interpretation.... The training of the students includes... critical thinking, to enable them to gain the insight that that which is the truth, [or what] looks like the truth no longer is *the truth*. To be given a lot of freedom during the training helps the students to find an inner compass, an inner bearing which will be decisive in their work. *Conflicts are seen as vitalizing* and the alternation between order and chaos as fertilizing for creative thinking and acting to take place. (p. 19, emphasis added)

The feeling of disorientation Henriksson describes – the disintegration of external authority, the fledgling emergence of one's own internal compass, the resolution of conflicting truths – are critical components of most theories on student development (see Figure 4: Love and Guthrie's comparison of developmental theories).

Love and Guthrie (1999) note that almost all student development theories share a common break-through point where the learner accepts the role of defining truths and generating knowledge. They call this break-through "The Great Accommodation." It reflects a new realization that uncertainty is everywhere. They say that as the place of knowledge, truth, and authority disintegrates for an individual, the person's own role as authority and knower emerges.

Architectural terms pepper the descriptors used by theorists to describe high-level cognitive abilities. Belenky, Clinchy, Goldberger, and Tarule (1986) define the highest level thinking as "constructed," Baxter Magolda (1992) calls it "contextual," and Kegan (1994) uses the terms "cross-categorical constructing" and "transsystem" thinking. The vertical line in Love and Guthrie's (1999) chart suggests a break between novice thinking (to the left) and refined thinking (to the right).

Love and Guthrie (1999) indicate that college professors spend a great deal of time trying to coax students to make The Great Accommodation. Theorists agree that it is rare for students to cross this line in their undergraduate years, although Love and Guthrie indicate that the percentage of undergraduate students crossing the threshold has probably risen over the four decades since Perry develop the base theory. In any case, it is clear that architectural educators focus on getting students to think contextually and helping them construct new approaches.

Students develop the ability to think contextually in some domains more readily than others. Kuhn, Cheney, and Weinstock (2001) describe four distinct domains of knowledge: personal taste, aesthetics, value, and truth. Architecture students must navigate these domains and accept the contextual nature of knowledge (in at least some of these domains) early on. Students find they must provide rational analysis and explanation of decisions - architecture professors consistently reject subjective reasoning. Likewise, architecture students cannot necessarily adopt the characteristics of Perry's (1970) relativism in all aspects of their lives at once, but they are soon forced to recognize multiple points-of-view, incorporate holistic analyses, and seek synthesis, congruence, and holism. Those who cannot do this are encouraged (or forced) to leave the major.

It is not unusual for those who teach college freshmen to encounter individuals in the earlier stages (i.e., to the far left of The Great Accommodation). Educators spend a great deal of time questioning beginning design students' assumptions. They actively model contextual thinking. Journaling is one way to promote this type of growth and foster high-order cognitive abilities. It helps move students forward along the developmental continuum.

In higher order thinking, the student realizes his or her own power to generate, produce, originate, author, or construct knowledge and truth. At the constructivist stage as defined by Belenky, Clinchy, Goldberger, and Tarule (1986), individuals view themselves as capable of generating and creating knowledge. They understand most knowledge to be relative and contextual. In other words, they see knowledge as being relative to the frame through which it is viewed. Individuals at this stage see theory as an approximation that attempts to define various phenomena. Most view dialogue as key in developing knowledge. In the process of constructing knowledge, students develop deeper understanding of themselves.

Chickering and Reisser (1993) focus on the development of identity rather than cognitive ability. In their theory, students begin by (1) developing competence and (2) managing emotions. Students eventually (3) move from a sense of dependence to an emerging sense of autonomy and eventually develop a sense of interdependence. In (4) developing mature interdependent relationships, students begin to (5) establish identity. Over time, individuals (6) develop purpose and (7) develop integrity. Purpose and integrity allow individuals to align their behaviors with their personal values. Journaling helps students critically evaluate their own values and motives. It can help them develop along each of the seven vectors identified by Chickering and Reisser (1993).

Most theorists recommend that educators allow students to progress through developmental stages at their own natural pace (Love & Guthrie, 1999). This is not something architecture professors typically do. Although the accelerated pace of architectural education seems at odds with theorists' recommendations, it may fit the needs of specific types of students quite well. "Students seeking an artistic avenue with a practical bent soon become fiercely devoted to the design studio culture," explain Boyer and Mitgang (1996, p. 5). "For many, architecture school is an opportunity to be part of a tight-knit community on campus that is defiantly proud of its distinctive methods and its reputation for long hours and hard work" (p. 8).

King and Kitchener (1994) also lend support for accelerated development. They recommend that educators press students to engage the next higher position (on various stage theories). This is known as a "plus one" approach. Evans, Forney, and Guido-DiBrito (1998) explain King and Kitchener's recommendation to gear assignments and activities "to the leading edge of development rather than to [students'] central tendency" (p. 166).

Several distinctive aspects used in architectural education seem to accelerate learning. These include the technique of compiling process journals, the collaborative design studio format, and the integration of handson activities (including modeling and drawing, service learning projects, and international travel). Such activities provoke reflection and help reveal new challenges. A proper balance of challenge and support is necessary, Sanford (1962) insists, to promote growth.

Overall, architectural educators appear committed to enhancing various abilities that Sanford (1962) describes as positive development:

- freeing of one's impulse by developing imagination and ease in handling cultural symbols
- enlightenment of one's conscious as reflected in the ways one determines beliefs and how one aligns personality with values
- ability to visualize increasingly differentiated points of view, refine one's individual responses, and contemplate one's own process

Unfortunately, architectural educators do not always ensure readiness before requiring a student to meet a new challenge. Nor do they always provide adequate support for individual learners (Boyer & Mitgang, 1996; Koch, Schwennsen, Dutton, & Smith, 2002). Sanford sees these as ethical imperatives.

## Conclusions

Boyer and Mitgang (1996) indicate that studiobased education offers a unique way of teaching students that can, and should, serve as a model for educators in other disciplines. The Boyer Commission (1998) also recognizes studio pedagogy as a unique contribution to the field of education and recommends using the studio model to help reinvent undergraduate education. Journaling and graphic note-making are critical parts of this educational model. They help foster the high levels of self-reflection that Boyer and Mitgang observed in their 30-month study of architectural education in the United States.

Design education prepares students to integrate rational, analytical, and intuitive thinking in the development of meaningful, creative, and beautiful places, buildings, and objects. Boyer and Mitgang (1996) found that "the study of architecture is among the most demanding and stressful on campus, but properly pursued it continues to offer unparalleled ways to combine creativity, practicality, and idealism" (p. 5). Architectural methodology requires designers to consider questions from multiple perspectives and to continually synthesize new information, components, and concerns in the creation of complex objects (NAAB, 2004).

The architectural design studio represents an optimal example of how to teach holistic, critical thinking to students (Boyer Commission, 1998; Boyer & Mitgang, 1996; Coates, 1974). The ability to synthesize emerging information through an iterative process constitutes one of the most essential skills instilled in students through architectural education (NAAB, 2004).

Mastering this type of learning appears to be critical for our society as a whole (Coates, 1974). Jackson and Ward (2004) explain that developing knowledge in areas where levels of agreement are low and uncertainty is high, or where situations and contexts are emerging or transient, requires a process of continual renegotiation. Kunstler (2005) argues that today technology and interpretation are changing, categories of knowledge are changing, and the overall nature of information processing and cognition is rapidly evolving.

The Boyer Commission's (1998) report recognizes these changes and describes interdisciplinary programs and studio-based models as effective ways to prepare students for emerging challenges. Understanding and managing student development in these types of programs remains critical (King, 2005; Koch, Schwennsen, Dutton, & Smith, 2002).

Although scholars recommend wider application of studio pedagogy, many also cite the need to refine this model (Boyer Commission, 1998; Boyer & Mitgang, 1996; Koch, Schwennsen, Dutton, & Smith, 2002). Architectural education has been successful with regard to student performance outcomes (such as design proficiency and critical thinking) due to pedagogical practices that seem to have their own pitfalls. Perry (1970) and his successors maintain that educators should let students mature at their own natural pace. In contrast to this recommendation, architectural education seems to force students to operate at very cognitive high levels from the outset (Bloom, 1956; NAAB, 2004). Architectural curricula virtually drag architecture students to high-level stages... and this happens much earlier than typical among college students.

Developmental theorists agree that few students cross the threshold of revolutionary restructuring or make The Great Accommodation during their undergraduate years (Love & Guthrie, 1999). On the other hand, architectural educators urge students to cross this threshold as early as possible. It appears that student development theory can help architectural educators understand their students' intellectual progression. In doing so, educators can become more purposeful and intentional in their instructional practices.

A study of process journals promises to shed light onto the way novice architects make decisions and how their approach to knowledge changes as they develop expertise in design. Further study holds the promise to (a) improve architectural education, (b) enhance student development theory, and (c) improve studio pedagogy so that it can be more effectively incorporated into other disciplines.

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## THINK>MAKE AND MAKE/THINK: BEGINNING STEPS IN ARCHITEC-TURAL DESIGN Making Pedagogy

MATTHEW T. BREHM, ASSISTANT PROFESSOR UNIVERSITY OF IDAHO

The research for this paper began with a question: As students begin the design process, is it more important that they first *think* thoroughly about what they intend to create, or that they first make something to stimulate and/or communicate their initial thoughts? Based on personal experiences with my own students and my observations of colleagues in the studio, I had been developing a bias that making should be the first step, with 'making' referring to the creation of drawings and/or physical study models. But in developing this paper, other considerations have come to the fore - in particular, the affect that psychological typology might have on a teacher and/or a student's predilection toward action versus contemplation as an initial design strategy. The original question remains, yet the nature and focus of the research has changed somewhat to include an examination of psychological factors that would likely affect potential answers.

There is an understandable reluctance to allow students to act too quickly at the outset of the design process, i.e., before the student 'understands the problem.' The fear is that a student will rely too heavily on preconceptions regarding the project type, or will respond reflexively without consciously considering the essential nature of the design problem. It is often asked of students, "What is your big idea for this project?", and until the student provides an acceptable answer, most tasks related to crafting a concrete design proposal are pushed into the future (a future that is ever-diminishing, since the project and/ or the semester must eventually come to an end). However, expecting students to perfect their *thinking* before one urges a student to act can lead to a type of paralysis - the belief that one can truly 'get it right' in one's mind before making graphic suggestions for space. This notion that thinking should or must precede action has been compounded by tales

of revered architects arriving at complete design solutions through pure force of intellect and only minimal graphic development, for example:

"Le Corbusier viewed drawing as subordinate to mental images: using Ronchamp as one example, he explained that he started a design task by storing and 'incubating' data about the project and the site in his memory for some months, but not making any drawings. After the incubation came the 'spontaneous birth ... of the whole work, all at once and all of a sudden.'" <sup>1</sup>

While there have been instances where a designer worked in this fashion, it is atypical at best. Even in this case, Le Corbusier was shown to have developed the design for Ronchamp through the act of sketching more than the he let on in this description of his process. But tales such as these tend to persist in the minds of students - it is seductive to think that the path to a fully realized design solution could be so direct and that it might require so little apparent 'work.' Students laboring under these preconceptions regarding the design process are less likely to employ a robust program of design communication and graphic thinking to generate, explore, and develop their ideas in other words, a program of *making*. They are less likely to engage the disciplines of diagramming, drawing, modeling, and writing, and the equally important discipline of reworking the products of these actions. Understanding the essential nature of a design problem and using one's intellect to explore design possibilities before acting are accepted tenets in design education, part of what may be characterized as a "Think>Make" approach. An alternate approach - "Make/Think" - advocates in favor of early action coupled with critical thought processes.

In the academic architectural design studio, the instructor sets the agenda in a vari-

1 Herbert, Daniel. Architectural Study Drawings: 55.

ety of ways. He or she most often provides the project program(s), the site(s), and the schedule. The schedule may be primarily an overview of the course, with little more detail than key dates regarding deadlines and design critiques. Or the schedule may begin to define the timing of general design phases or even specific tasks that students are expected to complete. To determine these orders of operation is one of the design instructor's most important roles, and the place where pedagogical goals can become most apparent.

"Think>Make" is my expression for an approach to teaching in design studios that is characterized by an extended period of conceptualization regarding the designer's intentions. I have used this notation to suggest that making follows thinking in this approach - that thinking and making only become concurrent after an initial phase devoted overwhelmingly to thinking. There might be a certain amount of loose sketching that takes place in this phase, but the primary activities tend to include reading theoretical texts and discussing abstract ideas and personal perceptions in groups or between instructor and student. In a Think>Make approach, students might be actively discouraged from making drawings or models that could be perceived to be overtly 'architectural,' or that have much to do with the specific project being considered. As a means of preventing pre-conceptualization, even the specific program requirements might be withheld from the students, such that they are only aware of the broad project type until their 'big idea' has been established - primarily through verbal means. Drawings tend to be mistrusted in the initial phase of concept development, or at least not given much significance, in favor of verbal explanations of the designer's individual point of view. As described by Kirby Lockard:

"A [prevalent] attitude holds that drawings ... are misleading and strike emotional responses that are not to be trusted in serious matters. My experience is that, on the contrary, drawings are much more dependable and honest than words. Drawing is also mistrusted as either a mysterious intuitive activity or discounted as automatic and mindless by many design-methods theorists. Most designers who are confident of their drawing ability and use drawing consciously in the design process find such paranoia of the supposed evils of drawing more irrational than the ritual it seeks to avoid."  $^{\rm 2}$ 

Many design instructors, and in particular those who hold drawing in relatively low regard, emphasize a Think>Make approach in the studio, leaving students more or less to their own devices in developing the graphic communication of design ideas while extending the time allotted for thinking and talking about the project. By prolonging the conceptualization phase, the more active phases of programming, space planning, and subsequent design development are typically postponed, and too often truncated. The result is typically a project with much conceptual potential, but relatively little graphic clarity or overall design development – as well as a student who has missed an opportunity to significantly improve and refine his or her graphic communication skills.

Another disadvantage of Think>Make is that it allows the unmotivated or disengaged student to hide a lack of activity behind a wall of words. Such students will claim that they 'have it [the developed design proposal] figured out in my head,' and, when challenged on this point, will go to great lengths to verbalize a variety of intentions without making drawings that would more quickly and effectively clarify the ideas. An emphasis on making early in the design process helps to identify students who are reluctant to use drawing to explore design ideas (due to a lack of confidence or other reasons), or who are simply less willing to be productive in the studio. An emphasis on conceptualization first would give these students the dubious opportunity to manage their time poorly, get a very slow start on a project, and not be in position to thoroughly develop a more comprehensive design proposal. Again, an opportunity is lost to help these students develop the skills and craft necessary to communicate complex design intentions. The communicative devices (drawings and models) are not as thoroughly developed for clarity as the focus between instructor and student centers around a verbal discussion, and the discussion revolves around embryonic concepts, often only tenuously related to the design project at hand.

2 Lockard, William Kirby. Design Drawing: 14.

In contrast to the Think>Make model, "Make/Think" is an approach characterized by active production through which concepts emerge and are refined more methodically throughout the life of the design project. Rather than delaying active production until the concept is thoroughly established, students are encouraged or required from the very beginning to make images that are expressive of their design thinking, and to have these images influence further development and refinement of their ideas. While it is entirely possible to think about design without acting, it is difficult to act without thinking about one's actions. By starting a design project with action – through drawing, in particular - students provide visual evidence of their ideas, allowing instructor and student alike to confront the student's preconceptions by getting them out in the open. A Make/Think approach also provides the time for students to focus on the craft required of advanced design communications - not the tentative, unclear, poorly-developed images of an uncertain designer lost in thought, but rather the rich and refined communications of a disciplined craftsperson who has clearly-defined ideas to share. Issues related to program and site are explored directly and primarily through graphic representation, with readings and verbal communication playing a supporting role. Students might be resistant to the expectation that they make drawings before 'knowing' what the content of the drawings could be, but Make/Think requires the student to draw what they do know about the project and their ideas for design. Evaluation and improvement of this graphic information acts as a trigger to the design process, spurring further drawing accompanied by further thinking. At the same time, necessary work takes place early in the design process, such that the analysis and development of program, site, structural and material issues can take place over a longer period of time.

No design instructor is free from bias, based on myriad factors including direct experience in the studio, independent research, input from students and colleagues, professional practice, etc. It occurs to me that my own bias toward Make/Think, the bias of colleagues toward Think>Make, and our students' willingness (or

lack thereof) to embrace each approach, must all be based to some degree on our individual psychological makeup. Understanding more about how psychological types affect the studio environment seems worthwhile before we can, or would desire to, apply either approach to initial design steps. While I might believe, for many reasons, that Make/Think is the favorable pedagogical approach in the studio, I also understand the value of a variety of approaches - throughout the curriculum as a whole, and within a particular design studio. Also, no matter how strong my belief may be, one particular approach will not be most effective for every instructor or every student. Yet we can't have a unique approach for each student – there must be some generalizing, some cohesive approach to a given studio course.

In the course of exploring these considerations, I discovered (or more accurately re-discovered) Carl Jung's writings regarding Psychological Types. Certainly there have been others who have attempted to categorize psychological patterns as a means to understanding interactions among people, and perhaps these categorizations have been applied to instructor/ student relationships. However, I have been attracted by the particular clarity of Jung's research and its ready applicability to design studio situations. While this paper cannot provide a full description of Jung's Psychological Types and their various permutations, a very brief summary of the Types is necessary. Jung determined that individuals fall into two major groups, Extraverted/Introverted, depending on the general nature and direction of their activity. Further distinction is made with regard to the way people process information internally, into two pairs of general categories: Thinking/ Feeling, and Sensing/Intuitive. The final level of categorization has to do with the manner in which people process external information, into Perceiving/Judging types. Each of these pairs describes opposing attitudes or preferences for functioning within and relating to the world. The individual types create sixteen potential combinations. (For example, one possible type combination might be Extraverted, Thinking, Intuitive, and Perceiving, while another might be Introverted, Thinking, Sensing, and Perceiving.) While there are numerous qualities possessed by each sub-type, and

thus by each of the sixteen type combinations, for the purpose of this paper it will be useful to identify just a few characteristics, especially to point out some differences between each pair of opposites.

Extraverts prefer action and initiative, while Introverts tend to prefer concentration and quiet. Introverts work well alone and are most interested in their own thoughts and feelings, while Extraverts adapt well to group settings and are more interested in what is happening around them.

Sensing types are practical and active, while Intuitive types are more attracted to theory than practice. Intuitive types often have doubts and tend not to like routine, while Sensing types are realistic and self-confident, and capable of adapting quickly to new situations.

Thinking types are interested in systems, structures, and patterns, while Feeling types have a greater interest in people and their emotions. Feeling types tend to evaluate situations ethically, with regard to 'good' or 'bad,' while Thinking types tend to evaluate situations intellectually, seeing issues as being 'right' or 'wrong.'

Perceiving types can begin numerous tasks at once without completing them successfully, while Judging types tend to plan work in advance and are more likely to finish. Judging types more easily follow rules and discipline, while Perceiving types would prefer to be free from obligations.

These are only a few character traits exhibited by Jung's Psychological Types, and it must be recalled that these types inevitably exist in combination with one another in every individual. Each student is unique, and will gravitate toward making or thinking, acting or conceptualizing, and every student must be expected to do both in order to create robust design proposals. But most instructors with experience in the design studio will recognize these traits, and will likely remember specific students who exhibited particular type combinations – along with the students' relative abilities to respond to the instructor's expectations. In the initial stages of a design studio, it is impossible to determine the precise psychological type of every student in the class. But a Make/Think approach has the potential benefit of bringing these issues into the open. A Think>Make

approach has similar potential, but it allows marginally productive students - even if they are extroverted (etc.) - to spin their wheels for too long and not make the most of the allotted time. Awareness of typological differences should allow instructors to understand how students might react to either a Think>Make or a Make/Think approach, and why. At the most general level, an Extravert, for example, might be expected to take more readily to a Make/Think approach. At a more specific level, an Extravert, Sensing, Thinking, Judging type might actually need to take a Make/Think approach, regardless of the instructor's agenda. Conversely, an Introvert, Intuitive, Feeling, Perceiving type of student might be strongly resistant to a Make/Think approach, and might logically thrive in a studio with an instructor who emphasizes a Think>Make model.

As yet, these are merely hypotheses, as I have not devised a structured studio (or more likely a series of structured studios) that would test these assumptions. Understanding the psychological makeup of a group of students would require the gathering of data through surveys and focused seminars. However, psychological typology has been applied in corporate settings with the goal of improving interpersonal communication, teamwork, and productivity, and there exist applicable models for collecting and interpreting typological data. If these models can be crafted to gather relevant information before the outset of a particular design studio (perhaps through a brief online survey), they might have the effect of suggesting a Think>Make or a Make/ Think approach. At the very least, such information gathering could allow the instructor to know his or her students better - to know what instruction techniques might be more or less effective, generally for the class as a whole, and/or specifically for smaller groups or even individuals. Further research will attempt to establish the purpose and methods for applying psychological typology to design education. This is an initial study, and I am aware that this paper potentially raises more questions than it answers. The intention was to establish Make/ Think as the preferred pedagogical model, and while this remains as my personal bias for the reasons outlined above, I have come to recognize that the model's effectiveness is likely

based to a significant degree on the psychological predispositions of instructor and student. Although the initial question regarding Think>Make or Make/Think remains, an important filter or modifier has been identified that might help to determine how and why a Think>Make or a Make/Think approach could be applied to positive effect in the design studio.

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## THE CASE FOR COLOR IN EARLY ARCHITECTURE EDUCATION: PEDAGOGICAL SOLUTIONS Making Pedagogy

### MARIA V. JULIEN, LECTURER IOWA STATE UNIVERSITY

# A Brief History of Color Education in American Architecture Schools

Prior to the civil war, the earliest architecture education in America was highly practical and could only be acquired as an apprentice. Along with a general knowledge of building materials and simple construction methods, the only training required for professional practice is the ability to use a tee-square and drawing pen.<sup>1</sup> By the late nineteenth century, the first American architecture schools were being established and watercolor classes became a significant and mandatory component of most curricula.<sup>2</sup> In addition to providing a necessary skill for the production of full color architectural renderings, extensive watercolor exercises served to inform the student about the nature of color in general. Inherent in this education was a strong understanding of value, hue, and saturation, the colors of various building materials, and how they worked in combination.

Much of America's early architecture education was imported from the École des Beaux Arts where France's one time Director of Arts, color theorist Clarles Blanc believed color was female and line was male. In the 1890's he wrote:

"the union of design and color is necessary to beget painting just as is the union of man and woman to beget mankind, but design must maintain its preponderance over color. Otherwise painting speeds to its ruin: it will fall through color just as mankind fell through Eve."

The period of 1898-1925 introduced many changes to architectural education. As technological advances produced a larger range of building materials, education placed greater emphasis on architecture as a formal profession and there was a trend toward standardization of the school curriculum. In addition to new ethical standards initiated by the American Institute of Architects, a separation of architecture from the allied arts had begun to occur:

Your Committee regrets having to report that it finds in recent American architecture, particularly in the ensemble, so little evidence of the successful collaborative effort of architect, painter, and sculptor, that it hesitates to proceed that on the basis that their arts are, in fact, allied in anything but name. We recognize the seriousness of this condition, both in loss in to the arts in question... and of the loss to the country itself of its birthright-a finished architecture.<sup>3</sup>

While watercolor classes were still being taught in American architecture schools<sup>4</sup>, the use of steel and concrete in later construction necessitated a growing shift in focus. Between the years 1898 and 1925, the accurate calculations of the working strength of these materials, along with the introduction of more complex mechanical equipment began to pose new problems for the architecture student.<sup>5</sup> As the emphasis on science and construction continued to grow, the character of the subjects in American architecture curricula were beginning to shift and color was increasingly seen as a distraction to the more serious pursuit of architecture. In 1912, the Association of Collegiate Schools of Architecture had careful specifications for the content of student design presentations:

The final rendering of the project included the indication of walls, circulation systems, and floor or ceiling mosaics as well as the immediate <u>entourage of the building in plan</u>, and a formally

3 American Institute of Architects, Report of the Committee on Allied Arts

(Proceedings of the Fourth Sixth Annual Convention, Vol XLVI, 1912) 36.

4 Arthur Weatherhead, The History of Collegiate Education in Architecture in the United States (PH.D. Thesis, Columbia University, 1941) 168-169.

5 Ibid., 74-75.

<sup>1</sup> Arthur Weatherhead, The History of Collegiate Education in Architecture in the United States (PH.D. Thesis, Columbia University, 1941) 5.

<sup>2</sup> Ibid., 32-59.

rendered elevation and section. At times these problems were rendered in weak color. Any positive or bold use of color, however, was strictly forbidden. <sup>6</sup>

Tall steel building construction and the advent of the modern movement in Western Europe were to have a further effect on American architecture education. Advances in industry had created a wide selection of colors offered in new building materials. Modern art had also become a major influence:

There is a new interest in color in American architecture, not only because of the growing appreciation of good creative contemporary art, but also because the function of color in connection with comfort and mental hygiene in living. Color is the mark of happiness and joy and is one of the greatest sources of aesthetic pleasure. <sup>7</sup>

While attitudes toward color have always varied widely, there often seems to be a marked opposition between popular culture and architectural culture. In his book, Chromophobia, David Batchelor describes this disconnect with his scathing critique of Le Corbusier and his contemporaries, as well as color theorist, Charles Blanc:

For our contemporary chromophobic architect, colour also represents a kind of ruination. Color for him signifies the mythical savage state out of which civilization, the nobility of the human spirit, slowly, heroically, has lifted itself -but back into which it could always slide. For one, colour was coded in the feminine; for the other, it is coded in the primitive. For both, colour is a corruption, a lapse, a Fall.<sup>8</sup>

While at Yale University, Joseph Albers' teachings on the theories of color interaction took an entirely new approach to color education:

This course normally employs as the color medium colored papers (for variety, ease, and consistency) rather than paint. The students proceed through experimental exercises, producing with paste-pot and augment a series of workshop studies in which colors act-not to illustrate

6 Arthur Weatherhead, The History of Collegiate Education in Architecture in the United States (PH.D. Thesis, Columbia University, 1941) 156-157. or decorate, and certainly not for the sake of self expression, but to produce specific color effects.<sup>9</sup> The Albers color course was designed to teach his students to see color as interactive, "to liberate the teaching of color from conventional theories, which codify colors but analyze them into oblivion by ignoring that which gives them life-the way they are perceived in context."<sup>10</sup>

Albers method deliberately avoided painting as a teaching aid for color education.

Joseph Albers' philosophy of color education had an enormous impact on his students. Between 1954 and 1956, Yale graduates, Bernhard Hoesli & Robert Slutzky redesigned the University of Texas at Austin drawing & color course to heavily borrow from Alber's teachings. Hoesli's studio instructions for an isonometric study pointed toward a more conservative approach to color in architecture renderings:

As work progressed, the students began to lay watercolor washes on the bird's-eye isonometric drawing under Hoesli's careful direction. He noted, "There are three planes: the treetops, the roofs, the ground. The purpose of the wash is to define these planes, to indicate them more clearly, to make clear their special condition. The purpose of the wash is not to add color, not to make it more 'realistic', not to make it life-like." Rather, the application of the wash was meant to emphasize the abstract quality of the drawing, giving specificity to the three horizontal planes, distinguishing them, and strengthening the volumetric and analytical aspect of the isonometric.<sup>11</sup>

Form was emphasized with color. Bernhard Hoesli & Robert Slutzky would to go on to teach at other universities, spreading the message, as would their own students in turn.

# Challenges of Color Education in Architecture

Currently, NAAB does not require color education as part of the architecture curriculum & most graduates will have left their programs with no basic knowledge about color. Many instructors neither compelled nor prepared to

11 Ibid., 99.

<sup>7</sup> Claude Bragdon, *Architecture and Democracy* (New York: Alfred A. Knopf, 1926) 49.

<sup>8</sup> David Batchelor, *Chromophobia* (London, UK: Reaktion Books Lmt., 2000) 23-24.

<sup>9</sup> Werner Spies, *Josef Albers* (New York: Harry N. Abrams 1970) 45.

<sup>10</sup> Alexander Caragonne, *The Texas Rangers: Notes from an Architecture Underground*, (Cambridge, MA: MIT Press, 1995) 186.

integrate color education into the beginning architecture studio. Although architects are responsible for specifying and combining finishes and materials, color continues to be quietly regarded as superficial or cosmetic.

One challenge to color education is the fact that individual perceptions of color can vary greatly. Molecular biologists have determined that the difference in a single amino acid-the minimum genetic difference between two people-can cause a perceptible difference in color vision.<sup>12</sup> A high incidence of color challenged persons in the North American population marks yet another challenge. North American and European populations have the highest incidents of color deficiency, affecting roughly 1 in 12. By comparison, color deficiencies affect 1 in 20 in Asia and only 1 in 50 in South America, Africa and New Guinea.<sup>13</sup>

The three main forms of color deficiency found in the student population, are as follows: *Anamalous Trichromatism* is the least severe form of color deficiency and most common. While all three primary colors and their ranges are recognized, the ability to make more acute distinctions does not occur in the normal range. *Dichromatism* is the term used to describe individuals who see color with only two distinctions, light to dark and one range of hue. This single range of hue could be either red to green, or yellow to blue. *Monochromatism* is rare and indicates an individual with completely colorless vision.<sup>14</sup>

In September 2009, researchers made major advances in the treatment of Dichromatism. In a multi-university study, scientists have successfully introduced the gene for a missing red pigment into the cone cells of two squirrel monkeys' retinas, inducing full trichromatic color vision.<sup>15</sup> Scientists are optimistic that the

Company,1990)

technique might soon be successfully tested on humans. Until then, it's important to address the issue of color deficiency in the classroom.

The typical architecture studio will have 1 or 2 students who are color challenged and depending on the severity of their condition, it's possible that they may not yet be aware of their deficiency. Once color challenged students are identified, they can be counseled and directed to a free online color aid program, such as Color Scheme Designer 3.1. Over the past year, this intuitive, easy to use color aid program has been used to assist color challenged students in our studios, enabling them to select simple or complex color schemes with greater confidence. Especially helpful to educators is a function which simulates most forms of color blindness, so a normal-sighted person can experience what a visually impaired user would see.

#### The Importance of Color Education for Beginning Architecture Students

Color is manipulative. Joseph Albers, arguably the strongest champion of color in our time, readily admitted, "Color deceives continuously."<sup>16</sup> While color is a powerful design tool, it also offers balance to the strong emphasis of form in the beginning design studio. Carefully crafted exercises develop sensitivity for color in the young design student and allow for a better understanding of color found in natural and manufactured building materials. When tasked with selecting and combining building materials and specifying paint colors, a student will emerge more confident after color education. An early understanding of additive and subtractive color helps enrich later studies in lighting.

As globalization and technological advances increasingly shift the boundaries of architectural practice, NAAB, AIA, ACSA, CIDA, and NCIDQ continue to squabble over turf. A slower economic model continues to unfold and new architecture graduates encounter an increasingly unstable work climate and limited employment opportunities. In times of economic duress, interior design firms typically fare better than architecture firms, clients often

16 Charles Riley II, *Color Codes*, (Hanover, NH, University Press of New England, 1995) 6-7.

<sup>12</sup> Charles Riley II, Color Codes, (Hanover, NH, University Press of New England, 1995) 1-2.

Helen Varley, editor, Color, (Los Angeles, The Marshalls Edition Limited, The Knapp Press, 1980)
 B.Cassin and S.Solomon, *Dictionary of Eye Terminology*, (Gainsville, Florida: Triad Publishing

<sup>15</sup> Katherine Mancuso, William W. Hauswirth, Qiuhong Li, Thomas B. Connor, James A. Kuchenbecker, Matthew C. Mauck, Jay Neitz & Maureen Neitz. (Sept.16, 2009). "Gene therapy for red-green colour blindness in adult primates" *Nature* 461 784-787. doi:10.1038/nature08401.

preferring to remodel existing spaces in favor of more costly new construction. It would seem that a responsible architecture pedagogy would strive to prepare students for as many professional options as possible; preparing students to be competitive candidates for internships in both interior design and architecture firms. NCIDQ certification continues to be an option for architecture graduates of accredited institutions and yet a quiet prejudice toward color education continues to pervade architecture education. The lack of basic color education amongst most architecture graduates potentially weakens the case for a continued NCIDQ certification option.

## Teaching Color in the Beginning Architecture Studio

The first year architecture program at the College of Design is comprised of 80 second-year design students divided equally into 5 studios. Before 2008, these students were receiving no formal color education. Starting in the fall of 2008, color education was introduced into the studio pedagogy. All 80 students gathered for formal lectures on color. In addition, students underwent intermittent color matching exercises followed by a variety of color rendering workshops. In preparation for the exercises, students purchased gouache paint in primary colors, a synthetic sable #6 round brush, and a plastic mixing palate.

### Color Lectures

We introduce color by addressing the issue of color deficiency head on. Statistics are cited and the latest scientific research on cures for color impairments are briefly presented, followed by a series of quick tests for color deficiency. Students are asked to notify their professors in private if they have any difficulty with the tests. After being identified, these students can then be reassured and directed to an online color aide program. In these early days of their architecture program, students are adjusting to studio culture and getting to know a new set of peers. Understandably, they are very reluctant to admit to a known color deficiency, even in private. If admission does not come swiftly, difficulty with later color matching exercises will make it obvious.

Throughout the initial color lecture, students are prompted to participate. We begin with an introduction to the color wheel, an explanation of complimentary colors and the difference between warm and cool colors. An overview of the terms, hue, value, saturation are covered, along with the differences between additive and subtractive color. Later lectures cover color psychology and the many cultural associations of color.

Once the basics are covered in the initial lecture, students often delight in participating in an after-image experiment. Students are asked to stare at a red circle for 30 seconds and close their eyes. They are then asked to describe the after-image and guess why it appeared as it did.

The after-image experiment segues into the more complex, Albers inspired understanding of color; students can now begin to comprehend that colors change according to context and their earlier experience with an after-image helps them understand why. After a brief overview of color theory history, students begin to appreciate the tremendous power of color as a tool for architects.

When Albers taught with colored paper instead of paint, he did not have the luxury of modern technology. Many of these same lessons can now be covered quickly in a lecture environment. One excellent resource for faculty interested in introducing color into the studio curriculum is the *Color, Contrast & Dimension* online tutorial, offered by The Poynter Institute.

#### Color Matching Exercises

For the beginning architecture student, color theory will only go so far to engage their interest and help them comprehend the complexities of color. While Albers preferred to teach with colored paper, there are many benefits to using paint. Paint offers a more tactile and expressive approach to color education, whilst also adding to a student's arsenal of communication techniques.

One of the best ways to teach color is with watercolor, or it's more heavily pigmented cousin, gouache. For these initial exercises, gouache is generally preferred to watercolor because of the highly saturated and faithful primary color pigment it provides the student with which to work. Before experiencing color matching exercises, most students believe that pink can be achieved by simply mixing red and white. Not true, as there are thousands of pinks, most containing small amounts of blue and yellow pigment as well. With the mixing of paint colors, students come to understand that most colors can only be achieved through the mixing of all three primaries; it's mainly a question of proportion.

We offer a regular series of quick, handson color matching exercises in regular intervals throughout the semester. Printed samples from an individual 'family' of color are distributed to the students, who then mix their primary gouache paints to match. Each color swatch has a hole punched out of it so stu-



FIGURE 1:

dents can lay the sample over their mixed color to determine if they've been able to achieve a true match. A 'true match' is made when the instructor is unable to discern the color of the paint from the sample. When the student feels they have a match, they raise their hand and an instructor makes an inspection. If there is no match, the student is briefly counseled and asked to make further attempts. If a student has a match, they are congratulated and offered a second swatch, thus allowing each student to work at his or her own pace. (Figure 1)

When this exercise is first presented, many students are overwhelmed and feel the task impossible. After achieving their first matches, they become encouraged and within 3 or 4 sessions, demonstrable skill is shown. Eventually, color matching becomes a lighthearted game of who can get through the most color swatches in twenty minutes. As students become more confident in their understanding of color, the exercise moves more quickly and the eye becomes increasingly sensitized. (Figure 2)



FIGURE 2:

#### Color Workshops

Color matching exercises prepare students for their first color rendering workshops where a variety of color mediums and rendering techniques are explored. In addition to gouache, students try their hand at a variety of other mediums, including professional markers, pastel, watercolor, colored pencils, and watercolor pencils.(Figure 3)



FIGURE 3:

Before the end of their first year of color education, students develop confidence in working with color. The majority of students are able to integrate color into their architecture projects with ease. (Figure 4)



#### FIGURE 4:

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## COLOR IN MAKING Making Pedagogy

HENNING HAUPT PHD, ASSISTANT PROFESSOR FLORIDA ATLANTIC UNIVERSITY

## **Teaching Color Theory**

Teaching color in an architectural design program faces many obstacles, which are often difficult to grasp or overcome for the beginning design teacher and student. The first obstacle is the lack of a long term, reoccurring practice of color problems, which can develop a student's color sensitivity over time. Color theory during foundation programs is often taught in one single class introducing color chromatics and color charts. To gain an extended ability in the use of colors, the use of color should be integrated but through the curriculum. One semester on color is not sufficient to reinforce students' opinion on color and to build up a confidence in handling them.

A second obstacle is to teach color as color theory. In contrast classes following the teaching of Josef Albers are more successful. Albers shifted the approach from teaching ordering systems as color theory to a hands-on experience with colors, a color-praxis. Students deal directly with color and choose colors in order to generate specific results. This experience develops a sensitivity of seeing colors in interaction with each other. *The interaction of colors*,<sup>1</sup> Albers finding that no color is the same color in a different context summarizes his color theory and teaching, as a result of his work as a painter.

The third problem in current teaching is the traditional segregation of color theory from the three-dimensional design process, a separation more typical than not in the architectural education. Color classes deal mostly with two-dimensional problems. Color is seen as a phenomenon on a picture plan rather than one in space, or as one that generates spaces. Color is reduced to its tonal qualities and considered to be one of the last decision made in a design process. Colors come second and serve to

1 Albers, Josef. *The Interaction of Colors*. Yale: University Press, 1963.

enhance the already established design. Color as a material that constitutes spaces like wood or any other material has been neglected. I argument in this paper that color and its materials should be integrated in the three-dimensional, architectural design process from the first semester on.

#### Praxis-based Research

In response to these obstacles in teaching, my research questions and tests the use of color in a three-dimensional context. This praxisbased research takes methods of painting and integrates them into a series of experiments through the making of architectural objects.

Paintings stand at the beginning of this process. They can be referred to as color-space investigations, in which the color material defines the expression of the work and produces color-spaces. In one particular series of my work, semitransparent layers of colors are



added wet on dry, following a proportional system of color fields. The colors define a visually three-dimensional orthogonal network of color spaces vertical to the picture plan. In other series of my paintings the color-space was formed by blurring color, wet in wet, on the canvas, which does resolve in a different quality of color-space. The experiments continued into the third dimension. The layering of transparent colors was completed by a series of cuts through the picture plane to allow folds in space. The result of this praxis-based research is a design strategy in which color, its application and its three-dimensional placement generates architectural spaces. In this exemplified process of color-space constructions colors come first and integrate the other parameters of the design.

The practical part of my research is accompanied by inquiries on color-space through the perspective of:

- Painting
- Corporeal Perception
- Physiological perception

#### Color in Painting

Color-spaces are the visual illusion of space vertical to the picture plane without any perspective means representing a physical space. One early example of the exploration of colorspace painting techniques is the work of Paul Cézanne. He avoids in his paintings, specifically those of the Montaigne Sainte-Victoire from 1904<sup>2</sup>, representational means of perspective. Cézanne purely focuses on color impression in his eyes and transfers those into individual color dots on the canvas<sup>3</sup>. By applying different color tones, Cézanne composes a visually three-dimensional, interwoven pattern of colors. The contrasts form a spatial network both in detail and in the larger composition of the entire painting. These specific spaces are painted by using a specific color material; Cézanne's heavy paint forms a relief of dots on the canvas enhancing the autarky of each dot as the result of the brush stroke. The 2 Cézanne painted a certain view from his house

towards the mountain a several times in various paintings of Montaigne Sainte-Victoire from around 1904.

3 Vukicevic, Vladimir. *Cezannes Realisation, Die Malerei und die Aufgabe des Denkens*. München: Wilhelm Fink Verlag, 1992.

materiality of color as means for painting was later explored in depth by various artists, and became a fundamental subject in painting and its criticism of the 20th century.

Wassily Kandinsky explored color and its space in paintings while teaching at the Bauhaus, a few years later after Cézanne completed his paintings of the Montaigne Sainte-Victoire. He summarized his thoughts in his writing Über das Geistige in der Kunst in 1952.<sup>4</sup> Kandinsky added the notion of movement to the spatial impression of colors. He argued that warmer colors such as yellow and orange would move outward, towards the viewer. The cooler color like blue would move backwards, away from the viewer into the depth of the picture plane. Kandinsky tried to argue that these visual movements of colors would be equally visible for a majority of people, and could defined in a general rule for the impression of colors. Another assumption of Kandinsky was that each color could be assigned to a certain form such as square, circle and triangle. His surveys among students and faculty at the Bauhaus showed that these ideas are not universal. Nevertheless the notion of visual movement between colors became a common description of vibrant color-space paintings.

The French painter Robert Delaunay took the exploration of color-space painting a step further than Paul Cézanne. In early years he focused on representational paintings; in his later work, beginning around 1910, he relied completely on the impression of color and color-spaces. He chose fields of colors for his non-representational paintings titled for example "Sun and Moon" or "Rhythm - Lust for Live", which describe cosmic phenomena and the intangible respectably. Color and colorspace became synonyms in conveying the incomprehensible and were enriched to carry meaning. Color as a meaningful material in painting, was later on, explored by the American Abstract Expressionists' from the 1940s until 60s. Painters like Marc Rothko, Jackson Pollock and Helen Frankenthaler investigated various ways to use different color materials, materialities and application techniques. The various color-space paintings opened up a wide range of possible consumptions to the

4 Kandinsky, Wassily. *Über das Geistige in der Kunst.* Bern: Bentelli. 1952, edition 2004. viewers. In contrast to this historical development in painting, the architectural production in that time focused on the maximization of the plastic impression of white forms and on the natural color of a material. The chance of adding a meaningful layer through the use of color was rarely taken into account for architectural purposes and was considered to be an issue of interior design, signage, advertisement and decoration.

## **Corporeal Perception of Color**

The appreciation of the non-representational color-spaces relies on our corporeal perception, the ability to expand our physical dimensions by projecting ourselves into the visual spaces. Through our empathy we acknowledge a reaction within the body that relates to the illusion of the color-space, as we would to a physical situation. The term empathy, taken from psychology, was introduced to the aesthetic theory in 1907 in the work of the philosopher Wilhelm Worringer Abstraktion und Einfühlung, which translates to abstraction and empathy.<sup>5</sup> He argues that the human body mediates between an external feeling for something ("Zufühlung") and an internal emotional reaction within our body ("Nachfühlung"). In the instance of seeing color-space our body reacts with an internal, emotional sense of space<sup>6</sup>.

Today the German philosopher Gernot Boehme aims to establish atmosphere as terms in aesthetics. Boehme describes atmosphere<sup>7</sup> as a phenomenon located between object and subject,<sup>8</sup> yet connected to the tangible space

7 Boehme, Gernot. Architektur und Atmosphaere. Munich: Wilhelm Fink Verlag, 2006. – 'Architektur und Atmosphaere' Arch+ 178, 2006. 'Die Produktion von Praesenz' Arch +, 2006. Atmosphaere, Essays zur neuen Aesthetik. Frankfurt am Main: Edition Suhrkamp, 1995.

8 In regard to Boehme, the object side of space is a compound of measurable components such as size, proportion, orientation and shape of the space. Furthermore Boehme considers texture, materials, colors,

and coupled to the things and their orchestration. He explains the perceptions of atmosphere in the sense of Worringer and broadens our physiological perception with the corporal perception through empathy. He points out that the bodily space of corporal perception is not the area of the body volume itself, but it is the space of our sensual presence and of our sensing. This goes beyond our physical possibilities of the body. In other words, the corporeal experience is not tied the movement of our body, as such we would experience the size of a wall by walking along the wall or to the proportion of our body when we relate the size of our hands to the size of each brick to measure the height of a wall. The corporeal perception reaches beyond the physical properties, like a blind person extends her body by using a stick to project herself out to sense the ground below or ahead. Another example of this perception is our sensing of materiality, for example we sense the warmth of wood. Through the combination of corporeal impression and a semantic context we experience an inner emotion as a reaction to the materiality of the object and add this information to our overall perception. For example steel is perceived as being cold without direct transfer of energy from the object to the subject. One does not have to literally touch the material to perceive its qualities.

Colors are one of many elements that produce atmospheres and we perceive the colorspace by using our corporal being. We experience the dynamic pulsation of colors, narrow or wide spaces, orientation of color and other color-space attributes as a bodily experience through our corporal perception. This corporeal perception includes the ability to see, hear, smell and touch to suspect a mood. It is an individual, sensing of the body, which makes the appreciation of color-spaces a highly personal evaluation.

<sup>5</sup> Worringer, Wilhelm. *Abstraktion und Einfühlung, Ein Beitrag zur Stilpsychologie*. München: Piper &Co, 1907, edition 1976.

<sup>6</sup> The term empathy (Einfühlung) used to be a term of psychology. Due to Wilhelm Worringer and his work Abstraktion und Einfühlung empathy became a term of aesthetics to discuss art and architecture. His theory was developed by others and later elaborated in the theories of phenomenology.

light, sound, temperature, air-movement, occupancy, peoples' movement and behavior as objects defining atmosphere. The subject is imbedded in the perception of the human being entering the space in correlation to the specific moment in time including his behavior, personal and cultural background. Between this and the tangible condition of space a certain atmosphere emerges.



#### Physiological Perception of Color

In contrast to the color-space perception, our perception of the three-dimensional, architectural space is linked to our movement through a space or to the movement of our eyes wondering around in space. This differentiates the three-dimensional space form the visual illusion of a color-space, which can be perceived from just one point. Nevertheless the information of both color-space and architectural space is provided simultaneously to us.9 One part of the brain observes the situation in which the body is situated and another part of the brain concentrates on the visual space. A person moves through the architectural space and projects himself into the colorspaces at the same moment. This explains why we define our presence in a room in relation to wall, ceiling and floor; however we relate ourselves to the colors and their spaces at the same moment. This simultaneity of color-space and architectural space perception is crucial for architectural design. By integrating both parameters into the design process, color and space become an integrated, inseparable element to our perception.

In general the perception of three-dimensional information is much stronger than the perception of the spaces with in the colors. In addition the linkage of colors to the perception of the object makes it even harder to recognize color-spaces. "Color constancy,"<sup>10</sup> describes the fact that color perception is combined with form, texture and context as collective criteria to perceive our environment. This allows our brain to prevent false information from misleading our orientation. For instance, we can perceive a lemon as yellow and recognize it as the sour fruit, even it appears green when situated in a blue light. We recognize the lemon not only by color, but also by its other attributes. This allows for the brain to recognize the object, to correct false information and gives us the impression of a yellow lemon.<sup>11</sup>

In contrast to our perception of color constancy, we find colors that are not connected to the object. We can think of these "film colors" as an impression when viewing colors through a long pipe and eliminates all neighboring conditions. That is why these film colors are also referred to as "colors in opening mode"; they do not carry information of form, texture or context and therefore the film colors can provide the strongest impression of colorspace. To make a color space most visible, the color constancy has to be reduced. Color space as a phenomenon mainly between film colors becomes more obvious when color and context information do not show evident correlation. This occurs, if the situation provides:

- A lack of form
- An indefinite surface
- A contradictory presentation of space
- A separation of form and color
- A separation of color area and line
- An increase of color contrast
- The color itself has a transparent character or shine<sup>12</sup>

The more the color constancy is disabled, the more enhanced is the perception of color space. The disorientation of representational

11 The perception of color through the reflection of light in certain frequencies and the transition of information to our brain is called bottom up process. The processing of information in the brain is called bottom-down process.

12 Schawelka, Karl and Hoormann, Anne. *Who's afraid of ... zum Stand der Farbforschung*. Weimar: Verlag Bauhaus Universität, 1998. Schawelka, Karl. Farbe. Warum wir sie sehen, wie wir sie sehen. Weimar: Verlag Bauhaus Universität, 2007.

<sup>9</sup> Richard Wollheim describes the simultaneity of both kinds of perceptions as "twofoldness" in his work: *Wollheim, Richard. Painting as Art.* London: Thames & Hudson, 1987.

<sup>10</sup> Goldstein, E. Bruce. *Wahrnehmungspsychologie, Eine Einführung*. Heidelberg Berlin Oxford: Spektrum Akademischer Verlag, 1997.

means allows our perception to concentrates on the color spaces.

#### Color in Architecture

My findings in the theoretical and in the practical research coincide with the comprehensive color conception of William Braham, which were presented in his book Modern Color / *Modern Architecture*.<sup>13</sup> His theory combines the different conditions for color perception such as biologic-physiological settings, psychological impact, historic and contemporary cultural coding, and the corporeal perception. Braham analyses the color concept of the purist architects, Le Corbusier and Ocanfant. He points out that color concepts were based either on perception related to a bodily experience or on a rational understanding of color theories. He concludes that instead of either-or the complex relation between semantic and corporality needs to be considered at the same time for well-founded color concepts. A color-coding by semantics or a system of color by tone, hue and value alone is not sufficient for universal color praxis.<sup>14</sup> For architects today it is instead more important to develop a specific color solution by the engaged, practical work on the project to develop the specific interrelation of arguments within each project.

This thesis of William Braham contrasts an older, but still relevant and applied color theory. Heinrich Frieling started his writings on color scheme (Farbgestaltung) in the 1950s. <sup>15</sup> His followers published the latest, revised edition of his book in 1998<sup>16</sup>. The modernist presumption that every element in an architectural design should be functional led his approach. Frieling designed universally color schemes in respect to the functional aspect of

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15 Frieling Heinrich. *Farbe im Raum, Angewandte Farbpsychologie*. Munich: Callway, 1974. Das Gesetz der Farbe. Goettingen: Musterschmidt, 1968. Psy-chologische Raumgestaltung und Farbdynamik. Goettingen: Musterschmidt, 1957.

16 Rodeck, Bettina and Meerwein, Gerhard and Mahnke, Frank H. Mensch - Farbe – Raum, *Grundlagen der Farbgestaltung in Architektur, Innenarchitektur, Design und Planung*. Leinfelden-Echterdingen: Verlag Alexander Koch, 1998. a room. To do so, he generalized the individual color impressions to a collective color perception based on psychological arguments. This reasoning is to a certain degree comprehensible and provable, but much more important is that Frieling's theory justifies historical as well as cultural coding. It confirms the collective color appreciation of a historical and cultural established group of society. Nevertheless or because of this, Frieling's color manuals and handbooks were largely appreciated to handle the practical necessity for architects to choose colors.

In consideration of color semantics, the corporeal as well as the physiological perception and psychological assumptions to acknowledge certain collective color impressions, the use of color in the experiments of myself and those of my students integrate the relativity,





<sup>13</sup> Braham, William W. *Modern Color /Modern Architecture*. Vermont: Ashgate Burlington, 2002.



the materiality and the personal evaluation of color. Instead of applying a system of pseudo universal color schemes, I suggest a relational approach for the making in color. Color is not just functional, it cannot completely be rationalized, since it is multidimensional, relative and can take on meaningful expressions.

### Teaching making in color

In my class "Color Material Space" exercises start with two-dimensional color experiments followed by studies on three-dimensional, architectural objects.

In the beginning of the semester, students present two-dimensional color experiments on paper, without using representational means. They develop a combination of color tones, color materials and a specific application in order to generate color-spaces. These initial results are transferred into three-dimensional compositions, guided by series of assignments such as the production of cut outs, a color-space diorama and eventually architectural objects of multiple interconnected spaces. Students reflect on their work in discussions and through a series of iterations they are able to discover an architectural idea that is dominantly led by colors. During the last phase of the class, scale and site are assigned to the project, which transfer the objects to preliminary architectural designs for inhabitable spaces.

The student's work is evaluated by three objectives, which are the development of:

- Sensitivity for color and its applicationTraceability of a design strat-
- egy in regard to the use of color
  Relation between the architectural elements and color, which together provide the atmospheric characteristics of the constructed space and form

Within the making of color students experience the impact of chromatics, such as contrasts. Their sensitivity and appreciation for colors change through the semester, as their color charts gain complexity. The discussions about the architectural objects, not models, are about 1:1 executed examples of color materials and space. The Objects demonstrate the properties of color, instead of representing them in model or plan and assuming the impression. The second objective traces a continuous line through the series of works, which results in a specific design strategy. The initial paintings and objects start the processes for the project; in this moment the choice of color relies on personal arguments, but later in the process choices are made in regard to the evolving conceptual ideas. The evaluation of the student is made on how consequential that process is understood and followed through to flourish the idea and the project. The third objective looks at the interconnection of color and construction, which generates space and form. It proofs positive, if neither form nor color alone can achieve a comparable result.

The main value of this approach is that students address architectural ideas in relation to atmospheric intentions, which often resides outside the discussion of other design parameters, such as site, construction or program. Atmosphere is an imprecise term, since it is not theoretically defined. Furthermore it needs to be considered that in architecture the atmospheric condition has a potential to manipulate human beings, either in a positive or in a critical sense. Nevertheless, atmosphere is criterion for personal comfort or discomfort in a situation.

Color investigations challenge both student, and faculty, to incorporate relational and rational arguments in any layer of the design process. It is emphasized that form and space can follow an idea and the idea develops from color and other material implications. Since we relate our selves simultaneously to the visual space and to the space we are immediately experiencing, the constructed space allows for a personal consumption by the user interacting with the atmospheric conditions.

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## TO UNSAY THE WORLD AND IMAGINE IT ANEW Making Writing

JOCELYN E. ZANZOT, ASSISTANT PROFESSOR OF LANDSCAPE ARCHITECTURE AUBURN UNIVERSITY

## Abstract

The distinction is made between writing about architecture and writing as a generative act: reflective and productive, bringing forth new conceptions and even figurations of architecture. The paper contends that writing is connected to making along a continuum of critical inquiry and creative construction. The author examines the premises, theoretical grounding, and pedagogy of writing in relation to making developed in an Urban Studies seminar at Auburn University. Correspondences between the seminar and a landscape architecture design studio situated in Mobile Alabama, as well as between the seminar and later thesis work, are evaluated in terms of a critical poetics of urban inversion: an unsaying of the world and imagining it otherwise. Writing through unfamiliar terrain encourages students to:

- 1 draw on personal experience and multi-sensorial insight
- 2 pursue secondary historical research,
- 3 consider beyond these modes of inquiry a third position at the border or margininformed and empowered by difference.

Writing becomes a space of design research in which a theoretical framework is articulated to advance new knowledge. These practices: descriptive and interpretive, critical and poetic, are developed in hybrid forms of writing + image that require students to think through and take ownership of theories of the built environment. The results suggest that the process of writing becomes generative through continuous practice with a range of genres throughout the course of the program rather than within a single semester or style.

## Introduction: Critical Poetics and Poesis

Writing architecture, the translation of ideas into language, can have critical and creative intent. In the pedagogy of the beginning design student, writing may be cultivated in relation to other modes of design practice such as drawing, painting, modeling, photography, mapping, videography etc. that connect thinking and making. Writing however has a unique capacity to handle theories, diverse ways of seeing and making sense of the world. While drawing is said so eloquently by David Leatherbarrow (1998) to "show what otherwise hides itself", writing offers a distinct milieu in which what otherwise hides itself might be considered a matter of language. The exploration of the world around us, through the medium of writing brings us into contact with our own theoretical constructs and intentions. and allows us to set these beside those of others. As our thinking evolves, writing becomes a space in which ideas may change and evolve in dialogue with others and the physical world.

This paper is not an analytic accounting of research on the relationship between writing and architecture substantiated by and exhaustive literature review, discussion of methods, and results. What follows are preliminary experiments in teaching hybrid forms of writing + image, investigating writing as an act that moves thinking and pushes the realms of the possible. The results are thus more speculative than conclusive. Examples will draw this connection through from the introduction of landscape architecture urban theory, to in-class text + image assignments, to studio and thesis work that demonstrates evidence for the claims made in the paper. Teaching writing in this case focuses on building skills and confidence, imparting methods of discovery and reflection, and cultivating hybrid practices that draw together these dimensions of writing towards alternate futures.

George Steiner (1975) said, "Language is the main instrument of man's refusal to accept the world as it is...Ours is the ability, the need, to gainsay or 'un-say' the world, to image and speak it otherwise .... " The act of unsaying the world around us, rethinking the places in which we practice, is a critical project that begins with an inquiry into how and why the built environment has evolved through time, how urban ecosystems work, how we interact with and within the city. In tracing past and invisible layers of inhabitation, unsaying dis-covers underlying intentions, structures and processes, overlooked or down-pressed experiences. Writing facilitates the process of thinking through the implications of theory, of interpreting others' ideas through the lens of personal experience and observation. Beyond first glances and preconceptions, writing opens a space to imagine how things might be otherwise.

### 1. Beginning: Writing as a Movement of Thought

With an interest in a third position or thirdspace perspectives, it might seem contrary to introduce students to dialectical motion. However, this move intentionally activates writing as an open process of inquiry, and as one in motion, moving towards new understandings. Marshall Berman (1982) in his seminal book, All that is Solid Melts into Air compares the experience of modernity to a maelstrom, a storm in which all is caught up, unsettling the past and throwing the future towards the unknown. On the one hand, this experience is disturbing and disorienting upsetting past traditions and orders. On the other, all possibility awaits. He recalls the great thinkers and writers of the nineteenth century and encourages those of us inclined towards postmodernism, to study these writings for an approach that in the same breath of critique and revision considers the significance of those things lost and forgotten in the storm. This dialectical motion in writing is introduced as a way of studying the built environment, seeking to understand historic origins on the one hand and contemporary directions on the other towards new understandings and propositions.

Many beginning design students are keenly aware of changes in the built environment and personally experience the mixture of associated emotions that change evokes. Whether rural or urban, local or international, they perceive the urban landscape as a dynamic condition. For some however, the built environment exists as a given, an accepted precondition of architecture. The labors and intentions of past eras are as unknown as the abundance and distribution of past ecologies. Several notable writers and theorists of the American landscape introduce *reading* the built environment as a readily accessible method of understanding American culture that is open to and will benefit from new perspectives. Authors such as Pierce K Lewis (1979) have established "Axioms for Reading the Landscape: Some Guides to the American Scene". The first Urban Studies course readings including Lewis, Clay and Jackson and Helphand offer direct encouragement to beginning design students to join in.

For students of the built environment this is a reminder to look beyond the building or open space, beyond even the scene or physical place, to consider cultural significance. Everyday needs and desires, neighborhood structure and boundaries, social and political motivations, popular culture, and changing technology all help make sense of what seem like brand new trends. JB Jackson's writings about the American landscape provide three keys to learning to decode the landscape rather than accept it as a given normative condition and offer a model of writing about the built environment that uses dialectical motion to move thinking forward. First, he advocates for writing across the disciplines, as a means of expanding relevance and attempting to reach a broad audience. Beginning design students are encouraged to draw on what they are learning in other courses, to relate their design work to other interests.

Second, in an essay entitled Learning about Landscapes (1980) Jackson advocates firsthand observation or primary research explaining that the sensual/sensorial are critical to memory and culture. He encourages writers to "recapture those sensual pleasures, and record them, for they give an emotional dimension to any landscape and keep its memory alive." The course requires weekly written responses to readings that seek to cultivate the descriptive, interpretive, critical and creative dimensions of writing. Such fullness is cultivated in the space of the response- which unlike a summary asks students to respond to the texts by relating the reading to the world around them, to wrestle with the challenging and interesting points made in the text and to continue to ask questions of the built environment through a dialectical approach that considers the argument from both sides. The written response strengthens an approach to primary research and is accompanied by a weekly photograph, creating a visual record of the work of learning to read the landscape, and more significantly making interpretation and critique into a physical personal act.

Kelly Lee, a student in the American Urban Landscape Course writes after JB Jackson,

"Since memory, in particular, creates the framework for existential depth and authentic connections between people and the environment, it would seem that the built world would foster sensory stimulation (which is the requirement of memory development). What is more, the intimacy of place is inherently a collective experience, yet in America the experience of the built environment is, more often than not, designed predominately with a single stimulation in mind. America has created an atmosphere with the most familiar of the senses - the sense of vision at her core. However, vision alone cannot sustain the sensory stimulation needed in order to arrive at a clear understanding of the environment....So much of human interaction and engagement with the natural world is based on how we perceive the landscapes around us, so it would be fatal to continue to build in the manner that we currently do. If sensory stimulation is the vehicle for perception, growth, and understanding, then why do we build bland environments filled with insipid visual experience? To impoverish the experience of place through sensory deprivation is a grave mistake and one that America must begin to restore."

Her thesis work has pursued this interest in the multi-sensorial and haptic qualities of the built environment and has found fertile grounds for design research that enhances such experience in the inner-city neighborhoods of Birmingham Alabama. Writing beyond these simplistic claims about the dominance of the visual, her thesis writing and design work challenges her to re-imagine the urban realm as a series of experiences and events that nourish a human need for sensorial connections to the environment. She is developing a design methodology based on sensorial mapping in



FIGURE 1:

text and image and site choreography that enhances a phenological connection to place. New public spaces are created by thickening the experience of the passage of time; through manipulations of sound, and smell and the qualities of light, shade, and water that touch us collectively and form the basis of associations between people and place.

The third lesson that Jackson's writing imparts is a focus on the vernacular. In a move that deftly demonstrates the power of writing to unsay the world and imagine it otherwise, Jackson reconceived the vernacular, the everyday, as architecturally significant as the grand themes of art history, architectural history. In Discovering the Vernacular Landscape (1984, Yale University Press ), Jackson locates mobility and change at the heart of the vernacular and in doing so, demonstrates that an essential property of the vernacular is its unending patient adjustment to the environment. Foregrounding landscape as the site of our shared collective existence, and everyday architecture as central to understanding culture empowers students to become part of the conversation.

Alex Bonda engaged topics of mobility and change by looking around Auburn Alabama and testing the readings for resonance. The weekly responses to readings culminate with an opportunity to pick one topic for further development in an illustrated midterm paper, the topic may be directly related to studio. In Alex's case, he wrote his paper about the evolution of the truck; navigating between Jackson's theories about the adaptive vernacular, personal experiences with his workhorse pickup, and considerations of the cultural landscape in which he lives. His thesis work a year later is attempting to unsay what he perceives to be a condition of the built environment: a dominance of automobile experience, and commercial over cultural presence. To imagine this otherwise, he is designing a route through a former mill neighborhood of Asheville North Carolina that connects industrial remnants in a series of public rooms that allude not to History but to the multiple stories of the place.

The draft and revision approach to writing is used in class to help students build an appreciation of further research both primary and secondary, to hone rhetoric and poetic skills that draw others into a conversation and encourage students to develop their own critical positions. In thesis work, the refinement of the thesis question and position over the course of the year is a powerful lesson in the precision crafting of the theoretical lens. Alex's writings allow him to connect theories of *flow*- of experience so engaging that linear time dissolves, with issues of public history and cultural memory. Thesis writing requires his attention to the connections between critical inquiry and creative intentions, in this case moving towards design work that creates new urban routes and civic destinations that presence public urban histories, the everyday experiences and significant events of the Mill community in new ways.

## 2. To Unsay the World, Making Words that Change Minds

The beginning design student writing about the built environment is encumbered by what James Corner (1997) describes as a calcified language or metaphor; for example, the word Nature fails for many today to conjure an animate landscape or wild other. Rather it connotes a place out there, apart, that might be managed, toured, consumed and then protected elsewhere. Grady Clay, journalist, author, and acclaimed critic of the American landscape recommends meticulous first-hand observation and a loosening of language, "welcoming in illfitting, odd-sounding, and allusionistic words, which, when applied out of context or in unaccustomed ways, send out sparks and flashes of insight." Alabama Hotpot was the name affectionately given to our weekly seminar to capture the flavor of discussion about the built environment that brought together the Chinese contingent and the Alabama natives, a Jamaican architect from Miami and a young planner from Eastern Kentucky.

Dolores Hayden similarly suggests that the generic language used to describe the built environment and its awkward subsidized habits

must be invigorated to engage the specific, the local, and challenge the downright unsustainable. She offers a "devils dictionary": the field guide to sprawl<sup>1</sup>. This book names the myriad new patterns of development and commercial installations that are proliferating at the urban edge from alligator investment to zoomburb to litter on a stick. Her use of the field guide itself is tongue in cheek, an exclamation about the abundance and distribution of these places, and a demand that the design fields enter the dialogue. These works have inspired text maps such as Kelly Lee's sensory map shown above, and urban transects both hand drawn and cinematic that attempt to re-invigorate the language of place. Both Hayden and Clay encourage a photojournalistic approach to writing the built environment, but the key is that their work is not merely descriptive and critical. Through the use of a design methodology, such as Alex Bonda's neighborhood recollections, that acts on these insights, their work suggests new ways of making urban history, and regenerating a vital urban realm.

One way of activating the power of words, is through weekly keyword papers that ask students to choose three words that seem central to the text and research their etymology. Key words unlock or decode the readings and they can reveal and emplaced origin. The term crossroads for example refers to the crossing of two farm or wagon roads. Intersection does not suggest as much. The student argues: this class should be more about design and less about words. The word, however, leverages the intentional and creative power of writing focusing the student on a concept within the text, that plays a central role. There is a pivot point around unsaying and making otherwise. The pivot is at the root of the term theory, from theroi- which has roots in both spectator and participant. This point allows us to conceive of engagement in context and construction, as detective and designer.

Tongfei Zhou's writings used the key word boundary as point of departure. The Oxford English Dictionary defines boundary as that which serves to indicate the bounds or limits of anything whether material or immaterial; also the limit itself. Zhou explains, "the definition has evolved in the field of landscape architecture. Dennis Cosgrove said today in landscape as in every other field, intellectual and practical, the most intriguing questions lie precisely at the boundary-which is of course no longer a boundary. Virtually, the boundary is considered as the right place to create public space where interactions and transitions occur. The Chinese city now is divided up into different socially determined islands. Different social groups have their own way of lives. And the main issue is how we could program different activities and create the opportunity to make connection between these social groups. And as we see, public space is the space where strangers mingle freely and continually negotiate the boundaries and markers of society. So it is important to research how to create social connection with public space."

He constructed a design test at the interface between Beijing Forestry University and the neighboring migrant community: Liudaoku Street. This work informed a redesign approach to an industrial boundary district in Birmingham Alabama. Drawing on multiple theories within the space of writing, from Sharon Zukin's warnings about the cultural cannibalism of cities to Walter Hood's call for hybrid typologies Zhou's position has evolved into a poetic and critical design methodology that constructs public, private and civic partnerships towards an adaptive transformation of the industrial realm.

#### 3. Discovering Thirdspace

In her earlier work The Power of Place (2004) architect Dolores Hayden helps students better understand the contested nature of the public realm, drawing on Henri Lefevre's writings on the production of space as a reproduction of economic and social conditions that maintain the political economy. She argues that social history is embedded in urban landscapes and that "this subject needs to be grounded in both the aesthetics of experiencing places with all five senses and the politics of experiencing places as contested territory". Thus intentionally does Urban Studies, a reading, writing and discussion class turn from dialectics to trialectics to move beyond knowledge of contested territories to ways of seeing that activate multiple perspectives, experiences, and possibilities by design.

To do this, the course introduces new theoretical frameworks such as Elizabeth Meyer's "expanded field" and Ed Soja's articulation of thirdspace. These writers advocate beyond an either or confrontation for a "both/and" or "and/and" approach to seeing the world. This is not to throw ethical questions out the window, rather to affirm and empower diverse and potentially conflicting needs and desires for architecture and the public realm. If a model of figure/ground establishes a reading of landscape in which building and land exist in isolation or mutual exclusion, Meyer suggests that the figured ground, offers a sense of interconnection. bell hooks describes the thirdspace position as one of radical openness. She explains that in fighting against oppressive boundaries set by race, sex and class domination, the position at the margin "provides a context from which to build communities of resistance and renewal that cross the boundaries and double cross the binaries..."(Soja,1996:84).

Students are introduced to these challenging theories and attempt to re-read the American Urban landscape through this theoretical lens. Hayden's work in presencing the role of the African American community in Los Angeles helps students see that designers need to look beyond the visible, for the built environment tends to concretize dominant systems of power building over the histories of laborers, migrants, women and children that often made such places possible. The writings of George Lipsitz on "The Racialization of Space and the Spatialization of Race: Theorizing the Hidden Architecture of Landscape", introduce the concept of the spatial imaginary as a descriptive metaphor that helps students understand multiple and often disparate experiences of a place.

As the semester progressed, the Urban Theories course offered a means to develop a theoretical standpoint from which to design responses to the studio problem of developing a green infrastructure proposal for the city of Mobile Alabama. Ballard writes, "in questioning of my own "thesis", why should the citizens of Mobile care about the quality of the Mobile River and Mobile Bay if all their only transaction is made with their eyes (and minimally so)? Perhaps a combination of Kemmis (Community and the Politics of Place) and Hester



FIGURE 2:

(Design for Ecological Democracy) might produce a plausible and understandable argument for this holistic approach. It would read as such: "Through import substitution, ecological knowledge, active democratic engagement, and the union thereof, a truly sustainable and happy community await". For, as Hester states; "If we do not address daily issues of habitation, we have little chance of solving more remote ones".

Ballard's research demonstrates a thoughtful consideration of how and why the Mobile riverfront and port has changed through time. He discovered that what is currently a single use industrial port was once a variegated working waterfront. Reading in the class helped him see the landscape as a shared realm that people experience and engage differently, also a realm that is produced for hegemonic economic and political reasons. Class writing enabled him to construct his own position in relation to these theoretical perspectives, drawing together Kemmis' writings about place-based economies with Hester's writings on ecological demoncracy advance his own critical and creative position by design- unsaying the world and imagining it anew. Above he introduces a new biological layer that builds ecological health as it returns diversity and civic use to the water's edge. The paper space of writing became a place in which to challenge his own first design moves that relied of visual access to the river and to seeing new processes of water cleansing. Relating his own ideas to those of Kemmis and Hester allowed Ballard to advance a new creative design solution that layered in democratic design processes and new opportunities for place-based economies as well as attended to the need for diverse smaller scale civic opportunities at the water's edge.

## 4. To imagine it Otherwise

Re-design works through deconstructive processes and regenerative models. New vocabularies animate design that imagines new ways. To re-design we must design in context, in a context we know to be material and imaginary, dynamic and contested, conditioned by our own cultural framing. To question the existing, not merely its surfaces and situations but its underlying logics and infrastructures requires critical skills: reading, writing and dialogue. Writing is one of the spaces in which these the relationship between critical inquiry and creative intentions are examined, articulated, guestioned and revised. The continuum between writing and making architecture need not be conceived of as linear, rather co-creative in a design research process that moves across multiple fronts toward a critical and creative practice of making.

The prospect of imagining otherwise can be honed through a trialectic of primary, secondary and thirdspace research. The third position has been considered in terms of human experience excluded by binary descriptions of history as in the case of the multiple histories of Bonda's mill neighborhood project, and as a spatial condition illuminated by Zhou's work along the urban boundary. Writing becomes a space in which the consequences of the third position might be investigated and allowed to evolve. Hybrid practices that bring writing together with these other modes of critical and poetic thinking are fertile ground for beginning designers to explore and encounter the possibilities of otherwise.

To conclude, the work points toward the need for increasing clarity in the pedagogic approach, to help students understand the cocreative relationship between modes of writing and making. It also points towards the relevance of a shared foundation in the disciplines of the built environment, to explore the theoretical constructs and evolve new critical and poetic responses to the challenges of landscape urbanism. The approach to writing cultivated in beginning design should be conceived of as a matter of lifelong practice. Writing as a process by which students can consider various ways of seeing the world, try them on so to speak, while allowing their own thoughts to expand and grow will enrich and enhance design process. Moving beyond responses towards the crafting of a critical position challenges and enables students not only to unsay the world but to imagine it otherwise.

## Figures

**1.** Sensory map and photograph by Kelly Lee, 2009

2. Design proposal by Dan Ballard, image was produced under a grant supported by the Mississippi-Alabama Sea Grant Consortium Omnibus program and University of Southern Mississippi. Grant: Charlene LeBleu, PI, Enhancement of Bioretention to Promote Civic Hydrology and Sustainability for Coastal Cities through Innovative Planning, Design, and Engineering of Stormwater Management, Utilization and Control, Mobile, AL. 2009 – 2010.

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## PLACE SETTING: MAKING WRITING Making Writing

PETER P. GOCHÉ, LECTURE IOWA STATE UNIVERSITY

## Introduction

Architecture is about constructing the event as much as it is about providing the shelter for its associated rituals. Our disciplinary chore, as it relates to the Arts and Humanities, is to mine the gap that exists between the logic of objects and that of its figure; between a *people* and their anticipated surroundings. Our obligation as disciplinarians is to reestablish our methods of production in effort to construct artifacts that elevate the importance of a dynamic experience over theoretical ideals.

When thinking about design, one is confronted with a fundamental paradox: it simultaneously encourages and resists making specific to a *people*. The characteristic is pervasive. It is a quality found in individual inquiry as well as in the collective oeuvre of our discipline. While design promotes innovation and adores ideas of bodily engagement, it has become reliant (almost exclusively) on various means of production which privilege standardized information with regard to human criteria over that which is particular and sincere. It is a product of the deducible context of contemporary culture and building. This paradox is, in a sense, the essence of my work.

The following paper will consider the role of writing in an interdisciplinary pedagogy that seeks to comprehend the experiential nature of lived space. My perspective is anthropological with specific interest in material culture and ritual. I will discuss ethnographic writing as part of a whole research methodology to which I refer as "place setting." This process of inquiry consists of two other basic precepts: making memoir and phenomenological staging. Each of these systems of thought work to inform the other and cumulatively serves to help define the criteria for making ethno-specific propositions.

# Making Memoir: Constructing a Personal Account

Because meaning and significance constitute our existence as human beings, we deepen our diurnal quest to unearth that to which our makeup belongs. From this excavation into our state of being universal emerges a binding affair between self and its evolution. To know our experience, and that of a people, is to embrace our own origins, evolution and eccentricities.

#### Ethnographic Writing: Making Scientific Analysis

Anthropology is the science that studies peoples past and present, their cultures, and their histories as groups. When anthropologists undertake a study of an unfamiliar culture, they typically write ethnography. Ethnographic studies look at the patterns of interpretation that members of a cultural group invoke as they go about their daily lives. An ethnography is a highly descriptive overview of a group's knowledge, it beliefs, its social organization, how it reproduces itself, and the material world in which it exists.

In short, ethnography is a process referred to by Clifford Geertz as "Writing Culture". Its implementation is dependant on writing field notes; an essential occasion in which the researcher creates jottings (brief texts) based on firsthand (lived) experience while amongst the study group. The purpose of making an ethnographic field report is not only to describe and explain, but also to unfold a view of the world in which cultural alternatives can be measured against one another and used, here, as a guide for the design process.

#### Phenomenological Staging: Synthesizing the Human Contribution

Continuity of meaning and value is the essence of cultural identity. Their recognition as agents

in the sustainability of a particular group is developed through experience. Every experience is constituted by interaction between "subject" and "object," between self and its world. In an experience, things and events belonging to the world are transformed through the human context of that world. We, who are external to this world, are changed and developed through intercourse with its material culture.

The following inquiries are the pedagogical manifestation of a desire to comprehend the experiential nature of lived space. The act of producing such a material survey serves as an agent for anticipating its architectural potential. Like ethnographic studies, their purpose is to unfold a cultural view of the world. As such, each effort is the embodiment of a performance agenda that has to do with authenticating our comprehension of the corresponding items of experience through memory, anecdote and ritual.

## Case Study One

In the spring of 2007 I conducted an undergraduate level studio that lead to individually developed architectural design projects that explored the relationships between identities and urban housing. The housing project required that each student consider the way people live together - both within an individual dwelling and in the larger community. There is a broad range of scales that this community of residents must address; from a group living space in an apartment, to the public circulation on a floor, to the shared functions and services within the building, to the way the residents of this building interact with the site and neighborhood, to the shared space of the street, to the character of the neighborhood and the type of people who live here, to the history and culture of this locality, and to the experience of living in New York. In preparation for the generative sequence, each student was asked to engage in the precepts for "place setting" as previously outlined. All of the scales of community were to be addressed individually to create an integrated urban project rather than just an apartment building. One student's criterion for "place setting" was developed based on the following memoir, ethnography and phenomenological staging.

#### Memoir: Cleanliness by Blake Fisher

He never understood cleanliness. It was always in anticipation of someone that rarely arrived. Anticipation of an opportunity to show off security, to shout to someone that we've made it. In a family that is completely normal; maybe there are strange things about them, but they have too secure a lifestyle to allow them to emerge, even to each other, at least directly. Cleanliness is the measure of that security within the most private room of their home. Without cleanliness, guests and relatives may lose faith in their affluence and responsibility.

On top of the toilet are other items to hide the bathroom's otherwise foul stench. There are lemon-scented Lysol wipes inside a blue tin bucket in the corner next to it. Mother has an affinity for blue things and how they pop against stark white. The home we live in is a blue Dutch Colonial circa1978. The toilet is the last thing to be cleaned.<sup>1</sup>

## Ethnography: To Mark by Blake Fisher

The word "tattoo" was derived from the Tahitian word "tatau" meaning to mark or strike twice. The first syllable, meaning hand, is repeated twice as a description of the action of tattooing while the "u" signifies the addition of color. There is a unique way with which individuals apply markings or meaning to their own rituals or habits. whether it be intentional or not. For these people, and I suspect for most people, meaning is applied out of necessity. In this specific case, breakfast was the only routine occasion in which all members of this family participated. They all realized this, being sure to note that breakfast was the only mealtime in which they spent significant time together. The interesting thing about this breakfast time and the importance and meaning applied to it by this family was its looseness. There was no hesitation to allow me into their home during this most sacred of times. Perhaps the most important time for Harv; Letitia and Hugh's only son.

The marking in this case could be the actual decision-making process. Actually choosing to make something an important moment in <u>one's day is equally</u> ritualistic as the act of

<sup>1</sup> Blake Fisher, Cleanliness.

breakfast itself. Similarly, the act of Hugh's tattooing served an important meaning or marking that had bearing for both Let and Hugh. In Let's case, it was an act she could live through, a creative means with which to identify. For Hugh, the act of making the tattoo was more important than the particular applied meaning. For him, the tattoo was merely a body graphic that the bearer should be proud of, not for it's meaning, but for its quality.2

## Phenomenological Staging: Assemblage by Blake Fisher

The assemblage was basically a continuation of the drawing/volume analysis we had done of the toilet. I chose to pursue another type of seat (the rocking chair) as the object of analysis for my assemblage. Through deconstruction and, reciprocally, reconstruction, the metal structure of the rocking chair's seat became the primary armature for further iteration. The original canvas fabric, that had been patched, re-patched, and torn, was draped over the armature. The various iterations employed minor modifications that dealt with the various holes in the reconstructed seat. Being that the assemblage was also occurring during the time Fisher was conducting his ethnographic fieldwork, some of those holes started to get covered with additional fabric onto which photographs of his informants had been transferred. Eventually the addition of a hand thrown ceramic bowl by Letitia was placed on the protruding rocker rail.

## The Nook by Blake Fisher

Being that breakfast was the primary meal during which the family was together, a nook seemed an appropriate articulation for the general mealtime space. The lower stair landing and a U-shaped bench bound the space of the nook. Within these spaces Fisher sought to shape a new sequence of areas associated with the occupants routine domestic practices and, thereby, create conditions that cultivate a way of life that is spatially individuated. This spatial intercourse signifies a distribution of ritualized modes regarding hygiene and recreation that are interrelated.

Additionally, the hard barrier/threshold of the bathroom door is questioned by placing

2 Blake Fisher, To Mark.

an additional sink just outside the bathroom, adjacent to the living room. This sink serves the purpose of providing an intermediary zone outside the cleansing chamber where one can wash their hands and face while being connected to the social space of the apartment. In the ethnography, he recorded an incident during which Harvey (the son) runs to the bathroom (where his mother is showering) and takes her lipstick. He then returns to the living area and proceeds to put the lipstick on, after which, Hugh leads Harvey back to the bathroom to clean the marks off his face.

## Case Study Two

In the fall of 2008 I conducted a graduate level studio that lead to individually developed architectural design projects that explored the relationships between architecture, cultural landscapes and biological issues based on the previous research. With emphasis placed on regional sites in Iowa, our studio concentration focused on the one-mile gap between two towns, Slater and Sheldahl. Special focus was placed on local food production and distribution - namely: Community Supported Agriculture (CSA). In preparation for the generative sequence, each student was asked to engage in the precepts for "place setting" as previously outlined. The assignment required the participants to develop a contemporary program based on their own research and site analysis in effort to develop a plausible land use plan and facility design strategy that would support the practices of an existing CSA while imagining the gap between the two towns as a locally sustainable place. One student's criterion for "place setting" was developed based on the following memoir, ethnography and phenomenological staging.

## Memoir: RR2 Box 73 by Lauren Strang

From Trumm's to Heim's; a fence line behind the machine shed, to beyond a crest in the field across the road. This was Dad's workplace. This was my playground. The farm was one hundred eighty acres, split by an asphalt strip; Highway 136. To its east, pig pasture and soybeans, to its west, a cornfield. Within the seasonal green frame of crops, up to 1,000 head of hogs and sows grunted, pushing their stouts into feeders, the steel lids bouncing almost rhythmically upon withdrawal. Perched atop a long hill, just off the center of the property, sat (and still sits) our farmhouse and buildings. Here in the house yard and road ditch, Mom cultivated her own crop of flowers, vegetables, tomatoes and strawberries. Her garden persevered through the winter on shelves in the basement cupboards; jarred beans, tomatoes, sweet pickles, dill pickles, applesauce, jelly and jam. None of this was novel. To me the farm was home, just as a farm was home to most of my community. The experiential richness of my upbringing was unknown to me, as it had to be.<sup>3</sup>

#### Ethnography: Mutualistic Production by Lauren Strang

Neither Curt nor Connie Bronnenberg envisioned a future in beekeeping, but for the past twenty-one years, they have owned and operated Spring Valley Honey Farms. The couple currently lives on an eleven-acre farm near Perry, Iowa, where they extract, process, and package honey collected from their 2,000 honeybee colonies. Aided by two employees, Curt distributes hives early spring and in mid-July begins collecting honey-filled combs. From then, the honey extraction process takes place on the Bronnenberg farm twice a week, 8 hours a day with all four assisting. Depending on the yield, this process can continue up to three months. Early November the colonies are sent to California to pollinate almond trees. In Iowa, the Bronnenbergs spend the winter repairing and repainting hives. The majority of the Bronnenberg's honey crop is sold wholesale in 50-gallon drums, and a small percentage is bottled in 4 oz. to 1 gallon jugs to be sold resale at local grocery stores and farmers markets. Connie also uses the beeswax to produce hand lotions, lip balms, and hand lotion bars.4

## Phenomenological staging: Brood Chamber by Lauren Strang

The Bronnenberg's ethnography takes form in a brood chamber of a beehive (fig. 3), obtained from their farm. Within the chamber are ten frames. Encased by an empty brood comb on one end, and empty super (honey) comb on

- 3 Lauren Strang, RR2 Box 73.
- 4 Lauren Strang, Mutualistic Production.

the other, the remaining eight frames hold photographs with corresponding captions. Printed as transparencies, the photographs maintain an ambiguity of perspective and direction of reading. The organization of the frames, reflecting the aspects of work and family, places activity in the center (activity of the users of space whether bees or humans), from which spatial conditions are formulated (the house, place of work, combs).

#### Honeybee Farm by Lauren Strang

The design of the 13.5-acre farm incorporates the reintroduction of a variety of native Iowa plant species, which were selected based off growing conditions, existing soil types, and the plant's dependency on the honeybee for pollination. Furthermore, consideration was given to the timing of blooms, so as to extend the period of availability of nectar. The residence (fig. 4) was designed with effort to allow the activities occurring within spaces to articulate the formal nature of the envelope. Attention to daily rituals and temporally shifting routines informed the interior organization of spaces within the home. Special emphasis was placed on the design of the kitchen. Contained as freestanding element, the kitchen reflects the circulation of produce through the home.

Strang's experience with the Bronnenberg family lead her to design, on multiple scales, a farm based on the evolutional spatial efficiency of a honeybee colony: from the soil conditions influencing vegetation; the buildings arrangement on the site; the orientation and interior layout of the residence; down to the organization of the kitchen and its corresponding equipment. By allowing the activities occurring in the 'space between' to inform the constructed forms, an acknowledgment is made to the numerous small elements that ultimately defined a larger form and ultimately our comprehension specific to the development of honeybee colonies.

#### Conclusion

The transference of cultural studies to an architectural proposition is a difficult task. The effort to do so was given over to students in the second year of study. Our intent in doing so was to attenuate the research through a case study that allowed for varying perspectives by students from a diverse array of educational and geographic backgrounds to apply and question the knowledge and resources particular to the work at hand. The case study served a number of functions, but we suspect its most important may well have been to provide structured trajectory by which to engage material culture and the space of domestic practices.

To this end, the act of producing such inquiries of space serves as agent in the cultivation of a specific architectural way of thinking. Like ethnographic studies, the purpose of constructing "place settings" is to unfold a more acute view of the world. This process of inquiry is the embodiment of an interdisciplinary agenda that has to do with engaging in new perspectives such as asserting self as scribe, anthropologist and artist in an effort to substantiate the architectural essence of lived space and define the criteria for making ethno-specific propositions.

This series of inquiries into architecture and culture are genuine recognitions, for both the authors and their audience, of inscribed spaces; the fundamental relationship between humans and the environments they occupy. In making written records of these relationships, the students not only document the narratives of those with whom they engage, but increasingly consider their own positions in that work. As such, each effort is the manifestation of a performance agenda that has to do with authenticating our comprehension of the corresponding items of experience through memory, anecdote and ritual.

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# A RESURRECTION OF NIGHT Making Writing

BRIAN AMBROZIAK AND ANDREW MCLELLAN UNIVERSITY OF TENNESSEE & TIME[SCAPE] LAB

I shall be a benefactor if I conquer some realms from the night...if I can show men that there is some beauty awake while they are asleep, -- if I add to the domains of poetry.<sup>1</sup>

- Henry David Thoreau, Night and Moonlight, 1863

This is a story a young girl gathers in a car during the early hours of the morning. She listens and asks questions as the vehicle travels through the darkness. Outside, the countryside is unbetrayed. The man who is driving could say, "In that field is a castle," and it would be possible for her to believe him.

She listens to the man as he picks up and brings together the various corners of the story, attempting to carry it all in his arms. And he is tired, sometimes as elliptical as his concentration on the road, at times overexcited – "Do you see?" He turns to her in the faint light of the speedometer.

Driving the four hours to Marmora under six stars and a moon.

She stays awake to keep him company.<sup>2</sup>

- Michael Ondaatje, In the Skin of a Lion, 1987

Douglas Darden closed his book, Condemned Building, with an excerpt from Victor Hugo's famed chapter "This Will Kill That," placing particular importance on the written word as a portable conveyor of meaning - replacing a static architecture. The words of Hugo's Archdeacon are critical to any discussion involving literature and architecture, seemingly so foreign to one another, for he claims that the two subjects were once the same entity. An examination of literary precedent reveals that the writer, and less often the designer, relies heavily on the subtle nuances of place as it transforms from day to night and year to decade in the same fashion that his characters wrinkle with time. This was never more evident than throughout the nineteenth century as writers and artists reacted to the transforming physical landscape, the loss of night's mysteries to the imposition of artificial light. Now, the ever-increasing illumination of our waking moments has turned the silence of the moonlit agrarian landscape into a distant memory and almost total fiction. With this industrial transformation, the possibility of oscillating in the uncertainty of human thought and emotion, a kind of intellectual twilight where vision succumbs to the imagination, has been eliminated from everyday life. Literature's portrayal of time and its ability to qualify experience through degrees of darkness offers a realm of opportunity for resurrecting the poetry and sublimity of night as a driving element in the conception of space. A resurrection of night challenges our conceptions of space as seen by a more majestic light than the sun, reconstituting the poetics of the night and reestablishing the potential for a symbiotic relationship between the design process and the written word.

<sup>1</sup> Thoreau, Henry David. Excursions (1962): 308

<sup>2</sup> Ondaatje, Michael. In the Skin of a Lion (1987): 1

#### **Night Fades**

I have written all this because I have thought that there might still be somewhere, possibly in literature or the arts, where something could be saved. I would call back at least for literature this world of shadows we are losing.<sup>3</sup>

In his essay *In Praise of Shadows*, first published in 1933, Jun'ichiro Tanazaki weaves between architecture, the theater, and rituals of everyday and defines a world whose richness is shaped by an absence of light. After a trip to the Warnjiya restaurant in Kyoto, where he observed that candlelight had been replaced by electricity, Tanazaki concluded, "that only in dim half-light is the true beauty of Japanese lacquerware revealed... darkness is an indispensable element of the beauty of lacquerware."<sup>4</sup> He suggests that the culinary arts in Japan depend on shadows and are inseparable from darkness. "A brightly lighted room and shining tableware cut the appetite in half. The dark miso soup that we eat every morning is one dish from the dimly lit houses of the past. I was once invited to a tea ceremony where miso was served; and when I saw the muddy, claylike color, quiet in a black lacquer bowl beneath the faint light of a candle, this soup that I usually take without a second thought seemed somehow to acquire a real depth, and to become infinitely more appetizing as well."<sup>5</sup>

Embedded in the core of Japanese culture are traditions such as the tea ceremony that pay particular attention to the control of light. The akatsuki no chaji commences prior to dawn. Water is sprinkled on the roji or garden path the previous night. The host and assistant, staying up through the night, light the garden torches, paper-covered lamp-stands, and candles in the tearoom. Waiting until they are extinguished, the host relights them just prior to the arrival of the guests. The desire of akatsuki *no chaji* is the appreciation of "the refined taste of the lingering light."<sup>6</sup> Sasaki describes the setting as ideally occurring beneath "the stars in the pitch-black firmament."<sup>7</sup> The surrounding vegetation has the depth of an "India-ink drawing. Here and there among them are lights about to go out but lingering coldly, like having an unfinished dream."<sup>8</sup> Akatsuki no chaji is related to yobanashi in that they both belong to winter and are centered on the contemplation of candlelight, and that which is illuminated by the candlelight, in a darkened tearoom. Settings such as this surely inspired Gaston Bachelard to claim that seemingly mundane objects become imbued with a poetic sense of myth. It is implied that everyday objects might too often be viewed in the ordinary or oversaturated light of day and that recognition in these objects of a parallel relationship with one's soul or imagination – both bettered by an uncommon frame of reference. This mindset comprises the soul of the introspective observer as he quietly catalogues memories of dying light on utensils or the illumination of the tea kettle "glistening as if dew-covered."

Tanazaki questions whether his readers "know that color of that darkness seen by candlelight," and comments, "It was different in quality from darkness on the road at night. It was a repletion, a pregnancy of

- 3 Tanizaki, Jun'ichiro. In Praise of Shadows (1977): 42
- 4 Tanizaki. In Praise of Shadows. 13
- 5 Tanizaki. In Praise of Shadows. 16

6 Sasaki, Sanmi. Chado: *The Way of Tea: A Japanese Tea Master's Almanac* (2002): 67

- 7 Sasaki, Sanmi. Chado: The Way of Tea: A Japanese Tea Master's Almanac. 67
- 8 Sasaki, Sanmi. Chado: The Way of Tea: A Japanese Tea Master's Almanac. 68

tiny particles like fine ashes, each particle luminous as a rainbow."<sup>9</sup> Written in 1933, Tanizaki's *In Praise of Shadows* serves as a last plea to counter the forces set in motion by the Industrial Revolution and the developing trend of the previous century to eliminate the mysteries of night. "The progressive Westerner is determined always to better his lot. From candle to oil lamp, oil lamp to gaslight, gaslight to electric light—his quest for a brighter light never ceases, he spares no pain to eradicate even the minutest shadow. So benumbed are we nowadays by electric lights that we have become utterly insensitive to the evils of excessive illumination."<sup>10</sup>

The origins of this ever-increasingly illuminated landscape so feared by Tanizaki date back to London, the world's most populous city, at the turn of the nineteenth century. "Making do, as they always had, with candles and rushlights and torches and lanterns... from a few miles away, you would have been as likely to smell London as to see its dim collective glow." In just over a decade, by 1812, the first gas lighting utilities were established in London and by 1881 other major urban centers such as New York City had put their first central power station into service, illuminating a section of lower Manhattan and giving Broadway its name "the Great White Way." Consider the significance of this undertaking when contrasted with the description of pre-illumination Manhattan found in Matthew Hale Smith's book, *Sunshine and Shadow in New York*:

No city in the world, except London and Paris, has a police which, in efficiency, discipline, and character, equals that of New York. It took many years, many experiments, and many changes, to perfect the system. Previous to 1844, New York was guarded by the "Old Leather-heads." This force patrolled the city at night, or that part of it known as the lamp district. They were not watchmen by profession. They were cartmen, stevedores, porters, and laborers. They were distinguished by a fireman's cap without front (hence their name, leather-heads), an old camlet coat, and a lantern. They kept out of harm's way, and did not visit the dark portions of the city. Thieves and rogues were advised of their locality by their crying the hour of the night. The whole city above Fourteenth Street was a neglected region. It was beyond the lamp district, and in the dark.<sup>11</sup>

As the reality of industrialization overtook the agrarian countryside, images of an untouched wilderness became symbols of the spiritual and sacred, the restorative and enlightening.<sup>12</sup> For artists and writers during this industrial transformation, the disappearing nocturnal landscape provided access into nature and the self, a way to tap into the spiritual essence of moonlight that the now glowing cities were making more difficult to see.<sup>13</sup> If the physical realm could not preserve the 'sublime' qualities of the night as defined by Edmund Burke, then it fell to literature and the allied arts to stimulate the imagination and record this disappearing and soon to become fictional night-world.

13 Sharpe, William P. "What's Out There?" Frederic Remington: The Color of Night.23

<sup>9</sup> Tanizaki. In Praise of Shadows. 34

<sup>10</sup> Tanizaki. In Praise of Shadows. 36

<sup>11</sup> Smith, Matthew Hale. Sunshine and Shadow in New York (1879): 173-74

<sup>12</sup> Sharpe, William P. "What's Out There?" Frederic Remington: The Color of Night (2003): 33

#### **Night Scribes**

Descriptions of the poetic qualities of night are a recurring theme in literature throughout the nineteenth century. Writers such as Nathaniel Hawthorne in his essay "My Kinsman, Major Molineux" (1832) react to the changing modern world and tap into darkness as a realm of silence and isolation capable of activating the subconscious. Henry David Thoreau in his journals (1837-61) retreats to the darkness afforded by nature, escaping the increasing blindness of the inhabitants of an industrial world. In Washington Irving's *Tales of the Alhambra* (1832) and Mark Twain's *The Innocents Abroad* (1869) the authors focus their attention on the awakening of two monumental architectural works by moonlight. These night scribes provide fragments of a critical body of work for reclaiming the subtleties of dusk, moonlight, and darkness and their emotive and metaphorical potential, experiences much lost to inhabitants of the modern world.

Nathaniel Hawthorne draws heavily upon the solitude of night in his short story, "My Kinsman, Major Molineux." Though a work of fiction, the setting is undeniably pre-Revolutionary War Boston. The story trails a naïve young man, Robin, from a rural upbringing as he arrives late at night in search of his kinsman, Major Molineux. Brought by ferry, perhaps paying homage to Dante and his trip into Hell in *The Divine Comedy*, the young man becomes entangled in a succession of crooked and narrow streets. Given the low-lit streets and their labyrinth-like arrangement, one of the few orienting devices is the sound of laughter. While the laughter seems to taunt Robin and his inquiries as to the whereabouts of his kinsman, vanishing around corners and forever fleeting, it provides a degree of continuity for the more fortunate reader in the tangled storyline. Tired and frustrated in his attempts, the young man peers into a church and sees the following:

There the moonbeams came trembling in, and fell down upon the deserted pews, and extended along the quiet aisles. A fainter, yet more awful radiance, was hovering round the pulpit, and one solitary ray had dared to rest upon the opened page of the great Bible. Had Nature, in that deep hour, become a worshipper in the house, which man had builded? Or was that heavenly light the visible sanctity of the place, visible because no earthly and impure feet were within the walls? The scene made Robin's heart shiver with a sensation of loneliness, stronger than he had ever felt in the remotest depths of his native woods; so he turned away, and sat down again before the door.<sup>14</sup>

The passage illuminates the spectral nature of architecture in night and questions whether man might truly glimpse the soul of an edifice. The moonlight infuses a presence and sacredness, coupled with the absence of man, into which Robin peers and contemplates his own mortality. Here the cosmic interconnectivity of his soul, that of the church and that of Nature seem palpable. Architecture, particularly in a nocturnal setting, functions as a kind of viewfinder in which the fusion of man and nature can be observed more clearly.

Henry David Thoreau's writing and journals chronicle his daily walks and provide a laboratory for his critical writings of the everyday environment. Thoreau's *Walden* (1854) is littered with passages on night, but perhaps his most telling passage:

14 Hawthorne, Nathaniel. "My Kinsman, Major Molineux." *The Complete Short Stories of Nathaniel Hawthorne* (1959): 525

I rejoice that there are owls. Let them do the idiotic and maniacal hooting for men. It is a sound admirably suited to swamps and twilight woods which no day illustrates, suggesting a vast and undeveloped nature which men have not recognized. They represent the stark twilight and unsatisfied thoughts which all have. All day the sun has shone on the surface of some savage swamp, where the single spruce stands hung with usnea lichens, and small hawks circulate above, and the chickadee lisps amid the evergreens, and the partridge and rabbit skulk beneath; but now a more dismal and fitting day dawns, and a different race of creatures awakes to express the meaning of Nature there.<sup>15</sup>

This passage, even in 1854, alludes to a kind of neglect of night by man and hints at the something indefinable about her influence. The indefinable might be better expanded upon in Thoreau's essay, "Night and Moonlight," (posthumously published in 1863) in which he cites Richter as saying:

The earth is every day overspread with the veil of night for the same reason as the cages of birds are darkened, namely, that we may the more readily apprehend the higher harmonies of thought in the hush and quiet of darkness. Thoughts which day turns into smoke and mist stand about us in the night as light and flames...<sup>16</sup>

This physical as well as psychological transformation of night is of such significance to Thoreau that he worries his readers will not fully appreciate the context of his writing, words and sentences that do not merely speak of darkness but are of darkness.

June 26. I have not put darkness, duskiness, enough into my moonlight walks. Every sentence should contain some twilight or night. At least the light in it should be the yellow or creamy light of the moon or the fine beams of stars, and not the white light of day. The peculiar dusky serenity of the sentences must not allow the reader to forget that it is evening or night, without my saying that it is dark. Otherwise he will, of course, presume a daylight atmosphere."<sup>17</sup>

Throughout his writing, Thoreau uncovers the hidden essences of the everyday and the self and gives form to the poetry of the natural world. His writings are imbued with the temperatures and sounds of the changing seasons. His subject, a world in constant poetic flux, awakens each night as twilight brings silence and reveals inner truths.

The night possesses similar unveiling characteristics in the writing of Washington Irving but in a constructed monumental realm. *Tales of the Alhambra* is based on Irving's experiences and on the stories that were told by his hosts. They exist as part historical truth intertwined with legend and artistic license. Many parallels can be drawn between Irving's work and Jorge Luis Borges's *The Thousand and One Nights* printed in the collection of his lectures entitled *Seven Nights*, both literary bridges between East and West. In *The Thousand and One Nights*, Borges tells us of the oral tradition of the *confabulatores nocturni* – men that told stories by night.<sup>18</sup> These men comprehended night not as a limiting disadvantage but as a setting capable of captivating the listener by minimizing visual distractions that might detract from the telling of the story. This tradition

<sup>15</sup> Thoreau, Henry David. The Works of Thoreau. Ed. Henry S. Canby (1937): 328

<sup>16</sup> Thoreau, Henry David. Excursions. 316

<sup>17</sup> Thoreau, Henry David. The Journal 1837-1861. Ed. Damion Searls (2009): 147

<sup>18</sup> Borges, Jorge Luis. Seven Nights. Trans. Eliot Weinberger (1984): 55

played a vital role in Irving's acquisition of his dream-like tales handed down through generations of *sons of the Alhambra*.

Sometimes I have issued forth at midnight when everything was quiet, and have wandered over the whole building. Who can do justice to a moonlight night in such a climate, and in such a place! The temperature of an Andalusian midnight, in summer, is perfectly ethereal. We seem lifted up into a purer atmosphere; there is a serenity of soul, a buoyancy of spirits, an elasticity of frame that render mere existence enjoyment. The effect of moonlight, too on the Alhambra has something like enchantment. Every rent and chasm of time, every mouldering tint and weather stain disappears; the marble resumes its original whiteness; the long colonnades brighten in the moonbeams; the halls are illuminated with a softened radiance, until the whole edifice reminds one of the enchanted palace of an Arabian tale.<sup>19</sup>

For Washington Irving, night vision enables him to travel to the enchanted place of childhood tales. His descriptions of the Alhambra transform a physical site into a dreamlike reality and convey qualities neglected by the shortcomings of traditional representational techniques. Elements such as sound, temperature, and the degrees of night are encapsulated by a waning and waxing moon. He suggests that moonlight heightens the senses by filtering vision and, melding with the atmosphere, prompts transcendence for both architecture and its perceiver, a timeless experience grounded in the imagination. Irving's description of the Alhambra serves as a kind of portal negating present time and space. Night, as it interacts with the construct, offers uncommon outward appearances that tap into the observer's chambered memories, both real and imagined. Irving concludes with the statement that his experience was "one of the pleasantest dreams of a life, which the reader perhaps may think has been but too much made up of dreams."<sup>20</sup> His experience was one of timelessness.

For now the national government has turned the Mississippi into a sort of twothousand-mile-torch-light procession. In the head of every crossing, and in the foot of every crossing, the government has set up a clear-burning lamp. You are never entirely in the dark... But this thing has knocked the romance out of piloting, to a large extent.<sup>21</sup>

Mark Twain shared a similar desire to tap into the poetics of the night landscape. In *Life on the Mississippi*, he laments the slow disappearance of the night. In *The Innocents Abroad*, Twain unearths the poetry of night surrounded by the monumental forms of an architectural landscape. His ship having been quarantined, Twain risks imprisonment by covertly rowing ashore in an attempt to summit the mighty Acropolis by night. He writes:

The full moon was riding high in the cloudless heavens, now. We sauntered carelessly and unthinkingly to the edge of the lofty battlements of the citadel, and looked down--a vision! And such a vision! Athens by moonlight! The prophet that thought the splendors of the New Jerusalem were revealed to him, surely saw this instead! It lay in the level plain right under our feet--all spread abroad like a picture--and we looked down upon it as we might have looked from a balloon. We saw no semblance of a street, but every house, every window, every clinging vine, every projection was as distinct and sharply marked

19 Irving, Washington. The Works of Washington Irving, Volume 2 (1987): 55

- 20 Irving, Washington. Alhambra (1938): 295
- 21 Twain, Mark. Life on the Mississippi (2009): 84

as if the time were noon-day; and yet there was no glare, no glitter, nothing harsh or repulsive--the noiseless city was flooded with the mellowest light that ever streamed from the moon, and seemed like some living creature wrapped in peaceful slumber. On its further side was a little temple, whose delicate pillars and ornate front glowed with a rich lustre that chained the eye like a spell; and nearer by, the palace of the king reared its creamy walls out of the midst of a great garden of shrubbery that was flecked all over with a random shower of amber lights --a spray of golden sparks that lost their brightness in the glory of the moon, and glinted softly upon the sea of dark foliage like the pallid stars of the milky-way. Overhead the stately columns, majestic still in their ruin--under foot the dreaming city--in the distance the silver sea --not on the broad earth is there an other picture half so beautiful!

As we turned and moved again through the temple, I wished that the illustrious men who had sat in it in the remote ages could visit it again and reveal themselves to our curious eyes--Plato, Aristotle, Demosthenes, Socrates, Phocion, Pythagoras, Euclid, Pindar, Xenophon, Herodotus, Praxiteles and Phidias, Zeuxis the painter. What a constellation of celebrated names! But more than all, I wished that old Diogenes, groping so patiently with his lantern, searching so zealously for one solitary honest man in all the world, might meander along and stumble on our party. I ought not to say it, may be, but still I suppose he would have put out his light.<sup>22</sup>

Like Goethe, who wrote a mere century earlier, "Nobody who has not taken one can imagine the beauty of a walk through Rome by full moon. All details are swallowed up by the huge masses of light and shadow, and only the biggest and most general outlines are visible,"23 Twain writes of architecture in a state to which few modern tourists can access. Nighttime reconnaissance and distant offshore vantage points provide him with new readings that transcend the physical realm. In "A New Refutation of Time" Borges describes a pastoral scene in Huckleberry Finn, in which Huck awakens on his raft at night. He is confused as to his location. He "recognizes the soft indefatigable sound of the water" and "he sees a vague number of stars, an indistinct line of trees...sinks back into his immemorable sleep as into the dark waters." In avoidance of oversimplification, Borges confirms the importance of the vignette as an example of the fusion of a material substance (surrounding nature) and the spiritual (the perceiver).<sup>24</sup> Night rejuvenates our perceptive soul that the day might otherwise sap.

### In That Field Is A Castle

As a poetic parallel and a literary bridge, one might compare and contrast the half-dreaming Huckleberry Finn adrift on the Mississippi River with the passenger in the following Michael Ondaatje poem:

What were the names of the towns we drove into and through

stunned lost

having drunk our way

22 Twain, Mark. *The New Innocents Abroad; or, The New Pilgrims' Progress* (2003): 251-52

23 Goethe, Johann Wolfgang. Italian Journey: 1786-1788. (1968): 156

24 Borges, Jorge Luis. "A New Refutation of Time." Labyrinths (1962): 221-222

up vineyards and then Hot Springs boiling out the drunkenness

what were the names I slept through my head on your thigh hundreds of miles of blackness entering the car

All this darkness and stars but now under the Napa Valley night a star arch of dashboard the ripe grape moon we are together and I love this muscle

I love this muscle that tenses

and joins the accelerator to my cheek<sup>25</sup>

In the two narratives one might equate the river to the road that offers place for moonlit journeys. Both passengers are in dreamlike states and not responsible for navigating; Finn's raft is moved along by the slow current of the river while Ondaatje, his head resting in the driver's lap, cannot see or recall the towns he and his companion drove through. With Ondaatje, technology (the car) too often the element responsible for distancing passengers from the surrounding landscape, ironically frames the night sky. Here, the author's sense of touch allows him a connection with the road. Finn employs his hearing and limited vision to orient himself. Similarities also exist between the Ondaatje poem and vignette from *In the Skin of a Lion* (used at the beginning of this paper and described in detail below) that speak to the essence of night.

The contrasting scenes of the two passengers frame the transition from an agrarian to an industrial landscape. This move prompted enormous reactionary works in all the arts throughout the nineteenth century, exemplified by writers such as Hawthorne, Thoreau, Irving, and Twain. Ultimately, the nocturne served artists as a bridge to modernism and a more subjective exploration of the self as exemplified in critical works such as Freud's *The Origin and Development of Psychoanalysis* published in 1910.<sup>26</sup> Alas, this tradition of drawing upon the emotive and psychological conditions of night has continued primarily in the arts outside of architecture.

Consider the elusiveness of night found in an excerpt of Borges's poem, "The Moon":

44

<sup>25</sup> Ondaatje, Michael. Cinnamon Peeler: Selected Poems (1991): 133

<sup>26</sup> Sharpe, William P. "What's Out There?" Frederic Remington: The Color of Night.

Now I shall never dare to stain Its pure appearing with a futile image; I see it indecipherable and daily And out of reach of my literature.

I know that the moon or the word moon Is a letter that was created to share In the complex scripture of that rare Thing that we are, both manifold and one.

It is one of those symbols given to man By fate or chance, which one day he May use to write his own true name, Uplifted in glory or in agony.<sup>27</sup>

Borges seems to worship the moon. The moon's ancient and hypnotic gaze evoke an indescribable feeling in the poet and the daunting task of writing about the celestial sphere seems to be "out of reach" of his words. Here the success or failure of mankind rests upon the ability to uncover the unseen creative potential found in the moon - the symbol of night. He acknowledges a connection or kinship between man and the orb, perhaps similar to that which haunted Hawthorne's Robin with such fearful realization. For Borges, the realization comes not as fear, but as acceptance of night's potential at which he strikes with the vague chisel of poetry in an attempt to give form to original genius.

While contemporary literature contains endless references to the evening hours, the allusions are not immediate reactionary statements to the transforming physical landscape that writers of the nineteenth century were experiencing. To the modern reader, the sublime qualities of night exist as a fiction erased by an industrial transformation and the gross illumination of our world. The writer Michael Ondaatje possesses a clear sense of the opportunities found in night and infuses his writing with a poetic sensibility that connects with contemporary eyes that do not see. The appropriateness of Ondaatje's poetry or literature emerges when we consider that he structures entire novels around night as opposed to many writers that might otherwise embed a description of night within the body of their work. With In the Skin of a Lion, Ondaatje creates a dialogue with the aforementioned authors of the Industrial Revolution in that the novel's political focus, the exploitation of the worker, is set against the backdrop of construction projects such as the Bloor Street Viaduct.

The presence of night or darkness in much of his work, particularly in *The English Patient* and *In the Skin of a Lion*, can be said to exist as a series of solid stone blocks at which he sets chisels of light, that brought into view or found immersed in the wrap of darkness endure as some of the most memorable vignettes in literature. This carefully crafted understanding of night serves as the ordering system for much of *In the Skin of a Lion*. The brief preface to the novel is imbued with the transcendent qualities of night as Ondaatje writes, "The man who is driving could say, 'In that field

27 Borges, Jorge Luis. *Dreamtigers*. Trans. Mildred Boyer and Harold Morland (1964): 66

is a castle,' and it would be possible for her to believe him."<sup>28</sup> The reader is made to understand that the forthcoming story is being told by a man to a young girl as their car "travels through darkness."<sup>29</sup> The poetic gesture of encasing the vignette in darkness, informs us that the entire structure of the novel is, in turn, ordered or covered in darkness.

Illuminated only by the headlights of the vehicle, "the faint light of the speedometer", and "six stars and a moon,"<sup>30</sup> the vignette is precisely crafted in that the darkened countryside, described as "unbetrayed," offers an ideal canvass for the girl to visualize the spoken words of the driver. In "A New Refutation of Time," Borges writes, "I cannot walk through the suburbs in the solitude of the night without thinking that the night pleases us because it suppresses idle details, just as our memory does."<sup>31</sup> For Borges and Ondaatje, the darkness of night removes the limitations set forth by the light of day.

In the early chapters of *In the Skin of a Lion* the boyhood of Patrick Lewis, occurs in the finely crafted and contrasting scenes. The most memorable scenes set in rural Ontario could be broken down into two classifications: scenes set in winter night or scenes set in summer night. Even the opening paragraph of the novel contains the highly intentional use of lanterns as seen by Patrick through his bedroom window illuminating a line of loggers walking in the snow "before the energy of the sun."<sup>32</sup> During summer nights, the boy deliberately turns out all of the light in his house except the kitchen. The lantern of the kitchen attracts insects to the screen door where Patrick studies them as if they were slides under a microscope. The night makes him pensive and the focus present in his studies moves beyond rote method, for the nocturnal setting slows his intake of information and allows him to achieve a poetic demeanor of enlightenment. His rural town is given no marker in his atlas - the place being "pale green and nameless."<sup>33</sup> The dreamer's curiosity prompted by night recalls the following from Thoreau's essay "Night and Moonlight":

Is not the midnight like Central Africa to most of us? Are we not tempted to explore it, to penetrate to the shores of its Lake Tchad, and discover the source of the Nile, perchance, the Mountains of the Moon, in the Central Africa of the night, there is where all Niles have their hidden heads.<sup>34</sup>

Rowland Harris, Commissioner of Public Works, would visit the Bloor Street Viaduct by night:

For Harris the night allowed scope. Night removed the limitations of detail and concentrated on form. Harris would bring Pomphrey with him, past the barrier, onto the first stage of the bridge that ended sixty yards out in the air. The wind moved like something ancient against them. All men on the bridge had to buckle on halter ropes... Before the real city could be seen it had to be imagined, the way rumors and tall tales were a kind of charting.<sup>35</sup>

<sup>28</sup> Ondaatje, Michael. In the Skin of a Lion. 1

<sup>29</sup> Ondaatje, Michael. In the Skin of a Lion. 1

<sup>30</sup> Ondaatje, Michael. In the Skin of a Lion. 1

<sup>31</sup> Borges, Jorge Luis. "A New Refutation of Time." *Labyrinths*. Ed. Donald Yates and James Irby (1962): 223

<sup>32</sup> Ondaatje, Michael. In the Skin of a Lion. 7

<sup>33</sup> Ondaatje, Michael. In the Skin of a Lion. 11

<sup>34</sup> Thoreau, Henry David. Excursions. 316

<sup>35</sup> Ondaatje, Michael. In the Skin of a Lion. 29

Harris is startled from his nocturnal ruminations on the bridge as he sees several nuns, confused in the darkness, move towards the unprotected edge past the construction barrier. One of the nuns is blown off of the bridge and, unbeknownst to him is saved by the heroic and acrobatic Temelcoff by catching her just as she fell past. We are told of Temelcoff's abilities as a bridgeworker:

For night work he is paid \$1.25, swinging up into the rafters of a trestle holding a flare, free-falling like a dead star. He does not really need to see things, he has charted all that space, knows the pier footings, the width of the crosswalks in terms of seconds of movement...He knows the precise height he is over the river, how long his ropes are, how many seconds he can free-fall to the pulley. It does not matter if it is day or night, he could be blindfolded. Black space is time. After swinging for three seconds he puts his feet up to link with the concrete edge of the next pier. He knows his position in the air as if he is mercury slipping across a map.<sup>36</sup>

Temelcoff's indifference to night makes him an anomaly. After being pulled to safety, the nun assists Temelcoff, having dislocated his arm in the saving act, to a nearby restaurant. The nun observes the strangely decorated interior through the darkness and slowly comes to the realization that "the darkness represents a Macedonian night where customers sit outside at their tables." Light is deliberately controlled "so when customers step in at any time, what they are entering is an old courtyard of the Balkans. A violin. Olive trees. Permanent evening. Now the arbor-like wallpaper makes sense to her. Now the parrot has a language."<sup>37</sup>

#### This Will Save That

...when Camoens' candle would go out, the poet would continue to write his poem by the light of his cat's eyes. The candle is no more, but it once existed. It began its vigil while the poet began his poem. The candle led a communal life, an inspiriting life along with the inspired poet. Line after line, in the fire of inspiration the poem unfolded its own ardent life by candlelight. Every object on the table had its glimmer of light. And the cat was there, sitting on the poet's table, its tail white against the inkstand. It was gazing at its master, at its master's hand moving over the paper. Both candle and cat were watching the poet with his fiery gaze. The gaze was everything in that little universe of the lighted table in the worker's solitude. How then could everything else not maintain the fervor of his gaze, of his light? A decrease in one is offset by increased cooperation from the others.<sup>38</sup>

A driving force in literature, the representation of night, and therefore its true consequence, has ironically all but been extinguished from the discipline most responsible for its creation. The paucity of architecture in thoughtful relationship to aspects of night becomes apparent only when acknowledging prejudice towards architecture in sunlight. Examples of architects reflecting upon the night landscape as a significant element of their design process are rare. Étienne-Louis Boullée comments in his manuscript, *Architecture, essai sur l'art*:

I was in the country, on the edge of a wood in the moonlight. My shadow produced by the light caught my eye (it was certainly nothing new to me). Because of my particular mood, the image seemed to me of an extreme melancholy. The

- 36 Ondaatje, Michael. In the Skin of a Lion. 35
- 37 Ondaatje, Michael. In the Skin of a Lion. 37
- 38 Bachelard, Gaston. The Flame of a Candle (1988): 26–27



shadows of the trees etched on the ground made a most profound impression on me. My imagination exaggerated the scene, and thus I had a glimpse of all that is most somber in nature. What did I see there? The mass of objects stood out in black against the extreme wanness of the light. Nature offered itself to my gaze in mourning. I was struck by the sensations I was experiencing and immediately began to wonder how to apply this, especially to architecture. I tried to find a composition made up of the effect of shadows. To achieve this, I imagined the light (as I had observed it in nature) giving back to me all that my imagination could think of. That was how I proceeded when I was seeking to discover this new type of architecture.<sup>39</sup>

With his design for Newton's cenotaph, Boullée took up Diderot's old challenge: "I defy the most daring of our artists to suspend the sun or the moon in the middle of his composition...I defy him to give us a sky like nature's, sprinkled with glittering stars as it might be on the clearest night."<sup>40</sup> Tales of Carlo Scarpa and his earlier countryman Giovanni Battista Piranesi exist about surveying sites under the light of candle to single out fragments in a kind of indirect vision. Peter Zumthor proposes that one might begin the design process in a realm of darkness. He imagines architectural space as a mass of pure shadow upon which you add light as if you were "hollowing out the darkness" and allowing light to seep in as its own mass.<sup>41</sup> More seldom than not, however, architectural representation remains static in its presentation of time and the consideration of changing environments outside of the technological considerations associated with temperature. Zumthor references the work of Inger Christensen who begins her poem "Alphabet" with: "The June night exists. The June night exists... and no one in this flying summer, no one understands that autumn exists, the aftertaste and the afterthought,"42 in describing the underlying nature of beauty as absence. Christensen's poem speaks to the immediacy of perceptual experience that often dominates the architectural process.

Thomas Carlyle writes in *Sartor Resartus* that "tangible products" are said to be reduced to the categories of "Cities...Fields...and Books" with the worth of books "far surpassing that of the two others."<sup>43</sup> The intent behind citing this passage emerges not from being partial to the written word, but to establish a sympathizing companion to the more often cited chapter "This Will Kill That" and out of optimism that the transformative power of literature evident here will inspire architecture and expand upon traditional practices of imagining and representing space. Our intent remains to unearth myths contained throughout literature and in so doing resurrect the poetics of night for architecture.

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# ROADS AND MONUMENTS: READING THE LANDSCAPE FOR OPPORTUNITIES TO CONSTRUCT Making Masters

KRISTINA H. YU, ASSISTANT PROFESSOR UNIVERSITY OF NEW MEXICO

The attraction of the architecture program for a graduate student must lie in its complex history and location as a perceived bridge between the arts and sciences. A wide range of very curious and thoughtful technically minded students as well as abstract thinkers have traditionally been drawn to architecture. It may be a common goal amongst many programs to engage and encourage this diverse collection of students through a challenging program. The paper will dissect three areas of the MARCH 1 third semester project called the descanso<sup>1</sup> studies. The project is designed to challenge graduate students coming from various disciplines with the theoretical importance of drawing as a traditional tool and process for designing, the struggles invested in making crafted objects and not just models, and the investigations of incorporating cultural information: found in the environment, its history, and significance into manmade objects.

The Descanso Project is not a building project but is rather much smaller and allows for an exercise in the construction of the actual artifact, not merely its representation. Within our architecture program, the first two semesters are rigorously detailed with skill building exercises: drawing by hand, crafting smaller models by hand. However, with the third semester in the M ARCH 1 program, the course is interestingly labeled the "history, theory studio." As I participate in the graduate student's education at this juncture, I am aware that they are excited to openly engage larger issues and to integrate their well practiced knowledge in other studies. Larger construction is advocated by a core group of faculty. It is tackled by and by within the curriculum. However, there are several courses: construction, structures 1, structures 2 that are paralleled with graduate studios that often time undertakes some form of construction as part of the lecture course.



#### Site and Context

The students often come from other parts of the country and are drawn to the desert landscapes surrounding our university. Therefore, in the third semester the issues of site and local become integral parts of the studio project, having projects previously deal with more theoretically universal principles of design. The third semester is organized with one shorter project (5 weeks) and a longer project (10 weeks). The descanso project is crafted

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pedagogically to challenge their drawing and making skills to the next level of proficiency, (having actually to build a full scale object approximately 6ftx6ftx6ft and to design in the 3D space, through the conventions of the trimetric drawing).

In the course, drawing is adapted as an extension of orthographic conventions the students have already learned. Using it as a design tool, the trimetric projection method offers two different perspectives: foreshortened anamorphic perspective as preview and the final perspective. The students were asked to design in trimetric. A latent but very apparent perspective emerges from the plan and elevation (or section) drawings. This drawing visually illustrates the interrelationship of plan, elevation and the 3d object in space by constructing lines that locate each point in all four different views, not unlike the working space of any 3d computer program. Therefore, the drawing exercise is a pre condition for later advanced computer graphic and topical construction courses.

# Seeing and Reading

From the passing car window, often one spots a descanso on the roadways of New Mexico. Other states also allow these temporary memorials but here in New Mexico they have a particular lasting power. Legally, the municipalities do not have the right to remove the descansos if they have been registered. Therefore, a seemingly unspectacular monument often persists longer into time than many other more formidable monuments. The monument is tenderly cared for year to year, and also many times being replaced. Possessing a potent relationship to site, there are roads that are sometimes filled with tens of descansos. The locations of the densest descansos appear in the frequented highways of New Mexico, those that often connect smaller towns with others. In an unsuspected bend in the road, a dark patch of highway, narrow straights where two lanes may pass, on and off-way ramps, there is an inextricable link between roads and descansos. The descanos represent haunting reminders of tragedies that have occurred in the road, and a frail attempt to mark and remember loved ones. This frailty is often transformed by the care and craft of



the object. A common descanso of two white wooden pieces nailed together as a cross bear names, dates, flowers, other precious mementos. The object is a hanger for many objects to be contained or strewn. On the one hand, the simplicity of it suggests that the descanso is made by a family member. However, this is often not the case. There are many local and national businesses that produce descansos. Common practice is to engage crafts people to make the descanso. Therefore, it seems fitting that architects might tackle the complex issues of memory, permanence. As a construction, the descanso challenges the aesthetic assessments of contemporary architecture. A bias emerges in design culture towards gleaming, highly crafted, machined, reproducible objects. This bias favors things which are complete, new, those things that 'work.' Descanso challenges this aesthetic. Technical requirements of the project were: detailing of attachment to ground, integration of mini solar cell units to self power the illumination at night, durability issues of materials consideration and weather appropriateness.

The descanso project presented in this paper does not end with mock ups but are ready for



use. Therefore, at the end of the five weeks time, the students have the added pressure for not only the design to be finished but also its construction. The students respond well to the heightened expectations. The quickened pace results in real break-through moments where careful design thinking, creativity, and constructional wherewithal temporarily merge.

#### Questions

The relationship of construction to concept is embodied in the challenge to last; how can it be permanent yet appropriate for a structure in is essence replaceable, what balances durability with the sense that the memorial requires care, and tending. Constructional considerations of the usual kind all apply (e.g. rethinking of the details, consideration of material qualities etc.) but to a wholly different problem: Is it even appropriate to think of the mass production of details? How can the construction be respectful to the tradition of folk artistry? How does design avoid being invasive?

Technical questions arose: How can one anchor the construction? Is it a safe place? How does one tend to the memorial regularly? What is the role of the architect or architecture in creating a memorial which has historically belonged to the realm of folk art? And even further: Is it appropriate for the architect/ designer's eye to be fixed on the descanso? How appropriate is it to mass produce descansos when each one is to be used a memory marker for individuals. If the descanso is to function as a tended object, where/ how can it be changed, maintained, cleaned, repaired?

These questions seemed to predicate an architectural design task that was meant, in part, to be incomplete until after design and construction were complete.

Without any means of illumination at nighttime, descansos disappear from the roadside. Therefore, the project was straddled with the uncommon requirement, the descanso must be self-illuminated. Photovoltaic cells were introduced and the studio studied panels, connections, etc. While at first this requirement seemed difficult to fulfill with the materials available to the students, the design solutions to many of the projects benefited from the added technical need for lighting. The ability to light the object at night transformed the presence of the object from mere stick construction to a haunting reminder at the road's side of someone's death.

Drawing with construction is an opportunity to invigorate and expand design education. In the case of the Descansos Project, the tension that one must settle between the subiect, death and architecture caused the class to question what is the role of architecture, and how much of life can architecture truly make better? Can it be an activity that renders us closer to the subjects that are so taboo, as difficult to bridge as a young person? In a way unexpected by the instructor/author, it brought sincerity to the design discussion. The project simply would not bear anyone having a cynical point of view about art, about culture about making; the project asked students to have an opinion of the difficult subject matter of common death and memorials.

#### Endnotes

1 descanso n. a roadside marker or memorial to a victim of an automobile accident. Etymological Note: From Spanish descanso 'resting place (of a dead person),' from the verb descansar 'to (have a) rest.' (double-tongued dictionary)

### BETWEEN THE HERMETIC AND THE COLLECTIVE Making Masters

DAVID HILL, ASSISTANT PROFESSOR; PATRI-CIA MORGADO, ASSOCIATE PROFESSOR NORTH CAROLINA STATE UNIVERSITY

In L'Architecture dans le Boudoir, Manfredo Tafuri asserts that cultural ideologies have relegated architects to "charming boudoirs."<sup>1</sup> Tafuri aims his critique at obscure, self-referential linguistic modes of architectural production that he characterizes as esoteric and hermetic—understood only by those who produce it. Tafuri observes that a magician's tricks are better understood "from backstage"<sup>2</sup>, and he suggests analogically that the elitist language of architectural production should likewise be demystified in favor of greater collective comprehension. Jorge Silvetti's The Beauty of Shadows answers Tafuri's critique, arguing that "the two discourses, the hermetic and the collective, seem to define the two poles of the scale of possible discourses that architecture is capable of handling."<sup>3</sup>

Both Tafuri and Silvetti suggest that architecture has its own language and therefore an explicit practical discipline. Considered together, their essays underscore architecture's challenge to communicate with both general and specific resonance.

Students with non-architecture undergraduate degrees entering the Track-3 Master of Architecture Program at North Carolina State University must complete preparatory studies (concentrated primarily in three semesters) in order to begin the final two-year program of graduate studies. This beginning "program" offers foundational courses—in the areas of design, building science/technology, history, and visual communications—that situate architecture in an expanded physical and social context. These form the basis for more specific 1 Reprinted in Hays, K. Michael, Ed. Architecture

*Theory Since 1968*. Cambridge: The MIT Press, 1998. P.167

#### 2 Ibid. p.165

3 Reprinted in Hays, K. Michael, Ed. *Architecture Theory Since 1968*. Cambridge: The MIT Press, 1998. P.278

instruction into architecture's formal and representational language.

Our initial Track-3 semester brings together a group of students with diverse undergraduate and professional backgrounds. In the past three years, only a guarter of these students entered the program with any formal experience in a design field and even fewer in architecture. While this represents potential for transformation and career redirection, it also poses an enormous challenge to students and teachers alike. Not only do the students have to adjust to a new educational culture in studio, they must also begin weaving together the multifarious aspects of a complex new subject. While at the foundational level the master's curriculum parallels second and third year courses for our undergraduates, the graduate students face unique and formidable challenges. In a single semester, they must acquire spatial and compositional dexterity as well as drawing and modeling skills to represent their designs. They are also challenged to engage in the criticaland often arcane-language of design.

As instructors, we are interested in the way that our students' backgrounds determine their initial skills and inform their transition into architecture. In polling new students, we have found that most of them are coming into an architectural education because they find the profession compelling, but also because of varying degrees of dissatisfaction with their previous educational or professional direction. Although we do not attempt to reject a student's past experience, the intensity of studio and other courses in the first semester clearly represent a shift in their focus. In the first year of our Track-3 Program, we invest a lot of effort in teaching certain prescribed design processes and the attendant vocabulary, and the courses ask students to critically consider the value of these approaches.

This paper illustrates our methods of engaging beginning architecture graduate students through collaborative teaching efforts that integrate the first semester core courses with the design studio. Our collaborative teaching model draws on professors' expertise in diverse specialties. Through integrated courses, the students are encouraged to discover how prior educational and career experiences might enrich their architecture education. Our teaching framework values both the "hermetic" and the "collective" discourses of architecture while seeking to demystify each.

In comparison to several other extended masters programs, our Track-3 program holds many similarities: it focuses on skills-based design studios and a series of courses in building technology, history, theory, visual studies and representation. The similarity in structure among numerous programs across the country is no doubt a consequence—in part—of the National Architecture Accrediting Board's requirements.

The four introductory courses explore the pre-conditions of architecture: site and historical antecedents. Architectural Design Fundamentals: Environment (Environment Studio, hereafter) forms the basis for design investigation, challenging students to consider the latent qualities of a site and how they might generate design solutions. The Environment Studio's investigations are coordinated with Architectural Drawing, a class that instructs students in site sketching, perspectival delineation, and orthographic projection. Natural Systems and Architecture (Natural Systems, hereafter) introduces students to observational and analytical methods that produce physical and experiential readings of site. All of these courses are intertwined with An Introduction to World Architecture (World Architecture, hereafter) to present these students with a new set of skills, initial body of knowledge, and the culture of the architecture discipline.

Within our Track-3 program, we have established a practice of "syncopated collaboration" between first-year instructors that allows courses to maintain degrees of both autonomy and integration. This collaborative model recognizes that each class has an inherent organizational structure: *Environment Studio* operates on a thematic framework, *Natural Systems*  is configured within a topical structure, *World Architecture* is arranged along regional/chronological lines, and *Architectural Drawing* focuses on skills acquisition. This mode of teaching enables professors to establish a trajectory for their individual courses and to coordinate at various times throughout the semester when overlapping content is mutually beneficial. Consequently, the courses develop a rhythm of "syncing in" and "syncing out" with each other.

The program has evolved over the past decade to address social, technological, and professional changes. In fact, many of these changes have provided impetus for more collaboration between instructors. The evolution has occurred along four closely related paths: curricular coordination, individual course development, new courses, and collaborative teaching efforts.

Our faculty has established a method of collectively evaluating studios at the end of each year, and these meetings revealed the need for greater curricular coordination of learning objectives between the first year studios. Professor Wendy Redfield has worked to establish closer pedagogical goals linking the Environment Studio and Architectural Design Fundamentals: Form (Form Studio, hereafter). In Environment Studio, students investigate the relationship between environment and built form, with special emphasis on design proposals that consider solar orientation, climate, topography, vegetation, and constructed context in relationship to user needs. Form Studio establishes relationships between idea and form using composition and precedent as parameters for generating, developing, and justifying architectural form.<sup>4</sup> Both studios are now built on a common language and of analytical and synthetic diagramming techniques that provide a "sturdy framework for a thoughtful and informed design process."5

Within the last ten years, courses have shifted focus or added content to maintain pedagogical and practical relevance. Digital media and sustainable design, for instance, have become increasingly vital topics in archi-

<sup>4</sup> North Carolina State University (NCSU) Course Catalog, ARC 404 Architecture Design Fundamentals: Environment

<sup>5</sup> ARC 403 Architecture Design Fundamentals: Environment Syllabus, Prof. Wendy Redfield

tectural discourse. Through **individual course development**, many of our classes—*Digital Representation* and *Natural Systems*, in particular—now include aspects of each.

Even though digital media is now established as a significant tool in architectural production, there is still no consensus in how schools teach digital applications. Rather, anxiety and experimentation seem to characterize most approaches to digital pedagogy. The speed with which software companies produce new applications induces a restlessness among faculty members that leads to constant reconsideration and re-tooling of digital instruction. In some programs, this results in an expanded slate of computer courses, while other schools relegate instruction to studios. Our introductory course, Digital Representation, operates outside the purview of a design studio, and though the title implies an emphasis on end-products, the course content has been amended to underscore the role of computers in the entire design process. The course attempts to cover a decidedly broad range of topics. It challenges students to develop digital drawing and modeling skills, and to cultivate a critical understanding of how digital media can be engaged to effectively represent design ideas.

Natural Systems has long established a program ethos that insists on the importance of thoughtful building-to-site relationships. Nat*ural Systems* employs project-based exercises that "introduce significant concepts of landscape and site design, along with a foundation understanding of biophysical nature, enabling students to design and plan more responsively and more responsibly."<sup>6</sup> Its focus on site planning complements the co-requisite Environment Studio. Though Natural Systems has always concentrated on site analysis, climate, soils, water, and topography, it now places more acute emphasis on sustainable design practices, land planning, and integrated infrastructure.

Architecture schools routinely offer new elective courses each semester to engage emerging issues in the profession, but the foundational course offerings remain much more constant. In the past several years, we have added three

6 ARC 211 Natural Systems and Architecture Syllabus, Fall 2009, Prof. Robin Abrams **new courses** that strategically address students' core competencies particularly in architectural history, drawing, and digital media, all of which are required for offered within the first year of the Track-3 program.

Under Professor Kristen Schaffer's guidance, the history course expanded to two semesters in the first year to offer a more comprehensive examination via *World Architecture* and *History of Western Architecture* (*Western Architecture*, hereafter). *World Architecture* presents a history of the built environment (buildings, urban planning, and associated arts) in western and non-western cultures that ranges "from dawn of civilization to dawn of modern era, including high-style architecture, vernacular buildings, and traditional forms."<sup>7</sup> Western Architecture covers the beginnings of the Renaissance in Europe to the late 19th century in the United States.

In addition to altering the history sequence, in 2001 the Architecture faculty instituted changes in the delivery of drawing skills to guarantee that students acquire proficiency in both traditional and digital modes of exploration. Until 2001, students were expected to pick up hand and digital representation skills in the studio context, but in time, this pedagogy proved "unreasonable and detrimental to [students'] development."8 Thus, a new course was introduced to specifically cover both traditional drawing and digital representation. But, due to the vastness of the course's content. in 2006 the faculty opted to separate the content in two partner courses: Architectural Drawing that covers traditional forms of representation, and *Digital Representation* that exclusively focuses on computer-aided modeling techniques. While Architectural Drawing is required only of Track-3 students who have not previously completed an equivalent course, Digital Representation, is required of both Track-3 and sophomore students.

Perhaps the most challenging and likewise most rewarding change in the last few years is a more collaborative teaching scheme and a set of coordinated courses in the first year. Our **collaborative teaching efforts** coincide with

7 North Carolina State University (NCSU) Course
Catalog, ARC 241 *History of World Architecture*8 ARC 450 *Architectural Drawing Course Action Form* developed by Professor Wendy Redfield.

current professional prerogatives that call for more tightly integrated design methods and coordination between a various consultants and stakeholders.

While the foundation portion of the Track-3 curriculum parallels the second and third year core courses for the undergraduates, Track-3 students face unique and formidable challenges during their first semester. Approximately 70% of the graduate students come into the program with little to no drawing or modeling skills.<sup>9</sup> The graduate students join the program with a limited architecture repertoire most likely gained in undergraduate Art History courses and/or as a result of personal inquiry. Thus, as faculty in charge of the beginning courses, we have one semester to level the incoming graduate students to the undergraduate ones in the areas of drawing, modeling, and exposure to architecture.

To address these specific challenges, three strategies have been adopted. Students who do not bring specific knowledge in architectural drawing are required to take *Architectural Drawing*. Within the studio, a series of lectures, readings, and independent research exposes students to key examples of architecture. And most recently, the faculty responsible for the first semester courses collaborates to coordinate these courses as much as possible.<sup>10</sup>

The strategies have proven effective. By the end of the first semester, the work of the graduate students compares favorably to that of the sophomore students.

The pedagogy of the *Environment Studio* in the first semester has been developed by Prof. Wendy Redfield and Maurice Cox first at University of Virginia, and later at North Carolina State University.<sup>11</sup>

9 The number of graduate students that register in *Architectural Drawing* varies every year. As a reference, the number of students taking this course represented 67.7% (14 out of 21) of the graduate students in fall 2008, and 75% (12 out of 16) in fall 2009.

10 David Hill (Assistant Professor) and Don Kranbuehl (Adjunct Professor) teach the *Environment Studio*; Dr. Robin Abrams (Head of the School and Full Professor) teaches *Natural Systems*; Dr. Kristen Schaffer (Associate Professor) teaches *World Architecture*; and Patricia Morgado (Associate Professor) teaches *Architectural Drawing*.

11 To read more about this pedagogy, see, Wendy Lathrop, "Four Walls. Transformation and Assemblage." *Not Only but Also* (14th National Conference Some of the studio content has evolved in the last few years, but the pedagogical goal remains: to have the students "understand architecture as the medium through which we pragmatically and symbolically create our relationship with the natural world."<sup>12</sup> Specifically, the studio promotes the principle that buildings are "extensions of the landscapes and cities they occupy, and of the history of architecture to which they intrinsically belong."<sup>13</sup> There are four primary design exercises in the studio: Five Points Nolli Map; City Diagramming; Room and Garden; and Museum of the City.

The techniques emphasized in these projects are meant to "provide the basic building blocks of a design language and methodology essential to the more advanced levels of architectural inquiry."<sup>14</sup> The projects are also organized to allow content coordination with the other required courses: *Architectural Drawing, Natural Systems,* and *History of World Architecture*.

In pre-instruction surveys conducted among Track-3 students registered in *Architectural Drawing*, to date, not one student has expressed interest in learning how to use drawing to think visually. Rather, the students' responses range from learning how to draw plans to improving sketching/drawing skills.

In contrast to students' perception of architectural drawing as a skill that enables them to document and illustrate a project, our main pedagogical objective is for students to realize the act of drawing as a visual mode of thinking comparable to the act of writing as a verbal mode of thinking. Therefore, in addition to teaching a variety of drawing techniques and types, our goal is to encourage the use of these lessons to develop, explore, evaluate, and present their architectural ideas. This is particularly important if we expect students to switch their perception of the course from a remedial one to a course that supports their development as designers.

for the Beginning Design Student Proceedings). Pittsburg: Carnegie Mellon University, 1997, 91-98. See also, Maurice Cox, "The Collaborative City." *Not Only but Also* (14th National Conference for the Beginning Design Student Proceedings). Pittsburg: Carnegie Mellon University, 1997, 99-104.

12 ARC 403 Architectural Design Fundamentals: Environment Syllabus, Prof. Wendy Redfield

13 Ibid.

14 Ibid.

The course is structured in a relatively traditional format covering the following topics: perceptual drawing, architectural conventions, paraline drawings, one- and two-point perspectives, and presentation drawing. However, unlike most drawing courses that introduce free-hand drawing last, *Architectural Drawing* begins precisely with perceptual drawing.

With the advent of digital technology, we cannot expect that after graduation our students will draw presentation or construction documents by hand. What we can expect is that by mastering the concepts behind each drawing techniques, initially using drafting tools, students can later apply them in freehand drawing for "visual thinking." Thus, from the very beginning, we instill in students the habit of sketching in order to help them develop confidence in their free-hand drawing skills.

In addition to students bringing a diversity of backgrounds into the program, they also bring a variety of skill/knowledge levels in the area of drawing. A pre-instruction assignment, consisting of a series of drawings from a given building (plan, section, elevation, perceptual and detail drawing), serves as a starting point to discuss the course content as well as a measurement of the students' beginning skills. This information allows us to tailor our teaching on a one on one basis in order to address each student's needs.<sup>15</sup>

As stated in the introduction, we are particularly interested in weaving our courses together where possible and advantageous. A look at our calendars shows how *Environment Studio*, *Architectural Drawing*, *Natural Systems*, and *World Architecture*, work in sync toward particular assignments, and out of sync in other instances, in order for the support courses to



FIGURE 1:

equip the students with the necessary skills for the next studio phase. [Figure 1]

During the first two and a half weeks of studio, students produce a "Nolli Map of Five Points" (a neighborhood in Raleigh, NC) by applying Giambattista Nolli's mapping criteria and technique to reveal the quality and the extent of the public realm in this area of the city. The assignment requires students to use qualitative judgment to observe, analyze, and document public and private spaces as well as the threshold conditions on the site. [Figure 2]

Perceptual drawing is one of the techniques required to capture the threshold conditions. These sketches are developed within the context of *Architectural Drawing* and counterbalance the hard-line pencil drawing being developed in studio. In contrast to the studio drawing, sketches are quick drawings intended to capture the physical and spatial characteristics of a building or space. Although the sketches are not intended to be rigorously precise, they need to convey the relative proportions of all major components. As a means to stress that a sketch is one of several other drawing types that can be used to convey the

<sup>15</sup> The results of the pre-instruction assignments show that students have: a. an unclear understanding of sections (students tend to draw an interior threedimensional view); b. an unclear understanding of elevations (students tend to confuse elevation with perceptual drawing); c. difficulty managing proportions and understanding of ordering systems both in orthographic and perceptual drawings; d. problems framing their drawing resulting in many cases in having to crop and important part of the building; e. lack of thought in the layout of the drawings both as a composition and a means to communicate the design of a building.



#### FIGURE 2:

same subject, students first measure (using their body) and draw a schematicplan and elevation views of the subject before beginning the sketch, making sure that both orthographic and perceptual drawings convey the same characteristics and ordering. This simple exercise emphasizes the imperative need to know the subject they are drawing and introduces at a schematic level—the concepts of orthographic drawing. In the absence of descriptive geometry in the curriculum, setting emphasis on the direct relationship between orthographic and three-dimensional views helps develop the ability to visualize space and form by reading plans and sections.

For the following five weeks (weeks 4-9), students work on a project titled "City Diagramming", an urban analysis of Washington DC and Georgetown. This analysis requires students to identify and diagram three "armatures"<sup>16</sup> of a city: landform, passage, threshold and place (the public realm),

16 ARC 403 Architectural Design Fundamentals: Environment Syllabus, Prof. Wendy Redfield

and texture (material mass of the city). Architectural Drawing will run independent of studio during this period, focusing its attention on teaching architectural conventions and paraline drawings,<sup>17</sup> while Natural Systems content focuses on site, specifically discussing topography, hydrology, geology, and soil.

Natural Systems and Architectural Drawing are directly coordinated with the studio during the studio field trip to Georgetown. During the visit, students put into practice some of the site analysis methodologies covered in Natural Systems, and thereby gain an enhanced reading of their studio project sites. The exercise requires students to map distinct sensorial characteristics or qualities (smell, sound, light, and color) of the area they are studying, complementing the compositional/ordering system analysis done in studio. Likewise, Architectural Drawing requires students to put their skills into practice by using sketches to observe and document the site.

"Room and Garden" is the first of two architectural projects developed in studio and serves as a transition from site analysis to spatial design. For this project, students consider how one uses spaces, but more importantly, they think about the room and garden's experiential qualities. Specifically, the spaces need to amplify the experience of one of three primary natural elements (light, air, or water), and use a native plant as the main component of the garden.

At this stage, the courses will be in sync a second time. [Figure 3] On the one hand, the sensorial map previously completed for *Natural Systems* introduces students to the importance of spatial experience. Their observations on

17 Architecture Conventions are taught by having students measure and draw a space in campus. The experience encourages students to question how to represent certain situations (i.e. the stairs once they are cut) and offers an important lesson on issues of scale, changing their position from someone who documents to one who can evaluate. To build upon the earlier lessons on the direct relationship between orthographic and three-dimensional views, paraline drawing types are linked to architectural conventions. Instead of requiring two independent assignments for each of these topics, students are asked to represent a building using both drawing types in a single board. This gives us an opportunity to discuss presentation drawings and the importance the layout has in conveying a building or space.

light, color, and smell, will help them in their decision making. On the other hand, *Architectural Drawing* introduces students to one-point perspective to complement the studio's use of models as the primary media for exploration. Since to some extent, many of the concepts of perspective have been discussed from the beginning of the semester through perceptual drawing exercises, students pick up the basics of perspective very quickly. This encourages students to produce free-hand perspectives to visualize the spatial qualities of their designs.

The history course also plays a direct role in the studio during the "City Diagramming" exercise. Prof. Schaffer leads students in reading and discussing Colin Rowe's essay, "Crisis of the Object: Predicament of Texture." The text introduces students to urban figure/ground concepts and lessons that can be applied to their diagramming exercises and later "Museum of the City" design project.

"Museum of the City" is the last studio assignment and its development extends through the last five weeks of classes. [Fig. 4] Students consider the building as an element within the city they have been analyzing, and to use the "building's program to enrich, strengthen, and interweave the existing city fabric and its spatial continuity of passages, places, and thresholds."<sup>18</sup> The project is an ideal vehicle to put new or improved drawing skills into practice, first by using them to develop, explore, evaluate their architectural ideas, and to effectively convey them in presentation boards.

During this stage, a last collaboration takes place between *Environment Studio* and *Natural Systems*; however, in this case, it will be the studio experience that feeds the support course. Students use their analysis of Georgetown to prepare a "Design Brief" to meet the Washington DC zoning code.

In a recent ACSA conference, Edward Allen called on educators to "solidify our core teaching"<sup>19</sup> by focusing on basic things such as drawing and spatial composition. Our Track-3 Program seeks to instill in students values that

Twenty-first Century Curriculum (2007): p.50.

honor design fundamentals while also preparing them for later challenges.

Like similar programs in other schools, we introduce architecture to a group of new students whose educational and professional backgrounds range from sciences, engineering, the arts and humanities, and other design fields. Considering the intense primary focus on architecture during the first few semesters, we run the risk of neutralizing a student's past experience if we ask them to essentially put this experience "on hold." Even though the initial semesters offer exclusively foundational architecture courses, we found in a recent poll of Track-3 students that most consider their prior degrees/professions relevant to their new course of study during their first semester. Although the subject matter is new, students have recognized the benefits of synthesizing their prior ways of thinking with design thinking while working on studio projects.<sup>20</sup>

Evidence from the poll and interviews suggests that the focus on architecture does not preclude students from collaborating effectively with students from other degree programs, nor does it inhibit them from making more pertinent (substantial) connections to their previous degrees in future projects. Track-3 architecture students in their final year of study have the opportunity to compete in the Urban Land Institute/Gerald D. Hines Student Urban Design Competition within a multi-disciplinary team of planning, landscape architecture, and MBA students. Students participating in the ULI Competition have stated that they felt competent contributing specific architectural knowledge, and that they were well equipped to assimilate their teammates' perspectives. They may also develop a Final Project-equivalent to a thesis-in which the student initiates a research topic and a project that investigates the topic through design. Recent Final Project students have also been able to combine their previous professional and educational experiences-including journalism and environmental science-with an architectural research and design agenda.

<sup>18</sup> ARC 403 Architectural Design Fundamentals: Environment Syllabus, Prof. Wendy Redfield
19 Allen, Edward. "Closing Response." Proceedings from Cranbrook 2007: Integrated Practice and the

<sup>20</sup> Students have stated in post-studio interviews that they were able to make important connections between their prior degrees and the projects in the design studio.

Collaboration is certainly a current buzzword among professional architects and educators. In 2006, the American Institute of Architects published a series of pamphlets that detail the aspects of Integrated Project Delivery.<sup>21</sup> The Association of Collegiate Schools of Architecture has also hosted conferencessuch as Cranbrook 2007: Integrated Practice and the Twenty-first Century Curriculum-to discuss the pedagogical shifts that should occur in response to this trend toward more collaborative practice. At Cranbrook, teams of educators and professionals speculated on various possibilities, and proposed new curricular models. Conference organizer, Joyce Nooe noted that among the teams' propositions, "collaboration was the common thread that stitched most of the academic proposals to interdisciplinary, professional, civic, and social endeavors."22 John Senhauser's writing team also stated that "to be an integrator, one must move from master to collaborator, seeking diverse intellectual content."23

The question, however, is not whether or not we should collaborate, but rather how we can collaborate in a manner that values specific course content, academic freedom, and the imperative that students understand the synthetic nature of architecture. As professors with competing agendas and contractual expectations, the coordination process can be difficult to maneuver. Ernest Boyer points out that "on campuses across the nation, there is recognition that the faculty reward system does not match the full range of academic functions and that professors are often caught between competing functions."24 In short, while effective teaching is expected, other forms of scholarship including research and publication are typically valued more highly in tenure and post-tenure reviews. Professors must find other motivations-pedagogical incentives, perhaps—that help to justify the initial challenges of collaboration. For us, payback from

syncopated collaboration has come in several forms: greater awareness and knowledge of course content outside of our particular areas of expertise, shared teaching loads, less redundancy between courses, greater connections to adjunct faculty, and increased dialogue that focuses on common curricular goals.

For students, there can be challenges in participating in overlapping courses. The system relies on a certain degree of co-requisites that necessitates that the students follow a strict semester-by-semester schedule. Stepping off of the prescribed schedule can result in an uncoordinated slate of classes. Some students have also reported that some highly-synchronized classes can create "combined anxiety"<sup>25</sup> in which failure in one course gets amplified in another. For the students, however, the most positive result is a more integrated understanding of the hermetic and collective qualities of architecture and the curriculum.

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Nooe, Joyce. "A Comparative Summary of Team</sup> Presentations." Proceedings from C (2007): p.38.

<sup>23</sup> Senhauser, John, et. Al. "Everything is Changing." Proceedings from *Cranbrook 2007: Integrated Practice and the Twenty-first Century Curriculum* (2007): p.41.
24 Boyer, Ernest L. *Scholarship Reconsidered*.San Francisco: Jossey-Bass, Inc., 1990: p.1.

<sup>25</sup> One student used this term in a post-studio interview to describe the effect of two closely synchronized courses during his second semester.

### DISCOVERY IN PROCESS: DEFIN-ING A SYNTHESIS BETWEEN MANUAL AND DIGITAL CRAFT Making Masters

# Preamble: Process and the Overlap of Manual and Digital Craft

Virtual three-dimensional modeling, in any of its forms, is not an emergent craft. The ideas and techniques presented here aren't new. However, the rapid evolution of software and computing potential demands a digital pedagogy that translates conventional principles of design process into the language of digital design. Virtual design is a craft that has the potential to influence the architectural design process of conception, development, and visualization. However, despite having established a firm foothold in the industry and education of architecture, the role of digital design in its development is still relatively undefined. Often digital, three-dimensional modeling is relegated to a presentation tool in mainstream architectural practice. It has little impact on the conception or the development of space. Craft is a term almost exclusively used in reference to manual techniques for making. However, with the capabilities of virtual design becoming more extensive and versatile, architects are becoming digital craftsmen. This is a proposal that explores the possibility that design software can become an integrated component of the iterative process; that it can add to a way of thinking through making. The question posed here is one of digital design, and its role in a long established process of iteration. This paper seeks to identify correlations between ways of making, and proposes a project that addresses a pedagogical model for integrating manual and digital technologies in the conception of architectural space. Student work from this project will be used as a case study for the proposed pedagogical model.

With projects in both industry and academia being entirely realized in a virtual environment the question "how does a virtual environment alter the way we make and design?" is a relevant one. Central to this question is the way JAMES ECKLER, ASSISTANT PROFESSOR OF ARCHITECTURE UNIVERSITY OF CINCINNATI

architecture is conceived. Conception in a virtual environment is governed by control over the factors that influence design. The virtual environment enables one to strip away those factors that are superfluous to the investigation of one idea or another; form can exist without material; an assembly of objects is not obligated to resist gravity. The control over those factors that influence a design creates a virtual environment where ideas can be tested and iterated in isolation. Segregating the different facets of a design allows space to be conceived to a high degree of precision relative to the idea being studied. The model can later account for influences left out through synthesizing multiple information sets.

Iteration is the foundation of the design process, and digital craft can facilitate a process of iteration in two ways: as a testing ground for spatial and formal ideas, and through media variation. The control of variables that define a virtual environment gives the designer the ability to be speculative; the digital model can be a tool for inquiry at the beginning stages of a process. The potential for iteration is also present as information is transferred from one program to another. The use of different modes of manual representation acts as a filter in the design process. Space can then be seen and understood differently as it is rendered in one media versus another. Similarly, transitioning between software applications functions as an iterative filter as spatial concepts are tested against different tools, and space is realized under different modes of visualization.

Space visualized in different ways presents multiple possibilities for testing and communicating architectural intent. The virtual environment can be used to simulate habitation, it can be used to test compositional relationships in space or form, and it can be used to test or represent various facets of spatial character. The virtual can be made to be a precise ana-



FIGURE 1: This figure shows the use of multiple software applications in the representation and investigation of space, composition, and tectonics. The assembly of elements illustrated in section is merged with perspective light study renderings as a way of illustrating the connection between tectonic assembly and spatial conditioning.

log for the actual, or it may be configured to indicate some ideal or imagined circumstance. The designer has the ability to occupy a design vicariously through the computer, or conditions can be abstracted to refine the focus of study or aspect of presentation.

"The business of reinterpreting each mark as it is made and thereby finding new information means that the design task as a whole is uncertain. This built-in uncertainty of the whole task derives from the uncertainty of each incremental step. A drawing takes real time, and each mark as it is made immediately becomes a new element that expands and redefines the design task."<sup>1</sup>

Each of these characteristics of virtual design has overlaps with manual ways of making; overlaps that permit a synthesis between manual and digital craft. Being selective of influencing variables overlaps with conventional processes of analysis and abstraction. Speculative design in a virtual environment overlaps with the conventional use of composition as a tool for testing ideas. The ability to manipulate the ways in which space is visualized overlaps with conventional modes of representation. In those overlaps designers might find the potential to diversify their design process and augment their capacity to generate architecture.

1 Herbert, Daniel M. *Architectural Study Drawings*. New York: Van Nostrand Reinhold, 1993.

This paper is predicated on the premise that the act of making is directly linked to conception; that making is thinking. That correlation between making and thinking defines the process of design, and guides the exploration of spatial possibilities. This principle is applicable to both manual and digital craft. In an effort to exploit the procedural possibilities of a synthesis between manual and digital craft a project was developed for a foundation graduate skills course at the University of Cincinnati. The students being from different disciplinary backgrounds were in their second academic quarter of architectural education. The skills course was coupled with a design studio wherein the students were asked to investigate the composition of tectonic elements in the creation of space and facilitation of program.

# The Plan, Section, and Arrangement of Tectonic Elements

Models were the primary tools for exploration in the studio component. These models were used to test many variations of tectonic assembly in the creation of space. In the midst of the model iterations students were asked to develop a set of plans and sections detailing those spaces and the strategies of tectonic assembly employed to create them. The plans and sections were to be hand drawn. They were to communicate the composition of spaces in the design project, the relationship between elements in the creation of space, an organizational system driving the composition, and a hierarchy of pieces.

The drawings were produced by hand for the merits of a direct connection between method and outcome. The act of drawing is not far removed from that of modeling. Pieces are manufactured and positioned in relation to one another, joints are made as lines come in contact with one another, and relationships are established through alignment, registration, and organization. Hierarchy is a direct result of pressure. Drawing by hand is a tactile, as well as visual, undertaking in which design thinking takes an active role in determining the way in which an element is made. Thinking and making were therefore paired in the conception of space as these drawings were used to advance the spatial ideas of the project rather than documenting an existing stage.



FIGURE 2: (Horizontal Orientation) Manually produced sections and plans were used to compose tectonic assemblies through the establishment of a set of organizational systems. This medium was used to create and test formal relationships between elements. The results of this process were used as a basis for virtual design

The drawings were scanned. The plans and sections were reviewed and digitally manipulated before being used as a framework for the construction of a digital model. The drawings were sized to act as a template. Scale, proportion, and tectonic arrangement were manipulated and used to configure the parameters of a virtual environment where design could continue from the vantage of inhabitation. Configuration involved establishing a relative scale, a way of measuring space both physically and perceptually, and a strategy for joining elements and arranging components.

#### The Space of Event – a Vignette

Important fragments of the drawing were cut away and used to develop virtual models of individual spaces. These spaces were considered apart from the others in the composition so that there could be a focused exploration of spatial characteristics in response to the events that would occur within them. Each virtually constructed space was considered a vignette; a short narrative that describes the experience of a space and the activities it holds. Event was the catalyst in the crafting of form and the composition of space. In the construction of the spatial vignettes the students considered ways in which the tectonic assembly of architecture could be manipulated to produce specific experiential qualities of space: the transparency of a material, the density of a screen, texture, reflectivity, joinery, the behavior of light. Each vignette was characterized by an event that the architecture was meant to house. The vignette that describes this space of event also describes the architectural response to program. It addresses not only what an occupant perceives, but also the ways in which perception is structured by architecture. The relevance of this exercise to a process of conception lies in perception and inhabitation. How does an occupant interact with built form? What are the implications of this interaction for the programming of a space? These questions are explored through the ability to occupy the spaces of the design vicariously through "cameras" established in the virtual environment. In this stage of the process students used the ability to inhabit the spaces of their invention as another iteration of the overall design; visualization as process rather than



FIGURE 3: Materiality and spatial configuration were developed in response to a prescribed event that was to occur within the space. The Spatial Vignette was a digital construct in which materiality was explored as a condition of tectonic arrangement.

document. The spaces were manipulated individually based upon perception and experience. Tectonic composition could be critiqued based on the way an occupant might interact with the forms that defined their spatial environment. The scale of assembly and the proportion of volume could be questioned and reconsidered relative to inhabitation. The virtual environment was used as an analog for the interface that exists between form and inhabitant.

With each space reconstructed based on the requirements of event, specific images were exported into another program that would enable them to be merged with the manually produced plans and sections from earlier stages of the process. This recombination of media and format permitted another iteration of the design as the individually constructed spaces were repositioned as a sequence. Making the sequence directed thought toward subjects of approach, encounter, order, and transition. It enabled the students to reflect upon and modify the composition of the original plans and sections in an effort to develop relationships between spaces based upon those issues of movement and sequence.

### The Itinerant Section – Conception and Exploration Through Space, Order, and Proximity

Students were to use collage as a technique to position the vignettes relative to one another and investigate the linkages between them as a path from one to the next. This was a hybrid drawing consisting of a synthesis of media as well as a synthesis of drawing type. The stu-



FIGURE 4: (Horizontal Orientation) Vignettes are spliced together using collage. The relationships established between spatial moments define a designed sequence of approach, movement, and encounter. Itinerary is investigated as a result of arrangement and characterized by tectonics.

dents were asked to join the hand-drawn plans and sections with various modes of image output from the virtual. The drawing was to be primarily considered as a section jogged and folded along the path through space. Additionally, plan, elevation, and perspective were to be integrated at moments where they would be useful in communicating notions of spatial arrangement or formal assembly. These itinerant sections were used as exploratory tools to script the way an occupant moves through space from one programmed moment to another, and to use this transition as a way of specifying the perception of space and event.

"An external condition is required in the process, something that will introduce a generative or transformative agent as a final layer in the diagrammatic strata. This external agent is not the expression of a desired subject, but rather must come from outside of architecture as some previously unfigured, yet immanent agent in either the specific site, the program, or the history."<sup>2</sup>

For the purposes of this project that external agent was site sequence or order. The students considered the sequence of movement in the construction of a single path through their projects. They explored ideas of arrival and the way that an occupant is introduced to a spaces and events. The notions of direction, promenade, pause and divergence were investigated as components that define movement along a prescribed itinerary. The collage directed another iteration of the design in which spaces were reconfigured, and tectonic elements were rearranged. It was not only a tool for determining the sequence of movement through space, but it also defined a hierarchy among spaces as one "vignette" took precedence over another. The path documented in this synthesis of information became a designed choreography of inhabitation and spatial relationship. It enabled students to study the continuity of spaces as they were linked together, as well as divergence as spaces were removed or held away. These relationships, defined in hierarchy and proximity, caused students to reconsider previously held design priorities. The latest studio models that were produced directly reflected the studies, discoveries, and observations made through the course of this process.

2 Eisenman, Peter. *Diagram Diaries*. New York: Universe Publishing, 1999.

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In this exercise digital design achieves a synthesis with conventional ways of making and integrates a way of thinking in virtual space with that of manual manipulation. Students were given a foundation of digital design principles that they will be able to develop independently, as well as a greater proficiency in drawing and composition. However, and more importantly, they were exposed to methods for combining their skill sets in manual craft with digital skills newly acquired. This methodology does not represent a singular position regarding the role of digital medias in process, nor does it limit the notion of craft synthesis to the technique portrayed here. Instead, students come away from this project with a procedural strategy for incorporating both manual and digital techniques for making. For this project, the potential for failure lies in composition without intent. At the moment the student gives priority to the use of compositional techniques to create interest, as opposed to actual spatial investigation, some of the desired outcomes are compromised. The design of relationships between spaces is replaced by a set of arbitrary juxtapositions. The use of tectonic assembly to facilitate a particular spatial condition is relegated to sculptural form making. The choreography of spatial sequence is reduced to manipulations of scale and proximity without correlation with event. However, the successful project uses techniques of composition as a tool for investigation and as a way of achieving those outcomes. The dialogue regarding spatial relationships, assembly, and sequence becomes more developed as the students investigate those issues through the course of the project. And, the studio design project becomes more developed as a result of the investigation. The synthetic collage prefigures future design exercises as it provides a foundation for digital design as a point of departure for other, more sophisticated explorations. As students develop as designers, they will continue to explore other possible methods and techniques for making and thinking toward the conception of space.

### PAPER TO TRAILER CON-STRUCTIONS: CONTEXTUAL RESPONSES AND PUBLIC ACTS OF ENGAGEMENT Making Real

Though it seems to be an activity which would take place quite naturally in the architectural design studio, construction is often the very opposite. Construction activities in the studio may run counter to the demands of a tightly run undergraduate architecture curriculum, particularly in the early semesters. Each studio is often required to fulfill so many educational objectives that little opportunity is left for explorations in construction. Construction activities may be noisier and dirtier than the design studio (or administrators) can tolerate. In this somewhat more cramped space for construction in the design studio which the author has encountered, a series of projects have been carried through with less emphasis on "hammer time" per se and more emphasis uncovering connections between conventional studio activities and construction. Like the legs of the coelacanth, these connections must exist of course, but may need to be believed in before they can be found to be true. On the level of pedagogy, each project represents an attempt to locate the missing link between the design studio demands for proficiency in drawing, representation and the students' natural proclivity towards construction.

This paper will discuss three projects which took place during three separate semesters with Design Studio 3 and 4 undergraduate students: 2d and 3d geometrical studies for small structures, The Mimbar Project, and The Mobile Farmer's Market. Discussions of the three projects will focus on a particular link between studio activities in early design curricula and construction which was discovered as a result of the two semesters' process. This link can be characterized generally as a sort of 'moment of truth' towards the end of the semester when the intellectual momentum of the previous assignments 'spills' into the final project. The discussion will focus on the connection between the first and third year of

KRISTINA H. YU, ASSISTANT PROFESSOR UNIVERSITY OF NEW MEXICO

architecture education that requires of the second year to provide the intellectual and thoughtful bridge between novice interest and the beginning displays of competency in professional courses. From geometers exercises to actual full scale trailer construction, it is hoped that a reflective discussion of these projects may provide insight into the potential for meaningful connections between construction and early design studio activities.

The semester is planned quite carefully. The sequence of weeks is conceived as time structured with limited, tested exercises. This has proven to be best done in the first 2/3s of the semester. The last third is devoted to a project with opportunities to work with fewer restrictions. The final project asks the student to construct at a 1:1 scale. The making of a full scale project after having completed a series of prescribed exercises has been a less daunting experience for the students. As a instructor I ask that question to myself. This moment between the first series of carefully sequenced exercised and the last project is the most frightening point of the semester for the author. This moment requires the teaching to let go, to not rely on devices for rote and iterative learning, and to trust the students' capability to think and build within the project. It is a moment where it could quite easily appear the entire first 2/3 of the semester was a waste of time. Many things can go wrong.

With each successive semester, however, fraught with the same set of anxieties, this general process of teaching (from very prescriptive exercises to full scale exercises to full scale construction) has proven to be the most rewarding way for the author to teach. It is precisely so because the process releases the students from "project requirements" (often the pitfall of many early design studio projects, highly instructed step by step processes) and allows them to impose their own standards. The most important aspect of the role of construction in these projects is that they are a means to respond to a wider, more far reaching sense of context. These projects attempt to elicit a response to local conditions, clients, even religious to political scenarios. Two methods have been tried to capture the response of students to vary different interactions with the broader community. These methods have instilled early in the students a reflective component to their education in regards to context, architecture and citizenry.

## 2D 3D Geometry

One semester at the start of Design Studio 3, I presented the class with the exercise to construct several types of polyhedra, included were variations on the geodesic spheres.

The goal of the exercise is to draw and construct the curves. Many students' entire this semester with a heavy desire to experiment with unconventional shapes and curves. To relieve the curiosity of shape and form making, the polyhedra construction was to support this desire and to extend their competencies in construction by having hand constructed and plotted points for the eventual curved surface. With this exercise the objectives were to instill a discipline and mastery of the curve. Each student was assigned a polyhedron, which they were assigned to deconstruct its geometries. They plotted on paper the flattened templates for the sphere. From there they used the laser cutter for the first time to create the many templates. From flat patterns they pieced the spheres together.

The next phase of the project is to conceive of a flatten structure transformed from spheres. Columns support the underside. Simultaneously, they were to transform the geometries to create a self supporting wall. Each exercise requires slight modifications of the patterns. Each degree of transformation encourages an edit of the complexities of the geometries. Intuitively the students were able to remove elements that complicated the structure of the roof or the wall.

From this point the students were given the final exercise of designing a vaulted pavilion, spanning 50 ft wide and 300 feet in length with the stipulation of the thinnest member possible. This tested their ability to structural con-



FIGURE 1

ceive of geometries that produced the most effective network of strength.

#### Mimbar

Geometry again found its way back into the studio exercises and final project. In the local newspaper in Lubbock, Texas, an article reported that the Islamic Center had been vandalized. Two people had broken in and had spray painted the walls inside the mosque. The author contacted the Islamic Center to ask if the architecture class could aid in some way. Through many conversations and visits it was realized that the most beneficial way to contribute was to construct a mimbar (a kind of pulpit for the Imam). It was damaged and rendered unusable by vandalism. The conversation was timely because the Center was experiencing an expansion of their facility. With this realization, the Center's leaders approached our group if we would be interested in also tackling the wall that currently separated the men and women's' prayer spaces as a design issue. We quickly agreed that the screen/former wall was an investigation in studying many culturally sensitive issues: gender, politics of vision and view, the role of architecture to mediate the division. Throughout the semester there were many visits to American mosques located throughout the state of Texas. The students and I were looking for ways to understand the cultural references that would guide the design process and create a thorough profile of the users back at our home mosque. With each successive visit, it became interestingly conspicuous that we were engaged in a sensitive project that challenged both sides of the groups involved: the students, instructor, and the mosque members. We quickly learned that the mosque is defined by the collection of elements brought together outside and inside the mosque: the portal, the ablution fountain,

the midrib, the minaret (sometimes) and the *mimbar*.

The *mimbar* has several programs: a seat, bookcase, threshold, transportable object, series of steps, a lectern and focal point, it is a complex object. It carries religious tradition however; it is mutable to embody the transformation of the changing culture and religion of Islam. From the open ended requirements of the project the students began a rigorous training in uncovering the geometric principles present in the elaborate Islamic motifs.

A series of drawings explaining the recurring techniques of pattern making and tessellations were traced. From theses drawings, a series of bas-reliefs were made to investigate the potential for texture, light, depth, shadow, surface qualities. The catalogue of motifs was created as a class. From which the students could browse the patterns with full confidence for how the tessellations were created. They then transformed the geometries to explore the architectural qualities of light, texture, translucency, transparency, depth, shadow. The results of these studies culminated in bas reliefs that later became the panels for the *mimbar* design. The students up until this point were confident with their knowledge of geometry. The rest of the semester was devoted to designing and building a mimbar befitting the Mosque. Each student created a separate design where two solutions were adopted for further development. The class was separated into two groups. At this point the project of creating a mimbar takes on the added pressures of managing group dynamics, allocation of work all the while continuously designing away to further develop a richer object. With additional issues of management, the task of designing details still remaining, the end of the paper exercises only made more evident the ensuing potential chaos of the construction process of the mimbar.

With several nervous phone calls from the Mosque as they were preparing for *Eid*, where the *mimbar* will be unveiled, the students progressed into the final design and construction phase. Two teams developed. One team's design relied on the metaphorical relationship to the preparation for prayer and the position of the body. Therefore, the *mimbar* design reflected the body's transition from a stance to a head bow. With several hinged elements, the mimbar was unfolded into a pulpit. The second design solution, one ultimately chosen by the Mosque, relied on two discreet cubes. The cubes stood symmetrical at the front of the prayer space. When it was time for prayer, one cube could be flipped over on its edge and tumbles toward the other cube. One cube contains the steps. The other is the podium from which the Imam gives the lesson. With only weeks remaining in the semester, the anxiety mounts as *Eid* approaches. The students were clearly expressing conflict about appropriate methods for incorporating the geometric motifs, how to resolve constructional details, the problems of obtaining materials on time, the inability to resolve minor personality conflicts, all of which resemble problems in much larger construction projects. With days to go, the push for completion, brought about by the momentum in the project and the students themselves, is exciting and exhausting. There were no need for reminders, or lists of requirements to be dictated, each student plays a vital role in the ecology of design and work that have developed over the last weeks. The students themselves determined the structure and completion of the project. Each team developed their own schedule. They received regular design critique over the comprehensive relationship between design intent and the overall execution.

As a summary, the students throughout the process of researching the cultural context, explorations in geometries, interview-



FIGURE 2:

ing users, creating worksheets for fellow classmates, designing independently and in teams and ultimately creating the final mimbar were extremely diligent and became increasing motivated by the desire to complete and give the best synthesis of all their learning in the design and construction of the *mimbar* to the Mosque. From which the instructor, was a guide through the process, a voice for balancing opinions, who became an objective consultant to the students' ownership of the project scope and final construction. This process transferred the authority and heavy reliance on the instructor to create the objectives and goals of the class to the entire class. The class focus shifted subtly from the usual list of NAAB criteria for the course and the expected pedagogical goals of the instructor to the collective interest in providing what could be considered a work of architecture to the Mosque members. The motivations of class were to understand, and to craft an object previously unthinkable to the Mosque. The users of the Mosque were in their wishes and expressions amenable to many ideas. The students quite sophisticatedly understood and incorporated many common conditions of the *mimbar* while refining details, and featured heavily new interpretations of geometry. The end result far exceeded the expectations of the Mosque. The members of the Mosque were guite astonished with the level of craft and concern the students displayed for the reverent mimbar. The Mosque was intrigued and encouraged by the knowledge gained in Islam over the course of the semester by the students. They were most impressed with the students' sincere and generous search to understand the cultural and religious differences.

#### Mobile Farmer's Market

For two years prior, the author had been working with the local food bank to create a project in which the architecture students could participate in designing and implementing a construction for the food bank's farm operations. It had taken the two years to develop the trust and financial commitment from the food bank and to conceive of a project with the most appropriate scope. This time was also useful in order to strategize the project's financial scenario. Together with eighteen third-year architecture students, the author organized a project to help the local food bank to distribute their fresh produce to disadvantaged outlying communities by designing and constructing a Mobile Farmer's Market Stand. By applying their talents and skill, the students would create a new means of transport for the food bank in order to distribute fresh organic produce to low income families.

Many of the students participated in the either the polyhedra spheres project or the *mimbar* project. Therefore, the students in this semester were conversant in structural and tessellation possibilities of geometry.

When the Mobile Food Market Stand project was initially introduced, it was unclear how the exercises of previous weeks were to relate to the uncompromising conditions of Market Stand project. It was however clear that the project would be located on a trailer bed. In brief, the demands of a "trailer" appeared to be far removed from the pure geometrical structural studies that were engaged earlier.

In the design process for the Mobile Farmer's Market, students were asked to take careful consideration of the materials they planned to engage. The final material choices for fabrication reflected an increasingly awareness for the tectonic issues of a mobile structure. For example: (1: Oak pallets were disassembled, planed, sanded and the planks reused as the trailer's cladding. In the materials research phase, it was discovered that university's region is one of the largest holding areas for second hand pallets in the nation; thus a plentiful source (2: For its lightness and resistance to corrosion, aluminum was chosen as structural framing for a retractable shade canopy (3: Recycled parachute fabric was utilized. The fabric was used as thin membrane for the roof. The trailer needed to shade both produce as well as the people working the stand in the sun and heat.



FIGURE 3:

In a defining moment, the class had been struggling for the first two weeks to design the project; it seemed that a roof solution was not in sight. The proposed solution was to use a simple umbrella structure that could be modified and pinned to the bay columns of the trailer. This idea essentially did not sit well with most of the students, not because it was a bad solution necessarily but rather because it seemed to the students that this was a significant design compromise or a kind of admission of failure in the process for them. They developed an intuitive sense for what this project required. They believed that the roof structure should be simple and incorporating light spanning members. When Monday studio time arrived there was a deep and sober silence to the class of 16 students. There were two significant designs that were then presented to the class, both equally thoughtful and rendered eloquently with small models. The efforts of the class over the weekend resulted in a breakthrough, not because a demand for a new design was given, but because the student group having, struggled and worked together vigorously for already 10 weeks, realized that they were committed to finding a design by connecting with ideas previously presented to them, the geometrical studies. Once the students explained and presented the models as a raised and lowered roof structures that could be manipulated by two people, they had solved the biggest problem of the project: the operability of the roof (1. must collapse for high speed transport (2. must be easily and inexpensively operable by two people.

The challenge of solving the roof with geometric lessons from earlier in the semester was not expected by the author/ instructor; neither is such an approach seen in common trailer construction. The problem as the students posed it: Can a retractable roof for a moving trailer be made possible through a geometric construction? This is the question they asked themselves. The construction project, from either the instructor or ultimately the client, the Food Bank, did not mandate that the trailer bear any relationship to geometry.

This moment in the semester was akin to the discovery of the Coelacanth, the fish with legs which connects an evolutionary path between land and sea creatures. The author



FIGURE 4:

feels strongly that the exercises earlier in the semester, and the previous semester created an intellectual momentum which was carried into the Mobile Farmer's Market Stand project's roof construction, even though (and perhaps because) it was not required by the instructor. This momentum was amplified by the apparent disconnect between the earlier projects and the Food Market project. With the juxtaposition of the Mobile Farmer's Market project, they were able to carry on the studies of their own interest and as a challenge to intersect the Mobile Farmer's Market with geometry.

From the standpoint of teaching future practitioners, the author's experience with The Mobile Farmer's Market Stand beneficially unhinged the studio from the grading process. Instead the students felt a responsibility to and investment in the community, The Food Bank, and other local charitable organizations had donated funds and materials so that the students would be able to construct the final project. The students worked steadily towards completing their design/construction work: figuring out details for the flooring, the column structures, the cladding, the roof structure, while testing details and making mock ups for operable elements, and starting the final construction. In other words, the students themselves drove the Mobile Farmer's Market to completion.

The earlier geometrical projects, structural projects, the *mimbar* and the trailer project were opportunities to recursively work from two dimensional studies to three and back again. The projects presented in this paper do

not end with mock ups or tested trials only; they are the actual built constructions. These projects are ready to use, to be delivered to the so called clients. They are not buildings but have many of the cultural, social, intellectual and technical requirements that at any moment could unhinge the projects and render them useless. In the author's experience the students readily absorb both the requirements and ramifications of the projects. Therefore, they are keenly aware that success in the studio does not simply mean passing the course with a good project for a good grade, but instead the students respond well to the heightened expectations of all issues of the construction project writ large.

As in the coelacanth, the connections sometimes have to be believed to be true before they are finally proven to be true. The beneficial connections between the design studio and construction activities can be located. The author of this paper feels that an intellectual momentum developed early in the semester can lead to students seeing opportunity in design tasks where they would normally be unexpected. The results may yield real breakthrough moments where careful design thinking, creativity, and constructional wherewithal temporarily merge.

Construction is often tackled as an exception to the rule along with special topic seminars, which are options in the curriculum. Constructing in the studio class can further develop design thinking by offering the opportunity for failure. Each attempt at building ultimately fails in some small or some large degree. Materiality by nature creates this possibility, which should be seen as a great critical opportunity to test design. Many of the author's attempts at construction in the studio have been beset with doubt about whether it can be done, whether it will be an experience that all students could learn from, and whether there are simply too many obstacles. (dangerous equipment, liability, noise etc). With each project, it is amazing how a class can be rallied together to construct something. The experience of studio is transformed into a memory of multiple lessons, not only architectural ones related to materials, information, etc., but of social cooperation, building team leadership skills, motivation and encouragement, appreciation for a diversity of

talents. Construction projects that have long standing funding and dedicated courses often have their own rhythms, where the responsibilities of the students roles may be more clear from both sides of the class: instructors and students. With the projects that have been explored via more modest tactics, such as those presented here, the pressure for "making a building" is released. On the other hand, a whole set of unexpected problems emerge as part of the process of learning, and working together. I value the experience of having to work in this piece meal.

# MAKING CONCRETE Making Real

MICHAEL P. ZEBROWSKI, LECTURER MORGAN STATE UNIVERSITY MARK WISE, STUDIO ASSISTANT MISSISSIPPI STATE UNIVERSITY

Architecture schools typically separate the required Materials and Methods course and the design studio, creating the impression that the two have little or nothing to do with each other. This misconception goes well beyond the academic realm, as the erroneous distinction between the "what" and the "how" of architecture is seen all to frequently in professional practice.<sup>1</sup>

In analyzing Richard Serra's work it is impossible to dissociate the physical properties of a piece and the psychological conditions of its perception. Materials, processes, thought mechanisms, time, horizontality, verticality, composition, weight disorder, perspectives, Gestalt, Knowledge, structures, and physicality are some of the different aspects under which his pieces may be considered, but they are all interconnected. <sup>2</sup>

#### Introduction: Process

Material, site, body and interactivity are the building blocks and foundation for architectural design and implementation. The process by which we manipulate and understand these units to form something new, something with purpose, something beautiful, is making. Throughout a career Architects become increasingly competent in the process of making. It is apparent through the work of Peter Zumthor and Carlo Scarpa, that the more intimate the architect becomes with the process the greater the quality, character and invention of the architecture.

Integral to the pedagogy of the first year spring semester studio sequence at Mississippi State University was an emphasis on making real architecture through the understanding that materials are bound by process and subsequently, so are buildings. For these students, the material was concrete. The beginning designers found that the way we design that process of making could be integrally linked to the design of a building on a site for the body. They tirelessly researched and experimented with concrete formworks such as fabric formwork, slip casting, traditional formwork and tilt-up concrete construction. Their understanding of the process of making created a wide playing field of architectural invention, innovation and exciting design possibility.

Students were given a set of three projects designed to intimately expose them to the process of making architecture with concrete. First, students (in pairs) explored nontraditional formwork and economy of means in an adaptive reuse chair project. Next, they designed a house for a photographer applying concrete construction to specific site and programmatic needs. Finally, the semester was anchored by the ACSA Concrete Competition where students designed and constructed an eight-foot cast concrete column (in pairs), built and installed in the studio space, as a submission for the "building element" category of the competition.

#### Why Concrete?

Craftsmanship and forethought are critical in concrete design in order to avoid the mundane character the material is also capable of.<sup>3</sup>

Concrete is one of the most ubiquitous materials used in architectural construction today. Because concrete transforms from a liquid material to a solid it has the ability to take on most any form making it a very exciting material to work with. One of the beginning design studio's primary objectives is to focus on the concepts of solid and void and positive and negative space. The action of casting offers a

3 Ballard Bell, Victoria. *Materials for Design*. New York: Princeton Architectural Press, 2006: 54

<sup>1</sup> Ballard Bell, Victoria. *Materials for Design*. New York: Princeton Architectural Press, 2006: 9

<sup>2</sup> Muller, Gianfranco. *The New Avant-Garde: Issues for the Art of the Seventies*. New York: Praeger Publishers, 1972. 19.


FIGURE 1: Ben Marshall & Nick Willis – Cast Chair, ARC 1536, Mississippi State University, Spring 2009.

direct and physical demonstration that hinges students minds open to the possibilities of how space is created and manipulated through solid and void. The casting process is are also scalable so the shift from model scale to half scale to full scale is possible with a simple pallet of materials, plaster, rubber, foam core, basswood, plywood and concrete.

# Project 1: Cast Chair

The first project of the semester ran for the first two weeks, in conjunction with an annual in-house competition sponsored by the Trim-Joist Corporation. The competition's main role was to foster a consistent and devoted attitude toward designing and thinking about more sustainable practices in architecture. The Cast Chair project was designed to do three things: have the students engage in the concept of economy of means in their designs, consider the potential to manipulate recycled objects for architectural reuse, and lastly engage the body, both in the act of making as well as the subject of the final object, a chair. The students were broken up into pairs and groups of three for the assignment to begin practicing the all-important act of collaboration in design. The project statement simply asked the students to: buy or find a chair of their choosing that interested them and ultimately use the chair as the formwork for a new chair. These limitations gave the students an opportunity to focus more on the crucial aspect of building with concrete, the formwork. They were not able to fall back on their preconceptions of how to work with concrete, invention and innovation followed because it was a necessary part of a solution to the assignment.

Throughout the design process students challenged the most basic and important aspects of working with concrete in construction, with limited background knowledge and under extreme time constraints (concrete itself requires seven days to properly set, alone). They challenged the thickness, the texture and the tectonic. The pace was rigorous and the iterations were many. Students worked as if they were prototyping, they were sitting, touching and understanding the weight and mass inherent in the material.

For their poster entry to the competition the students were asked to carefully photograph the relationship between the body and the chair and submit one photograph, which would capture the relationship most successfully.<sup>4</sup>

# Project 2: Cast House

Once completed with the Cast Chair charette, the students shifted their focus and worked individually for the next eight weeks on the design of a cast house for a photographer with a site on the edge of downtown Starkville, Mississippi. The project began with an intense three part research agenda. Investigations in formwork, including but not limited to fabric formwork, tilt-up construction, cast-in-place and climbing formwork were first. Next, site analysis including a group survey done on site with a transit and story pole, and a studio-wide production of a mold for casting individual site models. And lastly, they researched the program, what type of photographer where they designing for and what would be the consider-

4 Figure 1 – Ben Marshall & Nick Willis – Cast Chair, ARC 1536, Mississippi State University, Spring 2009.



FIGURE 2: Scott Penman, Tilt Up Drawings, ARC 1536, Mississippi State University, Spring 2009.

ations that the final design needed to account for.

Students explored the work of Mark West director of C.A.S.T at the University of Manitoba, Tadao Ando, Carlo Scarpa, Rachel Whiteread, Frank Fantauzzi, as well as construction methods used in infrastructure and in industrial construction. A series of three posters ultimately documented the research portion of the project. The students became highly invested in their own research agenda because the knowledge they were finding was giving them confidence and excitement for what they were going to invent, make and design. Through artists, architects and engineers they saw common threads of intertwining art and science, the pragmatic and the imaginative.

Drawing was the major mode of representation and discussion during this part of the semester. Students were asked repeatedly to investigate the space, construction and relationship to the site through drawing. This alleviated the construction detail oriented nature of what might be considered an issue in a studio of this particular focus. The work displayed a common understanding of site, program, construction, and architectural whimsy that might be unexpected for a group of young designers.  $^{\rm 5}$ 

# Fieldtrip: Detroit Michigan

Between the start of project three and the end of project two, the students and faculty took a six-day field trip from Starkville, Mississippi to Detroit Michigan, stopping on the way in Louisville, Kentucky and Cincinnati, Ohio. The main focus of the trip was an opportunity to work and visit Cranbrook Academy of Art to meet with Bill Massie the current Architect in Residence. Massie gave the students a lecture on his work during the time at Cranbrook that also reinforced the goals of the studio.

William Massie's work utilizes computer applications and digital information as a way of redefining "formal architectural construct" - a synthesis of ideas linked to construction in conjunction with the development of a theoretical position, all in support of an attempt to redefine architectural practice and making.<sup>6</sup>

The students also had the opportunity to work with a group of interdisciplinary graduate art students on a two-day site-specific charrette. Along the way the students went to Zaha Hadid's Contemporary Art Museum in Cincinnati to see the concrete work in the building as well as the current exhibit on Tara Donovan who uses ordinary objects en masse to create extraordinary architectural installations, emphasizing both their material focus and the possibility to innovate.

After touring the studios at Cranbrook and the architecture of Moneo, Holl, Williams-Tsien and Saarinen, the students broke up into groups of six lead each by one graduate student from the Academy. The departments of Architecture, Ceramics, Photography, Sculpture and Painting were represented. The charrette statement asked the groups to design and construct a "concrete body" that referenced the body and the place. The site that these students had were scattered along on one of the most striking and architecturally powerful exterior spaces on campus, along the main axis of pools Saarinen designed coming from the Art

<sup>5</sup> Figure 2 – Scott Penman, Tilt Up Drawings, ARC 1536, Mississippi State University, Spring 2009.

<sup>6</sup> Massie, William. http://www.cranbrookart.edu/ Pages/ArchitectureDept.html



FIGURE 3: Columns Installed, ARC 1536, Missispipi State University, Spring 2009

Museum and Library peristyle. The students were given a kit of parts including a certain amount of 2x4x8s, rope, plastic tarp, screws and two bags of concrete. Which according to current Cranbrook Architecture graduate student Charlie O'Geen, 'equals a body.'<sup>7</sup>

The projects that were designed and constructed continued to reinforce the complexity that material, site, body and collaboration generate in the physical form of architecture, as well as provide another opportunity to iterate with concrete and explore the potentialities of the material. The students explored proportion and scale in relation to exterior space. They discovered and enhanced the notion of the body moving down a path. They found ways to construct the act of sitting for the purpose of sitting and they found ways to interpret the silence of the absence of body in a monumental yet subtle way.

#### Project 3: Cast Column

The final installment of the semester came full circle back to students working in pairs on the creation of a full-scale "building element" again in conjunction with a competition,



FIGURE 4: Joel Wasser, Stacking Units, ARC 1536, Mississippi State University, Spring 2009

this time the 4th Annual ACSA/PCA/NRMCA International Student Competition: Concrete: Thinking for a Sustainable World. The project statement asked the students to design and construct a full-scale eight-foot column to be placed under the "bridge" in Giles Hall. The major beam across the font edge of the bridge deflected two inches across a distance of fortyfeet and it was an objective to stiffen the beam with a series of columns.<sup>8</sup>

At this point in the semester the students were given free reign in terms of how they went about the specifics of the project. They all leaned on research and previous ideas from projects one and two but did not settle at any point, in terms of the projects development. They kept and open mind and high level of energy for the subject matter.

Throughout the final weeks solutions were varied and variety was exciting the students. The competitive nature of studio, which is typical, instead became a common design conversation between interested and knowledgeable students of architecture. Their desire to be involved and help was impressive. One of the projects was even titled "The Helping Hand" largely as helping the beam but with an obvious nod to the studio atmosphere. The final projects acted mechanically expressing their program, they were made into units, they

8 Figure 3 – Columns Installed, ARC 1536, Mississippi State University, Spring 2009.

<sup>7</sup> O'Geen, Charlie, Phone conversation with the author. February 2009.

responded to classical Greek orders, they were sculptural, some failed structurally and logistically, and one used recycled tires as formwork.<sup>9</sup> The work reinforced the technical, social, historical and pragmatic aspects that the studio was founded on.

# Conclusion

In the end, the formwork of the studio offered substantial knowledge gain through similar modus operandi by programs successfully engaged in design and construction. The ability to see failure and obtain success in the real was crucial to the students learning both the pragmatic and theoretical. This studio defined the importance of material process and its linkage to the efforts of the beginning design student in making concrete their foundational approach to architectural design and realization through the exercise of engaging collaboration, body, site and material.

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9 Figure 4 – Joel Wasser, Stacking Units, ARC 1536, Mississippi State University, Spring 2009.

#### RECONFIGURED MATTERS: FORM FOLLOWS MATER AND AFFECTIVE DETAILS Making Real

PAUL C. DEAN, PART-TIME FACULTY THE SCHOOL OF THE ART INSTITUTE OF CHICAGO

# Introduction

The integration of material, structural and building systems studies at The School of the Art Institute of Chicago are combined into one course in a series in the curriculum. It is a new, developmental and progressive approach in studying these topics and education. This particular course titled "Matters and Structures II" exposes the malleability of knowledge and learning through making. The course, as well as the graduate department, was created three years ago. It has been co-taught by Thomas Kong and myself and is still evolving.

In part it is about materiality and real affects interfering with everyday life, influencing and transforming it, altering assumptions and actions about how spaces are created and designed, and how we orchestrate through the process of making things tangible. This pedagogy explores architecture through a path that travels through creativity, failure and ingenuity in assembling part of an education by building and making tactile things. Set up as a research study with an exploration into what creates materiality<sup>1</sup> and what this means within structural and technical constraints. it allowed for generative knowledge through reacting and re-constructing. In doing so it addressed how we perceive, utilize and understand the potential affects of materials and their structural possibilities.

The process of teaching architecture and design in the event of making things has in many schools become standardized.<sup>2</sup> Design projects weave with current trends and building sciences rely on a survey of past and current technology.

The concept of teaching how to explore, create and apply knowledge within materiality and structural integration versus what to design as a form is rare. Ideally you would design with an in- depth understanding of materiality not just designing a form where its realization is fashioned from what ever structure and material will work. Fantastic computer generated forms today - driven by digital technology - fill many schools, lacking material appreciation and an integration with structural realities. Are the students today really educated on how to learn, gear imagination and do so in a creative purposeful manner? How do they experiment, fail, absorb and apply newly found knowledge to solve problems in a real physical manner for making our environment? These are some of the questions this course has attempted to address.

#### Matters

A sensitivity of materiality and human interaction at full scale, typically undeveloped in many architecture students, allowed designs to creatively foster through tactile physical problem solving. It became an event of creating real innovative structures through alternative material applications. The process of exploration guided by loosely knit boundaries, exposed students to the possibilities of an inquirerbased-learning process. <sup>3</sup> It is a pedagogy that guides students in creating avenues from which they can redirect their concepts through found knowledge, revealing an ability to analyze progress and teach themselves. The real act of creating artistically-geared innovation is examined through the physical disclosure of found potential and hands on knowledge.

The ability to experiment with materiality at full-scale developed a particular case where the

<sup>1</sup> Hays, Michael K. *Architecture Theory since 1968*. Combridge: MIT Press, 2000.

<sup>2</sup> Salam, Ashraf. *New Trends in Architecture Education: Designing the Design Studio*. Raleigh: Tailored Text & Unlimited Potential Publishing, 1995.

<sup>3</sup> Birch, William. 'Towards a Model for Problem-Based Learning.' *Studies in Higher Education*, Volume 11, Issue 1 (1986): 73–82.

student's research and theories became reality. Students curiously and specifically observed the flux of aesthetics in a material as it is altered in a manner that influenced its affects on spatial and structural capacities and behaviors. This allowed one to inhabit the material.

Faced with the real element of making tactile designed constructions, the projects in this course cultivated their own success in displaying materiality and structures as a learning foundation. Through failure and innovation in found capacities versus pure formal desire, the learning process was curved. This led to vast opportunities, evolved concepts and a better appreciation of the real physical nature of material usage through making, fusing and utilization in architecture. These explorations, some in serendipity, found new material and structural affects that grew into alternative, successful studies with new generative possibilities and applications. These studies developed through basic common materials and through the recycling of discarded products (addressing sustainability.)

A reciprocal leaning process between architect/student and material was established. The material informs of its possibilities as the student engages and reacts to found affects through previously unknown material capacities. As one explores they understand and reinvent possibilities.<sup>4</sup> They create new starting points from which to act, then react and overcome historic prejudices. New discoveries can result from this bricolage and a whole new set of directions can be laid out and potentials left open.

#### Reconfigured

Our own history of materials can elude us in experiencing an objective meaning.<sup>5</sup> They can also allude to their usage and value. Predeveloped projections and standards guide our designs and thoughts. How we typically use materials can pose as a stigmatism into their potential. The material's history can affect our experience and in some cases dematerializing it negatively through norms and given applications, removing its potential value. Typically, a material's usage results in the copy of historic notions or mimicry of found applications and random crossed referencing of disciplines or engineering standards. From an educational perspective the quality of the creative process and learning potential in this manner can be stale.

In many studies and practices exploration of materiality is left up to historic notions of use and installation. Actually studying materials and structures, in this case, at a one to one scale developed an in depth understanding into a material's possible affects and structure potential that can alter our reality of spatial qualities in architecture. Traditional (or established) pedagogy approaches structures, materials and even design with disjunction, all from alternate perspectives. There maybe structure lectures, material seminars and design studios. This is reflected in many practices, where typically a design is generated from program analyses. Materials are then chosen for their known qualities in achieving certain prescriptive means through specifications and paralleling this structural issues are resolved.

However, through an alternate approach in these studies one is geared to overcome such restraints. The potential to elevate given architectural applications drove research into the qualitative and quantitative elements of the materials aesthetical and structural properties and possibilities previously unrecognized. This included potential recycled or re-used materials.

Initial goals and theories were developed in applying a material to a simple task concerned with aesthetical and structural projections. As initial intent of a material's application either failed or required re-adjusting one's logistics, an open enquiry into discovery and potentials sought through inquisition and curiosity exposed new qualities and redirected one's possible success. <sup>6</sup> Guided by empirical tactile reality that included structural observations and calculations students were able to achieve emergent application and knowledge of materiality.

<sup>4</sup> Bruner, J.S. 'The Act of Discovery.' *Harvard Education Review*, 31 (1961): 21–31.

<sup>5</sup> Cahnmann-Taylor, Melisa & Siegesmund, Richard. *Arts-Based Research in Education: Foundations for Practice*. New York: Routledge, 2008.

<sup>6</sup> Moustakas, Clark E. *Heuristic Research: Design, Methodology, and Applications*. Newbury Park: Sage Publications, 1990.

This pedagogy explores an alternate way to study, examine and design in architecture, beyond the recent heavy-handed focus solely on form driven design. In these cases, materials' unseen properties push their potential and structural possibilities, exposing new spatial qualities and atmospheres. They also tell stories of a materials life cycle through the re-use and recycling of products in new applications.

#### Process

This is demonstrated through critical studies that realize how one can cultivate and teach themselves the process of design through the act of making and creating real environments. Beyond what to design, but how to react, overcome, and understand the reality of constructing ideas at full scale, these studies alter our current perspectives of materiality and usage in the event of making for our future environments.

Presented are four critical projects, where the importance of material exploration and its potential are redefined through re-use and new-use applications. These approaches push matters and structures much beyond the typical materials study and structural calculation courses. The process of exploration, guided by loosely knit boundaries, carried the students through two stages.

#### Form Follows Matter

In stage one, the reuse or recycling of an existing product or material was chosen – by the students - for its known qualities and possibility or potential for new alternate applications. The study included transforming this material into small usable or standard block units. These were then constructed into a "wall." The requirements included a self supportive system, creating an 8ft x 8ft separation of space utilizing material affects and potential structure of the material.

Basic questions first arose and were researched, such as what are the known properties and historic uses of the material or product.

However, imposed quickly through the reality of a full scale construction, learned procedural knowledge presented new possibilities and forms derived through materiality. In observation of presumed theories of the material and the reality of constructing, studies evolved into a new focus, understanding and appreciation through found affects and alternative applications. The projects brought into question how this material can be utilized to expose qualitative spatial affects and structural possibilities previously unrealized. This empirical knowledge was researched and utilized in more developed applications through the second stage of the research study.

#### Affective Details

In stage two, the knowledge of materiality, through affects exploration and structural potential in building the "wall", were used to inform the possibility of a another more specific program function of the material. The material studies evolved into wall systems that addressed architectural interior and exterior separation and structural concerns, derived from their alternate reuse or creative new use. This required the creation of an exterior functioning wall system drawn a 3"-1'scale to develop details and note specifications, this included structural calculations to insure its realization as a potential architectural detailed building system. The research also included future re-use of the material, life cycle cost, health and safety issues and other environmental concerns.

In this case the architect becomes the protagonist of new products and possibilities, beyond the traditional "truth to materials" and into provocation and inventor. Materials and new construction techniques are used and explored not as redundant historic mimicry but from new compositions, subjective to alternate and innovative applied meaning.

#### Projects

# Project One: Compression Balloon Tension Link Wall, into Butyl Rubber/Bladder Prefab Wall and Roof System

In the first stage, *Form Follows Matters*, the research developed out of a desire to use a bladder or air filled membrane as a buildable wall unit. Its affects and potential structural capacities were explored using the membrane

in compression and other materials in possible tension.

Its stacking and structural constraints eventually led to a wall system that was very site specific and respondent to environmental forces implemented with the inclusion of a tension system that held it in place. Cellophane used in tension compressed groupings of air filled opaque bladders. These were then structured to other groupings to create a full wall set. It developed into a wall that could expose multiple uses, such as spatial separation, seating, lighting and could either have translucent or opaque properties depending on the location of the tension cellophane or compressive bladders.

Learned behavior knowledge of the air filled membrane was applied and developed in the second stage, Affective Details, of the materials study where several potential systems were explored for possible full-wall structures. The found knowledge that an air filled membrane will expand and contract given the atmospheric state (or air temperature/density) became the new starting point of interest. Research was conducted into what causes this and how it can be controlled. A precise system was created in a pre-cast concrete wall unit that housed translucent butyl rubber spheres. These membranes located within the wall unit contracted and expanded, pulling inside and then outside, relative to the specific air density ratio. As the temperature, or relative density, of the air changed the membranes expanded or contracted creating a dynamic wall system that is responsive to the environment and becomes reflective on the internal user.

As an architectural design, it not only responds to its environment but also adjusts to the climate of the interior and exterior space. On a warm day the membranes will expand on the inside, altering that space and suggesting a possible desire to move outside. On a cold day the membranes will pull out opening the interior space, creating a larger interior environment. Structural calculations were performed on the pre-cast concrete wall units given the openings to ensure their ability to resist vertical and lateral forces this included additional strategically placed re-bars given some of the locations of the bladder openings.



FIGURE 1:

# Project Two: Re-used Mailing Tubes as Interactive Wall, into Cast Glass Interactive Wall System

This project's *Form Follows Matter* portion started out as research into a creative way to re-use found objects. It was discovered that there exists an endless supply of mailing tubes that are either trashed or make their way to re-use warehouses. These mailing tubes were used to create a dynamic interactive wall. The tubes were constructed into building units that consisted of 3 tubes bolted together in a pyramid like structure. Their stacking, structural potential and spatial affects were explored and developed through the interrelationships of adjustable units to create a multi-functional wall. This tactile exploration exposed knowledge of how loads are transferred, various con-



FIGURE 2:

nection or fastening details could be utilized, the functionality of a wall and its environmental presence.

Technical difficulties realized at one-to-one scale lead to new and alternative applications. Specifically, in how one constructs re-used objects and utilizes their potential into a stable, functioning and architectural wall system through found limitations and possibilities. By adjusting the individual building units of the mailing tubes with their over all organization, a dynamic changing wall system can be created, that alternately reflects the environment as one passes along the wall. The tube arrangements can allow for a wall that is fully reflective, strategically or seemingly random and can be utilized for storage or collection.

In the Affective Details stage, found knowledge and awareness from creating the tube wall unit were applied to a design studio program with specific wall requirements; this resulted in the creation of recycled glass into full pre-cast wall units. These cast glass walls could house the re-used mailing tubes. 2'x 8' glass panels were cast that incorporated drawn out tube sections to hold the mailing tubes. These open orifices that housed the mailing tubes allowed them to be rearranged to serve various program functions. This included an array of activities such as product storage, sound systems and lighting. As in the first study their locations could be rearranged as needed or determined for various affects.

The cast glass wall units were designed into a timber framing system that was creatively held together through internal threaded rods allowing for the glass units to cleanly incase the structure on all sides. Through just 2-3 cast unit types and the flexibility of the tubes, a full range of affects, function and program capacities can be fulfilled with an eccentric quality.

# Project Three: Cotton wall, into Wrapped Copper Wall Panel System

This research, in stage one, used as a starting base the possibility of cotton used within a wall system. The first stage of this research explored cotton soaked in various epoxies and resins. It was then wrapped around a series of elements, such as air filled membranes. These membranes in some cases were removed and in others left in place. Each individual unit was woven into two or three others creating a stackable system. Those with the air membrane still in place could progressively have the air released, altering the space aesthetically and audibly, leaving traces of its history. This wall over time, through this process created a dynamic change in its opacity, translucent nature and its ability as a sound creating wall system.

The knowledge gained through this experimentation was administered into the second phase of the research study. Found aesthetical affects, such as light transmission and controlling opacity, in the cotton wrapped wall units were instilled into a wall unit that is wrapped in copper, it also allowed for greater structural potential and external use. The use of copper



FIGURE 3:

allowed for a more stable material in nature and one that would also change over time. It provided a tensile structure for the wall unit and achieved similar affects as the wrapped cotton unit. It allowed for a controlled disclosure and light transmission as well as audible sound creation, achieved through wind vibrating the copper straps.

# Project Four: Resin Impregnated Yarn as a Building Block Unit into Recycled Concrete Building Cubes Cast in Yarn

In this project for the *Form Follows Matter* portion, a study was conducted with yarn impregnated with resin. It was then tightly wrapped around a series of different dimensional blocks. Once the resin dried the blocks were



FIGURE 4:

removed and the yarn, as a possible building unit, was explored as a stackable wall system. The study ostensibly focused around two elements – its structural potential and controlling the light relative to materiality and form. Explored through a series of arrangements this developed an understanding of the transfer of vertical forces and unique lighting and visual affects of the material through a series of compositions.

In stage two, *Affective Details*, of this study learned knowledge of structural path requirements and force distribution along with unique aesthetical affects of the material lead to a recycled concrete building cube cast from the yarn blocks. In some cases portions of the yarn were left and in others it was removed. As well some cubes were cast with an additional smaller yarn block placed within the larger one. In this case the opening became a small light transmitting apparatus. Specific colored yarn was used to create these openings generating highlights of color with in the wall implementing an eccentric system.

Several building systems were explored and structural calculations performed to determine desired results with the cast yarn cubes. Two specific systems included re-casting the cubes into a larger building unit and the other simply using the cube in a similar manner as brick.

By creating just several different units and through strategic placement, an almost endless array of wall scenarios and desired affects could create a very dynamic environment and spatial experience.

# A DESIGN[ER] EDUCATOR Making Pedagogy

#### BRIAN DOUGAN AMERICAN UNIVERSITY OF SHARJAH



FIGURE 1: .

We have moved beyond the apprenticeship system of pre-industrial design, and now we must move beyond the pupilage system of industrial design education. We need a secure foundation from which to question the relevance of conventional skills.<sup>1</sup>

Being hesitant is one thing, assiduous an other. Both entail pause, but the distinction has to do with attitude. Because designers are a courageous lot, they manage the pause as an integral and necessary piece of their design activity, not as a loss of what to do. The pause is mostly physical. While the body is at rest, the mind is at work, reflecting, analyzing, planning, scheming, judging, and dreaming. Design progress entails time - more time than we often care to admit - movement through the unknown requires an exhausting application of sensibility and reason. The pause in a designer's forward momentum is a reflective necessity in navigating unknown territory. We usually refer to this navigation as process and it is as applicable to a studio professor mapping a semester's path as it is to each individual designer. So, what is it that we do? As design studio pedagogues, do we pause to question our progress and our process? The agenda in an academic design studio tends to be predictably similar from semester to semester, from school to school, nation to nation, culture to culture.

Donald Schon calls it an epistemology of the school, keyed to predictability and control, which are essential features of all bureaucracies. (It is in

1 Cross, Nigel. *Designerly Way of Knowing*. Basel: Birkhauser Verlag AG, 2007. p46. theory) the packaging of knowledge and the presentation of replicable methods stamped into a system of rewards and punishments.<sup>2</sup>

In our quest for developing the ultimate course outline or relevant curriculum we sculpt successful learning experiences and expect them to serve us well whenever we plug in. In this current era of immediacy, a course template patiently awaiting activation might possibly be waiting in vain. Many variables comprise a successful semester and an attempt to repeat or propagate the winning formula is a fraudulent deception. A healthy alternative strives for plasticity rather than fall into the grips of dogmatic curricula and/or habitual pedagogy. Despite the illusion of successful learning outcomes, there is a pathological stasis that hinders education when the design studio agenda becomes stale or diluted with efficiency. Matthew Crawford writes a chapter entitled, Thinking As Doing in his 2009 Shop Class as Soulcraft publication to point out that,

The current educational regime is based on a certain view about what kind of knowledge is important: "knowing that," as opposed to "know-ing how." This corresponds roughly to universal knowledge versus the kind that comes from individual experience.<sup>3</sup>

Universality might compromise the potential of a design studio agenda as it tends to be a rather horizontal endeavor into generics rather than a vertical investigation into the growth and development of free thinking independent individuals. The confusion occurs because in our pursuit to teach the discipline of design we can forget that what we are really teaching, are students. Classroom practice has many

<sup>2</sup> Schon, Donald. 'Educating the Reflective Practitioner.' 1987 meeting of the American Educational Research Association. Washington, DC.

<sup>3</sup> Crawford, Matthew B. *Shop Class As Soulcraft, An Inquiry Into the Value of Work*. New York: The Penguin Press, 2009. p162.

variables worthy of attention, but this proposition is specifically concerned with the inevitable question about delivering an appropriate design education as we make our way into the future - the future ominously waiting for us in the guise of next week.

The university as a derivative of the universe and its study has an educational responsibility to society. Likewise, the design profession occupies a position in society that also comes with an explicit responsibility. Combined, the educational dimension of the creative disciplines has a unique responsibility. The distinction between a designer and a design educator is enormous. While the two professionals obvi-



#### FIGURE 2: .

ously have a lot in common, their relative position in relation to design is quite different.

The superimposition of the two characters is simple yet complex and there is so much common ground that we might not recognize that their agendas differ. Designers are responsible for the design of all kinds of things from environments to rituals, cities to furniture, products to systems. Design educators are responsible for the design of curricula and pedagogy meaning that professors are not necessarily responsible for design, but for teaching design. I am not suggesting that a design education be vocational, formulaic, or even practical, but I will argue that design is teachable and the pedagogical reality is often overlooked in lieu of a kind of simulated practice. Despite the apparent consensus and success of studio product, deployment of an architectural program is not necessarily the best way to learn how to be an architect.

I suggest that in the design studio, learning takes precedence over architecture while context has an advantage over learning. I use the term context to mean the learning environment or what Donald Schon calls the learning system, that is to say, a system capable of bringing about its own continuing transformation.

A learning system... must be one in which dynamic conservatism operates at such a level and in such a way as to permit change of state without intolerable threat to the essential functions the system fulfils for the self. Our systems need to maintain their identity, and their ability to support the self-identity of those who belong to them, but they must at the same time be capable of transforming themselves.<sup>4</sup>

What the design studio wants to be primarily is a place to learn about learning. We must in other words, become adept at learning, as learning is inherent to both designing and more importantly living. In the spirit of relevance, we must become able to transform our institutions in response to continually changing situations and requirements. Not so much as an effort to stay in tune with the times, but as an attempt to stay sincerely engaged in the activity, to be compatible with design and its association with the unknown, and to simply keep it real for everyone involved. Schon says,

Students become socialized to an institution where tacitly and automatically they think that the only thing with real value is theory and the higher and more abstract and the more general the theory, the higher the status is.<sup>5</sup>

<sup>4</sup> Schon, Donald. 'Educating the Reflective Practitioner.' 1987 meeting of the American Educational Research Association. Washington, DC.

<sup>5</sup> Schon, Donald. 'Educating the Reflective Practitioner.' 1987 meeting of the American Educational Research Association. Washington, DC.

The contrast between an academic environment and its professional equivalent is bold. In regard to learning, the proverbial academic fortress standing segregated from its larger context can in fact perform well in its lack of integration with the professional sector and its professionally scaled doctrine. We know there is an undeniable connection between the academy and the profession. We know that an education precedes the profession and we know that the profession promotes life-long learning. I think it is the dimension of learning that is the weak link in the chain. In the book, *Designerly Ways of Knowing*, Nigel Cross writes,

People think that education must be for the sake of something extrinsic that is worthwhile, whereas the truth is that being worthwhile is part of what is meant by calling it education.<sup>6</sup>

The education, excitement and generative output in an academic design studio environment is often deceiving. Cross suggests that there is something fundamental about learning that transcends disciplinary specifics. He continues by asking,

How do people learn (to design) and on what principles should design education be based? Clearly, some development of design ability does take place in students – certainly at the level of tertiary, professional education, where we can compare the work of the same student over the years of his or her course. The crude, simple work of the first-year student develops into sophisticated, complex work by the final year. But the educational processes, which nurture this development, are poorly understood – if at all – and rely heavily on the project method.<sup>7</sup>

Design academicians usually adopt a program-based product-centered agenda in the studio that contradicts lessons concerning how designers design. As educators choreograph design education we sometimes get so enthralled with site specificity, structural grids, building codes or aesthetics that we tend to overlook instruction in lieu of product. We all want to see evidence of our temporal investment, so we celebrate the product without a keen awareness of its origin. We overlook an absence of evidence, evolution or process because we so appreciate the result.

A design school is obligated to teach students how to design. The *how* associated with design is only coincidentally related to product. In an academic design environment, teaching and learning is the activity that takes precedence over design and architecture. Design students would do well to be taught to be good learners as a requisite for becoming good designers.

An architectural education could be about simply learning *how* to design because design as I have already mentioned is about negotiating change and change is one thing we can be



#### FIGURE 3: .

certain to always have to negotiate. Learning how to design is in all actuality a technique; a technique of decision making to orchestrate change with respect to time. A designer is a learner in the sense that the design process informs the designer about that which she is involved. The design process is an endeavor in learning because its result is valuable only if it differs from its point of departure. The

<sup>6</sup> Cross, Nigel. *Designerly Way of Knowing*. Basel: Birkhauser Verlag AG, 2007. p19.

<sup>7</sup> Cross, Nigel. *Designerly Way of Knowing*. Basel: Birkhauser Verlag AG, 2007. p43.

designed conclusion must be different than its conception. If not, there evidently was no process and consequently - no design.

There is not a recipe for design and one cannot find the formula posted on the World Wide Web about how it is done, but it remains teachable none-the-less. The issues most important in a design studio do not include circulation, materiality, representation or even sustainability. Nor do they include arguments concerning the use of digital and analogue tools. The academic design studio is a place to learn how to engage a process so the process has an opportunity to impact the designer's intent. The studio is an environment that fosters discovery and mishap over strategy and intention. It values the means over the end and the journey over the destination. The value of a design studio is the engagement in a process that discovers not necessarily its conclusion, but its byproduct.

This perpetual motion and change of state makes the studio environment somewhat unstable. Designers, while notoriously confident creatures never occupy solid ground. The state of affairs is consistently shifting while being processed into something else. (Architectural) education can be understood as a metaphor for the reality that change for a designer is both anticipated and celebrated. The celebration honors the fact that design is a process, meaning that design rather than being the delineation of an idea, is about the exploration and persistent transformation of an idea. Ideas and access to their multiplicity are overrated to say the least. Ideas are useful because they provide the designer something to adjust, but in and of themselves are not the objective. The intention of a designer is to make iterative adjustments to the ideas that promote change. The design studio is therefore the place for said adjustments to transpire and for brilliant ideas to be overcome by being informed by exposure to the time occupied by a design process.

I interact with colleagues every day who distrust the thought that design is teachable. In such cases there is either a misunderstanding of design or a misunderstanding of teaching. Most likely it is the latter as most design studio instructors are educated in design rather than education. A design studio under my supervision embraces the particular attitude I have constructed in this essay. The activity in my design studio is always the same, yet in fourteen years of reiteration I have never done the same "thing" twice - not because I am trying to figure out what to do or because I have not yet achieved my expectations, but mostly so I do not get bored.

The issues and concerns in my studios are consistent – always the same, yet always different. The continuity is structural and intentional. I run one project per semester that is a seamless process-rich experience in which the variety of activities and experiences are in some form or fashion woven together meaningfully. The adventure is unquestionably about keeping the activity moving in pursuit of discovery, to maintain a curious demeanor and risky behavior as we sustain a persistent state of change. Stasis is not tolerated, clarity is avoided, and finishedness is an illusive fantasy.

My studios attempt to demystify the misunderstanding that creativity is mysterious. The creative act is not a mystery. It is explicable and learnable. What to some appears to be an epiphany or divine intervention is actually a learned iterative use of time defining that which was previously indefinable. By its very definition, design reveals the unknown by negotiating change with a choreographed process, in time. I will repeat myself and state that the value of design is its reciprocity with process that discovers not necessarily its conclusion, but its byproduct.

I see learning how-to-design as something other than capturing a brilliant idea. It is something other than divine intervention or even possession of an obscure periodical the instructor has never seen. It is neither a revelation nor an epiphany and it comes not from a thought process or a dream. Rather than an intellectual a priori rationale, the time inhabited to process ideas makes design an a posteriori event. It is realized as the result of a valid time investment. The design experience as I suggested earlier, does not exclusively belong to the student. As the professor, I engage a similar process to choreograph the length of the semester. I confront some degree of the unknown every time I enter the studio and must make informed decisions about the collective direction in the spirit of teaching students how-to design. The studio objective promoting our creative human

potential is to wake up, to engage, to observe, to notice, to be present, to be aware, receptive, interested, curious, empathetic ... and most importantly to see where we are, so we can ultimately be aware of who we are. Frederick Franck in the timeless book entitled, Zen Seeing Zen Drawing describes seeing as a human function pertaining to understanding what he calls our artist-within. He says,

Seeing is not something apart from life; it is a way of being in total contact with life within and around us. The artist-within does not just look at things and loving beings; the artist-within has the capacity to see. Merely looking at the world around us is immensely different than seeing it.8

In the design studio, seeing is how we maintain orientation while we navigate the unknown. It is concerned with not taking anything for granted and overcoming preconceptions. Design discoveries are made once we get beyond the illusion of our often-shallow understanding and premature conclusions. When we are enlightened by an engagement with process, we discover that which we were not aware before. When we design, we see and we learn.

A design process has no target or preconceived destination. In this sense it is the opposite of an idea. We engage a process to overcome preconceptions. We respect the process as we rely on its direction to guide our actions. We dance with the process as it leads us into unknown territory. Mathew Crawford in Shop *Class as Soulcraft* describing his inquiry into the value of work suggests that while working, we be attentive in a way of a conversation rather than assertive in the way of a demonstration.9

Such a dialogue promotes a revelation whereas a demonstration assumes authority that might be questionable or undeserved. The relationship between a designer and a process is not dominated by the designer. The designer for all intents and purposes, is following the direction of the process, which is not saying the designer is passive without a crucial role in the event. Crawford explains that while we know not where we are going, we are aware of the direction because attentiveness has a certain direction. (One) is not just passively receptive to data, but is actively seeking it out.<sup>10</sup> A process requires our keenest attention. We must stay alert while the process persists for the discovery we seek depends on our attentiveness. Working on our attentiveness is one of the important reasons we draw. Crawford as a student describes an experience in a drawing lesson, he says ... something happens where it is pointed out something right in front of my face, but which I lacked the knowledge to see.11

Engagement in a design process is similar to the gift of seeing in that it can illuminate those



FIGURE 4: .

dimensions of the creative experience we tend to neglect or bypass. The process enhances

<sup>8</sup> Franck, Frederick. Zen Seeing, Zen Drawing, Meditation In Action. New York: Bantam Books, 1993. px.

<sup>9</sup> Crawford, Matthew B. Shop Class As Soulcraft, An Inquiry Into the Value of Work. New York: The Penguin Press, 2009. p82.

<sup>10</sup> Crawford, Matthew B. Shop Class As Soulcraft, An Inquiry Into the Value of Work. New York: The Penguin Press, 2009. p90.

<sup>11</sup> Crawford, Matthew B. Shop Class As Soulcraft, An Inquiry Into the Value of Work. New York: The Penguin Press, 2009. p91.

our perception and focuses our attention. It presents us with information that under less intense circumstances would be mistaken as irrelevant or overlooked as obvious.

A design process is a messy endeavor and the environment in which it happens is consequently a messy place. On one hand, the mess presents itself in physical disarray as the designer flounders from one experiment to the next gradually establishing a transformed understanding and leaving a trail of various material in the wake of the investigation. The studio gets dirty. If the studio is not dirty, there is no design. The state of mind as one negotiates the accumulated matter of an exploration in the studio is a different manifestation of the mess. A baroque disorientation consumes the designer as she makes her way through the discovery process. It is always tempting to bypass the aggravation of the mess and focus on a familiar target, but the nature of the activity requires the designer to dwell in the legibly unclear and comprehensibly out of control experience to render it clear. The objective of engaging a process is to make some new sense of what was previously unknown or not yet understood. The task at hand is to realize what needs to happen. Realize, meaning to make it real.

If the design studio is conducted in a way that portrays the process in the absence of a mess, then again we might want to step back and question our fundamental agenda in the studio and promote a pause. Reflect on that which has become routine. An important concern for every designer in what Donald Schon calls the learning system is the need for everyone involved in the creative process to be - comfortable being uncomfortable, which means that the lack of comfort is the norm. The mess is to be expected. It is easy to slip and fall, to surrender prematurely to pressure, to compromise quality because the territory of design process is laden with a lack of familiarity. We tell students all the time to take risks. Risk is relevant because confronting the mess of design is risky and requires courage. The nature of this so-called mess includes the unknown and we confront the mess because of that fact.

The acknowledgement of the mess has an inevitable consequence in the product of the studio. Product of a design studio needn't

be clean, polished, refined, and definitively resolved. If the process is sincere and dwells in the investigation of the mess for the sake of discovery, the resultant product will usually be something other than recognizable. Is that not the point of design? to experience something not yet experienced ? to inhabit a place we have never been ? to realize that which we were unaware? When the poet Jane Hirshfield speaks about passion it is pertaining to poetry, but we can use her wisdom by substituting poetry with design.

The activity of poetry (design) is to tell us we must change our lives. It does this by posing again and again a question that cannot be answered except with our whole being – body **and** mind.

What is the nature of this moment? poetry asks, and we have no rest until the question is answered.

If and when it is answered and another moment is allowed in (focus), then the question is reconsidered and asked again.  $^{\rm 12}$ 

What is the nature of this moment? design can ask. We engage the process to experience the mess because the mess itself is where the discoveries are waiting to happen. In it lies the potential to enter the future, to evolve, to understand both where and who we are in the presence of a lack of familiarity. When the process leads us to a comfortable sense of belonging and we formulate a coherent understanding, then maybe as is the case with poetry, the design process in the design studio provides us the opportunity to dance and to reflect ... to pause and question, to reorient ourselves, to reiterate our understanding and reevaluate our relationship with many things, but most importantly, with our selves.

<sup>12</sup> Hirshfield, Jane. *Nine Gates, Entering the Mind of Poetry*. New York: Harper Collins Publishers, 1997. P52-53.

# AT THE SCENE OF THE CRIME: TRANSLATIONAL FINGERPRINTS AND BEGINNING DESIGN Making Pedagogy

ANN SOBIECH-MUNSON, ASSISTANT PROFESSOR, ARCHITECTURE/ ART & DESIGN AND CORE DIRECTOR IOWA STATE UNIVERSITY

The emergence of createdness from the work does not mean that the work is to give the impression of having been made by a great artist. The point is not that the created being be certified as the performance of a capable person, so that the producer is thereby brought to public notice.

- Martin Heidegger, "The Origin of the Work of Art" (1971)

Generalizing the "idea" of each program into Design 102 is not useful for determining a major; the "skills" I took out of that class included group work and critiquing, which could be taken out of pretty much any type of project and is definitely not specific to those projects.

- student comment, Core Assessment Phase 1 (2009)

This paper approaches "pedagogy" as defined by the Oxford English Dictionary: "The art, occupation, or practice of teaching. Also: the theory or principles of education; a method of teaching based on such a theory."<sup>1</sup> Teaching beginning design students requires both a theory and a method for introducing students to fundamental skills, concepts and practices associated with design. In our program, "design" involves an expansive list of disciplines, ranging from planning and environmental design disciplines to graphic design and studio art. The excerpts above illustrate one difficult issue faced by many beginning design educators: how to negotiate the students' expectations of knowledge-as-information and opportunity for individual creative expression with a philosophical position that emphasizes the art or design work and its embedded context over individual authorship. Here I first develop this contrast -- between students' expectations and a pedagogical position that challenges these expectations -- through the metaphor of fingerprint. Next, I present research related to the

1 Oxford English Dictionary online (www.oed.com); accessed 23 January 2010; definition 3.

teaching and learning of first-year students that documents their tendency to focus on either technical knowledge and/or individual expression. Finally, I describe a particular project in a beginning design studio that attempts to negotiate these expectations away from the individual author-genius and toward the work generated by the design process. This project, the first project students encounter in the design studio, exemplifies one way in which we might introduce students to design practices that both allow and recognize individual contributions but emphasize the resultant work, thus setting a tone for beginning design education that fosters critique and collaboration.

# On the Fingerprint

In their life as evidence, popularized by television crime drama and its attendant forensic mythologies, we focus on the interpretive quality of the fingerprint as identification, a mark that testifies to unique individual presence at the scene. In this way, we move from the mark back toward the individual. In doing so, we forget the translational quality of the fingerprint, a move from a fleshy digit to ink on paper, a mark left behind that inhabits the scene. Notions of "making" often highlight the former version of fingerprint: a discussion of the ways in which idiosyncratic individual contributions somehow elevate the work we do as design students, educators and practitioners. This has much to do with proof, demonstration, and acknowledgement of individual identity, a movement away from the work and toward the individual author. But what happens when we consider fingerprints in their translational capacity? This consideration removes the fingerprint from identification with its maker; while it would not exist without the fleshy digit, thus testifying to the individual contribution, it is now something else, with a trajectory of its own. It is part of the scene, but not the

protagonist - something the digit leaves behind and/or projects forward, moving away from the individual and toward the work, a presence metonymic rather than symbolic.

In terms of beginning design pedagogy, this consideration - the translational qualities of the individual mark, rather than its forensic properties, and the attendant shift from focus on the individual to focus on the work - articulates a specific philosophy of teaching designers at the earliest stages in their education. While the forensic fingerprint serves science, the translational print resides in the domain of poetry. Here exists an irony. The forensic, scientific print supports conventional notions of the individual in relationship to artistic production. The forensic (scientific) mythology thus links to another mythology: that of the creative genius, the heroic author, the identifiable figure in the work. On the other hand, the translational (poetic) fingerprint acknowledges the presence of the individual but does not prioritize it in the work. The scene of the crime, or the work of art, is its own world. Rather than publicly recognize the "great artist" (or criminal), the translational fingerprint points to the "createdness" of the work, in Heideggerian terms. For Heidegger, this "createdness" exists most purely "where the artist and the process and the circumstances of the genesis remain unknown...".<sup>2</sup> Somewhat paradoxically, this does not deny the role of the creator, but rather focuses on the "gathering of context into the work" that relies on both the creator's actions and a viewer's perceptions.<sup>3</sup> The work requires both creators and preservers in order to be, and this being becomes a knowing of "... the truth happening in the work."<sup>4</sup> The focus moves from the individuals and their genius to the work and its embedded context, but the work would not exist without its interactions with these individuals.

This shift in focus becomes key to a particular pedagogy of beginning design. Students new to design disciplines tend toward one of 2 Martin Heidegger, "The Origin of the Work of Art" in *Poetry, Language, Thought*. Trans. Albert Hofstadter. (New York: Harper and Row, Publishers, 1971): 65.

3 Much thanks to Dr. Michael J. Golec (School of the Art Institute of Chicago) for this phrase in a recent conversation. It was too articulate to paraphrase.

4 Heidegger, 68.

two extremes: they yearn to express their inner creative genius, or they crave technical knowledge that will lead to proficiency. Both of these extremes relate to the forensic fingerprint. The translational fingerprint, however, takes a both/ and position in relationship to these extremes, focusing on the work rather than the individual. This is why, in our beginning design curriculum, we begin with a team project. Students consider "passageway"<sup>5</sup> in its etymological, historical, and experiential contexts; the project places emphasis on the craft of materials as well as the conceptual approach developed by the team. The resulting poetic-translational fingerprints appear in concert with the range of variables present in the project, thus setting a tone for engaging design practices in ways that respond to and ask questions of the specific contexts in which they operate: the scenes of the crime.

#### Expressionism and Design Fundamentals

Before moving into a description of the "passageway" project, it is useful to understand something about both student expectations when they enter our studio and existing traditions in art and design education that begin to account for this tension between individual authorship and context-based work. A closer look into the intellectual development of firstyear students sketches a profile for their attitudes toward learning that supports the expectations noted above. This is reinforced by a number of currents in art and design education that perpetuate myths of the creative genius, demonstrated through individual expression. An examination of these two aspects of beginning design education establishes a solid ground for the pedagogical goals of the passageway project, which attempt to resist these existing conditions.

In terms of their expectations for postsecondary learning in design programs, the first difficulty for beginning design students involves their place along the ladder of intellectualdevelopment, as defined by William Per-

<sup>5</sup> My colleagues Igor Marjanovic (now at Washington University) and Karen Bermann (Iowa State) first developed this project; under my leadership, we shifted some requirements and moved the project from the end of the semester to the beginning.

ry.<sup>6</sup> Design education challenges their experience and attitudes toward learning. In a studio setting, repeated iteration and the appearance of multiple plausible responses to a given set of variables immediately attack the attitudes of students in the positions of dualism, the first stage of Perry's four stages, where everything has absolute right and wrong answers. Peer discussion adds to this challenge. As Erickson et al point out, "Class activities or assignments that ask students to learn from their peers are a second source of frustration for students in a position of dualism. The instructor knows the right answers; students do not."<sup>7</sup> In even the most the conventional studio environment, after a few days in design studio, most students move quickly to a position of multiplicity, in which knowledge becomes opinion. As students move through multiplicity, they may begin to understand how to construct an argument or opinion, but they continue to perceive this formulation as a response to a set of rules. And as Erickson et al note, backed by a number of studies, "most first-year students hold views similar to those described in dualism and multiplicity."8 The subsequent two categories, relativism and commitment to relativism, remain "well beyond the developmental positions of most first-year students."9 However, both of these advanced positions address goals often found in very early stages of design education: the recognition that "knowledge is contextual."<sup>10</sup> In these later positions, students begin to understand the complexity of a given question or problem in terms of both internal and external factors. "Recognizing the need to consider many factors, look at them from differing perspectives, use systematic methods of analysis, and supply evidence, these students view faculty as resources who can help them

- 7 Erickson et al 23.
- 8 Erickson et al 25.
- 9 Erickson et al 26.
- 10 Erickson et al 25.

learn disciplinary methods of analysis. Learning becomes the use of those methods to understand complexity."<sup>11</sup> Sounds much like design studio, with its embrace of active learning, project-based inquiry, ill-structured problems, all guided by an expert in the discipline. But remember, this is a stage of development beyond most first-year students. How might a design studio move them more quickly along this ladder?<sup>12</sup>

The intellectual development of the typical first-year student is complicated by a number of traditions or conventions in art and design education. In his discussion of the relationship between "aesthetic fundamentals" and "college art instruction," Randall Lavender explores why "opportunities for college students of art and design to study fundamentals of visual aesthetics, integrity of form, and principles of composition are limited today by a number of factors."<sup>13</sup> His study serves as a primer for a number of currents running through contemporary pedagogy in art and design, and the focus on "fundamentals" necessarily implicates beginning design. He points out that many college faculty members are heavily influenced by the methods with which they were taught, closely linked to the studio-based system of hiring practitioners to teach. As a result, instructors reproduce these pedagogies within their own courses. Lavender analyzes these "enduring traditions of art education" in terms of four objectives: "study skills, jobs, spirit, and understanding ourselves and others."<sup>14</sup> The first, "study skills," concerns itself with the usefulness of art education outside art and design disciplines. The second, "jobs," assumes a career focus, and teaches accordingly. The third and fourth categories both focus on the individual; in the case of "spirit," the goal was to "elevate the imaginative lives of students," and in the case of "understanding ourselves and others," educators prioritized "fostering the

14 Lavender 45.

<sup>6</sup> William Perry first published this scheme in 1968, and it has been widely cited in literature on teaching and learning. Here, I cite it as developed in Teaching First-Year College Students. (Revised and expanded edition of Teaching College Freshmen.) Eds. Bette Lasere Erickson, Calivn B. Peters, and Diane Weltner Strommer. San Francisco: Jossey-Bass/John Wiley & Sons, Inc., 2006. See especially Chapter 2, "Intellectual Development in College" (pp. 21-33).

<sup>11</sup> Erickson et al 25.

<sup>12</sup> My argument assumes that moving beginning design students more quickly along this scheme is appropriate. However, some scholars take issue with this assumption.

<sup>13 &</sup>quot;The Subordination of Aesthetic Fundamentals in College Art Instruction" Journal of Aesthetic Education 37:3 (Fall 2003): 41.

expression of self."<sup>15</sup> These biases, combined with a prejudice against introductory instruction in favor of more "intellectually advanced" levels of coursework, help to explain why aesthetic fundamentals came to be sidelined in introductory art and design courses.

While Lavender details other factors related to the issue of aesthetics, fundamentals, and art and design instruction, the expressionist biases in education contribute to both students' expectations when they enroll in beginning-level courses and instructors' tendencies when developing curricula. His argument is not nostalgic for intensely formal methods of instruction, or a return to any historic pedagogical approach. He proposes "a contemporary approach to aesthetic fundamentals" which incorporates "an understanding of visual quality" into coursework for first-year students. This does not isolate aesthetic principles from a contexts, but teaches students to "define and apply issues of visual quality" in order to "make aesthetic decisions" along with others.<sup>16</sup> He concludes, "When students identify clarity and/or ambiguity in composition, they perceive how the two manifest, perhaps differently for each individual, as visual strengths or weaknesses. In that way, issues of visual quality serve as guides for conceiving, composing, constructing, reworking, and assessing compositions in response to all kinds of learning prompts, constraints, goals, and objectives."<sup>17</sup> This might be one response to the negotiation between students' expectations and a pedagogy that emphasizes context and collaboration.

But we also have the message sent by design professions themselves that reinforces the expressionist tendencies of both students and conventional studio pedagogies. Picture Howard Roark at the top of the Wynan Building at the end of the film version of *The Fountainhead*; the mythologies of the profession of architecture reinforce the individual creative act over the communal. Garry Stevens explores such heroism in his sociological study of architecture.<sup>18</sup> Before he studies a number of social

16 Lavender 53.

18 The Favored Circle: The Social Foundations of

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Architectural Distinction (Cambridge, Mass: The MIT
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conditions in the discipline, including architectural education, he cites Donald MacKinnon's psychological study of architects, meant to find some psychological profile of creative genius.<sup>19</sup> This "psychological approach remains the dominant one among social science studies of architecture," in part due to the emphasis on the individual over the group.<sup>20</sup> Stevens asserts, "...the nature of the enterprise finds ready acceptance in the ideology of the artistic genius that is one of the fundamental axioms of architectural thought."<sup>21</sup> For the rest of his study, Stevens uses an analytical approach based on the work of Pierre Bourdieu to develop a close examination of the discipline of architecture. "For almost the entirety of its history, the field of architecture has relied on the transmission of symbolic capital through chains of masters and pupils, webs of personal contacts, to reproduce itself."22 This highlights the dynamic described by Lavender, in which the master-pupil studio environment and the role of practitioners in teaching reproduces, often without critical examination, a pedagogy that prioritizes the individual over the collective. Further, Stevens' study demonstrates the ways in which design professions themselves, with the assistance of popular culture, support this reproduction. Again, the question remains: how might beginning design education respond to these forces?

Press, 1998).

19 D.W. MacKinnon first published work resulting from this study in 1962, including: "The Nature and Nurture of Creative Talent" *American Psychologist* 17 (1962): 484-495 and "The Personality Correlates of Creativity: A Study of American Architects" 14th International Congress of Applied Psychology (Copenhagen, 1962): 11-39. Cited in Stevens 8.

20 Several others in the 1990s focused on sociological approaches to architecture; see Dana Cuff, Architecture: The Story of Practice (Cambridge: The MIT Press, 1991); Kathryn H. Anthony, Designing for Diversity: Gender, Race, and Ethnicity in the Architectural Profession (Urbana: University of Illinois Press, 2001); Linda Groat and Sheri Ahrentzen, articles published in Journal of Architectural Education 1996-97; Thomas Dutton, ed., Voices in Architectural Education: Cultural Politics and Pedagogy (South Hadley MA: Bergin and Garvey, 1991) and ed., with Lian Hurst Mann, Reconstructing Architecture: Critical Discourses and Social Practices (Minneapolis: University of Minnesota Press, 1996).

21 Stevens 9.

22 Stevens 168.

<sup>15</sup> Lavender 46.

<sup>17</sup> Lavender 54.

# Scene of the Crime: "Pop-up Passageway"

At Iowa State University, all undergraduates in the College of Design must take the same core courses during the first year, before they may apply to enroll in one of our professional programs in design. This curriculum includes general education coursework, an orientation to the College, and three Design Studies courses: a drawing studio, a design studio, and a lecture course exploring intersections between design and culture. When I became Director of this program in 2007, I also became coordinator of the design studio course (DsnS 102: Design Studio I). The course enrolls between 600-700 students per year, in 15-18 studio sections per semester. One of the existing projects in the course was a team-based, site-specific project in which students explored ideas of threshold and constructed a full-scale doorway. The conceptual focus of the project emphasized the experience of passage. We had been teaching this project as the final project of the semester. In 2007, amid some controversy from the instructors, I moved it to the start of the studio course. The rationale for this move was pedagogical, with some minor logistical advantages. In order to confront students immediately with a means of moving their attention to the work, rather than their individual success or failure, and to ease them into a system that privileges process, iteration, and candid critique, two aspects of the project compelled this move to the start of the semester. First, the project is team-based. Students work in collaborative groups to develop the project. Second, the project involves full-scale construction, within the first four weeks of the semester. Students inhabit the work, thus engaging the project through sensory experience. A third aspect of the project prepares students for what lies ahead in their design education: the exploration of a seemingly familiar, mundane aspect of their daily lives (threshold, door), within a set of given parameters, via unfamiliar design methods that provoke unexpected responses and new understanding. Finally, the move undid a typical hierarchy of activity in multidisciplinary design studios that progresses from two-dimensional work to three-dimensional work.

While I altered the timing of the project at the beginning of the semester and made some curricular modifications to the assignment, the credit for the conceptual development of this project belongs to my former colleague Igor Marjanovic and current colleague Karen Bermann. The educational goals for the project have remained the same since its inception:

The main goals of this project are to foster an awareness of the body and its movement in space, to explore and manipulate materials, to investigate design in response to existing site conditions, and to develop design and fabrication skills in a collaborative context.<sup>23</sup>

The project description reinforces these goals:

You will design a Passageway, engaging the issues of scale, proportion, materiality, and interaction between the human body and space. The focus is on material research and experimentation, use of precedent, iterative design processes and the beauty of craft. The project has both individual and team components; the intermediate and final full-scale passageways will be a collaborative effort.

Project activities include both individual and group work. Since the project occurs during the first weeks of the course, students have a week to engage individual activities that explore existing definitions and manifestations of door, doorway, threshold, and passage. At the end of this first week, they produce some small-scale individual study models that begin to suggest possibilities for the projects. At that time, students divide into teams; the method of division is up to each studio instructor, but one advantage to doing this early in the semester is that students tend to form teams based on shared interests and complementary skills, rather than cliques that may have developed over the course of the studio. As they work in teams for the next three weeks, they develop a conceptual approach to "the experience of passage" through multiple iterations. Material parameters are strict; they are limited to two materials - this year, twine and reclaimed cardboard – in limited quantities. They must select one of two sites adjacent to the studio. And they must meet requirements for modularity and collapsibility.

23 All project information is from the Fall 2009 version of "Pop-up Passageway."

Many students express discomfort with the idea of working in teams. They are, after all, accustomed to a system that grades them individually, and their grade in this course will be evaluated when they apply to their preferred degree programs. However, we explain the pedagogical reasoning behind the teamwork, and we include a brief statement in the project assignment sheet about the role of teams in design:

Design workers often collaborate in teams. These can be intra-disciplinary or inter-disciplinary teams. It is very important for every designer to learn how to cope with the joys and predicaments of teamwork. In this project you will be working in teams of three, four or five (maximum of six teams per studio). The Pop-up Passageway will be built collectively.

The project handout clearly distinguishes between the individual and team components of the project. Throughout the course of the project, we ask students to take "meeting minutes" to record group activity and individual contributions to the team components. These appear in a comprehensive binder explaining the team's iterative process and conceptual investigation ("team binder"). We also include a peer/self evaluation form as part of the process, included as the final page in the assignment handout, where students evaluate their own and their teammates' roles in the project, including some reflection on the process of teamwork in general. Not every student will necessarily receive the same grade for the project, depending upon the instructor's evaluation of the group dynamic, the design process, the final products, and the team's evaluations.

We have now been assigning this project first for four semesters. Initially, experienced instructors expressed some doubt about the way the teams would work and worried about the full-scale construction component. Even after our very first semester of moving it to the start of class, these concerns subsided when we witnessed the benefits of this kind of activity happening at the start of the semester. This year, we revised the material requirements, substituting reclaimed cardboard for what had been a limited number of wood 1x2s. This further increased the benefit, eliminating some of the intimidation caused by the prospects of learning to work with wood quickly and by allowing time for multiple full-scale iterations of the project before the final review.

Anecdotal evidence from faculty suggests that with this project being first in the semester, students begin to develop habits that benefit them during the remainder of the studio course. First, the teams tend to work more effectively (in most cases, not all) due to the fact that students are more likely to form teams based on reasons other than friendship or where they've been sitting for three months. Those who will eventually decide that design is not something they'd like to pursue have not "checked out" yet; students are more likely to focus discussions on ideas and interests. Second, students experience their first critiques in a group setting, thus taking the focus off of each of them as an individual and emphasizing discussions of the work produced over the course of the project. Attention moves away from the people and toward the material products and experiences resulting from their work. Finally, the project remains conceptually accessible while immersing students in the process of full-scale construction that must function in specified ways. As an upper-level peer mentor once put it, "If it doesn't work, it falls on them." The functional. full-scale mandate requires that students move the work forward very quickly to prevent catastrophe. The opportunity for multiple versions and the easily accessible site allow for iterative trial-and-error experiments that don't always work; this introduces students immediately to studio-based design processes.

But does this work to undermine or alter students' predisposition toward individual expression, moving them toward an understanding of the way their contributions become embedded in the work? To answer this question, we turn to some of their own comments from the peer/ self evaluation forms. The benefits of iteration appear in a number of their comments, such as this one:

"Being a team player is a lot harder when having a deadline. Having many versions helps greatly into coming up with ideas and I now can put that into other works not just design."<sup>24</sup>

Others expanded upon this to include the benefits of discussion and critique:

24 These comments taken from peer evaluations from fall semester 2009.

"Looking at a variety of design ideas and going through critiques is a key element in producing a great piece."

"I also learned that although group work was stressful – just from trying to coordinate – it was really nice to get second opinions."

Some acknowledged the ways in which the design process leads to unexpected outcomes:

"I learned that in design sometimes it is the aspects that you don't necessarily plan for or spend a lot of time on that are the true design and get the most attention."

"Through this design process I learned that things don't go the way you plan them in your head because when thinking about something in your head you think of it as a whole. You forget the individual aspects and don't realize that all the little things are what makes the one big thing work."

And others noted the ways in which team members interacted, recognizing that their own ideas could be expanded upon, questioned, altered, or rejected through team dynamics. These start to move from the dualist positions on the Perry scheme to positions of multiplicity, validating perspectives outside their own.

"I learned that I am good with incorporating my ideas with others. I also learned that people look at design in many different ways and view the world differently than me."

"We all were good at different things which helped with the process."

"The major strength we had as a team was how well we got along and how respectful we were when listening to, examining, and rejecting ideas." "I feel that in team projects there's always someone who does the most, and someone that does the least....Part of being a leader is making sure each person is contributing what they can and I think I need to work on that a lot."

One particular comment from my fall studio, however, summarizes the ways in which beginning students grapple with expectations and realities through the metaphor of a maze. He writes:

"Design is like going through a huge maze. You might make all the right decisions and go from start to finish with no mistakes but most likely you will run into walls, turn around, go the wrong way, end back where you started, and take a completely different path than you sought to take."

This description includes the possibility of a flawless, uncomplicated journey that might be likened to a student's early stages of intellectual development, one in which he "might make all the right decisions and go from start to finish with no mistakes...". However, this assessment acknowledges that such a journey is unlikely; the walls, twists and turns challenge the student to respond to factors outside himself, causing him to "take a completely different path than [he] sought to take." The idea that a set of "right decisions" exists characterizes the attitude of many first-year students; through this process, reinforced by team collaboration and full immersion in the construction of material artifacts, the student discovers that the "path" is unexpected. The "maze", though, may be likened to Erickson et al's description of students at the end of the multiplicity category, in which students still imagine a set of rules that guide the journey. In any case, this student describes a process of moving through several stages of intellectual development through just four weeks in design.

#### Tableau Versus Mug Shot: Conclusions

The "pop-up passageway" project provides a concrete example in which a theory of "translational fingerprints" frames beginning design pedagogy. This theory appears in not only the content of the project, which involves teamwork and full-scale construction, but also in the implementation of the project within the overall beginning design studio course. Key aspects include its place at the start of the semester and the role of peer- and self-evaluation upon completion of the project. As a result, students begin to move away from paradigms that emphasize individual expression and/or technical proficiency at the expense of an awareness of the place of the work in the world. By directing discussion away from individuals and toward the material results of the process, this project pushes students to develop revised attitudes toward learning the fundamentals of design. It introduces them to collaborative and critique without the anxiety of personal attack. They begin to see themselves as productive members of a larger scene as opposed to the personality behind the product, more part of a tableau set in a specific place and time than mug shot resulting from the traces they've left behind.

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# FORMATIVE MATERIAL STUDIES: DEVELOPING TECTONIC AWARE-NESS IN BEGINNING DESIGN STUDENTS Making Pedagogy

ROBERT M. ARENS CAL POLY SAN LUIS OBISPO

# Introduction

One of the more challenging aspects of teaching beginning design is the integration of technical subjects into foundation design studios. In upper division studios, design-build projects or comprehensive design projects address this, but projects in lower divisions have traditionally focused on design principles at the expense of materials and fabrication processes. How can these issues be addressed in the early years of a student's architectural development? How can we instill a sense of materiality and craft in an environment where digital processes are so nuanced and invisible? How can we develop student awareness of formal, spatial, tactile and experiential aspects of architecture as products of material and fabrication processes?

At Cal Poly we've begun to address these questions by introducing Form and Material Studies into second-year design studios. Related to larger design projects, these studies are conducted parallel to lectures, presentations and readings meant to frame conversations about the conceptual, theoretical, aesthetic, philosophical, performative and technical issues affecting architecture. The studies are designed to promote a fundamental understanding of materiality, tactility and fabrication processes. The focus is placed on traditional materials and processes (joining and binding wood, folding paper, weaving reed, casting plaster, etc.) with the understanding that these studies will lead to greater speculation in subsequent projects or design courses.

Two principles underpin this approach. First, we believe that although advanced materials and digital tools allow great freedom in architectural form, it is also necessary for designers to understand parameters that can and should delimit most architectural projects. Second, we believe that it is crucial to make the relationships between material and fabrication, and



FIGURE 1: Example of studies 1, 2 and 3

between form and process apparent before students move to more complex digital studies and fabrication methods where these relationships become less visible.

This paper presents ten total projects executed by second year students at Cal Poly between 2007-09. Seven of the projects are Form and Material Studies, i.e. short projects that may be evaluated on their own merit but which also inform more comprehensive studio projects. Three of the comprehensive projects informed by the studies are also included here to illustrate their larger context. In addition to linking materials with processes and processes with form, the studies are intended to reinforce larger themes introduced in secondyear studios such as lessons from everyday life, topography and site, single-space form, multispace form and the changing role of technology in contemporary society.

# Form and Material Study 1: Casting the Everyday Object

There is a power in the ordinary things of everyday life, Edward Hopper's paintings seem to say. We only have to look at them long enough to see it.<sup>1</sup>

Students, even those in their first of second year of college, are adept at finding and following the flashpoints of design and culture. This project challenged students to observe the world beyond the fantastic surface that fascinates the world-at-large in an effort to learn lessons from everyday life that are less obvious but often more poignant. Underpinned by a reading of Giuseppe Zambonini's essay "Notes for a Theory of Making in a Time of Necessity", this project encouraged students to engage the inner life of ordinary things while developing tactics for better understanding them.

Casting the Everyday Object (see Figure 1, top) asked students to select three thematically linked objects that could not be fully understood from looking at their exteriors. Using the objects themselves as molds, students prepared and cast them thereby capturing the negative space with plaster and making the invisible visible.

The first learning objective was to hone students' ability to look more closely at the everyday world. Students had to demonstrate curiosity and a facility for looking beyond surfaces into the substance of things. The second learning objective was to explore a new tactic for studying space: casting with plaster. Students had to demonstrate a grasp of the physical properties of the material, as well as the process used to give it form, namely mold preparation and release agents.

# Form and Material Study 2: Marking a Plaster Field

Ground has always been a crucial part of human existence. In almost every discipline...it is the common reference among people and the world that makes shared thought and action possible. Ground is where human artifice and natural pro-

cess commingle for the benefit of both.<sup>2</sup> Extending student understanding of plaster casting learned in Casting the Everyday Object, this project focused less on casting as an analytical tactic applied to an existing object and more on design methods for generating a new object. As a starting point, students read and discussed Nicholas Serota and David Sylvester's interview with Richard Serra in *Weight and Measure* 1992.

Marking a Plaster Field (see Fgure 1, middle) entailed two stages. The first was the composition and casting of a plaster relief 16"x24"x1-3". Students used the cast "objects" from their previous project to mark the surface of wet plaster cast in formwork of plywood and masonite. The emphasis in this stage was the successful composition of the markings in light of the surrounding white space, as well as an understanding of how to compose negative space without being able to see it in advance.

The second stage asked students to think of their compositions as a 1/8 scale representation of a plot of land measuring 128'x192' in San Luis Obispo County. With this scale shift in mind, students located a 25' wide road and added 200' total length of walls, composing these linear elements against the voids they created in the first stage. The walls were built from repurposed masonite previously used as formwork to cast the plaster field in stage one.

# Form and Material Study 3: Wrapping and Incising

It is not the formal technique, whether folding, cutting, or extrusion, that provides interest, but rather the ways that these manipulations produce new relationships between uses, confound

<sup>1</sup> Peter Zumthor in "A Way of Looking at Things", p.17.

<sup>2</sup> Robin Dripps in "Groundwork", p.88.

hierarchies, and liberate unexamined possibilities within known programs.<sup>3</sup>

Students executed this project, Wrapping and Incising (see Figure 1, bottom), as a prelude to the design of a retreat for a poet. Since the retreat was to be the first building design attempted by most students in the class, this project was introduced to help them sidestep the feverish form making that often characterizes this situation.

At its core, this project is less about materials and more about processes that can be used to activate a simple volume using unexpected tactics to lend surprisingly three-dimensional results. For inspiration, students read Donald Wall's "Gordon Matta-Clark's Building Dissections".

For the first stage of this project, students chose a poet and a poem by that poet (or vice versa). Parallel to this activity, students used chipboard to build a 2.5"x5"x1.5" rectangular volume as an unfolded single surface. Students explored relationships between the chipboard shape and the printed poem so as to capture the text on as many faces of the volume as possible.

The second stage of this project entailed incising a series of five openings in the volume with the stipulations that each opening must activate more than one face of the volume and that each opening could eliminate no more than one word of the poem.

# Comprehensive Project 1: Retreat for a Poet on a Rural Site

This project, an 800 square foot retreat for a poet sited on a half-acre plot of land in rural San Luis Obispo County, drew directly from the results of the previous three Form and Material Studies. Student designs for their plaster reliefs with walls (Marking a Plaster Field) were used as the landscape for the project, and their wrapped rectangular volumes with five openings (Wrapping and Incising) were used as the starting point for this project: Retreat for a Poet on a Rural Site.

The program called for interior spaces for writing, relaxing, sleeping, cooking, hygiene and storage. In addition, the site had to provide an outdoor poetry reading space for 40

3 Lewis, Tsurumaki, Lewis in "Tactics for and Opportunistic Architecture," p. 172.



FIGURE 2: Example of three scales of comprehensive project 1.

persons, a shaded space for outdoor activities and a covered parking space.

Like the projects preceding it, this project began with a palette of materials. Students were asked to design the retreat using heavy timber construction using engineered lumber, clad with standing seam metal on structural insulated panels. Although this palette took a range of tectonic decisions out of student hands, it helped to rationalize the rectangular volume, gave the studio the chance to discuss construction issues common to all student projects, and helped to relate the studio to parallel courses in materials and methods of construction.

This project (see Figure 2) drew much of its inspiration from the house and studio designs of Le Corbusier as students were asked to incorporate four of the Five Points of Architecture. To ground their work, students read and discussed the essay "Houses and Villas" by William Curtis.

#### Form and Material Study 4: Cutting, Layering and Binding

The idea of strategy invokes the art of engagement, typically in battles, but also in any activity that requires a certain finesse, careful positioning, and intelligent, informed, coordinated actions to ensure success. A good strategy is a highly organized plan that is at the same time flexible and structurally capable of significant adaptation in response to changing circumstances. A good strategy remains dynamic and open; it is more conversational and engaging than it is confrontational or assertive.<sup>4</sup>

The first objective of this project, Cutting, Layering and Binding (see fig. 2, top), was to introduce students to strategies that would help them in the project to follow, a printing press/ book bindery for a narrow urban infill site. In preparation, students were asked to volume by re-configuring its solid and spatial layers. Rather than using 2-D or digital means of exploration, students were asked to build the simple volume using mdf for solid layers (floors) and all-thread for spacers/binders (columns). This approach enabled the second objective: to hone students' basic shop skills with various saws and drilling techniques.

The project began with the reading and discussion of Steven Holl's essay "Anchoring" from the book of the same name. Students then moved their efforts to the shop where they built simple, stacked volumes then worked to internally transform them by re-configuring their solid and spatial layers. The final stage was to add a vertical element in such a way that each "level" would be engaged.

This project addressed design issues such as solids vs. voids as well as their activation through subtraction. At the same time, it addressed tectonic tactics such as cutting, stacking, layering and binding.

4 James Corner in "Not Unlike Life Itself."

### Form and Material Study 5: Transforming a Paper Field

Folding is more important for the development of techniques to derive new architecture than for the development of an individual architectonic form... Folding and the associated development of handeye coordination liberates the design thought-process from preconceptions and removes any existing architectonic images. The limitation that the technique of folding brings with it sharpens the mind and stimulates creativity. Folding also implicitly allows accidental and unknown end-results for a relatively long period of the design process.<sup>5</sup> By way of Stan Allen's essay "Field Conditions,"

students were introduced to the concept of field as a way to envision form and tectonics as a response to a specific set of physical and/ or metaphysical conditions at times embodying site, activity, space, energy and human relationships. Embedded in this statement is the issue of scale: both the conditions and the response may range from the scale of a building element to the scale of a city sector.

Beginning with 11"x17" sheets of Strathmore paper, Transforming a Paper Field (see Figure 3, middle) asked students to explore multiple studies of continuous fields using operations such folding, pleating, scoring, bending, slotting and cutting. Regardless of the operation (no more than two could be used per sheet), no paper could be added or subtracted from the 11"x17" field. Along the way, students were encouraged to focus on economy when making their manipulations: how could the paper be transformed with just the slightest intervention?

#### Comprehensive Project 2: Urban Strategies for a Printing Press

This project, Urban Strategies for a Printing Press (see Figure 3, bottom), was for many students their first attempt at a multi-story, mixed-use building type involving a complex urban site.

The San Francisco Bay area was selected for the project due to its long association with alternative presses. The presence of the Beats and the counter-culture surrounding Berkeley's campus generated a tradition of small, determined publishers dedicated to publish-

<sup>5</sup> Hans Cornelissen in his prologue to *Folding Architecture*, p. 6.

ing works that were too controversial for larger publishing houses. Students began by researching this tradition and analyzing the SOMA district that had been selected for the project. A point of much discussion in the studio was the delicate balancing act necessary to address both the deference of architecture to the urban realm, i.e. the legibility of shared space, with the fresh paradigms of space and place necessary to engage the contemporary mind. Underpinning this discussion was the reading and discussion of "Afterimage" by Ben van Berkel and Caroline Bos.

The main components of the program were a 4500 sf printing press/book bindery, a 1500 sf cafe and exhibit space and a 1500 sf residence. The 25'x85' site required a 5' setback along the southwest side. This presented some unusual daylighting potential but also necessitated shading strategies.

Students developed their projects using a combination of physical and digital models, moving back and forth between the two as the design process required. Like the projects preceding it, this project began with a somewhat prescribed palette of materials: students were asked to design with a heavy timber frame in combination with CMU masonry where fire separations and shear walls were required.

# Form and Material Study 6: Weaving Surface and Form

While the woven surface separates and contains, it breathes and connects. It is a scrim, a screen that is at once space and surface. Never quite a membrane but part joint, part surface, part volume, part system, weaving is unique in architecture in being simultaneously open and closed.<sup>6</sup>

As a prelude to a museum of Chumash culture, this project (see fig. 4, top) positioned itself as a form of research into the material lives of the Chumash Indians, the indigenous people of the Central Coast of California.

The Chumash were a culture that lived very lightly on the land and most of what it produced (including architecture) was made of natural plant fiber that was knotted, plaited, wrapped, coiled or woven. Although much of its cultural production has been lost due to the short lifespan of plant-based artifacts, the Chu-

6 Stephen Kieran and James Timberlake in Manual: The Architecture of KieranTimberlake, p. 161.



FIGURE 3: Example of studies 4 and 5, and comprehensive project 2.

mash baskets which remain are widely considered to be the most exquisitely crafted of all US Indian tribes.

Using a reading and discussion of "Wood, Earth and Fiber" by Peter Nabokov and Robert Easton and research into basket weaving technique as starting points, students explored form as the result of unique material processes such as plaiting, knotting and weaving.

Project objectives for Weaving Surface and Form were to create a woven form using reed that closed on itself (although not entirely). Projects were required to have both an interior





FIGURE 4: Examples of studies 6 and 7, and comprehensive project 3.

and exterior and fit within, but not necessarily fill, an 8"x"8 volume; students were asked to avoid forms that resembled baskets.

# Form and Material Study 7: Revealing and Framing

To make an artifact requires conscious choice, and no artifact is formed without some degree of both aesthetic and technical intent. You cannot have composition without a tradition of assembly.<sup>7</sup> Using images culled from their research on Chumash Indian culture, students created a 2-D

7 Kieran and Timberlake, p. 11.

collage using digital tools. This project, Revealing and Framing (see fig. 4, middle), asked students to completely rethink their collage by using it to line the interior faces of a wood box measuring 6"x8"x12". Whereas the original collage was meant to be viewed frontally and in its entirety, this project presented the collage in a 3-D frame that in turn provided select views of the collage within. To provide visual access to the box's interior, students crafted four reversible openings or viewing frames which each had to activate at least two sides of the rectangular volume.

The learning objectives of this project were three-fold. Certainly, the development of shop skills and knowledge of wood and wood tools was a consideration. Also, the exploration of simple form that is mutable and kinetic. Lastly, the investigation of the potential of framing devices that modulate the relationship between interior and exterior (as well as the recognition of how this might translate into openings in large built works).

The project itself was framed by a reading and discussion of "Tactics for Opportunistic Architecture" by Paul Lewis, Marc Tsurumaki and David Lewis.

# Comprehensive Project 3: Santa Barbara Museum of Chumash Culture

This project asked students to apply what they learned about transformation via weaving, hinging and revealing in their proposals for an 8500 sf museum both inspired by and intended to serve the culture of the Chumash Indians. Alongside research on museums, the Chumash and the city of Santa Barbara, students read and discussed essays by Alison Smithson, Timothy Hyde and Stan Allen from *Case: Le Corbusier's Venice Hospital and the Mat Building Revival.* 

Santa Barbara, now known mainly for its mission-style architecture, its shopping districts and its spas, was once the geographic center of the Chumash world that existed before the Franciscan and European invasion. Although siting this quarter's project in Santa Barbara is not without irony, the city's downtown has an alluring mix of civic, cultural and commercial uses and offered the opportunity to introduce a wide-range of tourists and locals to the rich indigenous culture that existed until the 19th century.

The Santa Barbara Museum of Chumash Culture (see fig. 4, bottom) asked students to weave together site, program and materials in a way that addressed both the world of the Chumash and the world of modern Santa Barbara. Students developed their projects using a combination of physical and digital model, moving back and forth between the two as the design process required.

Successful projects were able to project dual aspirations for art and history in compelling proposals that contributed to the vibrant, pedestrian-oriented community of downtown Santa Barbara.

#### Conclusion

In general, the seven Form and Material Studies presented here may be characterized as tactics for looking, thinking and making. Since the focus of this paper was the integration of materials and material processes into studio projects, i.e. making, it should be emphasized that making is both a reflective and prospective activity and is therefore inextricably linked to looking and thinking. These tactics are not meant as ends unto themselves, but rather are intended to be employed in the synthesis of the three critical aspects of architecture: site, program and technology. Hopefully the three comprehensive projects presented here are evidence of that synthesis.

Architects must ultimately possess an effective way of working towards solutions to complex situations. This paper makes an argument that we must help our students, even those at the foundation level, to develop a design process that effectively and simultaneously addresses conceptual, environmental, programmatic, spatial and tectonic considerations. Of course, this statement assumes that effectively is appropriately prescribed by each level of a student's development such that expectations are graduated from first through fifth years of an undergraduate curriculum.

To help younger students get a feel for a multi-dimensional design process, these projects took a procedural approach that required students to work in a disciplined and creative manner. In part, this is done to demonstrate to students that discipline and creativity are not at odds with one another. On the contrary, the design courses from which these projects are excerpted take a layered approach to design intended to help students think more deeply and holistically about the world and speculate how to effectively intervene in it. Hopefully they impress upon students the need for their projects to be well formed not just on conceptually and spatially levels, but also in material and technical terms.

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# INFORMED VISION: DEVELOP-ING OBSERVATION AND DRAW-ING SKILLS THAT DEFINE A SENSE OF PLACE Making Pedagogy

REBECCA J. SWEET, ASSOCIATE PROFESSOR EAST CAROLINA UNIVERSITY

# Abstract

In the introduction to Chambers for a Memory Palace Lyndon and Moore state that, Places are spaces that you can remember, that you can care about and make a part of your life.<sup>1</sup> This concept originated with the ancient Latin art of rhetoric. Orators would imagine defined architectural structures with specific rooms and decorative items that would be markers for concepts they would develop in their speeches.<sup>2</sup> With concepts such as Walls that Layer, Canopies that Center, Shapes that Remind, and Light that Plays, Lyndon and Moore are defining markers they believe create a sense of place. Beginning design students are challenged to visually document these markers-to pause, observe, plan and draw. But before instrument meets paper an intellectual understanding of the concepts to be drawn takes place.

Lyndon and Moore document 27 themes and compositions that provide opportunities for learning how to observe places that evoke aesthetic and emotional experiences. The process begins by asking questions about how these concepts are related to principles and elements of design, how they order the environment, how they are experienced by inhabitants of the environment, and if they are part of a shared understanding of space? Do they trigger memories of other places with similar concepts?

How is a sense of place captured in a drawing? Most beginning design students do not know how to observe and draw and capture the aesthetic which is a poetic expression of an environment. White in *Travel Drawing* describes sketching a place's spirit as drawing what counts in a way that conveys place's identity and character.<sup>3</sup> It's hard to remember that time before the connection between environments, design lessons and seeing became

- 1 Lyndon, D. & Moore, C., xii.
- 2 Yates.
- 3 White, 2.



FIGURE 1: Walls that Layer

informed. Students admit that they are not observant of their surroundings.

To see an environment in a poetic manner means capturing the essence of the place by considering viewpoint, framing, light, shadow, value, and contrast.<sup>4</sup> These elements are what set extraordinary projects apart from those that are functionally adequate both in the educational and professional studios. Understanding, discussing and applying these concepts in student drawings and later in projects is developing the art of design that creates a connection between an inhabitant and a place.

When I first began this assignment I had a totally different view towards it then I do now. I began looking around for pictures to sketch, and was strictly looking for the 27 items on the list, without really thinking about them. It wasn't until a few days later when I was walking through campus that I (began) visualizing certain landmarks or objects that would be a great way to abstractly show Lyndon and Moore's concepts and compositions. Since that day, I started looking deeper into each picture, always struggling to find an underlying meaning or abstract way of seeing common forms and landmarks.<sup>5</sup>

#### Introduction

In the introduction to *Chambers for a Memory Palace*, Lyndon and Moore state that places could bring emotions, recollections,

- 4 Ching.
- 5 Radspinner, K. Student.



FIGURE 2: Canopies that Center

people, and even ideas to mind; their qualities were a part of a culture's intellectual equipment.<sup>6</sup> This idea of remembering places originated with the ancient Latin art of rhetoric. Orators imagined and memorized defined architectural structures with specific rooms and decorative items, which served as markers for concepts they developed in their speeches.7 These ancient markers (loci) had to be easily remembered by layering them with images (forms) that kept each marker distinct from another. Lyndon and Moore believe that memorable places are needed for us to think about what is unique and special about our surroundings so that we can better understand ourselves and how we relate to others.<sup>8</sup> With concepts such as Walls that Layer (Figure 1), Canopies that Center (Figure 2), Shapes that Remind (Figure 3), and Light that Plays (Figure 4), Lyndon and Moore define markers they believe create a sense of place in their travels. Their markers are comprised of images and words that capture the essence of the place. For them, these markers provide starting points for designers to consider, and sparks for imaginative fires.

#### Literature Review

#### Interior Environmental Poetics (IEP)

IEP is an interior design methodology to organize an approach to design. Poetics implies a structured approach of designing interior environments that evoke aesthetic and emotional experiences between the designer and the user that convey a sense of place and a perception of human spirit. One of the first statements about poetics in interior design is from *Interior Design Visionaries' Explorations of Emerg-*

- 6 Lyndon & Moore, xi.
- 7 Yates.
- 8 Lyndon & Moore, xii.

*ing Trends*. In the article, Dohr explains a trend identified as Environmental Poetics: Poetics form a language and expression that touches people on several levels of meaning. It is thinking of cultural symbols, of celebrating people in places, and providing a soul or passion to spaces. <sup>9</sup>

A strong design process integrates the use of interior environmental poetics to inform, explain, and document the creation of place and the effect of a human spirit connection within an interior. It requires a strong design concept to activate and unify the design. It demands creative imagination and technical skill. It expresses an individual interpretation. It connects the designer, space, and user. It infuses meaning, context, and form into the space. It supports a sense of place by denoting a particular type of personal experience that affects the intellect and spirit of the users through meaning, expression, and spiritual values. It supports a perception of human spirit in interiors by conveying personality, energy, and magnetism. It addresses a combination of aesthetic experiences, ideologies, and naturebased concepts.

#### Poetic Language

Greek philosopher Aristotle's treatise Poetics addresses the creation of poetry through three principles that relate to structure, character, and execution which he cites as the foundation of design.<sup>10</sup> Structure denotes a form and order to the development of a design that allows an end user to see and experience a new place that is at once perceived as familiar. Perception is influenced by socio-cultural beliefs experienced through intrinsic signs and symbols as well as extrinsic factors of context and sensory input through movement and context. This relates to the human connection of IEP because of the sensitivity to person, setting and culture through the dynamic and interactive phenomenon that integrates behavioral, perceptual, cognitive, and affective issues.<sup>11</sup> It creates the locus.

The fundamentals of character are achieved by the skillful use of the designer's tools—the principles and elements of design—form and

10 Aristotle.

<sup>9</sup> Hassell & Scott, p.12.

<sup>11</sup> Ganoe, 1999, JIDER 25 (2), p.3.

shape, color, texture, light, proportion and scale, balance, harmony, unity and variety, rhythm and emphasis. These would relate to the Roman use of locus and the image (form) by creating a distinct sense of place to differentiate it from subsequent loci and images. Images and words are the markers for a sense of place that are derived from careful research into cultural and behavioral expectations of an end user by the designer. Research is analyzed and through the design process a creative and imaginative interpretation is developed. That becomes the character or style of the design. The resulting design addresses functional issues as well as deeper spiritual or cultural values held by the client that bring a strong connection to place and spirit, which is the execution of the poetic design.

# Sense of Place

Norberg-Schulz discusses place as a relationship among diverse images that expresses a unique character and has presence.<sup>12</sup> He acknowledges that an image can be more than a single entity; it can stimulate the memory of many related images. This process of establishing relationships between images and creating a sense of wholeness is a component of an artistic expression. Gestalt is important in the experience of a sense of place. It is a perception of imparting order and recognition of form that is memorable or familiar for the end user. An interior environment, like architecture is a series of parts that are related. It is these relationships of component parts, layered with programmatic needs, as well as the connection to person, place and culture that creates a synergist outcome. A sense of place is an integral component of Interior Environmental Poetics that is a perceptual connection between the user, designer, and environment that defines the spirit of the design.

In 1979, Alexander published The Timeless Way of Building which is epic in its detailed progression to create the quality without a name for timeless design of places.<sup>13</sup> This timeless design is only possible by following the living pattern language.<sup>14</sup> Interestingly, there are 27 concepts in both Lyndon and Moore's book

- 12 Norberg-Schulz.
- 13 Alexander, p. ix.
- 14 Alexander, p. xi.



FIGURE 3: Shapes that Remind

and 27 guides for Alexander's book. Both provide a pattern language towards creation of a sense of place. From Alexander's perspective to design in a timeless way is thinking in an ordinary manner about images and concepts that we already know deep inside and blocking images of modern architecture—steel, glass and concrete.<sup>15</sup> Lyndon and Moore see their concepts as fluid and providing inspiration for design that may result in the creation of a sense of place.

Discussion of memorable places is prevalent in Bloomer and Moore's *Body, Memory, and Architecture* written in 1977. What is missing from our dwellings today are the potential transactions between body, imagination and environment. It is absurdly easy to build, and appallingly easy to build badly.<sup>16</sup> In this book the authors discuss architecture, the built environment and the process of building in terms such as a sensual social art, needing to attend to the human body, and addressing the sensory experience of the design. The experience of being in a place occurs in time, is far more visual, and is generally as complex as the image of it which stays in our memory.<sup>17</sup>

#### Imagination and Creativity

The discussion of imagination and creativity comes from one of the most creative choreographers of the twentieth century who literally starts with an empty room, where she begins to craft her dances; a world-renowned "children's" author who envisioned a whole new world and took this world along with her; and an author who is celebrating the beginning of the Conceptual Age and the Right Brain Rising.<sup>18</sup>

- 15 Alexander, p. 547.
- 16 Bloomer & Moore, p. 105.
- 17 Bloomer & Moore, p. 106.
- 18 Pink.

Twyla Tharp does not believe that creativity is just for artists. She sees creativity as an important skill for envisioning opportunities, life changes, "what if's" in everyday lives. Words that recur in her writing are patterns, routines, and discipline. When working with beginning design students these words may seem incongruent, but Tharp sees them as the foundation that allows one to find the creative energy inside.

In order to be creative, you have to know how to prepare to be creative....No one is born with a skill. It is developed through exercise, through repetition, through a blend of learning and reflection that's both painstaking and rewarding. And it takes time.<sup>19</sup>

Honing the skill requires knowing who you are, being true to yourself, and having the big picture. Tharp cites Harvard psychologist Stephen Kosslyn, ...ideas can be acted upon in four ways...generate the idea from memory or experience, or activity....retain it,....inspect it....Finally, you have to be able to transform it...to suit your higher purposes.<sup>20</sup>

J.K.Rowling who created Harry Potter's fictitious new world with languages, customs, religions and hundreds of characters with distinct personalities, says that she has learned to value imagination in a broader sense<sup>21</sup>. In a speech to Harvard University graduates she tells them:

Imagination is not only the uniquely human capacity to envision that which is not, and therefore the fount of all invention and innovation. In it's arguably most transformative and revelatory capacity, it is the power that enables us to empathize with humans whose experiences we have never shared.<sup>22</sup>

Pink defines the players in the Conceptual Age, which we are entering (from the Industrial and Information Ages) as the *creator* and the *empathizer*, whose distinctive ability is mastery of R(Right Brain)-Directed Thinking.<sup>23</sup>Forces moving this process are affluence, technological progress (automation of some white-collar

21 Chronicle of Higher Education, Commentary, July

work) and globalization.<sup>24</sup> In the Conceptual Age it is not enough to have price and quality, but the intangibles such as beauty, innovation, and style are what are selling. According to research from London Business School, Pink writes that for every percent of sales invested in product design, a company's sales and profits rise by an average of 3 to 4 percent.<sup>25</sup>

Evidence-based design demonstrates the power of good design; in hospitals to help patients get better faster, in educational facilities to foster learning, in public housing to provide more aesthetically pleasing accommodations to increase pride of place, and environmental design that affects all aspects of our lives by providing healthy environments. ...the keys of the kingdom are changing hands. The future belongs to a very different kind of person with a very different kind of mind, creators and empathizers, pattern recognizers, and meaning makers.<sup>26</sup>

#### Process

Beginning design students are challenged to visually document Lyndon and Moore's loci and define the markers within their academic community or beyond. Pause, observe, plan and draw; pause to think about what a sense of place may mean in a student's life-a campus landmark, grandma's home cooking, or a first visit to the Eiffel Tower. How does the relationship between people and places become a sense of place? Observe the surroundingsput down the cell phone, watch people move, where do they gather, where do they sit, where are the unpaved paths? Plan the project-find the markers and determine the definitions? As interior designers, think about the relationship of proportion and scale to the human body, what materials and finishes are there and what is their significance, and finally how does human interaction happen in this environment? So what exactly is a poetic way of seeing? Lyndon and Moore document 27 themes and compositions (markers) that provide opportunities for learning how to observe places that evoke aesthetic and emotional experiences. They do not establish any rules defining the markers. The process begins by asking how these mark-

<sup>19</sup> Tharp, 9.

<sup>20</sup> Tharp, 101.

<sup>18, 2008.</sup> 

<sup>22</sup> Chronicle of Higher Education, Commentary, July 18, 2008.

<sup>23</sup> Pink, 51.

<sup>24</sup> Pink, 50.

<sup>25</sup> Pink, 78.

<sup>26</sup> Pink, 1).
ers are related to principles and elements of design, how they order the environment, how they are experienced by users within the environment, and how they are part of a shared understanding of space. Do they trigger memories of other places with similar concepts?

How is a sense of place captured in a drawing? Most beginning design students do not know how to observe, draw, and capture an aesthetic which is the poetic expression of the environment. The challenge is to meld the drawing skills learned in early design studio classes with the understanding of principles and elements of design into a drawing that captures the spirit of place. To see an environment in a poetic manner means capturing the essence of the place by considering viewpoint, framing, light, shadow, value, and contrast. 27 White in Travel Drawing describes the spirit of place as not just the physicality of the buildings but also the light, the ambience, the activity, the history, and the people.<sup>28</sup>The most significant learning from this assignment comes from the development of observation skills by sketching in situ. Students become keenly aware of the nuances of the spaces-depth, value contrast, light, and proportional relationships. These elements are what set extraordinary projects apart from those that are functionally adequate both in the educational and professional studios. Understanding, discussing and applying these concepts in student drawings and later in projects is recognizing, understanding, and applying the art of design that connects with users and creates a sense of place.

Documentation of the assignment continues the idea of poetic. The form of the presentation is a 12" x 12" hand-made book. The drawings are formatted into a 2 page lay-out with the theme or composition, a photograph, and a short explanation of the concept. Everything is hand-lettered. A reflection paper is typed and inserted in a pocket on the inside of the back cover. *Chambers for a Memory Palace* as a multi-dimensional exercise for beginning design students is a step towards recognizing and documenting markers and loci in their immediate surroundings. It creates an awareness of the importance of poetics that is



FIGURE 4: Light that Plays

then applied in their residential design studio project.

## Conclusion

Interior Environmental Poetics is a difficult concept to document in interior design projects. Interior design results in an experiencebased outcome supported by research and design processes. Is there a difference in a project that address poetics and one that does not? It is really not possible to say decisively. It can be said that in studying interior design projects that have survived the test of time and been documented (which are few) and exhibit a sense of place and a human spirit connection there are traits that are similar. Moving forward as a profession it will be to our advantage to consider the research and suggestions concerning narrative inquiry as a means of documenting the value of the work of interior designers.<sup>29</sup> Story represents a pathway to understanding that doesn't run through the left side of the brain. Personal narrative has become more prevalent ... when many of us are freer to seek a deeper understanding of ourselves and our purpose.30

Interior Environmental Poetics provides a key component within *The Interior Design Profession's Body of Knowledge* which is the aesthetic or artistic solution that researches, analyzes and addresses cultural, social and psychological needs of the end users through a design solution.<sup>31</sup> IEP is concerned with creating balance, wholeness and well-being in interior environments. It is a human-focused component of design that has a relevance to the entire scope of interior design projects.

<sup>27</sup> Ching, 1998.

<sup>28</sup> White.

<sup>29</sup> Danko, Meneely, & Portillo, 2006., & Portillo & Dohr, 2000.

<sup>30</sup> Pink,115.

<sup>31</sup> Martin & Guerin, 52),

From an educational viewpoint this project addresses a multitude of accreditation standards. It is an excellent indicator of skill level for movement through portfolio review. From a design perspective it illuminates new ideas, new ways of seeing and a deeper understanding of the spirit within an excellent design. It has also created awareness that documentation of interior design projects needs to move beyond still photography to capture the importance of our work in the lives of our clients in their own words.

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# CURIOSITAS AND STUDIOSITAS: EXAMINING THE LINK BETWEEN CURIOSITY AND DESIGN EDUCATION Making Connections

KORYDON H. SMITH, ASSOCIATE PROFESSOR UNIVERSITY OF ARKANSAS

Throughout history, profound discoveries have been driven by the engine of curiosity.<sup>1</sup> From Balboa to Gagarin, Curie to Feynman, Copernicus to Hubble, da Vinci to Muybridge, Aristotle to Lao-Tzu, and Darwin to Mead-impassioned curiosity has played a central role in the spark, pursuit, and capture of knowledge. As 1962 Nobel laureate and co-discoverer of the structure of DNA Francis Crick expressed, "I was curious about the world...and willing to work hard if my enthusiasm was aroused" (National Institute of Mental Health 8). Although seemingly colloquial, curiosity is a complex latent construct. Curiosity is highly individualized, exists in the realm between emotion and cognition, and its quenching leads to added breadth and depth of knowledge. In fact, curiosity may be the most foundational aspect of learning and character development (Peterson and Seligman), "a primary facilitator of personal growth" (Kashdan, Rose, and Finchman 291). Likewise, Gehring asserted that curiosity "is responsible for language, science, and religion" (59). High levels of curiosity have even been linked to increased lifespan (Swan and Carmelli).

As such, stimulating curiosity has become a primary, though usually tacit, goal of beginning design educators. Thom Mayne, 2005 recipient of the Pritzker Architecture Prize, for example, stated, "Inspiring inquiry is at the heart of our

1 Kenny refers to two distinct uses of the term curiosity: (1) curiosity as "concept" and (2) curiosity as "thing." In *The Old Curiosity Shop* (Dickens), for example, the narrator exhibited wonder and intrigue (curiosity as concept), while The Old Curiosity Shop, as a place, was a receptacle "for odd and curious things." Similarly, people can exhibit the characteristic of curiosity or they can, themselves, be curiosities, sometimes both. Nell Trent (the young protagonist of *The Old Curiosity Shop*) held curiosity about the world, while her grandfather, the owner of shop, instead, was a curiosity himself, "haggard" and "wonderfully suited to place." In the present research, curiosity as "concept" was the focus. responsibility in educating our young people, and architecture has the enormous potential to encourage inquiry and provoke curiosity." Surprisingly, however, these may be false assumptions, as some research suggests that curiosity "recedes with maturity" and that teaching hastens its degeneration (Schmitt and Lahroodi 144). Mostly unknown is the extent to which college teaching, and design education in particular, influences student curiosity, its pursuit, and its outcomes. This raises critical questions regarding the aspirations and methods of design education. This is especially significant in regards to the design studio, where teacherstudent interactions are intimate and extensive, particularly in the "studio" environment. This paper, therefore, explores the cultural and scientific foundations of curiosity and its connections to design education<sup>2</sup> Historical and empirical methods of analysis are used.

2 The operational definition of curiosity in the present work contains seven parts. First, curiosity is primarily epistemic in nature, but also entails aspects of perceptual curiosity. See note 4. Second, curiosity is primarily specific to a domain of knowledge, but also possesses diversive aspects: According to Berlyne, specific curiosity is directional and focused toward a distinct object, idea, or piece of information. Diversive (general) curiosity, in opposition, "has no such direction," and is typically motivated by the desire to relieve boredom or find new experiences. Schmitt and Lahroodi contended that "curiosity does not entail a generic desire for knowledge"; this is what would be termed "inquisitiveness" (135). Third, curiosity is driven by both *reward-seeking* and *aversion*: Spielberger and Starr developed the Optimal Stimulation/Dual Process Theory of Exploratory Behavior, an attempt to define the relationship between stimuli and responses regarding exploratory behavior. Spielberger and Starr contended that, if a stimulus is optimal and is perceived as pleasurable, exploration results. In contrast, if a stimulus is not optimal or is perceived as unpleasant, avoidance results. More precisely, Spielberger and Starr contended that diversive exploration stemmed from low-level stimuli and rewards, while higher-level stimuli and rewards led to specific exploration. Aversion behavior results when

# Brief Cultural History of Curiosity

The primary mid-twentieth century scholar of curiosity, Daniel Berlyne stated: "Few phenomena have been the subject of more protracted discussion than human knowledge" and curiosity (1954, 180). In the broadest sense, curiosity, or the "appetite for knowledge" (Schmitt and Lahroodi 127), is the desire to know, encounter, or acquire new information, experiences, or things (Berlyne; Kashdan, Rose, and Finchman; Kenny; Litman; Litman and Spielberger; Ramos; Schmitt and Lahroodi; Spielberger and Starr; Voss and Keller; Wohwill). The scholarship of curiosity may begin with one of the most important philosophical texts of history, Aristotle's fourth-century BCE Metaphysics.<sup>3</sup> stimuli are too extreme and perceived to result in negative rewards. More recently, Kashdan made the case that curiosity is reciprocally paired with anxiety, metaphorically seen as a single-control dial, whereby turning the dial towards the anxiety end of the spectrum automatically decreases curiosity, and vice versa. Fourth, curiosity is a *cognitive-emotional* process: Curiosity exists at the intersection of cognitive, affective, and sensorial realms. Wundt emphasized the reciprocal relationship between the "faculty of knowledge" and the "faculty of desire." Recent educational research (e.g., Forgas; Pascarella and Terenzini) and neuroscience advancements (e.g., Kandel) have further substantiated the interrelationships of cognitive, affective, and sensorial domains. Fifth, curiosity is definitively influenced by *intrinsic* factors, but less decisively affected by *extrinsic* factors Voss and Keller argued that curiosity was a subsidiary of the larger realm of human motivation. While curiosity is clearly influenced by intrinsic characteristics, e.g., genetic factors, the influence of extrinsic factors remains vague. As recently as 2008, curiosity scholars asserted that "our results do not immediately tell us whether curiosity can be fostered or how to foster it" (Schmitt and Lahroodi 146). Sixth, curiosity is made physically evident in verifiable traces or artifacts, resulting from the origination, pursuit, and satiation, of some target of interest: According to Berlyne, human curiosity results in "symbolic representations" and "permanent traces." Likewise, Schmitt and Lahroodi defined multiple aspects of curiosity, such as, "tenacity," which requires: (a) the target of curiosity both draw and maintain one's attention; (b) the target of curiosity stem from, be pursued by, and be fulfilled by the first-hand, not secondary, inquirer; and (c) the curiosity lead to exhaustive inquiry and a desire to know not just the target itself but contextual factors as well. Lastly, curiosity is individualized, but its outcomes have political and social implications.

3 The dualities of curiosity were evident as early as the 8th century BCE, when Greek poet Hesiod (1980) scribed the myth of Pandora. According to the myth, Pandora, presumed to be the first woman The opening line legitimated the importance of curiosity: "All men naturally desire knowledge" (3). Nevertheless, curiosity has held a variety of ranks in society throughout history. Curiosity has held the status of both high virtue and grave immorality. This span is evident in the simple difference between Hans and Margaret Rey's congenial *Curious George*, still popular today, and the 19th-century proverb "curiosity killed the cat." Likewise, according to Kenny (189), "'curiosity' differed from decade to decade, from language to language, from dictionary to dictionary, and from dictionaries to other discursive contexts."

In Don Juan, for example, Lord Byron wrote negatively of curiosity: "I loathe that low voice-curiosity" (Canto I, line 181). Likewise, St. Augustine of Hippo, in the late 4th century, wrote that God has prepared "hells for people who inquire into profundities" (229). Nafisi, referencing Nabokov, stated, "Curiosity is insubordination in its purest form" (45). In contrast, Samuel Johnson contended, "Curiosity is one of the permanent and certain characteristicks [sic] of a vigorous intellect" (486). Similarly, Dewey asserted, "The most vital and significant factor [of learning] is, without doubt, curiosity" (30). As well, it was Alice's "burning with curiosity" that led to her whimsical adventures in Wonderland (Carroll 4). According to Benedict, "This characterization [of curiosity], as both praise and blame, remains with us today" (23).

St. Augustine differentiated two forms of inquiry: quaerere, licit inquiry, and curiositas, illicit inquiry (O'Donnell). The latter was seen by Thomas Aquinas, like Augustine, as a vice, a sensorial inquisitiveness (typically visual) to "sight see" or to "people watch"—and had associations with the vice of "lust" (Augustine; Kashdan; Ramos). This is made evident by Thomas Hobbes's statement that curiosity "is a lust of the mind" (44). The former—quaerere meant "to seek" and was a deliberate, focused,

brought forth by Zeus, was given a *pithos* or "storage jar" (168)—likely by Zeus, and told not to open it. Driven by curiosity, Pandora opened the jar (not a "box," as is a common misconception) and exposed the world to the evils inside. Upon realizing what she had done, Pandora quickly closed the jar, leaving one thing inside: hope. Paradoxically, it is Pandora's curiosity that unleashed evils on humanity, but it was that same curiosity that revealed and kept hope safe within. and useful application of logic, and was seen as a virtue. It related to a similar concept, *studiositas*, or studiousness (Ramos), which gives rise to the Latin *studium*, to study, and *studere*, to devote oneself—the roots of the design studio.

Over the past half-century, the prestige and fiscal value of applied research has, presumably, led to a growing respect for and necessity of curious minds. Nonetheless, political and ideological shifts over the past two decades have retained some of the aforementioned duplicities of curiosity. It cannot be overstated that "curiosity is unavoidably moral" (K. Fisher 31). Likewise, although the primary focus of curiosity may be the apprehension of scientific, social, or metaphysical knowledge, its outcome is political. As Gehring stated, "Curiosity's prominent role in religion and politics provides further evidence...that one must always examine to whose benefit imparted information accrues" (143). This is why, during the early Modern era in Western Europe, "those who exhibit[ed] curiosity [were] depicted as upstarts who challenge[d] the order of nature and society" (Benedict 22), ultimately viewed as a threat to the establishment.

# Scholarship on Curiosity

Empirical scholarship on curiosity and exploratory behavior in humans and other animals is traceable to German psychologist and physiologist Wilhelm Wundt. Although Wundt did not use the term "curiosity" per se, there are multiple instances where allied exploratory concepts are compared in humans and other animals. For example, Wundt defined the exploratory behavior of "play," or what Berlyne later called "ludic behavior," as the imitation of purposeful actions, culminating in a fictitious rather than purposive end, where pleasure is the primary ambition. Though animals, such as dogs, often exhibit playful actions, "the play of man and the animals differs in the same way as their 'intelligence'" (Wundt Lectures 357). For children, play, in the beginning, "is exclusively in the form of imagination," and becomes more and more intellectual with age and development (Wundt Outlines 332). To Wundt, play was a sign of intelligence, of something human.

Moreover, Wundt thought that "volition," or decision-making resulting in action, was essential. Volition was seen as a decisive action stemming from emotion or desire, which led to satiation or transformation of the emotion or desire. Like play, volition shared some common ground between human and non-human intelligence. Wundt distinguished "simple volition," e.g., "impulsive acts" (207), from more advanced volition, what Wundt termed "moving reason" (206) or "selective acts" (208).

Quantitative empirical research on curiosity ramped up significantly during the mid-twentieth century among behaviorists and cognitive psychologists. Berlyne, for instance, studied both human and non-human curiosity, and is typically considered the founder of empirical analysis of this concept. Berlyne asserted that "we must draw a distinction between [human] curiosity and the curiosity drive that has been studied in lower animals" (1954, 180). For Berlyne, the difference was defined by two types of curiosity: perceptual curiosity and epistemic curiosity. The former stems from the sensesi.e., the desire to see, touch, taste, etc.-and exists in many animals. The latter stems from a more uniquely human capacity: the ability to synthesize memories and knowledge, and to speculate, i.e., the desire to understand facts, concepts, meanings, causal relationships, etc. Epistemic curiosity may originate from, but does not rely on, an external stimulus, e.g., the solitary act of "thinking."4

Research on curiosity has been advanced in recent decades by a variety of scholars. In 2004, for instance, Kashdan, Rose, and Fincham confirmed several prior findings particularly important to the present paper. They found heightened curiosity to be associated with: (a) positive views of oneself, the world, and the future, (b) "beliefs that goals are attainable and obstacles can be circumvented" (301), (c) an openness to new ideas and experiences, as well as an enjoyment of "effortful cognitive endeavors" (301), and (d) an increase in selfdetermination. In contrast, the research team found curiosity to be negatively influenced by:

<sup>4</sup> The common link between perceptual and epistemic behavior is that both result in what Berlyne and later scholars (e.g., Fowler; Voss and Keller) defined as "exploratory behavior." In essence, exploratory behaviors are the means by which an aroused curiosity is pursued and satiated. Common forms of perceptual exploratory behavior in animals include orienting, sniffing, and manipulating. A common epistemic exploratory behavior is reading.

social anxiety, boredom, personal anxiety, and apathy. Their research, however, showed little relationship between curiosity and extrinsic motivational factors.

Similarly, Kashdan and Roberts found curiosity to be inversely related to social anxiety (an intrinsic trait), but little relationship between curiosity and social stressors (an extrinsic stimulus). Kashdan, Rose, and Fincham concluded that "curiosity is affected by internal and external novelty and challenge" and is "a malleable trait," but "self-generated" factors, e.g., striving toward personal goals, appear hierarchically more significant (302).

With recent advancements in neuroscience, a new era of curiosity research has emerged, which has led to greater understanding of the limbic system of the brain and its relationship to curiosity (Kandel; Kashdan). This includes new information on how three major parts of the limbic system—the hippocampus, hypothalamus, and amygdala—are responsible for several phenomena associated with curiosity, such as, the creation of long-term and spatial memories, feelings of hunger and arousal, and behavioral responses to reward and fear (Kandel, Schwartz, and Jessell). In addition, it is the hippocampus, often referred to as the "pleasure center" of the brain, that is primarily responsible for the release of dopamine, and, therefore, the regulation of emotions; this is also the place where the "seeds of creativity and imagination are sown" (Kashdan 56). Curiosity is also closely linked to the emotional constructs of "anxiety," "pleasure," "fear," and "risk," as well as cognitive processes such as "speculation."

# Curiosity in the Context of Design Education

Design education—architecture, interior design, landscape architecture, industrial design, graphic design, etc.—is often held up as model for fostering critical, synthetic, creative thinking (Boyer and Mitgang). The central setting of design education, the studio, is a primary pedagogical mechanism for honing critical, creative problem solving, or what has become known as "design thinking."<sup>5</sup> Curiosity is closely tied to other latent constructs central to design thinking, such as, self-motivation, creativity, and perseverance. The study of curiosity "is not a self-contained speciality but something intertwined with many of the most fundamental issues" of the human psyche (Berlyne 217). If learning, in general, is about synthesizing new and potentially conflicting ideas with previous knowledge, then a willingness to transform prior knowledge in the light of new information is critical. Kathleen Fisher, in fact, found that curiosity leads to openness toward new ideas, or what Benedict (2) described as "seeing your way out of your place." So, in theory, fostering curiosity leads to deeper and broader learning or "the notion that curiosity begets curiosity" (Kashdan, Rose, and Fincham). As such, one major aspiration of studio pedagogy, presumably, is to promote curiosity. But a major question remains, which is the central subject of this paper: to what extent does the studio environment affect student curiosity? The answer to this question will be discussed momentarily.

In the design studio, the relationship between teaching and learning (instructor and student) is blurred, so too is ownership of the work, as students and instructors, together, examine a variety of propositions to a given design problem, issue, or situation. The design studio, in its most esteemed state, is a unique, challenging, and supportive setting, where students and professors work closely together as collaborators rather than hierarchically as mentor-and-protégé. As anecdotal observation suggests, however, the joint learning experience of the studio is undermined when instructors exert too much or too little control or, reciprocally, when students exhibit low levels of curiosity or self-motivation. Renowned educational philosopher John Dewey discussed both curiosity and learning ownership. Regarding ownership of learning, Dewey asserted:

The operation of the teacher's own mental habit tends, unless carefully watched and guided, to make [students] of the teacher's peculiarities rather than of the subjects that [students are]

<sup>5</sup> Tschumi asserted that design is a form of knowledge, not a knowledge of form, that design is most strikingly distinguished as a discipline through the

cognitive processes required. In parallel, Hickman defined art as not just a sphere of knowing but a "way of knowing." See also: Boyer and Mitgang; Burks; Fisher, T.; Smith; Smith and Rudzinski; Zimring and Craig; Zumthor.

supposed to study....No one other thing, probably, works so fatally against...the training of mind. (49, 54)

In essence, the argument here is that curiosity needs room to operate. Authoritative instruction rescinds student curiosity and, thereby, squelches the learning that might come from its pursuit. Likewise, Dewey stated:

With respect...to curiosity, the teacher has usually more to learn than to teach. Rarely can he aspire to the office of kindling or increasing it. His task is rather to keep alive the sacred spark of wonder and to fan the flame that already glows. (33-34)

Based on this and prior scholarship, as well as research findings of the author, the answer to the question posed earlier contains four parts.<sup>6</sup>

First, studio pedagogy has little effect on the overall levels of curiosity—i.e., inquisitiveness of design students. There is, however, evidence to suggest that design students—architecture, interior design, and landscape architecture, etc.—are more curious than their counterparts in other non-design disciplines. Design disciplines, not surprisingly, tend to attract inquisitive people. But, there is no evidence to suggest that curiosity levels change—positively or negatively—as students matriculate through the studio curriculum.

Second, the studio also has little influence on the particular interests of students. Particular interests of design students most frequently arise prior to their enrollment in higher education, often from interactions with specific family members. Interests that arise while enrolled in formal design education typically stem either from knowledge obtained in the non-studio curriculum or from perceived "gaps in knowledge" (shortcomings) in the studio curriculum. In essence, curiosity is idiosyncratic, unpredictable, and non-transferable.

Third, although the design studio does not affect the subject of a student's curiosity (the "what"), the studio does appear to influence the pursuit (the "how") of a curiosity. Curiosity, not unlike hunger, may be defined according to three phases: origination, pursuit, and satiation. The <u>pursuit is the aspect most susceptible to</u> 6 Findings of this section are based on mixedmethods (quantitative and qualitative) research conducted by the author during the fall 2009 and spring 2010 among 324 architecture, landscape architecture, and interior design students at a public research university. extrinsic influences. Though a studio instructor may not be able to impart a particular interest to a student, a studio instructor can help a student to identify productive and efficient means for pursuing, specifying, or contextualizing that interest.

Lastly, a final myth about curiosity needs to be dispelled. Curiosity is often associated with intelligence and, therefore, it is assumed that the most curious design students are the most successful. However, there is no relationship between curiosity and student performance. Lower-performing design students are just as likely as higher-performing design students to be highly curious, moderately curious, or minimally curious. The tacit desire of instructors to have "curious students" may be a conflating of one aspect of curiosity, tenacity (or diligence), confusing tenacity with curiosity itself.

#### Conclusion

"Amazingly, there has been almost no research on why people are so powerfully driven" by curiosity, "creativity, problem solving, and scientific discovery" (Loewenstein 94). Moreover, scholarship on curiosity—both its historical roots and its contemporary developments—has yet to permeate design education and the daily instructional practices of the studio.<sup>7</sup> In light of the more recent scholarship presented here, the dialectical history of curiosity may now make more sense. The rising and sinking value of curiosity over time is attributable not only to its ever-changing definition but also to misperceptions regarding the role that curiosity plays in education.

What existing scholarship does suggest is that intrinsic factors play a central role in curiosity and exploration, while extrinsic factors play a secondary role. Likewise, research suggests that the *subject* of one's curiosity is somewhat resistant to extrinsic influences, e.g., the studio environment, while the *processes* of curiosity are more porous. Or, as Berlyne stated, internal stimuli (i.e., thinking) commonly supersedes external stimuli in both the arousal and the satiation of curiosity, while the

<sup>7</sup> This has also been a criticism in art education. Baxter, Lopez, Serig, and Sullivan, for example, voiced concerns "that studio art has become so estranged from art education research" (5), despite the prominence of the studio as a pedagogical setting.

depth, breadth, and quality of the curiosity, however, may be influenced by external conditions. In any case, though curiosity may lead to Nobel-worthy discoveries for some, curiosity does not equate to student success in the design studio.

There are enormous implications for professors in all disciplines, as it begets a paradigmatic shift. This is especially the case in design education. On one hand, findings may suggest that studio instructors, often highly curious themselves, need to place less focus on getting students curious about the interests of the faculty (or worse yet, trying to make students more curious in general) and place more focus on helping students find productive ways of investigating what already interests them about design, and/or helping students to contextualize those interests. On the other hand, it may suggest, in a much more radical way, that design educators need to give up on curiosity altogether, placing it quietly and carefully on the shelf of *The Old Curiosity Shop* or safely in Pandora's pithos until we know what to do with it.8

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<sup>8</sup> See note 1 and note 3.

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# PROCESSES OF CONCRETE DESIGN: MAX BILL'S INTEGRA-TION OF THE RATIONAL AND THE INTUITIVE Making Connections

TANIA CALOVI PEREIRA, ASSOCIATE PROFESSOR FEDERAL UNIVERSITY OF RIO GRANDE DO SUL/PORTO ALEGRE, RS-BRAZIL

# Introduction

The theory of Concrete Design formulated in 1936 by the Swiss artist and architect Max Bill proposes a process of design not derived from the appearance of the visible world, but instead generated from fundamentals such as color and geometrical form, light, as well as movement and space. For Bill a Concrete form would be an idea which originates in logic as much as in imagination, and is translated by the intellect into functional form.

Max Bill's theory and works also provide a rare example of the unity of the arts sought after since the end of the 19th Century in England and Germany. This goal stems from Gottfried Semper's effort to raise creative visual works above their prevailing decorative aspect and to base their conception and production in reason. Through Style (Stil, 1861-1863)<sup>1</sup> Semper advocated a synthesis of the arts and proposed not only an encompassing and relational way of thinking that involved all the arts, but one that also allowed art to approach science. This lent rigor and had a legitimizing effect on the visual arts, and also brought rational analysis to fields that were cluttered with imitation and disconnected from the zeitgeist.

In 1898 the Belgian architect Henry Van de Velde criticized the desire for newness in his writings and lectures and advocated a unique style based in logic and purity.<sup>2</sup> In a time when the imitation of antique styles was synonymous with beauty, Van de Velde was an important voice in the German speaking world and, similar to Le Corbusier, he considered beauty to be, 'a return to reason.'3 Van de Velde claimed that the 'spirit of the machine' should stimulate the creativity of the artist instead of being a formula for the creation of mass produced objects, and could also reconcile the rational and the individual. The Bauhaus under Walter Gropius would eventually come to embody these ideals in its pedagogy, though few successful examples of architecture demonstrating this unity were ever derived from this effort.

The success of Max Bill's synthesis of the arts through his Concrete design theory is particularly interesting and challenging to penetrate for a number of reasons: his artwork is not mirrored by anything seen in nature, and it encompasses diverse themes, forms and techniques while exploring elementary means such as geometry, line and color in innovative ways. His architecture is likewise diverse in form, materials and construction techniques, and also explores the notion of the elemental. Furthermore, his artwork and architecture bridge concepts instead of forms between each other.

By combining apparently opposite qualities, such as diversity and essentiality, Max Bill's art and architecture demonstrates a rarely seen balance of functionality and aesthetics among modern architect-artists. Such dual careers almost invariably come to rely on either a pictorial method or a set of architectural elements and principles that conform to a certain visual pattern, and are ultimately characterized by a style. When one tries to place Bill's body or work within a style or to define the characteristics that connect his disparate Concrete artworks or his architecture, it is then that rigorous adherence to essentiality emerges as the link between them all.

## The Shaping of Concrete Design

Bill started as a silversmith apprentice in the School of Applied Arts in Zurich where he became fascinated by the writings of Le Corbusier and Gropius<sup>4</sup>, leading him to study at the Bauhaus between 1927 and 1929. Despite Hannes Meyer's pedagogical emphasis on social, utilitarian and economical values during his term as the director of the Bauhaus, which had replaced Gropius' emphasis on the arts, Bill pursued research into painting with a rational focus. He learned to value logical thinking in art through Wassily Kandinsky's<sup>5</sup> analytical and reductive method regarding form and color, and Paul Klee's<sup>6</sup> all-inclusive art which employs the power of lines and relationships between colors to convey meaning.

After the Bauhaus, Bill's early career included artistic exchanges with the *Abstraction-Création* group in Paris in 1932 where he met with Piet Mondrian and Georges Vantongerloo, both of whom would have a lasting influence in his work through the clarity of their investigations into space. Bill also discovered Theo van Doesburg's 1930 manifesto on 'Concrete art', and together all these events would be fundamental for the definition of his own 'Concrete design'<sup>7</sup> in 1936. Bill's term is more inclusive than Van Doesburg's 'Concrete art', because it describes a method applicable in several fields.

Furthermore, many substantial differences set Bill's thought apart as well. These concepts are expanded on in Bill's 1949 essay The Mathematical Thinking in the Visual Art of our Time<sup>8</sup> in which he explains his design method within a historical context and establishes relationships between art and science. In this Bill praises, among others, Kandinsky, Klee, and especially Mondrian with his technique of structural design, explaining that most of the modern art after these pioneers simply reproduced their techniques. He then argues for a logical way of thinking in visual art, and proposed that art should be made a vehicle for the direct transmission of clear ideas. It should encompass both feeling and reason, intuition and logic, and express its own time and culture. He would advocate a functional use for works of art, believing that the fundamental impulse for their creation is a process of mental clarification<sup>9</sup> in which artworks become objects for visual and intellectual use.

This is expanded on in texts such as *Beauty from Function and as Function*, 1948<sup>10</sup>, where Bill extends the debate on beauty of form to architecture, declaring that the form of an object or building should be a fusion between the rationalism of the engineer and the 'beauty according to reason' defined by Henry van de Velde.<sup>11</sup> The Exhibition *Good Form* (*Die gute Form*, 1949)<sup>12</sup>, that followed this text as well as the book Form (1952) broadly expand Concrete concepts to apply them to all visually creative fields. In this book several images of buildings, landscapes and urban projects share space with paintings, sculptures and objects, and define the spectrum of the Concrete idea.

Finally, the text From Surface to Space (De la Surface à l'Espace, 1952)<sup>13</sup> defends the spatial function of paintings, reliefs, sculptures and architecture. It advocates for works of art and architecture that can bridge actual space and psychological space, as it is perceived and understood, producing a dynamic condition in one's spatial experience. This encompassing attitude that relates man with his environment allowed Bill to travel comfortably between works of art, architecture and engineering, and to characterize them<sup>14</sup> not as self-contained but as related to a broader context. A painting or a sculpture, as he sees it, should be more than an object unto itself, it should be open and able to compel the viewer's mind to connect with realities of the environment and to the subjective realities of one's mind. While transparency is essential to an architecture where interior and exterior spaces are integrated<sup>15</sup>, for Bill it does not necessarily imply the use of glass. He expands on this principle by proposing an analogy between slabs and walls, demonstrating an economy in the use of materials and also a clear spatial conception that supports their function. Finally, artworks and buildings are both more functional the more they are able to establish relationships with their surroundings.

Bill professed the need for, 'artists capable to unify painting, sculpture and architecture,' and said, 'it is in this space that plastic creation – pictorial and spatial – can be raised to unity. This is the unity that we aspire to.' <sup>16</sup>

# Connection and Disruption in Composition

Analysis of Bill's artworks and architecture elucidates the intellectual operation of his Concrete design theory as well as the scope of his Functional Beauty. Rather than formal or material associations between his work, examination reveals the transference of analogous concepts between them.

In the late forties and fifties, analogical relationships between Bill's art and architecture can be characterized by investigations into the concepts of connection and disruption. This was conducted in the long-running exploration of his Endless Ribbon series (1935-1995) and its single surface structure which was approached again and again with a growing sophistication. In later versions stone was replaced by a thin sheet of metal which made the surface plane thin and pliable, allowing him to literally fold the surface and create several distinct objects. Advancing from his early investigations into continuity and the integration of surface and structure of his first Endless Ribbon, these new versions employed various deliberate distortions to focus on moments of rupture and reconnection. In sculptures such as Endless Ribbon from a Ring II (1947-1948, Figure 1a) the inert shape of a ring is altered, becoming a flexible plane. This thin sheet of highly polished gilt brass allows the reflection of incidental light, colors and shadows, transforming it into an interactive object with the illusion of movement.17

Other works of this period include paintings that explore the potential of line and color to generate space. The painting Unlimited and Limited (1947, Fig. 1b) explores how the curve line affects space, and perceptions of the finite and the infinite. The tension along this line is due to contrasting tones and pairs of colors which recall Kandinsky's color theory and define formations with various senses of depth and materiality. Another example, among many, is Six Lines of Equal Length (1947, Fig. 1c) where the darkness of two brown lines alludes to a formation with depth around which four colored lines unroll from spools. These colored lines are constrained and driven by the implied space created between the first two. Due to this effect, the green line retreats, while the blue extends upward between the brown lines.

Bill's artistic investigations into the concepts of connection through a single surface, curves and colored lines can be seen in his next significant architectural project, the *Ulm School of Design (Hochschule für Gestaltung*, or *HfG*, Figure 2a, 2b), designed and built from 1950 to 1955 in Germany. The *HfG* is considered by many to be Bill's most important architectural work. Aside from the programmatic complexity of a school that was intended to be a personal interpretation of the Dessau Bauhaus pedagogy of Walter Gropius, it was Bill's first opportunity to realize his own ideas for design education in material form.



FIGURE 1: from top to bottom, a,b, c.

The site is located on a hill to the south of the city of UIm, and opens to the south on the Danube valley. The school complex spreads upwards to the top of the hill, enhancing the undulating landscape with its configuration of buildings. Similar to the programmatic distribution of the Dessau Bauhaus, the activities labeled 'work', 'live' and 'meet' are addressed by a sequence of volumes stretching down from a ridge. These include a large volume dedicated to school departments and workshops, a smaller attached volume dedicated to a communal space with lodgings, meeting rooms and a bar and cafeteria, fol-



FIGURE 2: from top to bottom, a,b

lowed by a row of small studio volumes linked to the dormitory tower which is the only building in the complex that stands four storeys tall. Out of the three planned dormitory towers just one was built due to budget restrictions. All these volumes are linked by a corridor spine that runs through each building to integrate the different spaces, and which becomes a covered passage such as a loggia or a promenade as it approaches the dormitory tower. The long spinal circulation, which is dynamic in nature, allows for views of the different functions inside the building while connecting them, and also for a variety of views of the landscape which add counterpoint to the rationality and simplicity of the buildings. 18

If one compares the *HfG*'s winding spinal circulation to the surface of *Endless Ribbon from a Ring II*, it becomes clear they are both charged with motion which offers several markedly different views and interpretations. These multiple perceptions and moments embodying change of direction are concentrated in the *HfG*'s three triangular areas that function as angled joints along the spinal corridor. Bill envisioned the three angled joints in the sequence of buildings as points of tension, decision and orientation both inside and outside, and as a way to signal programmatic shifts. In *Endless Ribbon from a Ring II* there is one point atop the piece and two beneath where the surface shifts, and similarly these become focal points of tension.

Recalling the painting Unlimited and Lim*ited*, a curving line strikes through patches of color, and, energized by contrast, operates as an aggregator of energies or a common ground between worlds, and less so as a separator. Correspondingly, in Six Lines of Equal Length where four lines are compressed and expanded by the relationship of two more prominent lines, there is an implication of nesting and accommodating initiated by a predominant field. One can likewise perceive the *HfG*'s distribution of volumes as responding to the curving form of the terrain in which Bill accommodated the school complex. This careful distribution of buildings combined with the angular junctions of the corridor spine are strategies of organic order which ultimately relate the parts to the whole.

The curved line that integrates the complex is also an instrument of connection between the school's geometrical figures and the hillside it rests on. Walking through the passageways that unite the buildings one encounters different tensions from the emergence of various spaces along the way and from views of the surroundings.<sup>19</sup> Instead of confronting the topographical order of the surroundings the *HfG* reproduced it through the building's serpentine format and a functionality that is geometrical and programmatic.

# Contextualization and Purity of Form in Composition

After Bill's resignation in 1956 as president of the HfG, and his replacement in its presidential committee in 1957 due to differences of opinion, he would reopen his professional studio in Zurich. His experience designing, teaching in and directing the school at Ulm would be succeeded in his architectural practice by an even more reductive approach and a focus on contextual relationships that saw his buildings as components of their cities and environs.

Among Bill's artworks of late fifties and sixties, a progressively minimal aesthetic with a growing use of rectilinear and pure colored forms reveals itself along with a reduction of investigations into curves and lines. The grid which Bill had previously used would no longer be employed as an overt instrument of organization but as a submerged principle, and one that was frequently challenged. Just as the square and the rectangle came to frequently occupy his paintings, in his sculptures the sphere would predominate, and all served as investigations into basic geometries that address minimal form. These geometries gained identity from the integration with color in painting and with material in sculpture, and also from arrangements that emphasize forces acting upon them. Similar themes would be expressed in his architecture through a renewed interest in the forces present in cities and landscapes that affect the surface and the internal conception of architecture and also act as means to contextualization.

By the sixties Bill's sculptures would shift back to the use of stone as in his early works. In these he expressed his appreciation for minimal form and dense materiality, and especially for the forces that act upon matter.

These same concepts of purity of form and contextualization are seen in Bill's last architectural work, his own *Studio House in Zumikon* (1967-1968, Fig. 3a, 3b) which, unlike his first *Studio House in Zurich-Höngg* (1932-1933), was designed and built without budget restrictions. It also represents Bill's mature ideas as an architect and the consolidation of many values he discussed and wrote about over the years.

The house is situated in the green suburban area of Zumikon in Zurich where it looks down a hillside to the West and South. Bill's strategy was once more to design a house to suit the existing topographical contours, employing here an L-shaped plan that faces the rear of the site where it embraces a garden and a view of the sloped surrounding landscape. The topography led him to distribute his design among three levels including a ground floor, an entrance floor above and an upper floor. The entrance is set in a low, elongated volume which, approaching from the driveway, is



FIGURE 3: from top to bottom, a,b

slowly revealed among the trees with a somewhat industrial aesthetic of hard lines and seamed white Eternit panels. While the three storey structure is almost completely hidden at the entrance, in the terraced garden at the back one is able to comprehend the multi-level arrangement from a lower elevation.

The plan of the house is composed of independent areas organized with reference to the landscape. The living room is at the core of the plan and serves as a link between spaces including the master bedroom and bathroom, and the kitchen and dining room. Commenting on this project Bill<sup>20</sup> noted that in his creative process he often took a central idea and opened it up to several other developments. 'This central living room extends on every side into other rooms. All around, the inner space merges logically into the outer space." While this is the only space in the house with multiple free interconnections, this statement also shows Bill's intentions to unify house and land, inside and outside. Most of these spaces face



FIGURE 4: from top to bottom, a,b

the rear garden and the West, while one workshop and four studios face the Northeast with a private view that is separate from the garden.

Different heights characterize certain rooms such as the double-height workshop located on the entrance floor, and the partial high ceiling in the living room that defines two integrated but distinct areas. Above the living room fireplace toward the front of the house is a lower ceiling marked by two pilotis that establish a human scale, while the adjacent raised ceiling allows in a great deal of sunlight and anticipates the view of the rear garden. The same strategy of height is applied to one of the studios. This spatial shift could be defined as moving from compression to expansion or from a private use to a more active and social use. Bill adds to this project a multifaceted relationship between landscape and space's height, width, and length which especially challenges the envelope of the house as a self-contained frame.

In his last project, Bill employed an interpretation of contextualization and purity of form which operates through a topographical order. This is evident in the allocation and relationship of spaces in the house which recognizes the natural surroundings and responds to them through a variety of rooms that account for their different views, while their integration and passageways confer significance on the main rooms within.

Significantly, the sculptures *Twin from a Quarter Sphere* (1968, Fig. 4a) in African granite and *Striving Forces of a Sphere* (1966-1967, Fig. 4b)<sup>21</sup> in rose granite are placed at the main entrance of this house and embody the play of forces that reconfigure their forms, much the way topography shapes the house. These sculptures are fractioned wholes, massive pieces of stone that have clearly been cut, moved and arranged as new forms, and this is analogous to the understanding of this house's design as individual parts reconnected into a new whole which makes sense as one unity when perceived with topography in mind.

In Striving Forces of a Sphere two smooth diagonal cuts divide a sphere into quarters and allow two pairs of sections to slide apart along the axis of the cuts with an inherent sense of gravity. Simplicity of geometry is paired with complexity of implied movement and a sense of stability is paired with instability depending on the observer's angle of view.

Twin from a Quarter Sphere is a quarter section of a sphere with a wedge cut from the section's straight edge. The cut produces a negative space alluding to the retreat of matter and the subsequent penetration of the surroundings as seen through its gap. While Striving Forces of a Sphere can be read as the aftermath of transformations and the force of gravity, it nonetheless maintains its parts and integrity while Twin from a Quarter Sphere emphasizes the withdrawal of matter and the advance of the surroundings. This alludes to the house's design in relation to the land which gives prominence to the ridge and the sloping terrain that are cut to allow the driveway and the house to nestle into the landscape. If the Studio House in Zumikon does not convey the simple geometrical purity of these sculptures by the aggregation of volumes that reflect context, it nonetheless expresses a different concept of purity. This involves less of the interpretation and recognition of isolated forms in the house and more of the collective elevations that reflect grades in the landscape. Thus, Bill interprets concepts of contextualization and purity of form which operate through a topographical order.

## Conclusion

This investigation supports the validity of artistic research in its contribution to architecture, and particularly where this research deals fundamentally with concepts rather than forms. The advantage of the Concrete processes in the design of architecture is the variety of architectural arrangements that can be derived from the same set of concepts, and the avoidance of a formalism that stales through repetition and imitation. The innovative aspect in Bill's Concrete design is his balance between practicality and aesthetics which is developed through reason. A short phrase by Max Bill succinctly concludes this investigation: "...perhaps just a strict limitation to essentials is the great art."<sup>22</sup>

#### Endnotes

1 Gottfried Semper, *Der Stil in den Technischen und Tektonischen Künsten, oder Praktische Äesthetik* (Style in the Technical and Structural Arts, or Practical Aesthetics, 1861-1863).e

2 Henry van de Velde, *Déblaiement d'art, suivi de La triple offense à la beauté; Le nouveau; Max Els-kamp; La voie sacrée; La colonne*; (Clearing of Art), Archives d'Architecture Moderne, Brussels, 1979, p. 104. According to Van de Velde this work was originally published in 1894 (see on page 3).

3 Le Corbusier published *Vers une architecture* in 1923, but the essays for the book were written previously in 1921 and published in the magazine L'Esprit Nouveau. Le Corbusier was one of the forerunners in the claim that architecture should be reformulated and abandon the imitation of old styles, but was nevertheless preceded by Adolf Loos (Ornament and Crime, 1908) and Henry van de Velde. In 1929, when Van de Velde's text The New was published, he admitted that his own claim for a logical conception applied to the 'creation of every form' was already published in 1901, in the book Prédications pour les Laïques (Preachings for the Laymen), in which he wrote the chapter, 'Declaration des Principes' (Declaration of Principles). See Henry van de Velde, Déblaiement d'art (Clearing of Art), op. cit., p. 81.

4 In this period Bill found two books on architecture in the School of Applied Arts's library which were especially influential on him, *Staatliches Bauhaus Weimar* 1919-1923 by Walter Gropius, and *Vers une architecture* (1923) by Le Corbusier and which had recently been translated into German. This edition of Corbusier's book was entitled *Die kommende Baukunst*, Munich: Bauhausverlag Weimar, 1923. Angela Thomas et al. 'Max Bill: The Early Years. An Interview', In: *The Journal of Decorative and Propaganda Arts*, 1993, p. 101.

5 Bill had learned to value logical thinking in art through Kandinsky's analytical method in art and his analytical drawing exercises which departed from stilllifes and were intended to analyze the logical relationship of objects by studying the structure behind phenomena, through forces or tensions described by means of diagrams employing, lines, dots and color. Kandinsky stated that the young artist, 'should accustom himself to objectivity, i.e., to scientific thought,' and argued against what he called the, 'one-sided emphasis upon the intuitive element.' This was a period in the Bauhaus when a functionalist orientation was becoming more entrenched under the directorship of Hannes Meyer, and soon art would be disregarded in design education. Wassily Kandinsky, 'The Value of Theoretical Instruction in Painting', in Kenneth C. Lindsay and Peter Vergo (ed.), Kandinsky, Complete Writings on Art, New York: Da Capo Press, 1994, p. 702-703.

6 Like Kandinsky, Klee believed that the rational played an important role in the process of creating art and included a subjective aspect that he called man's 'worldview', which he defined as the expression of a man's inner reality or a certain state of mind which drives one to manifest one's spirit in a certain place. His Bauhaus lessons described the power of lines, and through them his own works became emblematic of the forces behind nature itself and the permanent movement in it. Klee remarked to his students that his creative methods were just possibilities and not strict laws, and that they should avoid blind schematiscism. Paul Klee, 'Contributions to a Theory of Pictorial Forms', in Jürg Spiller (ed.) Paul Klee: the Thinking Eye: the Notebooks of Paul Klee, New York: G. Wittenborn, 1964, p. 99-100 (note 11). Rainer K. Wick noticed that the translation of the original word used by Klee to refer to the subjective content of art, Weltanschauung, translated by Spiller as 'Philosophy' was not accurate and he updated it to 'Worldview'. See in Rainer K. Wick, Teaching at the Bauhaus, Germany: Hatje Cantz, 2000, p. 238 (note 71).

7 This interpretation refers to the text 'Concrete design' (1936) originally written by Bill for the exhibition *Zeitprobleme in der Schweizer Malerei und Plastik* (Current Problems in Swiss Painting and Sculpture, June 1936) at the Kunsthaus Zurich. This text is reproduced in Karin Gimmi et al, 2G 29-30, *Max Bill Architect*, Barcelona: Editorial Gustavo Gilli, 2004, p. 255. This first exhibition gave an initial overview of the various tendencies of non-figurative art in Switzerland. In subsequent texts Bill would make even clearer his broad view of the Concrete as an 'idea' that spreads to all creative fields.

8 Max Bill, 'The Mathematical Approach in Contemporary Art', Ibid., p. 261-262. 9 Eduard Hüttinger, *Max Bill*, New York: Rizzoli and Zurich: ABC edition, 1978, p.190.

10 This lecture was given by Max Bill at the Swiss Werkbund yearly meeting in Basel, in 1948, when he addressed the plenary session. The original title was *Schönheit aus Funktion und als Funktion* and it was first published in *Werk*, vol. 36, no. 8, 1949, p. 272-274.

11 Henry van de Velde was one of the first figures who strove to bring art to industry, and was among the first leading members of the German Werkbund. His ideas were aligned with those of art and social critics John Ruskin and William Morris together with the English Arts and Crafts Movement. For him there was only, 'one style...rationally conceived, consisting of pure forms determined by their function.' Henry van de Velde, 'Lecture to the Swiss Werkbund, Langenthal, 16 November, 1947', Das Werk, January 1948, p. 34-42. In 1898 he criticized the desire for newness in his writings and lectures and advocated a unique style based in logic and purity. Henry van de Velde, Déblaiement d'art, suivi de La triple offense à la beauté; Le nouveau; Max Elskamp; La voie sacrée; La colonne; (Clearing of Art), op. cit., p. 104.

See in Karin Gimmi et al, op. cit., p. 98-101.
Max Bill, 'De la Surface à l'Espace', in *XXe Siècle, Nouvelle série*, no. 2 (double), January 1952, p. 59-65.
Among the artists mentioned by Bill are Klee, Mondrian, himself, Vantongerloo, Voldemberge-Gildewart and Arp, while the architects are Richard Neutra, Frank Lloyd Wright and Mies van der Rohe, together with the engineer Robert Maillart.
Max Bill, 'De la Surface à l'Espace', op. cit., p. 64-65.

16 Ibid., p. 65.

17 Other sculptures of this period that investigate the concepts behind *Endless Ribbon are Surface in Space Delimited by One Line* (1952-1970) and Surface in Space (1948-1971) which became long-term explorations through several versions. See these works in Thomas Buchsteiner et al, *Max Bill: Maler, Bildhauer, Architekt, Designer*, Hatje Cantz Verlag, 2005, p. 138-139.

18 The four sketches drawn between June of 1950 and August of 1952, before Bill's fifth and final proposal of 1953, show the progress from the initial intention of connecting buildings with pedestrian passages and courtyards to the design of an open and angular yet serpentine format that can be seen in the three subsequent sketches. Hans Frei, *Konkrete Arquitektur?: über Max Bill als Architekt*, Baden: L. Müller, 1991, p. 71-78.

19 Frampton described the composition at UIm as a, 'sacrifice to the logic of aesthetic measure,' but he failed to consider Bill's sensitive treatment of the landscape. If the HfG is analyzed off-site, or as an axonometric drawing floating rootless on a sheet of paper, the distribution of volumes appears arbitrary and pointless. In fact, the isolated axonometric drawing of the HfG was published several times in many articles and books. However, its coherence becomes obvious where the curve of the school's corridor spine departs from the administrative and workshop volumes high in the terrain and descends with the hillside's treeline, encounters the communal area, and ends at the dormitory towers and architecture studios which extend deeper into the forest. Kenneth Frampton, 'On Max Bill. A review of the Albright Knox Exhibition Catalog', in: *Oppositions 4*, October 1974, p. 157.

20 Michael Peppiatt. 'Max Billl, Perpetuating the Bauhaus Ideal', *Architectural Digest*, v. 44, August, 1987, p. 48D.

21 See also in Arturo Carlo Quintavalle et al., Max Bill, Università, Comune, Provincia di Parma, 1977: col patrocinio della Regione Emilia-Romagna, Parma: Grafiche STEP, 1977, p. 122.

22 Max Bill, 'The Beginning of a New Epoch in Architecture' (1955), in Karin Gimmi et al, op. cit., p. 269.

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# VICE VERSA MACHINES: ARCHITECTURE/CINEMA Making Connections

JODI LA COE AND MARCUS SHAFFER PENN STATE

"... because that's what we're concerned with as architects. The movement of human beings in time and space!"

-- Sarah Wigglesworth, "Deviant Decoration" lecture at Penn State, 2009

The Cinematic Kinematic Project is presented in a required course at Penn State (ARCH 131S: Basic Design Studio I) consisting of four student sections comprised of 15-20 first year architecture students, with each section assigned to one of four first-year architecture faculty. Traditionally this studio course serves as an all-encompassing introduction to the practice of architecture for students with little or no experience in the field that are beginning their Bachelor of Architecture Degree Program. The curricular goals for the first year Basic Design Studio include an emphasis on architecture's traditional visual/tactile skill set, architectural analysis and representation (through means both analog and digital), and an introduction to conceptual thinking and creative/ intuitive problem solving. This project, given to students in the second half of the fall semester, was initially devised in 2008 as a reactionary response by the faculty to common student assumptions about architecture that inevitably surface during the first-half of the semester. These specific student attitudes or prejudices in the studio interfere with the creative process, and as beginning design instructors, we were interested in expanding the student's assumptions of what architecture is in order to develop their curiosity and understanding about what architecture can be.

Beginning design students often suffer from a some-what narrow perspective on the role, methods, and "jurisdiction" of the architect in relation to the arts, the sciences, and society a short-coming they seem to adopt through limited experiences with design prior to beginning our program. The "job" of the architect, as often reported by these new students, is to draft designs for buildings and occasionally make scale models in response to the needs of a client. The fact that these buildings must first be initiated and evolved as design-and how one goes about designing—are approached conceptually by freshmen students as language/actions/processes that are as new and foreign as learning Mandarin Chinese or quantum mechanics. This condition forced us as a faculty to address the question, "How does one create design awareness and ability out of common or familiar experiences?" Additionally, our first-year students often display an over-dependence upon knowing and immediately working towards the final deliverable of a given project. This short-sightedness with regards to the design professions, and the student's "need to know" reflexes developed in high school, stress beginning design education (and educators) and constrain the studio in an environment of disbelief, preventing students from opening themselves up to the vital and nuanced experiences to be had within the free-form evolution of a work of architecture. As educators in a department with a renewed interest in multiplicity within the practice of architecture, our inclination is to strengthen and broaden the architecture student's capabilities and perspectives early, through exposing them to a greater range of architectural, endeavors, tools, products, and ideas. Floating in the air above this problem, beyond it's being devised as a reactionary measure, is the critical observation made by one of our faculty for those of us teaching first year in this particular program. Over time, she has realized that we also had to consider ourselves critically responsible for establishing a whole variety of minor architectural habits, instincts, tendencies, and liberties-the architectural "airs" and "fancies" that don't make appearances in curriculum requirements or on a class syllabus. In delivering the first year experience to the beginning design student, we needed a project that could evolve into a reliable framework for furnishing the school with a great pile of characters, whims, and "kits" that might be adopted, carried, modified, and employed by students in various combinations or ensembles for the



FIGURE 1: Exhibit of still objects

rest of their careers. In this regard, our Cinematic Kinematic project serves as a powerful introductory/threshold experience to students inventing themselves in our building.

Much like a trip to the cinema, our strategy for addressing these hurdles begins with presenting students with a project that keeps them "in the dark", intensely focusing on the action at hand through a sequence of related shorts/deliverables. In addition, each component of the Cinematic Kinematic Project requires students to adapt quickly to a variety of new skills, media, technologies, and sensibilities that are only revealed in an undeniably architectural product during the final weeks of the project. Through the processes of drawing, two-dimensional design, filmmaking, machine making and instrumentation, model-making, and reflective architectural analysis, the students are effectively put through an 8-week contemporized foundation course (not too

dissimilar from the one offered to beginning design students at the Bauhaus). The pedagogical subtext attached to this project is that design is arrived at through mastering creative processes and technologies, and then employing them specifically to address material and spatial realities. The project also speculates that architects in the near future will have to become increasingly adept at responding to a culture awash in process. Perhaps the days when architecture could afford to socially or culturally edify a single event, an institution, or individual are by gone. In an age when everything is subject to, accommodating of, and animated by process, our students need experience in hitting moving targets. In this case, students begin the project being assigned a specific film, a moving image of three-dimensional space, as site and program. They finish the project by producing a design for a room (represented in a scaled wooden model) that houses a machine, its function, its choreography, history, and attendant(s).

Film, as site and program, affords the beginning design student a very quick and comfortable mastery of ideas analogous to architecture while sidestepping questions of right and wrong thinking or approach. Time, place, constituency, materiality, aesthetic, narrative, etc are apparent and conceptually available to the majority of our students who may not be immediately able to approach the physical world in this way. As everyone from the rural Pennsylvania farm boy to the cheerleader raised in the Philly suburbs seems predestined to develop film-watching habits and interpretive instincts/authority in today's popular culture, films-as-site involve much less second guessing as a educational experience than physical site. They also sustain the imagination better while translating more readily into parameters for analysis and design to be addressed by fledgling architects (for the faculty, there is the advantage of allowing Jean Cocteau to come alive at a desk, with Charlie Chaplin and Sergio Leone in residence as neighbors). Student relationships with filmsas-site, born of multiple viewings, transform rapidly from the first opinionated visit, to a more measured/ informed/educated "expertise" around the third week, to one that is ultimately a form of liberated mastery: objective/

subjective participation, extension, improvisation in the final critique/product. When this conceptual proposition is effectively working at it's best, the beginning design student is bridging the realms of film and architecture as the site or common ground of productive imagination—and responsibly operating within the realm of architecture as both pragmatist and visionary.

Students are given an introductory document on the first day of studio that establishes essential links between architecture and film. From the document:

"Architecture is the masterly, correct, and magnificent play of form in light."<sup>1</sup> -- Le Corbusier

"The City, analogous to film, is a continuous open sequence of spaces and objects perceived through time."<sup>2</sup> -- Diana Agrest

# Cinema: from the Greek Kinesis—Movement

Convergence was a common theme within arts and architecture during the later half of the past century, and it continues today in the form of collaborative work and routine crossing of artistic boundaries. Perhaps all artists and designers are influenced by other practices and creative media, but there is a specific affinity between architecture and cinema. Poets, painters and composers attempt to draw their audiences into a world made of their imagining, but the architect and the filmmaker must go beyond triggering an appeal to the imagination. Our two professions envision, design, build, and record stages for human activities (comedy, tragedy, romance), and in doing so we are also creating work that initiates and/or sustains reflective discourse within our societies. Buildings and films attempt to register who we are as a people or culture.

Planning a house, a skyscraper, or a city very much requires the architect to think as a filmmaker: site/setting, actors/actions, scenes, movement, light, color, time sequence, and narrative are critical aspects of our professional responsibilities. Both in their construction and in their use, good works of architecture unfold over time (hours, days, years) to govern, document, and/or play amongst our daily routines according to the "vision" of the architect. This project anticipates your participation in the world as architect/director, archi-



**FIGURE 2**: Exhibit of process drawings describing the unfolding

tect/actor, architect/cinematographer... we are asking you to move into the world within a film, to know it as your site and program, and to emerge from the film armed with its specific design sensibility.

In studio, as a group, students were instructed to approach their film as "active" rather than "passive" observers (this is a discussion), and encouraged to aggressively investigate all of the qualities of the film—its aesthetics, as well as its genre, theme, historical context, origin, etc. In an attempt to emphasize the great importance of analysis in every aspect of the profession, all discourse with the students as a group throughout the project's 8-week time period stressed the importance of a thorough relationship between the student architect and their assigned film. The Cinematic Kinematic Project will require students to make objects, drawings, machines, films, and sev-

<sup>1</sup> Le Corbusier, *Essential Le Corbusier L'Esprit Nouveau Articles* (Oxford, Architectural Press, 1989), p. 29

<sup>2</sup> Diana I. Agrest, *Architecture From Without: Theoretical Framings for a Critical Practice* (Cambridge, M.I.T. Press 1991).

eral scale models in guick succession-and we were explicit in stating that each sequential endeavor (which are not revealed ahead of time) was ideally mediated by their particular experiences with, and insight into the assigned movie. While the film becomes something the students come to know, it is also the entity they are working for and in, and the governing agent they rely upon for design direction. As the film slowly gives over something of itself as a cultural product to our student architects, they respond less and less to the original film, and more to their own responses. This iterative process of designing and taking of ownership produces works that are created with empowering qualities of authority, expertise, and intimacy.

In the two consecutive years that this project has been presented to students, parameters have been tweaked so as to accommodate the diversity of deliverables while offering students a path that is more readily discernable (at least in hindsight) for the benefit of more iterative work.

## Step One

2008 – 2009: A film is given form: construct a representative form/object for the film and cover it with 10 stills/images chosen from the movie.

2009 – 2010: The film is given form: choose 15 stills from the film that clearly register a movement: body/physical, geographic, temporal, plot/narrative, etc. Construct the sequence as a form/object.

#### Step Two

2008 – 2009: A process of rendering form into image: crush, peal, or unfold the object so as to flatten its 3D form into a 2D image; record this process using photography. Measure and draw the resultant image/object at one-to-one scale.

2009 – 2010: Reinterpretation - Intentions vs. Perceptions: through group "viewing", critique, and analysis, student's movement/objects are redefined and edited by the perceptions of their studio colleagues. All of the movement/ objects are re-titled.

#### Step Three

2008 – 2009: Image-making process and the movement/mechanics of film: make a second representation of the film-a machine-based upon the visual record (animation) of "flattening" the first. The action of an architectural deconstruction informs the movement/ mechanization of a new representation. Draw the machine (and its movements) in plan, elevation(s), section and axonometric views. 2009 - 2010: Addressing Process: the movement and mechanics of film: make a second representation of the film-a machine-based upon the descriptive title assigned to the first object. The viewing and perception of an architectural construction informs the movement/ mechanization of a new representation. Draw the machine (and its movements) in plan, elevation(s), section and axonometric views.

## Step Four

2008 – 2009: Film as movement, film as machine: make a one-minute short film featuring the actions and "character" of the machine as a "re-make", re-interpretation, or sequel/ extension of the original assigned film. 2009 – 2010: Film as movement, machine as movement: make a one-minute short film presenting the performance, character, and/or history of the machine as an object or representation of the movement sequence from the original assigned film.

#### Step Five

2008 - 2009: A room for the machine: with the machine transformed in scale (from desktop object to 1" = 1'-0"), design a room/interior space for the machine and the routine of a "mechanic" charged with its caretaking. Model the room first in corrugated cardboard (schematic) and then wood (final), and record it in plan, elevation(s), section and axonometric views.

2009 – 2010: A room for the machine: with the machine transformed in scale (students are individually responsible for proposing an appropriate change of scale), design a room/ interior space for the machine and the routines of a "mechanic" charged with its caretaking. Model the room first in corrugated cardboard (schematic) and then wood (final), and record it in plan, elevation(s), section and axonometric views.

# Step Six

2008 – 2009: Final film: a mechanical view of a mechanical room: Make a one-minute short film that captures the activity and architectural qualities within the machine/mechanic room. 2009 – 2010: Final film: a mechanical view of a mechanical room: Make a one-minute short film that presents the activity and architectural qualities within the machine/mechanic room.

In responding *conceptually* to various the components and requirements of the project, our first year students are encouraged to con-



FIGURE 3: A machine and stills from the machine-film

nect with and confront the immense complexities captured within their assigned movie, in a "piling on" of variables and considerations that is distinctly of the design professions (meanwhile, our colleagues in engineering and the sciences are teaching and emphasizing reduction). Not only do they discover an interpretive wellspring of ideas and inspiration through this type of broad accommodation, but the films-as-site, as governing agents, also begin to cause or simulate the "real" difficulties an architect might experience in putting together a response to complex and/or conflicting constituents; site, programmatic, and time constraints. Ironically, we've discovered that this project, beginning outside of the popular realm of architecture, where our world touches film, takes on a greater degree of "reality" than one we might have constructed to adhere to more conventional notions of architectural instruction, deliverables, or professional practices.

While immersed and operating in the conceptual world of a film, students are simultaneously responding in very *physical* ways through the first-time making of objects, machines, and architectural models. Using all variety of materials—paper, steel, plastic, wood—and incorporating simple mechanical systems, gears, and



FIGURE 4: A room for the machine

wiring, our students are wrestling with the "real" and constant problem of translating the intangible into something "independent" that we can see and touch. The machine in particular presents students with significant material, structural, and mechanical problems. Representing the machine on film/video (the students sign out high-end cameras and projectors, have access to green screen technology, and go through i-movie or stop-motion animation tutorials) allows students multiple means for bringing this representation or character to life. Finally, students must construct a room for the machine and attempt to accommodate a "back story" that they are intimately familiar with, as it is essentially a brief of their own making.

In addition to viewing their accompanying film several times while progressing through the components of the assignment, all students are required to advertise (in a graphic of their own design) and project their films for viewing by the entire School. For this purpose, a 30' x 30' screen was constructed as a hovering presence that looms over the first-year studio in a building that features educational/experiential permeability. In addition to infusing the studio (and the school) with an atmosphere that was undeniably cinematographic, projecting the assigned films (Monday, Tuesday, and Thursday nights for 8 weeks) expose the students to a greater variety of opinions, perspectives, and discourse on their films (which impacted their responsive work), as supplied by upperclassmen and graduate students, as well as various faculty and staff members from the school and greater college environment. Projecting the assigned films as a series--and the new films the students would eventually make--served as a continuous invitation for everyone in our educational community to comment on, and be involved in the first-year student's work/education. Additionally, the four faculty instructors used film as their primary means of teaching and student exposure when introducing or addressing various components of the problem throughout the half-semester. Architectural qualities essential to the development of student work-light, space, roomness-where demonstrated via film, rather than through lecture, drawing, etc. and in this manner, the project became equally challenging and thought provoking to the faculty involved.

The success of the project—as a stimulus for creative works of architecture, and as a schoolwide discourse on the scope of architecture's education and professional reach, is largely revealed in hindsight. In a manner that is certain to leave a lasting impression, the first-year students and faculty used the final critique and documentation of the work as a means of commenting on both the circuitous nature of the projects, and the almost inexplicable richness resulting from a more expansive method/ investigation/process.

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# MAKING DESIGN OUT OF THIN AIR: MUSIC AS DESIGN INSPIRATION Making Connections

# Abstract

This presentation reviews the impact of a freshman interior design studio assignment aimed at enhancing the creativity of students' design solutions. The assignment, Music as Design Inspiration (MDI), was conceived by Sweet and requires students to translate the elements and principles of music into a completed interior design. Beginning a design outside the parameters of visual media requires a shift in thinking and encourages release of preconceived solutions. MDI utilizes an educational technique labeled Random Input, which requires students to make connections between random and unrelated entities, to generate new approaches and new ideas to the material or problem in question.

In this exercise, students listen several times to a piece of music, and create a series of abstract drawings based on their impressions. They use line, shape, texture, color, and value. The resultant drawings generate a model which students use as the basis of their design for a commercial space. The drawings also serve as generators for patterns or elements within the space.

Many students do not reach for deeper sources of design inspiration than magazines or online images. Our "left-brain" looks for the most direct, linear, "easy" solution to a problem, and this often leads to a lack of exploration. The medium of music expands the mind and the design possibilities. This exercise is designed to embed creative exploration in students' design process, a process they will carry with them into professional practice.

Music as Design Inspiration encourages both creativity and complex problem solving. Embedding this creative exploration in students' design process at the beginning level enhances their creative output as they rise through their program and their career. CHARLES F. GUSTINA MFA, ASSOCIATE PROFESSOR REBECCA SWEET MFA, ASSOCIATE PROFESSOR KATHERINE SWANK PHD, ASSOCIATE PROFESSOR EAST CAROLINA UNIVERSITY

# Introduction

This paper reviews the impact of a freshman interior design studio assignment aimed at enhancing the creativity of students' design solutions. The assignment, Music as Design Inspiration (MDI), was conceived by Sweet<sup>1</sup> and requires students to translate the elements and principles of music into a completed interior design. Beginning a design outside the parameters of visual media requires a shift in thinking and encourages release of preconceived solutions. MDI utilizes an educational technique labelled Random Input<sup>2</sup>, which requires students to make connections between random and unrelated entities, to generate new approaches and new ideas to the material or problem in question.

A literature review is conducted on creativity and enhancement methodologies. Following the review is a case study of an architectural project that draws inspiration from musical form. Then the procedure for MDI is presented, along with examples of student work. Finally, educational and design implications and continued study is discussed.

## Literature Review

# Defining Creativity

Since ancient times humanity has recognized the creativity of great artists and inventors. Most often this creativity was looked upon as a divine gift, given to certain individuals for unknowable reasons. It was not until 1950 that J. P. Guilford exhorted the American Psychological Association to focus research on creativity. Over the years since that speech, psychologists have proposed various models for the functioning and structure of creativity. Their studies indicated that creativity can be mea-

Sweet, 2003

<sup>2</sup> de Bono, 1992; Starko, 1995

sured and, more importantly for design educators, enhanced.

For the purposes of this paper, this definition of Creativity provides a useful starting point: 'Creativity is the ability to produce work that is both novel (i.e., original, unexpected) and appropriate (i.e., useful, adaptive concerning task constraints)'<sup>3</sup>. Although the psychological literature on creativity is not entirely united behind any single definition, this quote appears to address two of the most salient factors of creativity as related to the field of interior design: namely, the production of works and the appropriateness of those works to the programmatic requirements thereof.

Creativity is viewed as the outcome of the intellectual operation of divergent production<sup>4</sup>. This operation involves the production of a range of information in the mind, in response to a given statement or problem, and is contrasted to the operation of convergent production. Whereas convergent production comes into play in finding a single correct answer to a question or problem (e.g.: the solution to a mathematical equation), divergent production raises the broadest possible list of answers and associations (e.g.: brainstorming for solutions to a problem). 'It is in the divergent-thinking category that we find the abilities that are most significant in creative thinking and invention'<sup>5</sup>.

The term lateral thinking is an alternative to divergent production; as might be expected, its correlative vertical thinking aligns with convergent production. 'Lateral thinking is closely related to insight, creativity and humour'<sup>6</sup>. And 'Vertical thinking selects a pathway by excluding other pathways. Lateral thinking does not select but seeks to open up other pathways'<sup>7</sup>.

In Drawing on the Right Side of the Brain, Edwards quotes a finding by Sperry that 'the human brain uses two fundamentally different modes of thinking, one verbal, analytic, and sequential, and one visual, perceptual, and simultaneous....' Edwards labels these modes left-brain (verbal/analytic/sequential) and rightbrain (visual/perceptual/simultaneous), and notes that right-brain thinking seems critical

- 3 Sternberg and Lubart, 1999, p. 3
- 4 Guilford 1959, 1986, 1988
- 5 Guilford, 1968, p. 8
- 6 DeBono, 1970, p. 9
- 7 DeBono, 1970, p. 39

to drawing and other creative acts<sup>8</sup>. Thus, leftbrain thinking would include the linear processes of convergent/vertical thinking, and right-brain thinking would include the non-linear processes of divergent/lateral thinking.

### Enhancing Creativity: Random Input

The literature of psychology suggests that creativity can be enhanced, that it is worthwhile to attempt this enhancement, and that encouraging divergent thinking may promote such enhancement. Nickerson believes that enhancement of creativity is possible, and that the challenge is discovering more effective approaches of bringing it about. Among important aspects of creative thinking is the 'ability to see things from different perspectives, especially novel or unusual perspectives'9. Mednick suggests that the juxtaposition and correlation of remote, apparently unrelated ideas will be more likely to produce strong creative products<sup>10</sup>. Csiksczentmihalyi points out that divergent thinking has been extensively studied as a 'creative cognitive style', and has been related to creative originality<sup>11</sup>.

Starko devoted her book *Creativity in the Classroom: Schools of Curious Delight*, to the proposition that creativity can indeed be enhanced. One of her many exercises to address creativity enhancement is Random Input, which pairs the subject under consideration with a completely unrelated subject, to spark exploration of their potential interrelations.

Looking specifically at divergent thinking, it appears that unfamiliar stimuli elicit more original ideas than familiar stimuli. Further, unfamiliar stimuli seem to elicit original ideas more consistently and reliably than familiar stimuli.<sup>12</sup>

To summarize, creativity involves a function titled divergent production, which produces creative (novel and appropriate) ideas by juxtaposing unrelated ideas. Furthermore, it has been found that presenting persons with unrelated ideas as they work to solve a problem (Random Input) can enhance the creativity of

- 8 Edwards, 1999, p. xii
- 9 Nickerson, 1999, p. 410
- 10 Mednick, 1962
- 11 Csiksczentmihalyi, 1999
- 12 Runco 1991, p. 187

their solution to the problem. The discussion of MDI proceeds from this finding.

## Why Attempt to Enhance Creativity?

Interior design students in entry-level studio classes often struggle to create effective and interesting spatial volumes. Many have no experience in making space, and accept the existing boundaries of floor, walls, and ceiling as givens. Within these given boundaries, they insert furniture and décor. This response seems natural: in the face of a problem that makes one uncomfortable, one tends to fall back on what one knows - everyone knows how to select a sofa. While this tactic can effectively decorate a room, it doesn't create the compelling, integrated interior volumes that we expect from our students.

Another incidence of students' struggle to create effective space designs is that beginning art students typically appear to perceive objects in two dimensions. For example, their drawings of human figures have a cartoon quality about them. Another facet of their spacemaking is to focus on the planar elements (i.e., surface embellishment) to the exclusion of mass and void, ignoring the potential for transforming volumetric elements to address the design intent (i.e., expanding their perception of objects and spaces from 2-D to 3-D designs, paving the way to do integrated design that embraces philosophies such as 'form follows function').

Through the Music as Design Inspiration (MDI) exercise, music is introduced as 'random input' in interior design studios. The goal of MDI is to free students from their focus on the literal parameters of a given space, encouraging them to look at design solutions that they might not have conceived without the intervention of a different medium.

# Case studies: Applying Random Input to Design Problems

### Why Music?

Goethe's quote that 'Architecture is frozen music' suggests a relation between these two disciplines. According to Sheridan and Van Lengen, 'Vitruvius devoted as much text in *The Ten Books on Architecture* to sound, music, and acoustics as he did to site design, materials, and colour<sup>13</sup>. The fact that MP3 players are owned by well over 22 million Americans<sup>14</sup> and that the Apple store has recorded upwards of 100 million downloads over a given 60 day period<sup>15</sup>, indicate the ubiquity of music in our lives. It is a medium that designers are familiar with, but not familiar working with as a visual design tool.

The structure of music parallels that of design; both disciplines utilize design elements to structure their productions. Music employs melody and harmony, rhythm, emphasis, balance, movement, and colour, among other elements. These roughly equate to design's unity and variety, rhythm and repetition, focal points, symmetry or asymmetry, texture, and colour or light. (See Table 1) Just as the elements of music can call forth or enhance emotion, so can the elements of design as applied to an interior<sup>16</sup>.

Table 1: A Comparison of Design Elements and Principles

> MUSICAL DESIGN SPATIAL DESIGN Melody Line Harmony Texture Shape/Form Volume & Mass/Balance Timbre/Tone Color Light/Color Rhythm Rhythm Rhythm/Balance Movement Dynamics/Volume Emphasis Range/Pitch Unity & Variety Duration Scale & Proportion

A review of the Stretto House by Steven Holl underscores multiple ways the architect integrates musical structure to generate architectural form. MDI is then described, with examples of student work illustrating similar generative energies.

## Holl's Stretto House

Steven Holl bases his design for the Stretto House in Dallas on a waterscape of ponds and dams on the property, and on Béla Bartók's *Music for Strings, Percussion and Celeste*<sup>17</sup>. Both water and music offer Holl a continuous move-

- 13 Sheridan & Van Lengen, 2003, p. 38
- 14 iPodpalace.com, 2005
- 15 Complemedia, 2008
- 16 Sweet, 2003
- 17 Holl, 1998

ment over 'obstacles', which inspires the interaction of forms through the house. The division of the stream into ponds, and of the piece of music into movements, leads to Holl's creation of spatial 'dams' – heavy masonry pavilions that interrupt and modulate the flow of the house's glass walls and wave-like roofs. Here the rhythms and structure of music create a powerful model for a powerful architectural design.

## Music as Design Inspiration

MDI is structured to function within an interior design studio project. In the freshman design studio, the project background is explained to the students, including program, project location, and floor-plan. The sequence of assignments for the studio project is: research and concept development, drafting of base plan and sections, MDI, final plan and sections, preparation of a lighting model, final renderings, and presentation.

In the MDI assignment, students listen several times to pieces of music. They are encouraged to note the various structural elements in the piece, and how they relate to each other: melodic and harmonic lines, rhythm, colour, movement, etc. They then use the visual elements of line, shape, texture, colour, and value to create a series of abstract drawings based on their impressions from the music. The resultant drawings generate a model which students use as the basis of their design for a residential or commercial space. The drawings may also serve as stimuli for patterns or elements within the space.

The Figures illustrate the use of MDI in the design process of one freshman interior design student during the spring 2009 semester, at East Carolina University in the United States. The students were assigned the design of a new reception and waiting area for a day spa, on the third floor of an existing commercial building in an eastern US city. The Figures begin at the introduction of the MDI exercise and follow the creation of abstract drawings to music<sup>18</sup>, then the creation of music models based on those drawings<sup>19</sup>. The music models are used in conjunction with program data about the client's requirements to generate the plan of the space<sup>20</sup>. A lighting model is constructed to study the ways in which light will impact the design<sup>21</sup>. Finally renderings of the space are completed.

#### Discussion

In looking at creativity, Random Input has been suggested as an effective means of enhancing creativity. Random Input employs the juxtaposition of material that is apparently related to the subject or problem at hand, with material that is apparently unrelated to the subject or problem. The resultant cognitive disjuncture caused by this juxtaposition brings forth more novel creative solutions.

MDI uses Random Input, actualizing the transition from auditory perception into visual and spatial thinking. The exercise helps students creatively conceptualize, breaking leftbrain problem-solving dominance. Introducing music into the design process encourages students to step away from left-brain, rational, problem-solving mode. It allows imaginative thinking to enter the creative process. Students develop more nuanced designs and design processes, by relating musical structure to elements and principles of design in the creation of interior spaces. Since 'qualities of being adventurous, imaginative, and inventive are perceived as important traits across allied design ... fields,'22 this exercise has the potential to add value to students' education by strengthening these crucial traits in their approach to design problem-solving.

# Problems, Limitations and Next Steps

The exercises developed in MDI are intended for use in an interior design studio, and as such, it is preferable that participating students have appropriate background in the skills needed for interior design. However, because the exercise is given as part of a freshman studio, the skill levels needed are not very advanced. As further study, it would be instructive to use MDI with students other than interior design, to compare the results.

<sup>18</sup> Figure 1: Student Project – MDI abstract drawings done to music

<sup>19</sup> Figure 2: Student Project – Models created from MDI drawings

<sup>20</sup> Figure 3: Student Project – Final floor plan

<sup>21</sup> Figure 4: Student Project – Lighting model

<sup>22</sup> Portillo, 2002, p. 23

MDI shows promise in helping students to think more creatively; however a methodology for quantifying or tabulating the effects of the exercise is needed. Most of the test methods utilized by psychologists in the area of creativity employ verbal tests, using subjects' responses to sets of words to correlate to other indicators of creativity<sup>23</sup>. Also, most psychological testing to date addresses the measuring of creativity in individuals, rather than measuring of creative outcomes in product form (Ibid). The measurement of creative output is necessarily subjective, as instructors within design disciplines are well aware. Nevertheless, it seems that the next appropriate step to take would be development of a rubric to measure jurors' reactions to students' presentations of their projects. This would be particularly effective if the feedback could be compared to that for a control group of students who have not used MDI as part of their design process.

#### Conclusion

It is always a challenge to balance the demands of life and professional practice with the demands of creative incubation and production. This can be particularly true for students, who have not yet developed the experience to manage all of life's demands effectively. Music as Design Inspiration utilizes the creativityenhancing methodology of Random Input to inspire creative problem-solving. This helps students move beyond simplistic approaches to creating space and allows the pleasure of enjoying music in the design studio.

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<sup>23</sup> Mednick, 1962; Guilford, 1968; Runco, 1991

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# WHY WE DRAW, OR PREHISTOY IN ARCHITECTURAL DISCOURSE Making Drawings

JORGE PRADO, ADJUNCT PROFESSOR NJIT SCHOOL OF ARCHITECTURE AND DESIGN

Current architectural discourse is devolving into a confrontation between two camps that can be described as the technographic (summarized as computer aided drawing with its privileging of the optic) and the diagraphic (summarized as hand drawing with its privileging of the haptic).

Current architectural technography is heavily in thrall to terms such as "parametric", "generative", "iterative" and the more problematic "performative". While these terms mean many things to many theorists, it is generally agreed that this technographic project has had and will continue to have a growing impact on architectural practice and discourse. However, in the rush to adopt new digital techniques and technologies, architectural discourse is losing touch with the diagraphic component of architecture. Traditional representational strategies based on diagrams and orthographic projections are being transformed through the use of graphic design and photo editing software and perspective-based "3D" and BIM applications. What are the implications of this transformation? While this transformation is an important evolutionary process intended to move architecture more firmly into the digital world, it is being interpreted hyperbolically by some as a revolutionary call for the end of traditional architectural drawing and pedagogy. In this light, does this technographically driven transformation imply a larger strategy to divest architecture of its less tractable diagraphic and haptic components, organs now deemed anachronistic and vestigial?

In the context of exploring the divide between technography and diagraphy, we will set aside such issues, for the moment, in the hopes of understanding what might be lost should diagraphy cease to play a role in architecture and architectural education. In order to do this, we will discuss early man's cave painting as a means of exploring the ontology of drawing as a symbolic device pre-dating linguistic history. What does it mean to draw? The hand drawn diagram will be investigated to determine its role in provoking the development of a critical faculty that is fundamental for the development of an architect and that sets the stage for the integration of digital tools into architectural discourse.

In his book, *Why Architects Draw*, Edward Robbins lays out a compelling Marxist critique of the architectural drawing as a hegemonic tool deployed by the architect to exert command over the means of building production.

... when architects draw they are building a whole structure of relationships that they will control or around which the structure will be built. They are creating not only a conceptual framework for what will follow, but a social location for themselves in the structure of relations that produce architecture, a discourse with which to control that structure of relations, and a material embodiment of both the structure of relations and the nature of the architectural object. <sup>1</sup>

What Robbins fails to do, in fact, what he cannot do as a critic focused on socio-politico-economic forces and their impact on the means of production, is address the nature of the drawing that he sees, so clearly, as an expression of power. He writes, "we cannot claim to adequately understand how an architectural drawing means outside of its effects."2 Such ontological speculations, as he might say, could not be further from the reality on the ground at the jobsite and in the architect's studio. He is not concerned with the forces at play in the production of drawings, in as much as he wants to address drawing as an institution, as a means by which the architect exerts authority over others, in fact, as a tool to subjugate the voices of builder, engineer and client

<sup>1</sup> Robbins, Edward, *Why Architects Draw* (Cambridge: The MIT Press, 1994) 49.

<sup>2</sup> Robbins 5.

to his own. In a sense, it is this last formulation that sees drawing as the repression of disparate voices that begs the question, by what agency is drawing able to repress? What is the operative theory of drawing that describes this agency?

Let us explore the idea, borrowed from Robbins, of what the architectural drawing means outside of its effects. To do so we will need to understand what a drawing is and where it comes from. As an architectural drawing is the result of centuries of formulating and refining drawing conventions, it might be more interesting to go back to certain origins of symbolic representation, in particular to Western European Paleolithic cave paintings, to understand what forces were at play during their production. In short, our study should incorporate findings about the early mind from the field of anthropology.

This mind is a complex thing, not in the sense that an engineered machine is, with many separate parts working smoothly together in pursuit of a single goal, but in the sense that it is a product of ancient reflexive and emotional components, overlain by a veneer of reason. The human mind is thus not an entirely rational entity, but rather one that is still conditioned by the long evolutionary history of the brain from which it emerges. Great though may be the leap we have made away from the rest of the living world in the acquisition of symbolic thought, we have not entirely emancipated ourselves from the brain structures that governed the behavior of some very remote ancestors indeed."<sup>3</sup>

In his book, *The Mind in the Cave*, David Lewis-Williams searches the fossil record to conclude that Homo sapiens's fully developed modern nervous system and his higher order of consciousness, that included modern language abilities, were the direct cause of his imagemaking capacity.<sup>4</sup> Homo neanderthalensis, who had migrated to Western Europe many thousands of years earlier, possessed only a form of primary consciousness that precluded modern language abilities. Or as Tattersall states,

... we cannot read language abilities directly from the external form of brain casts; but the structures of the vocal tract that make articulate speech possible imprint themselves on the base of the skull.... Homo heidelbergensis [the precursor to Homo neanderthalensis] is the first hominid we know of that had a skull base designed to accommodate a vocal tract of modern kind. These human precursors were efficient stone toolmakers, fire users, and shelter builders and they had pretty big brains to boot; yet the behavioral record they left behind contains virtually no evidence of symbolic activity....<sup>5</sup>

And similarly of Homo neanderthalensis, he writes, "the Neanderthals did not live, as we do, in a world of their own making, reconstructed in their minds, but in the world as nature presented it to them."<sup>6</sup>

Lewis-Williams argues that Homo sapiens would have had the capacity to experience a nuanced consciousness not different from our own. He would have had waking states and dream states such as ours, and the capacity for altered states of consciousness such as ours. for instance, from illness, diet or ritual trances. Homo sapiens most likely lived in a world shared with visions and memories arising from their conscious and unconscious experiences. Lewis-Williams separates this higher form of consciousness into two distinct components, the spectrum of consciousness that reflects the structure of the brain and content of the mind that reflects the exterior world. He writes, "The spectrum of consciousness is wired, but its content is mostly cultural."7 Thus, the spectrum of consciousness is fixed in the structures of the brain, but the forms to which it reacts and on which it reports are cultural, i.e. we all wake, perceive, sleep and dream, though the world we wake in, the one we perceive and the one that visits us in our dreams is individual according to our cultural context.

Moving from consciousness to unconsciousness, such as when we are going to sleep, is a continuous linear journey along the spectrum of various states of consciousness. However, to better understand the imagery found in the caves, Lewis-Williams focuses on intensified consciousness. To account for this intensified consciousness, the diagram of the journey changes from a linear spectrum to a branched

6 Tattersall 229.

<sup>3</sup> Tattersall, Ian, *Becoming Human* (New York: Harcourt, 1998) 234.

<sup>4</sup> Lewis-Williams, David, *The Mind in the Cave* (London: Thames & Hudson, 2002) 193.

<sup>5</sup> Tattersall 228.

<sup>7</sup> Lewis-Williams126.





25 The two spectra of consciousness: (1) 'normal consciousness' that drifts from alert to mnolent states, and (2) the 'intensified trajectory' that leads to hallucination

FIGURE 1

"Y" spectrum, with the branch occurring at the fork between the standard spectrum consciousness and the intensified consciousness. See Figure 1.8 This intensified branch of consciousness is elaborated as having three stages: entoptic phenomena, construal and hallucinations.

With stage 1 entoptic phenomena we begin to see the correlation between consciousness and image-making. Entoptic is defined by Merriam Webster's Medical Dictionary as "lying or originating within the eyeball -- used especially of visual sensations due to the shadows of retinal blood vessels or of opaque particles in the vitreous body falling upon the retina." Entoptic phenomena are essentially a shadow play acted across our retina by physical structures within our visual sense organs.

It has been found that the patterns of connections between the retina and the striate cortex ... and of neuronal circuits within the striate cortex determined their geometric form. Simply put, there is a spatial relationship between the retina and the visual cortex: points that are close together on the retina lead to the firing of comparably placed neurons in the cortex. When this process is reversed, as following the ingestion of psychotropic substances, the pattern in the cortex is perceived as a visual percept. In other words,

by the cultural circumstances of people experiencing altered states of consciousness.

FIGURE 2:

people in this condition are seeing the structure of their own brains."9

Lewis-Williams distinguishes between entoptic phenomena, also called phonemes, and hallucinations, as hallucinations have "no foundation in the actual structure of the optic system."<sup>10</sup> He describes the complete system in Figure 2.

A number of studies over many decades have documented these entoptic phenomena as relating to such diverse experience as rubbing one's eyes to the onset of migraine headaches.<sup>11</sup> Gerard Oster refers to the ambiguous position held by phosphenes in children's' consciousness:

It is instructive for an adult to ask an articulate child what he sees when he closes his eves at bedtime. Children have an ability, which diminishes with adolescence, to evoke phosphenes quite easily. Phosphenes may indeed be an important part of the child's real environment, since he may not readily distinguish this internal phenomenon from those of the external world.<sup>12</sup> He goes on to cite a study of the scrib-

bling of children that suggests the develop-

10 Lewis-Williams 127.

Generally: Asaad, Horowitz, Oster & Richards.

Oster 83.

11

12

<sup>8</sup> Lewis-Williams124-125.

mental significance of phosphenes, going so far as to formulate directly the question being addressed here:

Children between the ages of two and four, capable of manipulating a pencil but not of making naturalistic pictures, draw figures that have a distinct phosphenes character [see Figure 3a]. Were phosphenes also part of the subject matter of art in the childhood of the human species? Phosphene-like figures appear in prehistoric cave drawings and in folk art and more sophisticated works from many cultures and different periods [see Figure 3b]. Art historians, it seems to me, might well consider the possible effects of phosphenes as an "intrinsic" source of inspiration for men of many different societies when they are speculating on relations and cross influences among primitive cultures.... "Seeing stars" is seeing phosphenes, an experience that can be induced by a blow on the head or by other mechanical means."13



FIGURE 3: 3a Left, 3b right

By the time consciousness reaches stage 3 of this model of consciousness, at the furthest autistic scale of the spectrum, iconic images begin to assert themselves, sometimes overlaying entoptic phenomena, sometimes replacing them:

Iconic imagery may be projected against a background of geometric forms or entoptic phenomena may frame iconic imagery. By a process of

13 Oster 83.

fragmentation and integration, compound images are formed: for example, a man with zigzag legs. Finally, in this stage, subjects enter into and participate in their own imagery: they are part of a strange realm. They blend with both their geometric and their iconic imagery. It is in this final stage that people sometimes feel themselves to be turning into animals and undergoing other frightening or exalting transformations.<sup>14</sup>

Confronted with this richness of projected imagery within their consciousness, Lewis-Williams proposes that early man would have tried "to socialize the autistic end of the spectrum."<sup>15</sup> Much like us today, early man would try to account for all states of consciousness. He would be aware that his dreams and visions were part of his world, and he would need to make sense out of them by incorporating them into his waking consciousness through sharing his remembered visions verbally at first and later through two-dimensional symbolic representations.

That they were "revealed" in the depths of caves where the only form of illumination were rudimentary burning lamps, Lewis-Williams understands as the conscious, real world equivalent to the dream state darkness, from which the images first appeared, probably as afterimages of dreams or physical states of consciousness.<sup>16</sup> Early man retreated into the darkness of the caves to explore their intensified consciousness, to find a waking, conscious correlative to the visions he was recalling. In this process, we can catch a glimpse of early man's development of abstract thinking.

How, then, did people come to make representational images of animals and so forth out of projected mental imagery? I argue that at a given time, and for social reasons, the projected images of altered states were insufficient and people needed to 'fix' their visions. They reached out to their emotionally charged visions and tried to touch them, to hold them in place, perhaps on soft surfaces and with their fingers. They were not inventing images. They were merely touching *what was already there*.

The first two-dimensional images were thus not two-dimensional representations of three-dimensional things in the material world, as research-

14 Lewis-Williams 129-130.

- 15 Lewis-Williams 191.
- 16 Lewis-Williams 210.

ers have always assumed. Rather, they were 'fixed' mental images. In all probability the makers did not suppose that they 'stood for' real animals .... If we could be transported back to the very beginning of the Upper Palaeolithic [sic] so that we could compliment a painter on the 'realism' of his or her picture, I believe we should have been met with incredulity. 'But,' the painter might have replied, 'that is not a real bison: you can't walk around it; and it is too small. That is a "vision", a "spirit bison". There is nothing "real" about it.' For the makers, the paintings and engravings were visions, not representations of visions [emphasis in the original]....<sup>17</sup>

Lewis-Williams describes here what he elsewhere describes as the ecstatic moment:

Here, then, we have an instance in which people take hold of the possibilities of the intensified trajectory – they harness the human brain – and believe that they derive from their visions insights into an 'alternative reality' that, for them, may be more real than the world of daily life. This is a worldwide experience. Indeed, ecstatic experience is a part of all religions – as I have pointed out, people have to accommodate the full spectrum of consciousness in some way.<sup>18</sup>

I might argue that the ecstatic moment is the moment when early man reached out to touch "what was already there". The physical act of laying hands on the vision in the dark cave, the actual contact that momentarily annihilates the distance between the waking state and the dream state, that is the ecstatic moment.

Cave paintings, then, were executed at the very cusp of early man's ability to delineate, or fix, the images inherent within his consciousness, albeit at the autistic end of the spectrum of consciousness. It is this ability to transcribe mental images into real images that suggests a theory of drawing that we might put forth as the basis of modern man's ability to execute symbolic thinking. Drawing might be considered the performative and ecstatic act of touching ones visions through the empirical agency of our haptic senses by tracing an already present, pre-linguistic, quasi-conscious and, in the case of phonemes, universal imagery.

Though this theory of drawing falls short of astonishing us as we look back from the far

17 Lewis-Williams 193.

18 Lewis-Williams 133.

shore of millennia of refinement and elaboration of symbolic language and drawing, it nevertheless illuminates the agency of drawing as a social, ecstatic act to bring into the world the richness of our personal visions. Furthermore, and again with respect to phonemes, the social act inherent in the act of drawing confirmed a universal, quasi-conscious visual experience that may have served as the basis for mutual understanding. The repetition of entoptic motifs, while almost certainly received as evidence of a mystical domain, nevertheless must have comforted the group in a way that pure autistic images of spirit animals could not. Each individual could relate to these symbols, because they could experience them in their lives, irrespective of dream or trance states that might elude them.

The notion of this physical touching of our otherwise autistic consciousness for the purposes of sharing it with others is in direct contradiction to Robbins's idea of drawing as a means to exercise power over others. In this theory, drawing is the tool for sharing and bringing together a group of people to make sense of a complex of imagery that otherwise would remain within the realm of personal experience. Drawing is a keenly human moment when individual images are brought to the group for the establishment of dialog. Perhaps, this moment was so crucial an event for the simple reason that it must have overcome what eventually must have been an impulse to conceal a vision that might disturb the group.

Having come as far as we have, and with this tentative theory of drawing before us, we now need to look back to the questions posed at the outset of this paper regarding the confrontation between the purely technographic and purely diagraphic positions being elaborated in today's academic environment. For the purposes of this discussion, we will limit ourselves to schematic design drawings for the simple fact that they represent the design process in its most primary state, mostly devoid of direction beyond the architect's ideas. And we will weigh this discussion more heavily towards early architectural pedagogy than to practice in as much as aesthetic options available to a practicing architect are very different indeed

than they are to a student of architecture in his core years of study.

Does the proposed theory of drawing relate equally to both technically produced schematic drawing and diagraphically, hand produced schematic drawing?

While it is true that both types of drawings share the ability to reveal and to evoke an idea to be shared with the group, technographic drawing (or modeling), I can argue, fails to meet the criteria of this theory of drawing in at least two critical ways.

First, it is at least one step removed from the ecstatic moment. When skillfully used, technographic drawing can be, in its visual effect, as expressionistic and personal as diagraphic drawing, but it would be harder to argue that, at its moment of execution, it can equal the surfeit of sensory feedback that is experienced by the body through the act of drawing



FIGURE 4:

by hand. The moment of technographic execution is one of profound visual and intellectual focus, but the haptic senses are abstracted from the act of drawing through an interface that relies heavily on a back and forth between mouse and keyboard, between what I might call graphic and linguistic commands that only secondarily effect the resulting drawing. By secondarily I mean that though the mouse is used to draw, it does not actually act on the drawing. The actuation of the screen relies on tricking the brain to move the hand in certain ways at a remote distance from the screen to cause the software to execute a pattern of the drawing on the screen. The ecstatic moment is diminished through the loss of immediate effect on the drawing and the loss of touch. The vision is executed technographically, but it is not touched by us, not fixed by our hand. As for diagraphic drawing, the hand draws the pencil across the paper, leaving behind a direct trace of its movement. The quality of the lead, the tooth of the paper, the imperfections of the work surface beneath the paper, the oils of the skin, the smudges of the hand, etc. all leave their imprint on the executed drawing.

Second, technographically produced drawing can only be self-reveletory of the computer's internal structures not of the architect user. It is not difficult to go through the drawing archives of any architect and pull from them examples of drawings containing entoptic motifs. The presence of these motifs is by no means a crucial element in their work, but they do exist at the margins of their thought. Figure 4 shows sketches by Corbusier, Hadid and Gropius. In each drawing, entoptic motifs are clearly visible: Le Corbusier's entire sketch is a study in these motifs; Hadid's exhibits a classic zigzag; Gropius uses the zigzag as a hatching technique. These ancient motifs were present when man made his first mark and they are there today. They are part of us, marks of our commonality, the tooled marks left as we exercise our craft. This is an ongoing subject of my research, and I hope to elaborate on it in greater depth.

On the other hand, at no moment can the computer be operated in such a way as to allow for the human mind and body to be revealed in the act of execution of the drawing. While many will consider this to be the
great virtue of the technographic project, it has serious implications for schematic design. Even a skilled user of any software package who is seeking the "happy accident", to which architects have referred to as being an important component of the design process, will fail to reveal anything of their physical and sensory existence by challenging the software with expert and experienced manipulation. The best they can hope to achieve through skillful misuse of software is human error that manifests itself as revelatory of the computer's internal hardware and software structure. For instance, an algorithm can be designed to create a recursion that causes a described geometry to produce an unforeseen outcome; however, that outcome will be a description of the algorithm, not of the architect. Again, many will argue that the removal of the architect from the equation of design is the purpose behind the technographic project.

In conclusion, I would like to reiterate my belief that the relationship between the architectural idea and the means by which it is generated is crucial to architectural pedagogy. Technography, by definition, embodies a profound alienation of the architect from his work. Diagraphy, on the other hand, embodies the architect in his work. The role of hand drawing, the role of the projection of the architect's body into the design process through the agency of drawing, the role of the ecstatic moment when architect and idea are indistinguishable from the hand sketching on paper, should be, however brief, the defining moment in an architect's practice. Architectural pedagogy should strive to impart to students the skills necessary to think through drawing. It is this ecstatic bonding of hand to mind that will allow them to explore what has been described as the intensified spectrum of consciousness. Before we had codified language, we were exploring our deepest consciousness through imagery. Though we have moved far beyond that evolutionary moment, its prehistoric pathways are built into our brains. All we need to explore them is a pencil.

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# HIT PRINT: VIRTUAL TRACE-PAPER IN BEGINNING DESIGN Making Drawings

HANS C. HERRMANN, ASSISTANT PROFESSOR MISSISSIPPI STATE UNIVERSITY

This is a case for the beginning design student's freedom of inquiry in an ever more "product" oriented digital design environment. Stewart Brand, in his book How Buildings Learn, wrote of a building type dubbed the "Low Road Building."<sup>1</sup> This type could be understood as a building without the requisite quality of design, integrity of form, or historical provenance needed to prevent its user's appropriation and/or mutilation in the agency of new and expanded use. While lacking the integral qualities needed to *present* itself as fine architecture, this type of building offers something much more valuable to the occupant-the opportunity to use space as needed, not as directed. It is a contention of this paper that the digital design environment should be presented to the novice designer as a similar operable field or "low road" for design investigation.

The digital environment may present to the fledgling designer a kind of safe-zone to explore ideas and methods of making, devoid of negative repercussion. This paper will explore three elements critical to the principle contention that low road software best fits the beginning designer. First, the software types typically seen in schools of architecture, and which of those types might offer a means of inquiry as opposed to production. Second, how the speed and ease of digital deletion affects the goals and intentions of young designers. And finally, of particular interest, software output that serves as virtual trace-paper. How, if only the student sees, the digital artifact produced, learning becomes severely limited. The conclusion will focus on how "hitting print" helps to reveal process and curb the desire to "finish".

The contrast among "high road" software, those specifically designed for the architect's

use, and "low road" software, those intended for a range of design professions, will be delineated by the work produced in a second year design studio. While both forms of software are potentially highly generative, the "high road" software runs the risk of promoting a false horizon of design resolution while reinforcing linear thinking.<sup>2</sup> The idea of image completion, as opposed to design exploration and conceptual organization can become the goal. Actual trace paper allows ideas to collide and persist in the presence of the student, fostering the approach of "design as a patient search".<sup>3</sup> The intention of this questioning is to explore a pedagogy rooted in the exploitation of digital traceries and virtual remnants.

It should be noted that this paper is not a nostalgic recall of analog means of visualization. It will consider and look to delineate the principles and possibilities relevant to both analog and digital means of architectural design through the lenses of tempo and residue. This proposal will probe for answers in the use of digital technology as a mediating tool, rather than a finishing tool, for the beginning design student.

#### Introduction

Proof of consideration and judgment are issues most pertinent to architectural education. In a paper prepared by Jon Kolko, a professor of Industrial Design at the Savannah College of Art and Design the design process phases, typical to most projects, are outlined. Among the phases, Kolko lists an early step known as the Discovery Process.<sup>4</sup> The "Discovery Process" is

<sup>1</sup> Stewart Brand, *How Buildings Learn: What Happens After They're Built* Penguin - Non-Classics, (October 1, 1995)

<sup>2</sup> Steven Holl, 'Tin Ice' *The Eyes of the Skin by Juhani Pallasmaa*. Academy Press; 2 edition (June 17, 2005) p.8

<sup>3</sup> Le Corbusier, *Creation is a Patient Search* , trans. James Palmes (New York: Frederick Praeger, 1966)

<sup>4</sup> Jon Kolko, 'Information Architecture: Synthesis Techniques for the Muddy Middle of the Design Pro-

an important (yet often under emphasized in early architectural study) phase of any design work. Students are asked to perform research at the start of projects. This request at the entry level of the design studio sequence has a high frequency of resulting in only a shallow effort wherein pages of internet-gathered fluff appear on desks. The pages are later naively, if at all, looked upon as having formed some basis for design generation. In a true Discovery Process, reconnaissance data are gathered to bring insight and principle to the designer's thinking so that the Synthesis Phase of the work is as well informed as possible. The use of Photoshop, as an example of low road software, requires the act of gathering reconnaissance and via its operational logic of Image Editing rather than making, brings outside information to bear upon the design. The rules and limits of a place and program form the ground upon which the work may progress and be measured. If this ground is not attended to, the final product of the process stands humiliated in its presence.

# Statement of Pedagogy

As a means of "breaking and making grounds" this studio, co-taught and directed by Associate Prof. Gregory Watson, attempted to introduce digital design software via an integrated, somewhat subversive image/drawing design methodology. The approach to the software's introduction was to not announce or give any priority to its incorporation with regard to the semester agenda or curricular overview. This "soft" introduction was intended to diffuse the often overly anticipated application of digital technology to the architectural design and visualization process.

Fledgling students may easily conceive that when the computer is withheld from their working palette it is because it somehow holds more accessible answers and perhaps more precise means of design. This potentially sets the computer up to be understood as a more "architectural way of designing," a severe misconception. If students perceive the computer as a "next step" rather than just another tool, it is feared that their work becomes refereed by a very different agenda. While numerous authors

cess.' Proceedings of the 23rd NCBDS, Savannah College of Art and Design, 2006 p.47

and architects have written cogently on the subject of digital technology and its effect on design, the particulars of differing software applications make an enormous difference in their resulting output.

"Throughout our world consumer goods, propelled by hyperbolic advertising techniques, sever to supplant our consciousness and diffuse our reflective capacity. In architecture the application of new, digitally supercharged techniques, currently join the hyperbole." <sup>5</sup>

Among the myriad of design software applications available to students and professionals, a range exists that could be defined by the *background(s)* intrinsic to the application's workspace. These slates, used as a starting point for the design process, may be blank or may be images with latent meaning. In this, it is suggested that some software requires the user to determine a ground upon which subsequent operations, manipulations, and impositions will occur. While many 3D software applications offer the option to build or import terrain and context, this step in the production of a ground is often overlooked or not considered by students in the beginning years of their education. Beginning design studios, often focusing on abstraction and skill building, are particularly prone to this pitfall. A contention of this studio was that the groundlessness issue is symptomatic of the isolated working field produced by many "High Road" 3D software applications. The operator may be overly directed by the software and its' lack of user gathered contextual input, promoting a highly focused means of production and a potentially under focused means of inquiry. The work of this studio explored the severe consequence of losing sight/site within the digital design process.

The vehicle for Photoshop's introduction was a focus on context and its' vital importance to architectural design. Postulating that, to work with landscape and issues of context within the digital realm one must observe and capture context rather than attempt make it, the studio sought digital means of reconnaissance and analysis. The aim always remained to suggest that the information input determined the

<sup>5</sup> Steven Holl, 'Tin Ice' *The Eyes of the Skin by Juhani Pallasmaa*. Academy Press; 2 edition (June 17, 2005) p.8

quality of the output and that the software was only a processing device-never a production device.

It is important to note that this generality applies to the novice student and that these software applications are capable of magnificent results in the hands of matured and highly versed students. Maturity, in this case, is a critical component to the effective engagement of these digital tools. A requisite perspective on the range and appropriate implementation of the many architectural design and visualization methodologies is of significant importance. Because "High Road" software applications are becoming increasingly capable of "auto-finishing" buildings, they run the risk of instilling an infused generative myopia with regard to design strategy. Furthermore, students in the early years know little of the value added by the selective use of material and assembly detail. When software casually, or even worse, preemptively applies material and pattern it proposes these things as only skins to be considered apart from the architecture.

#### The Studio

The second year design studio used to test these theories set as a priority the design of the relationship between building and landscape. Issues of context and site were paramount to the judgment of what software applications would be introduced.

Included in the semester project scope was the design of a small wildlife viewing platform/ micro-hydro power generation installation, a public access boathouse, and a small rowing scull shipworks. The venue for the work was a man-made lake located in the Noxubee Wildlife Refuge. As a means of addressing context the viewing platform/micro-hydro power station was to be integrated with a pre-existing water level control structure embedded within a levy. The boathouse, situated on the margins of the lake and land, was intended to force the issue of threshold and the vicissitudes associated with the program.

The work was conducted through a variety of design methodologies that often focused on the value of the two-dimensional image as a tool of design generation. Stages of the design process included field sketching, photography, printmaking, board based drawings, and the digital manipulation of the latter as means of design generation and process recording.

Using photo editing software required gathering photos and drawings and this act opened the study of how recordings are not necessarily artifacts. Students were reminded that the photos and sketches would not remain *still* but would eventually have to *move*. The judgments required in the background material selection process slowly shifted images from being a recording to an engaged medium, forming a ground condition, sometimes foreground other times middle or background. With the student having made decisions about the ground, a



point of registration and reference was established for consequent spatial operations.

Low road software bares the proviso of a kind of "contextual friction" which students should learn to contend and gain value from. High road 3D software may be less likely to offer this friction outside of its own internalized system operation demands. Real conditions, i.e. earthbound context and site, are generally out of frame and sometimes even inert, often a thing to be considered "after the architecture is finished". In this way it supports a model of working that mirrors the contemporary state of our (American) urban/suburban developments, a sprawling seemingly limitless and self-referential production.

Approaching these design challenges, the students were asked to survey the site firsthand. Students visited with only sketchpads and cameras and were asked to create blind contour drawings of the landscape and photograph the subjects of their drawings. This visit was followed by a second day of observation that required the students to document the landscape via the assistance of a framing device. The devices were designed to isolate particular conditions in the landscape that the students identified as having an intrinsic worth. While the students prepared their blind contour drawings using the framing devices, fellow students documented the process using digital cameras. In figure 1 a student was drawing her desired prospect while forming the aspect or the thing looked upon by the photographer. The images produced a multi-axis understanding of the site in that the location of the observer simultaneously created a location to be observed.

Where this experiment exposed a touchstone for later work was the eventual student recognition that the project was not only about how people might look into the landscape using their viewing platforms, but that the platforms would also become part of the landscape. By layering the many drawings, photos, and diagrams recorded the software introduced a kind of composite outline of contextual issues that the students could use to inform their designs. This work demonstrated a type of site analysis with which students were not familiar. Rather than just looking, the students began seeing.



The composite drawings became invaluable tools of operation as opposed to simple record of a place or thing. The flatness of drawing and photo became merged in Photoshop and made possible a multi-dimensional awareness. The software became a tool for understanding, not just finishing.

# Delete: Taking Away in the Agency of Addition

Deletion as a tool in design can be dangerous. Reflection on the operation of deletion may lead one to consider its link to abstraction. To delete elements allows us to focus but it also runs the risk of removing the nuanced undertones, gray areas or foggy edges that are so important to the depth and poetry of our environment.<sup>6</sup> Young designers seem to crave clarity and objective goals in design. If our digital tools allow too much, or even the automatic deletion of "superfluous" data, design often becomes lifeless and sometimes painfully precise.

A principle lesson of the semester was that architecture can and will displace its context but, with insightful design, context may be made well again by the architecture.<sup>7</sup> The benefit of software like Photoshop is that one must

<sup>Juhani Pallasmaa, 'Touching The World.'</sup> *The Eyes of the Skin*, Academy Press; 2 edition (June 17, 2005)
Juhani Pallasmaa, 'Touching The World.' *The Eyes of the Skin*, Academy Press; 2 edition (June 17, 2005)

be selective in choosing what to delete with equal regard with what to add.

"all buildings involve the use of a place and all architecture, regardless of program or cost, must become a place. The things we admire most accomplish this either through an architecture of innocence or through an architecture of emplacement which seeds to make the building and the place one thing."<sup>8</sup>

In generating the aspect/prospect images the power, productivity and poetry of careful deletion was a measured discovery for the students. Forming a background upon which to operate, the images gave students a place to start and consider while designing their observatories. Deleting or replacing parts of the landscape with building immediately created a loss of context that the students had to acknowledge. The basic working method demonstrated conditions of imposition, atonement, and imbued value, issues present in the writings of W.G. Clark which were made to accompany the projects.

In addition, the work reopened first year discussions of *Figure/Ground* but in a new light, as a 3 dimensional condition, involving not only plan but also section and elevation.

The ability to delete and paste selections of ground, enabled students to conceive of the context, including the soil, trees, sky, water, and all components of landscape, as being malleable and operable design elements-not just places to set a building. For beginning design students the notion that architects deal only with buildings (wood, metal, stone, walls and roof) is very typical and highly evident in their work. To open the palette of materials relevant to architects beyond the envelope of the building proper is something often talked about but sometimes difficult to demonstrate. The use of low road image manipulation software aided the introduction and provided a clear means to practice. This lesson bears particular importance given our precarious environmental state. Teaching young architects to see beyond the edges of their buildings may be the most practical and potent lesson in providing a sustainable future.



# Speed: What is the Value of Letting Things Linger a While

Speed in the design process is a curious consideration because the process may be undertaken in so many ways. This studio asked if speed was a desirable quality and if so in what way? The function of speed in design presents a manifold issue including matters such as production, replication, and pattern but also the greater issue of the value in operating fast. Our evidence suggests that the use of simple 2D software like Photoshop, plays to the fluency of contemporary students, a condition of the question that supersedes the smaller application oriented issues. The use of digital design tools, even though often producing work that is just as time consuming and mutable as analog equivalents, relieves a sometimes paralyzing concern over *redoing*. The idea that a hand drawing be "completed" more than once seems a difficult, almost wasteful act for our students, yet to delete and start again on the computer is strangely less demanding. The safety blanket of a "save as" seems to speed the student's willingness to explore ideas and track avenues of design consideration further than if working via purely analog means.

Students were asked to use the speed of 2D digital applications to distort and adjust work, in some cases produced first via analog methods. In this way the low road software was a tool for revision, not creation. The reality of architectural design is that nearly all proj-

<sup>8</sup> Lost Colony, W. G. Clark, *Perspecta*, Vol. 28, Architects. Process. Inspiration. (1997), pp. 114-125

ects will be an imposition on an existing field. Learning that their work should be seen as a revision of that field as opposed to an insertion into the field is vital to sustainable development. Software applications that promote revision and editing are operationally allied with this theory.

# Conclusion: Tracing Toward Making

Letting design ideas linger in the presence of new ideas is valuable and the existence of analog trace paper underlies this fact. Students, in their aim for closure and brevity, are often quick to clean off their desks and look at only one thing at a time. At many institutions the act of tracing and use of trace paper has faded. Students see trace paper as only a cheap media to draw on top of. Rarely at MSU is it understood as a tool, made semitransparent, for the purpose of design construction by way of over and underlay. Tracing allows the user to observe two, three, four things at once to better determine relationships, adjacencies and interconnections. Low road software follows suit in its' composite based operation. Students understand that to trace is not to create but to use tracing as a strategy for combination and reconciliation is inherently creative.

The manipulation of building fragment models captured in photograph was the final means of digital media exploration employed by this studio. Shifting from observation, to recording, to analysis, and finally to genesis, the students explored how the editing of images might prompt 3 dimensional making. The ability to stretch, duplicate, enlarge, and shrink the models began a process of drawing beyond image making. Images became operations that became principles that governed building



design. For many students the resulting output captured evocative spatial configurations that pulled reference from the surroundings. Students found themselves making connections as opposed to replacements.

Faculty and students alike may struggle to explain how work is produced and what principles, factors and judgments belie the designs process. With low road software the requirement of a background undergirds and reflects the context of a project. For a novice student this supportive ground is invaluable as a point of guidance. Teaching students to appreciate the formative value of site is made easier by the application of low road software that offers new ways of seeing old things. Making drawings enables ideas to become real, to hold place in our attention and to bare the quality of our efforts.

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#### MARIA DEL C. VERA SOUTHER ILLINOIS UNIVERSITY-CARBONDALE

# HAND, EYE, AND MIND, MAKE THAT! Making Drawings

Three of us enter the lift as the one who was pressing the bottom for the third floor continue talking to his companion, assuring her that the class will be over in less then ten minutes. Typically, we go in, attendance is taken, we review the first assignment and in no time we are dismissed for the day. When the elevator stopped, we all exited at once walking towards the east-south studio where I greeted everyone enthusiastically announcing that the semester would start immediately. I proceeded by requesting that each student stand next to one another and form a large circle. While they followed instructions, I grabbed a box of pencils and a pile of papers, handing them out one by one as I stated, your immediate task is to draw what you see within your cone of vision. Clearly, these students did not foresee an in-studio assignment, least of all to render a drawing by hand during the first day of class. Chaos and confusion dominated the room as it became evident that using a pencil plus paper to document what was immediately visible provoked anxiety among the group; it was as if freehand drawing was an unattainable act, why?

Architects are educated to be avid communicators; they learn to observe, document and transmit data visually using their hands, eyes, and mind. At the core of every architectural program, there is a constant pursue to address and advance skills according to the tools and technologies of the times. Today, the act of drawing by hand is hardly visible as students, faculty, and practitioners of architecture, across the globe are all too eager to spend endless hours modeling three-dimensional objects in front of screens. In my teaching realm, few if any, are able to use pencil and paper to investigate the nature of scale and space. The basic appropriation of the page that once determined proportions and distributions of a line or composition of lines, one that can reveal how scale and specificities of ideas project a point of view are now a site-less realm of infinite dimensions floating in an endless screen that distances one from understanding limits. This disappearance of the physical paper signals a disappearance for sensitivities that relate to scale and proportions and prompted me to ask the question – Why is architecture drifting away from tangible perceptions towards intangible domains? And, is the ability to draw by hand important to regain the physicality of spatial awareness?

Within American schools the answer to this questions are blurred and open-ended. Yet two pivotal events that date back to the late 1960's / early 1970's and one inaugural segment established in 1994 set the stage for my inquiry. During the early seventies Nicholas Negroponte and John Hejduk simultaneous departed from establish curricular agendas towards distinct pedagogic methodologies that forged a divide in the way architects learn. It heralded a perceptual drift that profoundly contributed to the development of current pedagogic standards and to the way these standards are implemented in education and practice. While both educators understood the tools and techniques that define the discipline, each resorted to articulate opposing dexterities in students.

For Nicholas Negroponte -- the founder of Machine Group [1967], Media Lab [1985], WIRED Magazine [1992], and One Lap computer Per Childthe need to incorporate computer aided design methods within the architectural program and to initiate the first digital think tanks was imminent. In the early seventies, at Massachusetts Institute of Technology Nicholas Negroponte implemented the first computer aided courses in the architecture department. In the course of forty years, he has extended his goals and pioneered many of the investigations that are accelerating the digital shifts commonly embedded in the practice of architecture and the built environment. Among them are the initiatives regarding real versus virtual space, artificial intelligences and multiple types of performing devices that serve to control environments. To Negroponte creative thought is fundamental yet, it is not linked to an specific tool or technique, it is successive, a series of results motivated by a pool of different perspectives that do not conform to uniform goals, as he decisively mention in his writings from Where Do New Ideas Come From.

Ideas may come like thunderbolts, but it can take a long time to see them clearly - too long. And ideas are often born unexpectedly - from complexity, contradiction, and, more than anything else, perspective. Alan Kay, father of the personal computer (among other things), likes to say that perspective is worth 50 points of IQ (it may be worth more, Alan). Marvin Minsky, father of artificial intelligence, says that you don't know something until you know it in more than three ways.<sup>1</sup>

Simultaneously, John Hejduk's visions sought a different route. Contrary to Negroponte, Hejduk opted to train future practitioners in isolation, subjecting students to experience a sanctuary similar to those found in monasteries or cloister, where the student like a craftsmen engages in physically making and shaping by hand, using all tactile forces to create. He asserted that architects think while doing and thus, ventured away from virtual techniques and focused exclusively on manually driven task. On July, 16, 2000 days after his death Herbert Muschamp who wrote for The New York Times said

 $\dots$  he dedicated himself almost entirely to a dual practice of running a school and making architecture in the form of drawings.<sup>2</sup>

Glimpses of Hejduk's educational enterprise, were first visible in 1971 when the New York Museum of Modern Art [MoMA] ventured outside of their exhibition spectrum to display the work of an unprecedented group of artist –the students of The Irwin S. Chanin School of Architecture of Cooper Union. At the time, the MoMA's exhibit was a splendid rendition of how the hand and the mind resourcefully composed data. It prompted a limited printed edition that included reproductions of the original work and written excerpts from educators who guided such mindsets. For years, *Education of an Architect: A Point of View*, influenced the pedagogic modes of many architecture schools. Countless educators followed with awe the educational opus of John Hejduk and impromptus design stu-

<sup>1</sup> Negroponte, Nicholas. <u>Where Do New Ideas Come From</u> email message to Ir@ wired,com, 01 Jan.1996

<sup>2</sup> Muschamp, Herbert. 'Art/Architecture; Solitary Performer On-a-Crowded Stage.' New York Times 16 Jul. 2000: ART

dios across the globe implemented similar teaching strategies, in hope to achieve the drawing genre Cooper developed.

To these two distinct and separate educational ideologies a third and decisive factor that is tearing the fundamentals of how-to institute drawing processes in the curriculum of architecture, is the inception of the paperless studio, ignited in 1994 under Bernard Tschumi's tenure at the Graduate School of Architecture, Planning and Preservation -Columbia University. Tschumi's vision for the students of GSAPP was to foster an education absent of paper, based solely in the production of digital work yet, open to the pursue of making. Indeed, the task facilitated new breeds of software, usage of equipment, and theories that at first challenged educational curricular and now propels the production of three-dimensional drawings, digital models, and the manipulations of multiple real and virtual landscapes.

This statistical trajectory demonstrates three dramatically different scopes of education. Each is extremely influential in today's debate when the value of drawing and the know how of tools and techniques needed for the practice of architecture are challenged. Thus, in spite of my ingenuous overview, it is through the above trajectory that the dilemma of how to teach drawing becomes apparent, especially as the decisions of -howto- are reconfigure and replaced by endless images from a single digital model that promotes effortless and simplistic outputs.

Accordingly, while there are educators that emphatically protect free hand drawing as an essential technique that connects the hand, eye and mind in the act of recreating the real, others proclaim hand drawing an obsolete task. Drawing is both a visual tool and a cognitive act; for this reason, when we use digital mediums to visualize ideas the process requires one to input in order to render multifarious products. Conversely, when we engage in hand drawing, especially freehand drawing, the process internalizes data through the experience of seeing, sensing and transcribing knowledge. Haunted by both the value of a sensorial approach and the need to decipher and document in multifarious modes, brings me to argue that teaching drawing to aspiring architects in the 21st century cannot be as reductive as above educators once foresaw. Instead and in retrospect of their invaluable initiatives, I argue that the act of observing, documenting, re-configuring and re-producing unconditionally, does not lie exclusively in learning to first draw through analogue or digital mediums; but as a composition of how the eye, hand and mind engage with all.

Today architects need to engage with the hands, eyes, and mind regardless of tools and techniques because after forty some years of grappling with the differences of, how-to-do, what is fundamentally important is to actively engage in making. In brief, quality of thought and informative data are part of an integral quest to constantly communicate, grasp, and document in both real and virtual forms. The moment drawing is understood as an evolving modality that is both a means to communicate and a means to learn, what matters is the quality of experiences and their end product. On this regard, what comes to the fore is Hejduk's vision to charge Sue Gussow with the task of "invigorating" the architectural curriculum through drawing, Negroponte's timely pressure to implement computers in the architectural curriculum and Tschumi's challenge to extend architecture beyond physical mediums. Independently; these educators forwarded academic agendas that advance our objectives and commitment to the art of teaching. For this reason after 34 years of teaching, it is Gussow's book *Architects Draw*, which is most telling of how students at Cooper gained the insight to produce knowledge and project ideas. Their ability to observe and draw is due to Sue Gussow's teaching methodologies. Gussow knows that beyond Hejduk's aspirations, the hand must always be in motion as the mind observes... *Drawing is thought extended through the fingertips.*<sup>3</sup>

The decline of hand drawing that distances students from understanding of scale and proportion is reflective of the choices educators make. While visionaries like Negroponte, Hejduk, and Tschumi had the foresight to isolate specific techniques and tools that are now providing us with advanced alternatives to communicate our thoughts, I am pursuing means to teach through the mergence of all. I look for means to institute in students the need to engage in using pencil and paper as well as digital software and hardware. In my studio, I intentionally merge Gussow's teaching techniques in ways that the hand, eye, and mind plus digital mediums influence the student's work. It is not simply paper and pencil but rather the threading of all mediums and techniques that is proving to be resourceful for the understanding of space. In this way a teaching methodology empowers the student to embody experiences of intimacy, reality and virtual representation, for the sake of sparing and preserving the understanding of scale and to embed in future practitioners the need to communicate through tactile and physical realms as a means to ensue that real as well as virtual techniques, coexist.

Like this, the first day of class ceases to confuse students as they learned that when all of their bodies form a single circle they are initiating the process of drawing in segments, independent and dependent of each other. Their drawings and their neighbor's drawings plus the drawings of their neighbors are part of a larger image. Each segment is part of the whole. I find that this exercise is crucial, early in the course, while they learn to develop a sense of scale. Their independent 60° cone of vision is recorded in a 11" x 17" sheet of paper and added to a series of images where a collective set of drawings completes an immerse 360° point of view. Upon further manipulation and in class discussion, the assignment grows and extends for one week in order for students to formulate their own 360° experience from specific outdoor space. Beyond this week, further development requires extended use of their hands, eyes, and minds to collectively advance the notion of scale and space.

<sup>3</sup> Gussow, Sue Ferguson. Architects Draw. New York: Princeton Architectural Press, 2008. Pg 19



FIGURE 1: The final drawings generate a series of stills, models and films. Students learn how to transfer the gained knowledge and engage in a series of explorations that requires the use of analogue and digital tools. A warm-up exercise that provides students with the means to simultaneously develop reasonable understandings of how to produce multiple points of view using scale and space in analogue and digital forms.

# CREATE|OBSERVE|CONNECT Making Connections

JON HUNT KANSAS STATE UNIVERSITY

"Drawing is not a mysterious activity. Drawing is making an image which expresses commitment and involvement. This only comes about after seemingly endless activity before the model or subject, rejecting time and time again ideas which are possible to preconceive. And, whether by scraping off or by rubbing down, it is always beginning again, making new images, destroying images that lie, discarding images that are dead. The only true guide in this search is the special relationship the artist has with the person or landscape from which he is working."<sup>1</sup>

#### Introduction

This paper describes a foundational design graphics and visual thinking course that engages students to develop observation and documentation skills through an examination of the land art movement of the 1960s. Land art, which developed in response to corporate depredation of the environment in the post-World War II period,<sup>2</sup> reflected the rise of a global ecological awareness. Land art practitioners discarded traditional modes of painting and sculpture. The works they created revered the landscape and explored the environment in terms of ecology and aesthetic character.<sup>3</sup>,<sup>4</sup> Site-specific installations constructed by land artists utilized local materials (natural and unnatural) found on the site to create new sculptural forms and aesthetic perspectives, "Subject both of science and art, the landscape functions as a mirror and a lens: in it we see the space we occupy and ourselves as we occupy it."  $^{\!\!\!^{5}}$ 

#### Issues

Many first-year design students are timid regarding the act of drawing. The hesitation to develop and advance ideas through visual thinking obstructs a student's ability to 'let go' and hinders experimentation and the expression of a strong final design. Many beginnerlevel design students strive for quick answers to design problems and are unreceptive to change and are often inundated with digital technologies that inhibit the development of their visual observation and documentation skills.

Today's students are typically multitaskers who are often reluctant to the concept of slow observation and prefer to rely on photography over the direct experience of sitting and sketching. However, the convenience of photography has its drawbacks. The camera's lens is a particular observation medium that alters viewing, warps and frames an image, and is its own form of perception. Photographs often lack the unique earthly qualities of the landscape. For most students, the studio curriculum precludes site visits, thus, hampering a student's understanding of direct creation, observation, and connection with the landscape.

#### **Course Objectives**

The course was developed specifically to enhance understanding of site analysis, the temporal qualities of landscape, and direct observation skills through the exploration of a variety of mediums and techniques for sketching and documentation. The pedagogy focuses on strengthening visual thinking and challenging students with sketching and rendering

<sup>1</sup> Lampert, Catherine, et al. *Frank Auerbach : Paint-ings and Drawings*, 1954-2001. London: Royal Academy of Arts, 2001.

<sup>2</sup> Kastner, Jeffrey, and Brian Wallis. *Land and Environmental Art*. Phaidon Press, 1998.

<sup>3</sup> Kastner, Jeffrey, and Brian Wallis. *Land and Environmental Art*. Phaidon Press, 1998.

<sup>4</sup> Dempsey, A. *Destination Art*. University of California Press. 2006.

<sup>5</sup> Kastner, Jeffrey, and Brian Wallis. *Land and Environmental Art*. Phaidon Press, 1998.

methods to be utilized while exploring a place. Students have the opportunity to build a tangible work in the landscape and enhance a sense of ownership while "isolating the activity of sketching."<sup>6</sup>

#### **Class Structure**

The semester-long course focuses on foundational drawing and visual thinking methods where students design and construct a land art installation, observe their creation, and document their response to the work on its surrounding site. The fifteen week course is structured into three phases: land art installation design and construction (two weeks), observation (seven weeks), and documentation (six weeks). Students are introduced to films regarding drawing, sculpture, and installation artists, such as Mark Dion, Kiki Smith, and James Turrell, which reveal each artist's design process. Students evaluate each artist's work and examine renowned contemporary designers, their projects, and their creative processes.

Class lecture topics include the process of drawing, understanding and evaluating spatial qualities, categories of space, and color theory. Students complete a series of written narratives, journaling, and visual products. They construct a land art installation and complete observational sketches, drawings, and a final design package. Students are encouraged to explore multiple mediums and materials to express their observations and visual findings.

# Process of Creating, Observing, and Connecting

#### Constructing the Land Art Installation

Initially students work in teams to construct the land art installation. The teams first select a site to explore. During this exploration phase, each group identifies the characteristics, processes or patterns in nature their installation will reveal. Students are encouraged to create land art which directly responds to the spirit of the place – both physically; through the use of found, onĐsite objects, and emotionally; through personal reflections and responses to the site.

6 Goldschmidt, Gabriela. "The Dialectics of Sketching" *Creativity Research Journal* 4.2 (1991): 123-143.



FIGURE 1: Student Work. LAR 310. Design Graphics and Visual Thinking. Kansas State University. 2009.

Each group produces a series of conceptual ideas and design goals for their land art piece through sketches, diagrams, and written narratives. One student group described their site selection as in response to contrasting forms.

"Intricately woven branches and willow leaves spiral to a wondrous height, merging with the branches above. There was contrast between the irregular and ruddy bald cypress roots and the bulky cylindrical massing of the spiraling branches. In addition, the largeness of the structure added variation within the site. The smallness of the roots was emphasized through the visual comparison with the great size of the installation. Therefore, the primary factors in determining the form of the installation were replication, incorporation, and contrast with the existing site."<sup>7</sup>

Students are encouraged to create an 'intervention' in nature that responds to its environmental surroundings. When planning the eco-revelatory<sup>8</sup> design, students consider the site's visual qualities, land forms, interactions between wildlife, and human interventions. The students focus their land art installation on

7 Student Work. LAR 310. Design Graphics and Visual Thinking. Kansas State University. 2009.
8 Eco-revelatory aims to expose and interpret environmental phenomena, processes, and interactions. such concepts as: erosion, water, changes in weather, growth, layers, light, patterns, etc... (Figure  $1)^9$ 

"The initial intent was that, as the water level rose and fell over the course of the semester, it would cover up the lower portion of the limestone circle and it would appear that the "sun" was setting behind the horizon of water. During all times, the limestone sun would also be reflected in the water."<sup>10</sup>

Students create an impermanent sculpture that is to evolve through time. A student group wrote, "The construction of the installation occurred primarily at dusk over the period of a week. Wearing rain-boots and jeans, we ventured into the dense vegetation of the surrounding area and gathered fallen branches."<sup>11</sup>

When merged with the ordering and aesthetic principles of art and design, the physical act of assembly allows students to intervene, observe, respond and be a part of the site. Students evaluate their 'artistic installation/intervention' to study their use of the ordering principles and aesthetic elements that are utilized in all art forms, such as composition, color, balance, asymmetry, texture, and form, etc.

# Observing the Land Art Installation

Following the completion of the land art installation, students embark on the observation phase of the semester. Working individually, each student observes their installation and its surroundings over a seven week time frame. The student examines and records the temporal, physical, sensual, and emotive qualities of the land art installation (Figure 2).<sup>12</sup> In addition, they examine how the installation impacts its surrounding site and how the surrounding natural or manmade process has in turn influenced the installation. A student wrote, "Our project



FIGURE 2: Student Work. LAR 310. *Design Graphics* and Visual Thinking. Kansas State University. 2009.

does not dominate the landscape. Rather, it is a reflection of its environment and its setting."<sup>13</sup> Students are encouraged to visit their installation at different times of day and during different weather conditions.

"Over the course of observation," a student wrote, "I have experienced varying levels of emotive qualities within our site. Weather has one of the most observable impacts on the site's experience. With rain comes a sense of gloom, wind brings a tense and agitated mood to the site, calm and clear days create a peaceful atmosphere, and darkness bears a sense of anxiety."<sup>14</sup>

To truly know the site, the student must examine it repeatedly.<sup>15</sup> During this intense and repetitive study of the land art installation and its surrounding context, students are more inclined to investigate the site and discover that which they initially overlooked. This intense focus on the installation brings forward details otherwise ignored or unseen.

<sup>9</sup> The students positioned limestone, in a circular pattern, at the water's edge and to be effortlessly viewed from a heavily traveled road. The students constructed the land art as a way to mark how the water fluctuates over time.

<sup>10</sup> Student Work. LAR 310. *Design Graphics and Visual Thinking*. Kansas State University. 2009.

<sup>11</sup> Student Work. LAR 310. *Design Graphics and Visual Thinking*. Kansas State University. 2009.

<sup>12</sup> Many students experiment with abstracting their observations to communicate the emotive and sensual qualities of the site.

Student Work. LAR 310. Design Graphics and Visual Thinking. Kansas State University. 2009.
 Student Work. LAR 310. Design Graphics and Visual Thinking. Kansas State University. 2009.
 \_Richmond, Wendy W. "Your Thoughts on Why You Draw." *Communication arts* 46.6 (2004): 212-214.

"Bright. I squint to look more closely at my surroundings. There is a bridge in the distance. Its sharp lines contrast the gentle slopes of the prairie and of the Flint Hills in the distance."<sup>16</sup>

This repetitive process teaches students that habitual observation is essential to truly understanding a place or a concept. Students begin to 'recognize' the patterns of the site, 'detect' changes that occur over time, 'discover' new patterns and processes, and 'appreciate' the environment.<sup>17</sup> During the seven week observation period, the student gains a sense of familiarity with the ebb and flow of change on the site during their visits. This ease gives students an opportunity to simply be alone with their sketchbooks while in a state of concentration, absorption, and a 'letting go.'

Through observation, students begin to appreciate and value the act of direct experience of the site and understand that observation allows them to rely less on memory and more the tactile experience on the site. Often, when drawing a landscape, past memories and experiences 'fill in' the illustration as well as the understanding of the subject.<sup>18</sup> Students are made aware of the limitations of understanding a site based on a quick photo, or a brief fifteen-minute site visit.

"Observational studies show accidental features that are typically observed, not invented. Drawings from mental images, on the other hand, rely on generalities, on the simplifications that remain in memory as abstractions from the multiplicity of individual experiences. Information can be continually refreshed by overt attention to vivid perceptual snapshots."<sup>19</sup>

#### Connecting

Students document their weekly observational routine through objective and subjective drawing methods, experimental methods of documentation, photographs, and written narratives. Students are encouraged to use multiple for<u>ms of media and mixed mediums to find</u> 16 Student Work. LAR 310. *Design Graphics and Visual Thinking*. Kansas State University. 2009.

17 Schon, D. A. "Kinds of Seeing and their Functions in Designing." *Design Studies* 13.2 (1992): 135.

18 Treib, Marc. ed. *Drawing/thinking: Confronting an Electronic Age*. New York: Routledge, p28. 2008.

19 Fish, Jonathan, and Stephen Scrivener. "Amplifying the Mind's Eye: Sketching and Visual Cognition." *Leonardo* 23.1 (1990): 117-26. tools that assist in the visual expression of their findings. They must learn how to test selected and new mediums. They experiment with different mark making and gain an appreciation of the different characteristics of the mediums.<sup>20</sup>

"Observing the quality of the light caused me to notice the highly varied palette of textures present within our structure and the site. I focused the majority of my sketches on the qualities of the surrounding context. Implementing graphite, I combined linear strokes and washes of color to emulate the enclosure of the stream bed. Using markers, colored pencils, and water color I expressed the textural differences between the water."<sup>21</sup>

Students also evaluate their work. "The harsh weather does not deserve delicate drawings," a student wrote, "but rather distinct, purposeful lines." As the students learn to perceive the object and environment, the students must learn to identify and evaluate their drawing as they exist on paper.<sup>22</sup> Students scrutinize their drawing and observation skills for "delusions."<sup>23</sup> Delusions are illustrated when students rely on what they accept as true rather than observing and understanding the accurate physical appearance of the subject.<sup>24</sup> Delusions are the inaccuracies between direct observation and the drawing. Students are encouraged to focus and examine specific detailed elements found within their site to break free of delusions.

"I've been getting closer and closer to the grass itself these last weeks," a student wrote, " I don't know how much closer I can get before I need a microscope. I'm again confident in noticing improvements on my observation and hand work."

The physical, emotional, and tangible experiences, through the creation of the land art installation, strengthens the students' relation-

20 Cohen, D. J. "Why can't most People Draw what they See?" *Journal of Experimental Psychology*. 23 (1997): 609.

21 Student Work. LAR 310. *Design Graphics and Visual Thinking*. Kansas State University. 2009.

22 Cohen, D. J. "Why can't most People Draw what they See?" *Journal of Experimental Psychology*. 23 (1997): 609.

23 Cohen, D. J. "Why can't most People Draw what they See?" *Journal of Experimental Psychology.* 23 (1997): 609.

24 Cohen, D. J. "Why can't most People Draw what they See?" *Journal of Experimental Psychology*. 23 (1997): 609.

ship to and understanding of the environment while enhancing the students' investment in the land art installation project. This connection to the land art installation and environment is apparent through the students' drawings and narratives. During the semester, site visitors dismantled two land art installations. For both groups, the students were personally impacted by this removal or destruction of their land art installation projects. Each student, clearly exhibiting a sense of ownership, reacted through a variety of means. Some responded via images and narratives. One, emotively, illustrated the aftermath as a dark, evocative, and nothingness space within the prairie setting. (Figure 3)<sup>25</sup> Another student employed printed materials to collage an image of giant lucha libre wrestler destroying their art installation. As a result of the demolition of the installations, the students began to appreciate that the physical environment interrelates with one's feelings and experiences.<sup>26</sup> All identified with the environment depending on the emotion that the landscape induces on the student.<sup>27</sup> Students clearly demonstrated an emotional investment for their land art installation.

A fundamental responsibility of a designer is showcasing designs and visual concepts for others to view, experiencing interaction with the viewer, and witnessing the viewer's response to the design. There are many avenues for one to express such elements. For this class, each student group constructed one bound book during the final phase of the semester. Collectively these materials documented the efforts for the semester. The final product designs reflect the student's understanding of composition and graphics. The book is divided into four sections: introduction, overview, chapters, and reflections. It also contains an appendix of additional and sup-

26 Nilsson, Isak L. and William V. Lindberg, ed. *Visual Perception: New Research*. New York: Nova Science Publishers, Inc., 2008.



FIGURE 3: Student Work. LAR 310. Design Graphics and Visual Thinking. Kansas State University. 2009.

porting materials. Each book is bound and is well crafted and individually designed by the student.

The introduction contains the title, a creative statement and a statement of intent. The creative statement is a poetic narrative about the land art installation. It describes the emotive, sensual, and descriptive qualities of the installation and its surrounding context. The statement of intent reads as a concise summary that describes and states the group's goals for the land art installation. The overview includes descriptions of the groups' thought processes, construction methods, and of the installation and its surrounding context. Each group member completes an individual chapter communicating and spotlighting the member's exploration of the land art installation and its site context. Each student states his or her findings, thoughts, and inspirations experienced while visiting the site.

While evaluating the renderings and narratives, students distinguished concepts revealed in their drawings that were not originally intended. Students gained appreciation of how others interpreted their creative work. Their book became a spatial journey for all.

#### Findings

Most students agree that the land art installation project was a valuable experience that improved their observation and drawing skills. Student comments reflect that the course balanced the technical and computer classes and permitted a more emotional response to the environment. The students that truly became

<sup>25</sup> Students were personally affected by the abrupt removal of their land art installations. One student reacted, emotionally, by rendering the aftermath as a dark, evocative, and as an empty space within the prairie setting.

<sup>27</sup> Nilsson, Isak L. and William V. Lindberg, ed. *Visual Perception: New Research*. New York: Nova Science Publishers, Inc., 2008.

involved in the overall construction of their land art installation produced richer narratives and drawings. Only a small number of students continued to focus on quick-fix rendering techniques, and did not appreciate direct observation. This group of students remained uncomfortable with the practice of drawing and visual experimentation. They did not produce the same level of final product as students willing to explore and observe. "Problem for creative growth comes when we try to cut corners and use 'rules' or procedures which, unless we are very careful indeed, will tend sooner or later, to inhibit appropriate (creative) looking strategies."<sup>28</sup>

Next year, the course outline will emphasize that students are to focus solely on the land art installation and not the surrounding context. A few students neglected the land art installation and explored primarily outside the installation area. They did not participate in the objective of the class to focus and repetitively observe a space.

Students stated that the Design Graphics and Visual Thinking course was the foremost occasion that they were required to ĐtrulyĐ observe instead of drawing a rapid, postcard image. By designating a specific space, students developed opportunities to explore new materials (create), created richer drawings (observe), and moved toward a higher intensity of understanding the site through direct observation (connect).

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# A "FASHION" DESIGN PROJ-ECT: WEARABLE AND MOVEABLE ARCHITECTURE Making Connections

WEILING HE, ASSISTANT PROFESSOR TEXAS A&M UNIVERSITY

# Abstract

The project, *Wearable and Moveable Architecture*, was conducted in the author's second year design studio in the fall semester of 2009. The project invited students to examine fashion design from an architectural point of view. Four key concepts were focused on throughout the design processes: the visual, the body, the tectonic, and the temporal and ephemeral. Students were encouraged to investigate architectural implications of the project.

#### Introduction: Architects' Fascination of Fashion

Architects have long been fascinated with fashion. The reasons are a complex matrix. They can be literal, conceptual and cultural. Architects' endeavor trying to establish links to the world of fashion both enriches and critiques architecture's own discourse.

Fashion and architecture signify a tension in the relationship of art to mass culture. High fashion exists as well as high architecture. Everyday ready-to-wear clothing exists as well as cookie cutter houses. Fashion and architecture's striving to be art reflects the desire to elevate tangible facts and operations that fashion designers and architects routinely deal with. In the course of elevating, or escaping from, the everyday, the creations of fashion designers and architects are transformed into artistic explorations and expressions.

Parallel to the idealistic desire of expression, both high fashion and high architecture display a tendency towards imagining and establishing the privilege of exclusiveness and a status of cultural superiority. A modern house pivoted on a cliff exemplifies the same unattainable beauty as a novel masking of female corporeality on the catwalk. Approaching an exclusive beauty, both fashion designers and architects can be suspected of being narcissistic.

Fashion has been referred to literally and metaphorically both as a practice and as an idea in the field of architecture. A literal example is the Curtain Wall House (Tokyo, 1993-1995) designed by Shigeru Ban. Ban challenged the idea of the curtain wall by literally using fabric to wrap an inner layer of sliding glass doors. The curtains provide needed privacy for the house. Meanwhile, the formless fabric of the curtains weakens the conventional preconception of architecture as being sturdy. Besides literally using fabric in architecture, a number of contemporary architects adopt visual impressions of textile, such as folding and draping, in the forms of architecture. Diller, Scofidio + Renfro designed the skin of the Eyebeam Institute of Art and Technology in New York to mimic continuous folds of fabric. Folding, as an idea derived from fashion, is then given an architectural extension as a way to transform from interiority to exteriority and back.

Further, fashion becomes the content of architecture in the design of fashion stores. In many cases, fashion stores are given appearances as prestigious as what is sold inside the space - high fashion. The exclusiveness of high fashion is pronounced in the manner of displaying in art exhibitions. Architect Gluckman Mayner designed Helmut Lang's outlet on Greene Street, in New York City, in such a minimal way that the store was almost empty. Stripped of merchandise the store space challenges its main function as a store but resembles its appearance to a gallery space. Interestingly, Mayner designed Lang's store in between his existing commitments of art gallery relocation projects. Another example of prestigious fashion architecture is OMA's Prada Epicenter in New York City. It is designed not only as the container of the objects of desire, but also as a potential performance space, a gallery and maybe a laboratory of public activities. Exclusiveness is exaggerated in unusual architectural

elements, such as the big scale Prada wallpaper, and the intimate scale of a button that adjust the opacity of the glass door of the changing room.

Beyond desires and social psychologies, fashion and architecture share a wide area of conceptual common ground. The conceptual intersections between the two domains include identity, site, body, movement, structure, skin, and construction. However, fashion and architecture deal with these aspects on different scales. Fashion pronounces the character of the body inside the garment; architecture often manifests the identity of events in a space. The site of fashion is the body; architectural experiences are based on the body. Fashion incorporates body movements; architectural space engages body movements. Fashion is given form by operations on fabric, such as pleating, folding, and draping; architecture is realized in materials and tectonics. Simply put, the relationship between fashion and architecture is deeper than merely a fascinating skin.

#### A Fashion Project

Drawn by the fascination of fashion, the author conducted a second year studio in the fall semester of 2009, *Wearable and Movable Architecture*. The objective of the project was to examine architectural concepts on the closeto-body scale and through the lens of fashion. The intended explorations in this project are both literal and conceptual. To a certain extent, the project shows reminiscences of Da Vinci's machines and Theo Janson's moving creature at the beach. The mechanical quality of the garments blurs the boundary between fashion and machine and illustrates architecture on a small scale.

The site of the project was a breezeway connecting the three buildings at our architecture school. Each student picked an electronic sound piece to map the spatial characteristics of the breezeway. Body movements were used to express the rhythms of sound pieces and the spatial characteristics of the site. Students experimented with individual movements, such as extending, contracting, bending, squatting, falling and swirling, as well as the flow of movements, such as progression, climax, continuity and interruption. Through choreographing movements, students identified spaces in between their bodies and the site. These spaces determined the volumes and possible transformations of garments to be designed. Looking for moveable structures to realize the initial thoughts of garments, students researched biomorphic examples, such as wings, human spines, and snake skeletons. These structures were elaborated in materials and construction. At the end, the project concluded in a runway performance at the breezeway.

This paper will focus on four elements of inquiry: the visual, the body, the tectonic, and the temporal and the ephemeral. These four elements will be examined through the lens of space and in relation to broader discourses both in fashion and in architecture. The conceptual inquiries will be extended from the project and beyond the operations.

#### The Visual

Fashion illustrates the pleasure of looking and being looked at. Beautiful models in fancy garments walk on the elevated platform like moving sculptures on a pedestal. Because of the relative distances and positions between the audience and the fashion, the actions of looking and being looked at become a spatial dynamic. The perceptions of the audience derive not only objectively from the form of the fashion but also subjectively from the manner in which the fashion is presented. Therefore, in the case of fashion, the visual is a spatial issue.

That the visual is spatial is not an unfamiliar idea in architecture. Moving visuals have been practiced in many architecture pieces, such as the moving views when approaching the acropolis and the promenade in Le Corbusier's *Villa Savoye*. Spatially, the difference between the visual in fashion and the visual in architecture is that of the interiority and the exteriority of space. Fashion is usually perceived from the outside as an object. Architecture can be perceived both from the outside and the inside. To a certain extent, interiority dominates architecture because one can never be outside space. He or she is always surrounded.

The visual is iterated and re-iterated in the fashion project on various scales and from multiple points of view. Students are given the site, the breezeway that connects the architecture buildings. The site is the place of performance so it is examined in relation to the performer's body, the audience's points of views and possibly the camera's points of views. In order to construct visual attention, students walk on the breezeway, observe the space, and explore ways to engage the space with the route of the walk, body movements and the transitions among the movements.

Further in the design process, after the students have developed a schematic idea, the visual of the performance of the garment is designed in relation to the site instead of the static object. Students choreograph how the garment is revealed and transformed as an object as well as how such revelation and transformation are associated to the site. Unlike a stage for which there is a front and a back, on the site of the breezeway the visual is in all directions. So the revelation of both the garment and the body that carries the garment is spatial rather than elevational. Further, the spatiality and the transformation of the garment enable an interchange between the interior and the exterior of the piece. The visual is allowed at a depth rather than merely at the surface (Figure 1).



FIGURE 1: Karl Mielke: Engine dolly

#### The Body

Fashion both contains and emphasizes the body. The body is the site of fashion. Form fitting garments accentuate the continuous curvature of the body. Some other garments are more architectural in that the designs are dictated by the exterior appearance of the form but not by the shape of the body. For example, Issey Miyake's design between 1968 and 1998 used abstract volumes of garment to mask the body. Pockets and layers of spaces are formed in between the body and the surface of the garment.

Maureen Connor's sculptural work in 1981 used reed paper and silk to make enclosures of surfaces. Connor's work is in between fashion and architecture. The scale of the work is close to fashion. The anthropomorphic form of the work highlights the absence of the body. The object itself is architectural in that it is built to define a space.

In architecture, the human body is the carrier, the conductor and the receiver of spatial experiences. Space is constructed around the body. Spatial conditions stimulate the body and waken the awareness of its own existence. A chair can be an architectural state in a close-tobody scale. The seating, the back and the armrests are in such forms that the physical object of the chair contains the body. Some architectural interior spaces are designed in similar ways. Their forms are like bubbles pushed by the body. In addition, the body can both be the subject and the object of architecture. Biomorphic buildings mimic the form of an organism. They crawl around in the boxy urban fabric as if they were to execute a secret mission to take it over.

In the project, the students were invited to use their body movements to establish spatial relationships with the site, to determine the form of the movable garment, and to feel their own bodies in movements. Students moved their bodies in ways of extending, contracting, bending, straightening, moving fluidly or rigidly. They felt the inner forces that form the postures, such as gentle versus aggressive, passive versus active, and sometimes neutral. They observed flows of forces in terms of continuity versus interruption and looked for progression and climax. Key body movements were defined in verbs, such as swirl, drag, float, extend, weave, twist, open versus close, and fold versus unfold. Space around the body was defined through these movements. The outer skin of the space then became the initial form of the garment. In addition to key movements, transitions among them were explored so possible transformations of the garment could be designed.

In giving form to extend body movements, one may have two approaches: the biomorphic and the geometric. The former is nature. The latter is an abstraction of nature. On one hand, prosthesis can be one form of the biomorphic body. The goal of prosthesis is to mimic and enable as close as possible the original movements of the missing body parts. Biomimicry can be another example. Extending wings from a human body is to facilitate the movement of flying. On the other hand, extensions and movements of the body can be read in terms of lines and planes as modern dancer and choreographer William Forsythe does. To Forsythe, the tip of a hand forms a line from the starting point to the end point of the movement. An arm sweeping forms a plane from its initial to the end position. The students explore both kinds of possibilities. The garment both extends the body and transforms the body. The corporeality of the body is investigated (Figure 2).



FIGURE 2:

#### The Tectonic

The making of fashion dictates the visual of fashion and its relative forms to the body. The three pattern creation methods are distinct in their relationship to the body. The drafting method is the most remote from the body. Patterns are created via measurements in straight lines and curves on flat pattern paper. Flat-pattern method uses muslins as a mimic of the real body and the drapery of lightweight materials. Draping uses real fabric on the muslins because it is nearly impossible to predict how the fabric reacts to the contour of the body and its own gravity, elasticity and flexibility.

Ways of manipulating the fabric gives form to fashion, such as pleat, ruffle, godet, gather and gore. On the level of detailing, stitching techniques complete the joints among the pieces of textiles and fabric. The emergence of laser cut technology in fashion leads to not only a revolution of surface patterns but also the "hanging" and "fringing" effects of fashion. As a result a layer of space is vaguely defined around the garments.

The making of architecture dictates the formation of architecture. Tectonics has constantly been a force of architectural evolution from the ancient forms of Gothic architecture, to the modern structure of a free plan, to the contemporary digital fabrication. In the Wearable and Moveable Architecture project, the tectonics of architecture is examined on the scale of a joint, especially the joints that enable transformations of the garment. Two issues are present in this study: material and movability. How materials are put together is a core architectural issue. However, architecture is in most case immobile with the exceptions of audacious explorations such as Santiago Calatrava's works. Therefore, the tectonic aspect of the project both lines up with and extends architectural practice. Students studied biomorphic examples to understand how movements can be realized in a movable structure. They also studied ready-made joints from Home Depot and used them to as a parameter for the design and the making of the garments. Students used rigid materials for the skeleton of the garment and flexible material for creating tensions to stabilize the structure at certain points of transformation. In other word, all materials used in the project were structural, if not always, then at some times. Glue was not used in any of the connections. Interestingly, the kinds of joints used were not many. Three types of joints were used the most. They were ties, friction joints, and bolts and nuts. Although the garments presented various form transitions, the elemental movements of the joints were limited: rotation and sliding. Combinations of the two movements created countless variations and illustrated the beauty of simplicity (Figure 3).



FIGURE 3:

# The Temporal and the Ephemeral

The presentation of fashion is temporal. Either on the catwalk with the background of barcode techno music or in the street with the background of everyday life, garments are moving with the movements of the body. The garment is given life by the body, becomes an extension of it, and constantly transforms in time.

Temporality can be iterated as transformation - forming in time. Hussein Chalayan's 2007 spring summer collection presented a series of transformer dresses. Electronic devices were embedded so that they gradually changed the garments from one form to another on the model's body. Through expansion, contraction, and rotation, dresses became coats and skirts become gowns. In the last piece of the show, the dress completely disappeared from the model's body. In architecture, Tom Kundig's projects, such as Chicken Point Cabin, Delta Shelter and Rolling Hut, draw parallels to Chalayan's collection. In both projects, mechanical devices were installed to enable the houses to transform. A 20 by 30 feet window could be opened and closed from the living room. The exterior of the shelter could be completely shut. The huts were on the wheels, which challenged the very foundation of architecture being grounded.

Meanwhile, fashion is ephemeral. It is a reminder of the fragile mortality and the failure of enduring human desire. In 1995, in Comme des Garçons, Silvia Kolbowski and the architect Peter Eisenman built video installation. The video showed simultaneously catwalk footages of the newest collections and previous designs that are nearly forgotten. The project, *Like the Difference between Autumn/Winter '94/'95 and Spring/Summer '95*, presents fashion's immediate occlusion of its past.

Temporality is experimented with in the project both in the rhythm of sound and in the transformation of the garments. Students were asked to find a sound piece that rhythmically and atmospherically connected their bodies and the site, potentially expressed the wearable architecture, and provoked the excitement they felt about the anticipated fashion show. Time was registered in the rhythms of the sound pieces and mapped in the gradual revealing of the garments. Transformations of the garments emphasize the ephemeral of the appearance. Among the changing forms of a garment, no individual moment can summarize what the garment is. To a certain extent, the transitions among the moments are more telling than the paused moments. Overall, when the show is over and the garments are detached from the body, the movements of the garments are only suggested through the mechanics of the joints (Figure 4).



FIGURE 4:

#### **Conclusion: Close Your Eyes**

The Wearable and Moveable Architecture project invited a visit to the intersections between fashion and architecture. It called for a variety of references - modern dance, biomorphic examples, fashion, as well as installation and architecture details. Students studied modern dance pieces to understand body movements in space and music; they examined biomorphic examples to understand the relationship between joints and movements; they analyzed fashion examples to understand the close relationship between a structure and the body; they investigated installation and architectural details to understand the tectonics of materials. The Wearable and Moveable Architecture project not only addressed the relevance of fashion to the study of architecture on multiple levels but also illustrated how architectural education could benefit by connecting to other disciplines.

The climax of the project was the fashion show. In music, students turned into mysterious models hiding and revealing themselves behind the garments. The garments looked like armors, harnesses or additional limbs. They moved with and transformed the body. The performance was seen by the audience from various perspectives but could not be seen by the students themselves. They experienced the performance through body movements, feeling the extensions of the body, and the connection they tried to establish with the site – both the architectural site of the breezeway and the fashion site of the body. The visual aspect of fashion is minimized from the students' point of view. Close your eyes.

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# BODY COPY: TYPOGRAPHY AND THE HUMAN SCALE Making Connections

RODERICK GRANT, ASSISTANT PROFESSOR OF GRAPHIC DESIGN ONTARIO COLLEGE OF ART & DESIGN

The typographic sequence of study at the Ontario College of Art & Design (OCAD) follows a historically accepted course of studio practice that closely outlines an understanding of typography - the means, logics and strategies for the combination and integration of alphabetical and numerical forms for visual communication. While format – page, space, environment - are given significance in this approach, an exposure to spatial realms far beyond the page are necessary to broaden the discourse of the role typography can play in our increasingly mediated cities. The confines of formal study in small, intensive typographic exercises should be supplemented by the inclusion of larger formats that serve as a preface to scales of engagement that address the body. This paper will argue that along with investigations that address the symbolic and systematic aspects of typography, significance must also be given to projects that engage the human body in scale and quality. The device driven dissemination of information now crosses and integrates previously distinct channels of media. Cell phones, mp3 players, net-books, and handheld video games all share a common typographic scale and experience. The pedagogical evolution from a typography of the eye and hand, to one that integrates the body as a whole may be considered timely as our collective attention is being pulled from civic environment to virtual device.

The involvement of the body, hand, and eye to a routine of typographic production has its roots in the teachings of Armin Hofmann and Emil Ruder; both studio masters at the Basel Allgemeine Gewerberschule. Hand drawn type and a series of exercises in the refinement of silhouettes, distinguished the approach to basic typography and formal study in Basel from those of other Swiss design schools in Zurich and Lausanne where mechanically set type was exclusively the norm.<sup>1</sup> The many students of the Basel Allgemeine Gewerbeschule that are now teaching at OCAD, the practices of Hofmann and Ruder continue to be relevant in both curricular and pedagogical approach. While implicating Hofmann and Ruder in the curricular evolution of OCAD, it may be Wolfgang Weingart who has had the strongest affect on the current generation of Professors at OCAD. In 1968, Weingart initiated the Advanced Program for Graphic Deisgn which intensified the global dissemination of the pedagogy and processes unique to Basel. Weingart's insistence to push basic principles of typography to process based ends, free of professional or market constraints remains a hallmark of beginning typography studios within the Graphic Design Program at OCAD.

'School' for me is an institution which, through a certain teaching program, attempts to clarify certain information. This information is essentially independent from the concrete demands made by existing professional standards. The teaching programs are open, not bound by fixed opinions. The content of the program is determined and constantly developed in the school. It is important that the 'school' maintain an experimental character. The students should not be given irrevocable knowledge or values, but instead, the opportunity to independently search for values and knowledge, to develop them, and learn to apply them.<sup>2</sup>

Weingart's experimentation at the outset of his typographic education was largely unsupervised, and constantly informed by investigations of individual letterforms. Using printed letters of various scales, Weingart pasted 6 prints to the sides of a cardboard cube, covering the surface of the solid with typographic form. Using a camera, and now able to change point of view through his camera and the cube,

2 Weingart, Looking Closer 3, 221.

<sup>1</sup> Hollis, 215.

Weingart was able to achieve views on letterforms that were previously impossible to generate through mechanical means alone. This experiment, Weingart dates at 1965 while he was working independently in Ruder's type studio in the Basel Allgemeine Gewerbeschule.<sup>3</sup>

It is significant to reach back to project forward in terms of typographic education at OCAD. The teaching methodology and basic parameters for project work at the Gewerbeschule were always process based, not product or outcome-based. The typography studio in Basel was a place to experiment and challenge convention. Convention however, meant students had gained basic control over typeset language forms, and thus, basic control over visual communication through typography. While OCAD manages to preserve the emphasis on process and formal development in typography, there remain issues of comfort and convenience to overcome in the current student population. Omnipresent digital devices only provide a limited experience of typography, and engender a relationship to type that is at best imprecise. Large, and Standard type display options on an mp3 player hardly make for compelling control over a type-based interface. This being the dominant form of typographic interaction when students arrive at OCAD, a significant push needs to be initiated in the typography studios to introduce experiences that flesh out the opposite end of the scale continuum. The context and case-study presented here provides the documentation of one such push - and its outcomes.

# A History of Beginnings

The study of typography at OCAD often begins with the stroke - the basic constituent elements of typography. The derivation of thick and thin strokes from writing tools, whether natural or mechanical, introduces the beginning student in typography to line weights that are even and static, or variable and dynamic. Vertical, horizontal, diagonal and curvilinear strokes intersect in specific relation to form individual, legible Latin characters.<sup>4</sup> The relationship between hand, motion, direction and speed all correspond to specific formal qualities of stroke. These exercises are best repeated

- Weingart, My Way to Typography, 233. 3
- Kunz, Formation, 24. 4

slowly, thus contributing to a physical understanding about the relationship between the specific action of the body and a specific production of form.

The scale of these exercises is frequently limited to common letter size sheets of calendared or hardened bristol paper, so chosen for surface smoothness conducive to consistent markmaking. The connection between hand, action and form is a crucial first step in craft-based understanding of the derivation of typographic form.<sup>5</sup> This understanding is further developed through a series of exercises that challenge students to move past making strokes by attempting to resolve freehand tracings of historically significant typefaces. When given an actual typeface, the complexity of the edge becomes a new challenge. Typefaces such as Garamond, Baskerville and Bodoni prove to be incredibly complex forms of compound curves that demand great attention to changes in direction, radius and the sharpness of intersections (Figure 1).



FIGURE 1: An exercise in freehand tracing of Baskerville Regular

Students in beginning typography at OCAD can face a month of these exercises, slowly building a familiarity with typographic form that is both haptic and optic. Both of these concerns, that of the body and the eye are preserved when the study of full type families are introduced to the studio. When asked to com-Hollis, 215. 5

pose a simple word using unattached, individual letters, students must physically overcome the most basic issues of typographic composition; baseline and vertical plumb. The necessity of a triangle and T-square brings the assumptions and ease of the digital environment to the foreground as an issue to overcome. As certain letters - for instance 'o' and 'a' - have no clear reference to how they "sit" on a horizontal datum (baseline) students must begin to resolve this issue in the relationship between characters individually, letter by letter. The practice of arriving at an acceptable typographic structure is one of optical refinement. Once an optimal relationship to basic typographic structure is selected, students address the issue of letter spacing or kerning, an exercise of looking at, and adjusting the space between each letter while respecting the overall shape of the word, and the form of each letter in sequence. The pace of the exercise is slow, forcing students to constantly assess their manual spacing of letterforms at every greater distances. Even when the type is to be digitally or mechanically set, there is no one absolute solution, only degrees of refinement, the process still remarkably slow and similar across media. The activity of physically moving type in space, by hand, however, begins as understanding of type as object with physical properties (Figure 2).

It is at this point that students must assess their work from eye's length – rather than arm's length. Optical relationships of space between letters are dynamic, and change instant to instant. Adjustments are no longer objective, but depend on a growing realization of the quality of a given spatial arrangement in relation to previous attempts. While students are aiming at a temporary resolution of letter spacing, they are also gaining an attentiveness to their typographic environment. Road signs and everyday wayfinding becomes a constant source of student education as they discern ever finer issues of letterspacing in their city. Though the scale of these exercises remains small, it is the spatial engagement of kerning that forces the beginning student of typography to consider not just the task at hand on paper, but its evaluation from across architectural space. Ruder's pointed stance on the spatial aspects of positive and negative form, of

# design

FIGURE 2: Kerning exercise with Helvetica Neue 55 Roman letters; students must establish typographic structure and a good relationship between counters and negative space within and between letterforms.

solid and void, are made clear in this contribution to the 1960 catalogue Typography as Communication and as Form:

The formal quality of every piece of typography depends on the relationship between the printed and unprinted parts. To see only what is printed, to overlook the decisive contribution of the unprinted parts, is a sign of professional immaturity. The business of typography is a continual weighing up of the white and the black, which requires a thorough knowledge of the laws governing optical values.6

# Scaling Up

The practiced path of typographic education at this point gains complexity and scale, but within the parameters of previous experience. Students slowly graduate from letter to word, word to sentence, sentence to paragraph, paragraph to text, then into more complex relationships with image, page structure, and content communication. Within Graphic Design Program at OCAD, a great deal of repetition and focused study results in highly developed typographic sense at the level of the page and the screen, but very often omits an engagement with the architectural environment. At the stage of the kerning exercise, evaluation of form should happen from a distance of approximately 4 meters. The distance foregrounds inconsistencies that would remain otherwise hidden at arm's length.

Due to curricular imperatives to address type within limited and confined scales there exists a threshold in this approach that many students never cross. The progression forward from stroke to letter, then word, sentence, paragraph, text, image and onwards often entails a path of uniformity in digital tools, and 6 Hollis, 218.

their inherent limitations in the visual display of type: the laptop screen. In order to preserve, and in some ways extend the beginning students' engagement with type as a physical experience, we need to initiate and include other processes and typographic precedents.

# Project

A project just completed at OCAD involved a scale of letterform previously reserved for the initial stages of typeface design itself. Taking advantage of basic output technologies in large format laser printers and laser cutters, students are asked to generate distinct letters at a scale that forces them to "handle" the letterforms. Some students remain cautious of truly human scale letters, but even a letter of 3-4ft in height proves to be a challenging object to control. The project begins with students staging their letter in an environment, then continues with the stage being lit using a variety of light sources. While the activity stretches nascent photographic skills, it introduces a relationship to type in which one has to bodily position type as spatial object in a constructed scene (Figure 3).



FIGURE 3: Staging letters for spatial investigation

The resulting photographs can only indicate an index of the staged type which challenges students to both understand the form of their large typographic elements, but also understand how their scene is changed by spatial composition in three dimensions. In place of paper offering little resistance in the earlier kerning/letterspacing exercises, the letters are now formed from corrugated plastic, MDF, Sintra/Forex. The act of staging a scene requires students to act upon material qualities that resist certain placements, and accommodate others. The upward shift in scale and material change from the page also gives letterforms additional properties that must be managed through physical manipulation.

The shift from the earlier kerning exercise, and letters of 3-4 inches to letters of 3-4 feet begins a material education for Graphic Design students that is often circumvented by the introduction of digital tools. As each letter form embodies a unique path or bezier curve, students gain an understanding of their letterforms as digital and material constructions through the transition from screen to physical object. Though contemporary digital output devices render type with precision and rapidity, students still find themselves correcting for material imperfections and minute alterations of edge quality. Such imperfections would only be magnified through the casting of shadow, thus the output material type object must represent a specific letter of a specific typeface in a specific weight. Edge quality that was once digital and smooth carries slight imperfections that might require sanding, or other physical adjustment. Inward from the edge, students must adjust for the light cast by high output light sources. Materials that were once seen as opaque gain slight translucency, objects that are white reflect, while those that are darker or black absorb projected light.

The dematerialization of type into index allows students to perceive typographic form free of the limitations of a 15" screen, or the typical letter and tabloid sheets of paper germane to common output devices on campus at OCAD. The scale is of a different order than previous exercises in beginning typography in which the format is usually a page of some orientation, or a smaller square for ease of iteration. The introduction of floor, wall, ceiling and room gives the students an exposure to typographic environments that are not bound by the screen, and that can envelop the body. Typographic space becomes not just the space between letters, but a space we can momentarily inhabit. The shift from paper or screen as surface to a different order of substance in the space of a room is difficult, as even the shadows cast are on a flat surface. The goal within the parameters of the project is to overcome,

momentarily, the flatness of the plane, and produce a typographic environment of depth. The freedom to work without the need to communicate a specific message outside of a single principle makes students much more attuned to the formal experience of their staged constructions. The focus becomes the nature of the experience – and –does that experience begin to give one a sense of depth past the confines of the immediate walls (Figure 4).

The parameter of depth then becomes the operating reason for the construction. Students cannot simply overlap letterforms, or orient them in such a way as to indicate perspective. If atmospheric and spatial events that



**FIGURE 4**: Outcome of project through light projection and cast shadow.

indicate depth are to be generated through cast shadow, the construction of the stage becomes all important. In this sense, the project is an extension of the earlier kerning exercise, though free of the constraint of an English word, and free of the typographic structures of baseline, cap-line, and sequence. The shift from a horizontal, planar understanding of type to an environment in-the-round challenges students to look at type as both symbol with communicative potential, and as an object with specific formal and spatial properties. While the shift from linguistic symbol to material object may read as dichotomous, students are asked to think in a continuum – type is both of these extremes, and all the iterations in-between. As a continuation of kerning, the project is formally quite unrelated through outcome, but very much related in spatial experience. To address the counter forms between letters in a kerning exercise one must look

between letters. To address the shadows possible through specific spatial arrangements of type in the depth project, one must walk between letters.

The project can continue through endless iterations, but it remains the initial experiences that are the most instructive. Larger letterforms, the transition into three dimensions, and a higher level of complexity in spatial thinking brings students of Graphic Design into a more rounded appreciation of form, symbol, and information in an architectural environment. These are threads that will be pulled later in the OCAD curriculum, yet information design, environmental graphic design, and interface design have their beginnings in this type of project work. The significance of the project does not lie in the fact that it involves and particular type of space, but that it stretches Ruder's white and black parts into solid and void, beyond the optic and into the haptic. Perhaps from here other avenues of exploration might include a return to supergraphics, or perhaps more appropriate to today, superinformatics, and how to communicate specifically, and clearly at the architectural scale through typographic intervention.

# Conclusion

Typographic education at the level of basics - the anatomy, structure, composition and assembling of type must always be responsive to the needs of student context. At present, that context is spatially limited in scale, contained within the screen and devices germane to current digital communication and computation tools. A basic education in typography at OCAD now includes and exceeds such contextual constraints, to both acknowledge the import of knowing digital tools and environments as formats unto themselves, but also to reach for scales beyond the device-level and experience type as object, as solid, as mass and volume in-the-round. The project parameters and outcomes set forth here represent a beginning from which other forays into architecture might take place, to synthesize a typographic experience across dimensions and practices.

The leap from individual letters on paper carefully kerned by hand to a staged environment of typographic objects is a necessary extension in the traditional progression of graphic design education. The primary goal of the project in this study being the experience, translation and communication of depth, students gain a far greater understanding of page space, and are able to make connections forward to spatial and information navigation that will come later in the curriculum at OCAD. Aspects of data visualization, and exhibit design are also informed and engaged by this basic project well located in the second or third semester of study. As a spatial practice, Graphic Design very often begins and ends as a flat surface. Projects that pull us out of flatland for a more inclusive view of our surroundings need not leave behind forms that we know, and that we need in order to communicate symbolically – typography.

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# THROUGH THE LUCINDA Making Drawings

#### JODI LA COE, ASSISTANT PROFESSOR PENNSYLVANIA STATE UNIVERSITY

The lucinda projects undertake to provide the beginning design student with a historical understanding of perspective through making. The work of Albrecht Dürer provides the apparatus for demonstrating and distorting graphic, spatial and temporal understandings through perspective and anamorphic projections. The lucinda projects, spanning several years, have provided an ongoing dialogue between the students and the representation of their work through the deliberate reuse of the lucinda. The first project [sur-FACES] required the construction of a large-scale lucinda intended to be used as both a drawing device and as a film screen. Later, the sur-FACES lucinda became essential not only in demonstrating Dürer's method for the creation of a perspective representations but also in understanding the abstraction of scale when toggling corporeal references [The Anatomical Theater]. The most recent projects [Projection Rooms] attempted to collapse previous explorations through abstractions of the grid, anamorphic projection onto surfaces, and distortions of scale. In the Projection Rooms, the grid of the sur-FACES lucinda became the framework for vertical organization of film screening rooms.

An examination of Dürer's body of work reveals his desire to understand visual perception through proportional representational systems. In addition to spatial systems, he compiled an exhaustive study of the universal proportions of the human body and types of bodies [sexual and cultural], as well as the unique characteristics of each individual. Dürer's perspective constructions cannot be characterized as a unified mathematical perspective because he retains a connection to the sensual world where any representation of visual perception is certainly confounded by the mobile binocular experience. Therefore, in Dürer's spaces, he inserts multiple vanishing points in order to optimize the relationship to visual perception. The value of his work is evident in his exhaustive analysis of human proportion and representation of dimension as an attempt to depict the visual world through a precision of observation. The device of the lucinda, likely constructed from a description in Alberti's Della Pittura, apparently aided Dürer in producing a level of precision in developing a framework for the deepening of proportional relationships as a means of understanding an underlying order within a sensual experience of the world.

In The Draughtsman Drawing a Reclining Nude (c. 1527), Dürer illustrated the visual relationships at play in perspective representation. The draughtsman's eye was fixed at a single viewing point with a stationary oculus. A lucinda, a framed grid of strings, was positioned along the cone of vision perpendicular to the line of sight. The grid of the lucinda corresponds to a grid established on the drawing paper enabling the draughtsman to plot the view at that section through the cone of vision. Dürer's woodcut was a geometric proof written in terms of the sensual world. This geometric proof was an attempt to accurately depict the visual perception relying on his development in mathematically proportional relationships.

In 2006, first-year architecture students constructed a large lucinda. Based closely on the lucinda depicted by Albrecht Dürer, the students worked together to choose the materials, details, scale and site. The project was an exploration of the cone of vision as introspection and projection. The lucinda would therefore, serve as a drawing device and as a screen for the projection of the film, *Belly of an Architect* by Peter Greenaway. The title of the project, *sur–FACES*, evolved from the deliberate exploration of the plane of the section through the cone of vision. At once a plane without thickness and in another circumstance the plane is thickened to accept the anamorphic screens produced by the students. After many proposals, the students produced silhouettes of themselves as the screens, essentially shadows manifest in plywood.

#### Perspective Drawing Machines

As Abraham Bosse illustrated in his treatise on the perspective method of his mentor, Girard Desargues, Maniere universelle, the cone of vision may be depicted as a set of strings that connect the eye of the beholder to the points of an object in space. The frame and the cone of vision are now explicitly geometrical constructions in Desargues' work. In his treatise, Desargues was using his knowledge of geometry, optics, and perspective to formulate a method for stone-cutting for masons. His project angered many Parisians invoking a fierce public debate that took place through publications, lectures, and placards. His main opponents objected to the obfuscation with which he imbued that art of stone cutting.<sup>1</sup> Although he stated that this treatise was for the craftsman his opponents believed that it was too difficult for them to understand his complex descriptive geometries. Desargues understood space as a system in which all architectural drawings are geometrically coordinated to produce complex, unified perspective understanding of visual space.

It is unique to note his geometrization of space where man inhabits a point in Euclidean space. A noticeable change has occurred from the woodcut of Albrecht Dürer in which the draughtsman is in control of his instruments manipulating their precision and effects in the space of room located within a real landscape. As with Galileo Galilei and René Descartes, there is evidence in Desargues' work on physics and mathematics that his mathematical understanding of space was conceptualized in order to discover the essence of Nature itself. These figures contributed to the changing worldview at the end of the seventeenth century. As such, they have influenced not only their own fields but also the course of modernity. Their positions and experiments have significantly shaped the history of thought.

Two aspects were problematic in the equations of seventeenth-century scientists. Both light and time by their nature refuse to be geometrisized. Therefore, it was light and time that were still the most problematic aspects of the mathematicization of the perception of the world. Alexandre Koyré contends in his work, Galileo Studies that Galileo recognized that any attempt to represent time inherently geometricizes time that in its nature is continuous and denies geometricization. He kept this continuous aspect of time throughout all of his thoughts on physics unable to wrestle it into his equations. Koyré states that Descartes, on the other hand, had no qualms about using time as a factor in his equations. Being acquaintances with Descartes, Desargues also presents a curious space in which time was frozen. This had not been an unknown concept in art; yet within the discussions occurring at the end of the seventeenth century, it was probable that the concept of a frozen moment in time took on a different aspect in the thoughts of these men.<sup>2</sup>

Unlike time, light became the trick of perspective artists. Light carried with it many theological debates on its nature. Whether it was Divine and mysterious, or corpuscular and quantifiable, in perspective light became a trick for fooling the eye. Perspective treatises attempted to depict the rules for representing light, shade and shadows.

#### Trompe l'Oeil<sub>3</sub>

The casting of shade and shadows along with the rules of perspective projection has produced mystifying spatial effects. Andrea Pozzo was adept in painting domes and vaults where a flat or irregular surface actually existed.

It was Andrea Pozzo's intention in his treatise to teach a simple and easy way to draw perspective. He began with the drawing tools and perspective treatises necessary for one to understand and produce perspective drawings of architecture. He proceeds slowly through simple geometrical shapes to more complex architectures and figures. Pozzo concludes with a demonstration of his method of producing *quadrature*<sup>4</sup> onto the dome or nave of a church.

<sup>1</sup> Martin Kemp. Science of Art.

<sup>2</sup> Alexandre Koyré, Galilean Studies.

<sup>3</sup> Trompe l'oeil translates from the French as 'trick of the eye.'

<sup>4</sup> The Italian term, *quadrature*, refers to perspective illusions.

There is a continuity between the representation of space and physical space in his treatise.

Pozzo also demonstrates how to produce illusions onto flat screen as used in stage set designs. As a major part of the Jesuit Counter-Reformation, theater was an important aspect of society and religion in the end of the seventeenth century and beginning of the eighteenth century. Many perspective artists were striving to produce the most realistic illusions visible from multiple vantage points in the audience.

The final plate illustrates his method of painting illusions in architectural space. It is in the joining of truth and illusion that Pozzo explores the relationship between real architecture and visual illusions, between reality and fantasy.



FIGURE 1: sur-FACES project, 2006

In the *sur–FACES* project, students were exploring the real and the fictitious through the merging of lines of sight and film projection along the cone of vision/projection. It was an interesting touch, and in keeping with the etchings of Desargues, that the students chose their own silhouette to inhabit and distort the film viewing experience.

Considering the method employed in creating *trompe l'oeil*, the grid can also be stretched to an extreme distortion known as anamorphosis. From a single point, the illusion collapses to form an image which otherwise is indecipherable from any other point of view. These hidden images raised some suspicion of the intentions of these artists. A favorite anamorphic projection was of the portrait and more specifically the scull, representing time through the mortality of man.

Most artists who wrote treatises on perspective included some mention of the art of anamorphosis. These images were also produced using mirrored cones, spheres and cylinders. Some artists were somewhat more preoccupied with this art such as Jean-François Niceron and Jean Dubreuil. In Dubreuil's frontispiece to the right, he illustrates many of the devices of anamorphic projection. The cherubs are playing with mirrors and peepholes to see the otherwise concealed images.

Beginning design students returned to the lucinda project many times through annual demonstrations of drawing using the grid and strings. Following the demonstration students



FIGURE 2: perspective drawing demonstration using the *sur-FACES* lucinca, 2007

were asked to create their own scaled down versions of the lucinda. Portable grids were constructed of a size that could attach to their sketchbooks.

In 2007, the lucinda and the grid played out in the choreography of a studio project to design *The Anatomical Theater*. The students produced and subsequently transformed an over-collage of a anatomical print by Andreas Vesalius into a wearable [and zip-able] wireframe piece. Then they were asked to draw, or more accurately, plot a perspective drawing of the anatomical piece using their constructed lucindas. Working with the abstract scalability of the grid, students were asked to chose active and intriguing squares with which they would enlarge and represent using figure ground charcoal technique. This series of exercises acclimates each student to the rhythm of produce, reflect, and transform, re-produce, reflect, and transform again. At each stage, the piece is critiqued yet participation in the next phase is not limited by success in the previous stage. Therefore, each student may 'catch on' at any point, whenever the process begins to take over the project.

Ultimately, *The Anatomical Theater* projects progress through several stages of model extrusions until the final twist presents the student with a scale jump and an application of function. What was perceived as object turns inside out and becomes spatial. The complex arrangement of spaces and surfaces become an undeniable challenge to design within parameters that were unwittingly created by each student's abstract exercises.

The function of the room as an anatomical theater also questions the role of human scale, vividness, vitality, vision, viewing and perception. The subject-object relationship presented in Dürer's woodcut of *The Draughtsman Drawing the Reclining Nude* is turned on end to subvert the gaze of desire and dominance. The visceral and the clinical inhabit the perspective and establish the horizon and point of view. In the most insightful projects the cone of vision collapses as the interior and exterior are inverted.

#### Architectural Representation

The Scientific Revolution has bound architectural representation to the myth of progress. As Merleau-Ponty states in Eye and Mind, "[s] cience manipulates things and gives up living in them."<sup>5</sup> Perspective representation explored in this way in architecture has confounded the issues of perception and experience. By striving to discover more accurate means to represent reality, architectural representation has lost sight of the issues of architectural space and embodied experience. The reality of which it speaks is quantified through a technology that makes transparent the density of space and time.<sup>6</sup> This density is the space and time, which fosters dreams, revelries, and the poetic imagination. The horizon provides a frame of understanding of our perception of the world. Its presence impresses on us and at the same time reveals to our senses our orientation in the world.

Our situation is stated most appropriately by Merleau-Ponty, "Space no longer is what it is in the Dioptric a network of relations between objects such as would be seen by a witness to my vision or by a geometer looking over it and reconstructing it from outside. It is, rather, a space reckoned starting from me as the zero point or degree zero of spatiality. I do not see according to its exterior envelope; I live in it from the inside; I am immersed in it. After all the world is all around me not in front of me... Vision reassumes its fundamental power of showing forth more than itself...Light's transcendence is not delegated to the reading mind which deciphers the impacts of the lightthing upon the brain and which could not do this guite as well if it had not lived in a body. No more is it a question of speaking of space and light; the question is to make space and light, which are there, speak to us. There is no end to this question, since the vision to which it addresses itself is itself a question."<sup>7</sup> The most recent iteration of the lucinda projects requested that the students explore the films of Dada and Surrealist artists. The initial action captured the images of each film as they were projected onto a sheet. Once again the process of scaling and abstracting, framing and re-framing, using the proportional grid clears the path for the presence of physical production while remaining linked to the physicality of the lucinda. Students produced models that were essentially tracings of the projections of light and shadows, always projected using the original film as a re-doubling of image, surface, form and space. At the final stage the lucinda, simultaneously positioned at the section through the cone of vision and projection, was thickened and thickened again, doubled and re-doubled as program, scale and function collapsed and expanded with the insertion of room models into the lucinda. The projection rooms were screening rooms, inserted in the screen, projected onto and projected as designs for film screening rooms.

7 Maurice Merleau-Ponty, "Eye and Mind," *The Primacy of Perception...*, p.178.

<sup>5</sup> Maurice Merleau-Ponty, "Eye and Mind," *The Primacy of Perception...*, p.159.

<sup>6</sup> Alberto Pérez-Gómez, "Architecture as Science: Analogy or Disjunction?" *Anyplace*.



FIGURE 3: film/shadow projections through the sur-FACES lucinda, 2008





FIGURE 4: film/shadow projections through the sur-FACES lucinda, 2008

It is through the work of understanding and inhabiting the perspective frame that students may understand in a visceral manner the construct of spatial perception. While perspective is a mathematical construction, the physical understanding and undermining of the coherence of the grid establishes the abstraction as inherently unreal.

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# FOLDOUT DRAWINGS: MEDITA-TION BETWEEN THE MATERIALS AND MAKING Making Drawings

KENTARO TSUBAKI, ASSISTANT PROFESSOR TULANE UNIVERSITY

# Introduction

"Real time now prevails above both real space and geosphere. The primacy of real time, of immediacy, over and above space and surface is a fait accompli and has inaugural value."<sup>1</sup>

In his essay, Speed and Information: Cyberspace Alarm! Virillio focuses on speed, the effect of digital media in the cultural context. Digital culture demands instantaneous visual gratification. Pictorial depictions of accurately replicate three-dimensional forms. Theoretically, these tools are to bestow back in the hands of architects the long lost control over fabrication. However, it virtual models have long replaced the slow notational drawings in the design process. Digital fabrication tools, a staple in many architectural institutions, quickly and is shortsighted if the goal is simply to replicate by skipping the hands of the fabricator and subverting the material tendencies and limitations all together. Design decisions based on feedbacks from material properties and fabrication processes are integral to the notion of craft and making. Without a conscious effort to reflect upon material resistance, the newly found control will turn into an overindulgent formal exercise.

The poetics of architecture resides within a phenomenal performance of a physical construct beyond the predictable, evoking an emotional and intellectual response. Without the embodied understanding of materiality and sensibility to fabrication, it is impossible to make potent design decisions. How can we engage students in an empirical process of making and instill the attention to phenomenal qualities of the materials? How do we emphasize the importance of notational drawings to reflect on the design intention and material execution? Is a drawing too slow and obsolete in the digital-centric age? This paper focuses on the role of drawing as a meditation between the materials and the act of making. It demonstrates that notational drawing is an essential tool for both design and fabrication that is impossible to substitute with pictorial depiction. Student exploration, directed by the author in the core design studio would be referenced for this purpose.

#### Language, Music and Notation

"This division between the materiality of sound - its physical substance - and its ideal representation is however a modern construct. It would have made no sense in terms of a philosophy of being according to which, as we shall see, bodily performance and intellectual comprehension are as viscerally linked as eating and digestion."<sup>2</sup>

In Lines: A Brief History, Ingold begins his quest to lay the foundations for a new discipline, the anthropological archaeology of "the line" by dedicating a whole chapter on the question of the relationship between speech and song. The modern notion can be reasonably attributed to a difference between the use of voice in language and music. In speech, the meanings of words subvert the sound. We respond to what's conveyed through the voice. In song, it is the opposite. We respond to the sonorous space rendered by the voice, not necessarily the meaning conveyed through the words themselves. However, Ingold points out that this distinction did not exist in classical Antiquity or in the Middle Ages. Speech and song were one and the same. Serious music was considered a verbal art, harmony and rhythm following the word's lead.

"....that meaning and sound, and cognition and performance, which modern thought aligns on either side of a distinction between language and

<sup>1</sup> Virillio, 'Paul. Speed and Information: Cyberspace Alarm!.' *Reading Digital Culture*. Ed. David Trend. Oxford, UK: Blackwell Publishing, 2001. P23. Print.

<sup>2</sup> Ingold, Tim. *Lines: A Brief History*. Oxon, UK: Routledge. 2007 P15. Print.
music, are in the writing of classical and medieval scribes not opposed at all, but are rather aspects of the same thing....... Thus reading was, at one and the same time, both an 'acting out' and a 'taking in'."<sup>3</sup>

Then, the question becomes, how did this difference evolve? Ingold contends that the distinction is directly linked to the development of notation system. The score gradually emerged as an aid to script, notating variations in pitch to assist speech. The sophistication and the separation of score from script as an independent notational system forged the distinction we are accustomed to, the difference between music (sound/performance) and language (meaning/cognition). It "silenced" the script. The classical and medieval scribes "spoke" first and foremost, evoking sounds. Words were recited externally as sounds first and heard by the ear before comprehension. To read was to listen and to internalize through remembering, an action to recover and reconstruct not as a means to recall a complete and objective account of the past or specification of a plot, already composed and complete in itself.

The separation also induced a significant shift in the perception of scripts. If the modern idea of texts is the birds-eye view of the constructed world, a complete navigational chart, the classical and medieval understanding is analogous to an experience moving through the landscape. It is an open-ended territory with signposts and directional markers where readers of antiquity inhabited and explored empirically.

If pictorial depiction of a digital model is analogous to the modern texts, a birds-eye view of the constructed world, what is the equivalent of the classical and medieval scripts in architectural design and making? Is it possible to create a drawing, comprised of cognition and performance, its reading an action to recover and reconstruct? The author asserts that the "Foldout Drawing," a notational drawing system discussed in this paper is just such a drawing.

### Fabric Formwork

As a means to cultivate and promote material understanding and fabrication sensibility, the author introduced a fabric formwork technique<sup>4</sup> in the context of a core design studio in the spring of 2008.5 Students experimented in casting scaled building components such as columns, walls, and slabs and speculated on its tectonic potential in a subsequent building design project. The emphasis was on a physical understanding of gravitational and hydrostatic forces of the concrete in a liquid state. Fabric is an ideal material to formalize these forces at work. The desired effects were achieved by conscious manipulation of these forces through the articulation of fabric surfaces with folds and stitches. In conjunction, the foldout drawing, initially introduced as practical means to document the fabrication of fabric formwork, evolved into a necessary drawing to reflect and to contemplate prior to the revision of the design.

#### Concrete as a Material

Ubiquitous yet rich in process, concrete is an ideal material for creating an effective empirical learning experience. It is one of the few materials where manufacturing is required on site via proportioning and mixing of the cement, aggregates, and water under various weather conditions. These subtle variables influence the outcome of the workability, strength and surface quality. The material exhibits the property of liquid when poured and the property of solid when cured providing little margin for any correction. Combined with the substantial density/weight, it resists control without proper consideration for gravity. The material is infinitely scalable with rich color, texture and surface quality. Construction of a required formwork implies the dichotomy of negative and positive relationships, retaining the memory of the formwork. A level of indeterminacy in the outcome resists predictable

5 Overview of the studio is discussed in Tsubaki, K. Concrete/Fabric: materiality caught in-between. ACSA West Fall Conference. Los Angeles, CA. October 2008. Proceedings. P58-65. Print

<sup>3</sup> Ingold, Tim. *Lines: A Brief History*. Oxon, UK: Routledge. 2007 P17. Print.

<sup>4</sup> One of the inventors/leading innovators of this technique is Professor Mark West, director of C.A.S.T., University of Manitoba. Overview of the fabric formwork is detailed in West, Mark. "A Brief description of Fabric-Formed Concrete." CAST The Center for Architectural Structures and Technology. 2008. University of Manitoba. 25 Sep. 2009. <http://www.umanitoba. ca/cast\_building/resources.html>

human manipulation and results in the distinct tectonic possibilities.

#### The Experiments

Within five weeks duration, students were asked to cast basic building components in multiple iterations of the fabric formwork they designed and fabricated. Following basic rules were established and observed.

- Formwork must be fabricated from a single sheet of (45"x45") natural, unbleached cotton muslin.
- No cutting/shearing of the fabric was allowed.
- Formwork must be fabricated through folding and sewing with red heavy-duty upholstery thread.
- Concrete casting is done collectively during the studio hours under the supervision of the author.

Four distinct scaled components were fabricated: block, column, deformed wall, and slab. We will compare how the drawing "performed" in the design and fabrication process of the two components, column and deformed wall, to demonstrate the author's assertion.

The column problem was intended to take advantage of the nature of gravity and hydrostatic pressure. The students were asked to design and fabricate a formwork to vertically cast a (36" h) solid concrete column. When properly accounted for, the surface tension of the fabric resists the hydrostatic pressure and rigidifies the formwork. The amount of concrete used was restricted to (500) in<sup>3</sup>, (1/2) of a (80) pound bag of pre-mixed concrete. A total of (2) forms were fabricated accompanied by the conventional record drawings. See Figure 1: Column casting and drawing, C.Davis.

The deformed wall problem was a variation on the column problem. The students were asked to vertically cast a solid concrete flat element with an outer dimension of  $(10"w \times 36"h)$ by controlling the thickness to (2" +/-). The use of a plywood sheet backing was suggested in conjunction with washers, nuts and bolts to restrain the fabric formwork against the hydrostatic pressure of the concrete. This method allowed a post tensioning of the fabric to make subtle adjustments during or immediately after the pour. Students were encouraged to consider articulating the surface of the deformed column with pleats and folds. However, taking the overall volume into consideration, restriction was placed to limit a pre-mixed concrete to a single (80) pound bag of per pour.

After the initial cast, they were asked to focus on a specific aspect of the cast and construct another fabric formwork. A total of (3) formworks were fabricated accompanied by the foldout drawings. See Figure 2: Deformed wall, Ver. 2. L. Rutherford.

#### **Conventional Drawing**

Along with the column formwork fabrication, students were asked to document the process by drawing. The intent was to gain collective insight into how the operation to the fabric surface manifested on to the surface of the concrete (cognitive) and to determine if we can use the drawing in a projective manner to control the outcome of the subsequent castings (performative). Both aspects are paramount to the role of the drawing if it is to become a meditative ground between the material and making. On this attempt, students defaulted on a series of conventional architectural drawing methods (plan, section, elevation, axonometeric), a pictorial depiction of the formwork in particular stages of fabrication. The drawing diagrammatically indicates the look of the formwork and describes the fabrication sequence, but not much beyond. It does not convey meaningful information to reconstruct the formwork adequately, let alone, to be used projectively in the design process.

#### Foldout Drawing

What information do we need to duplicate a fabric formwork? How can we document them? A simple notation system was devised to resolve these very practical questions. Students were asked to record the fabrication of their formwork, step by step, along with the initial casting of the deformed wall according to this system. They documented each operation performed to the surface of the fabric as they constructed the formwork. The result, a full-scale line drawing in the form of unthreaded, folded out fabric formwork.

The foldout drawing is a notational line drawing that documents the following:

- Beginning and end points of the folds and stitches.
- Spatial relationship of the points.
- Line and type of fold (valley fold or peak fold).
- Line of stitches.
- Regulating/extension lines inferring the line of stitches and folds.
- Critical relative dimensions of the various points and lines.

The implication of the foldout drawing is significant, precisely because the drawing is not a pictorial depiction of end results. Nonetheless, it is visually permeated with the potential figurative outcome of the cast, analogous to the classical and medieval notion of scripts mentioned earlier. It is a record of the past and a promise to the future, a disassembled assembly. To reconstruct the formwork, one can simply "read" the drawings to trace the steps of the action and take those actions one at a time against the surface of the fabric. There are no separation between the meta-physical and the physical, the cognitive and the performative. They are the one and the same. See Figure 3: Deformed wall, Ver.3. Casting and drawing. L. Rutherford.

#### Reflection

"Thought or reflection ...... is the discernment of the relation between what we try to do and what happens in consequence."<sup>6</sup>

Further implication of the foldout drawing is in relation to the role of reflection, the thought between the design intent and the outcome in the design process. Cement, aggregate, water, fabric, wood, metal etc. Exploration involving various materials and the act of making is inherently empirical and fluid. The foldout drawing stabilizes this dynamic process by providing an interstitial, time independent space allowing for a moment of reflection. In the subsequent design and fabrication of the formwork for the deformed walls, students were asked to focus on a few figurative aspect of the initial cast and intensify them by altering the design of the fabric formwork, projectively utilizing the foldout drawing. Based on their experience and outcome of the previous iteration, students contemplated and altered

the drawing prior to the fabrication of the formwork for the next to achieve the intended effect. In essence, the drawing became a "working drawing." Any changes made were layered over the previous drawing to track the changes, to reflect on the design process and to contemplate of the results of the cast. See Figure 4: Deformed wall, Ver.3. L. Rutherford.

#### Conclusion

During the course of iterative castings, the level of sophistication in the formwork fabrication clearly improved after the introduction of the foldout drawing. For the first time, students confronted, experienced, and embodied the performative role of drawings in relation to the reality of the basic material behavior and making. They became one and the same. These categorical separations are nothing more than a modern convention where intellectual construct is distinguished from the physical construct and the act of construction itself. With this recognition, the idea of "representation" disappears. Drawing is no longer a mode of communication. Thus the question of digital versus analogue becomes a moot point. Perhaps, the real question we need to address is: "How does a drawing perform regardless of the media by which it was created?

<sup>6</sup> Dewy, John. Democracy and Education. New York: The Macmillan Company, 1916. P 169. Print.



FIGURE 1: Column casting and drawing, C. Davis



FIGURE 2: Deformed wall, Ver. 2. L. Rutherford



FIGURE 3: Deformed wall, Ver. 3. Casting and drawing. L. Rutherform



FIGURE 4: Deformed wall, Ver. 3. L. Rutherford

#### LEARNING AND DRAWING FROM MUD, EARTH OR NOTHING Making Drawings

JOHN M. HUMPHRIES, ASSISTANT PROFES-SOR/DIRECTOR OF GRAPHIC MEDIA MIAMI UNIVERSITY

# Introduction

This brief will present the beginnings of a design methodology that supports and tries to include the act of conceptual or speculative drawings into the design curriculum. The techniques used link transformational learning principles technical drawing processes; the curriculum portion is followed by a creative design project attempting to realize this transformation across multiple media. The larger scope of the project is to develop a working methodology whereby multiple forms of media can be used to generate new content around a central theme or from an original set of data.

Transformational learning states that the primary manner in which one learns is through transforming one known or familiar concept to another--incrementally<sup>1</sup>. By connecting small portions of one set of knowledge to another, insight can be gained in other knowledge. It proposes that ideas and notions and understandings are evolutionary and not instantaneous. Even the apparent instant connections and "ah-ha" moments or bolts out of the blue are the results of an active thought process that has been, overtime, forming relationships between many things until several connections are apparent. There is a critical moment where cascade events happen--this is the result of not instantaneous revelation but one small thing transformed acting as catalyst.

## Transformation as Drawing

The act of making a line is the act of assembling and crafting in space. Drawings for design are most readily thought of as a means of communication, a communicative device for what is proposed as a design solution. Conceptual drawings contain a broader potential. It is a mode that can consider intentions and attitudes, literal aspects and abstract thoughts, complexities and contradictions, fantasies and



FIGURE 2:

intricate relationships, along with fragmented notions. While the process of drawing can be both tangible and speculative, it is the speculative nature that can provide a significant contribution to the process of design. Without the firmness required of a building, one can investigate tectonic ideas of space, narrative, texture, order (and disorder), connection, human passage, and material. Through this ambiguity

1 Mezerow

a drawing can transform a notion, idea, or concept (Figure 1)<sup>2</sup>.

Drawing as a means to discovery involves being prepared for the opportunity to make connections and other relationships. An investigative drawing pulls much from the beauxarts tradition of representation the analytique. The juxtaposing of multiple type of media is not exclusive to this form of representation there have been many forms developed through the history of human communication from the linguistic cartouche of ancient Egypt (a symbolic representation of glyph and image), the explicative and decorative borders and characters in illuminated manuscripts and psalters, the revolutionary and powerful early soviet posters and documents by artists such as El Lissitsky, the very space conscious concerns of newspaper pages, even the ever present pharmaceutical advertisements linking a pleasant and desirable quality of life with mountains of legal copy and a side effect list long enough to scare most viewers. The analytique, however constructed a drawing where the elements exist not only in juxtaposition but inter-relate, expand the narrative, and when best there is evidence of elements affecting each other. Often students new to the field of design are struck by the complexities of these drawings and comment on the genius it must have taken to fully plan the document. This is the response of an inquiring mind, which is focused on solving a specific equation instead of using representation as a means of exploration. One can hardly fault the new designer, we have to teach content as well as develop life long learners who can make their own discoveries.

When drawing for speculative work or the formation of ideas (and likely unforming conventional representations) several techniques or notions are used in both the authors work and to try to shift transformational drawing into the design studio.

#### **Technical Interconnections**

The key to a drawing, which can shift between ideas and open the possibilities for an author to generate original content, is the ability to find and make interconnections or to find the technical clues. This inter-connection connotes the manner in which a novelist might work

2 Martin

by linking characters and personality traits to a plot, story, or circumstance and likely some element of a human condition for the most enduring manuscripts. An orthographic projection of a project, being largely horizontal and parallel lines, can easily extend to become other orthographic drawings with variable scales or amounts of information. Orthographic representations can shift to paraline by way of the vertical mark. The diagonal shear of an axonometric surface can open the gate for perspectival planes to recede or expand from the page. Letterform is accessed through figural forms, vertical or horizontal marks, through the diagonal strokes of the characters, or bound within a frame.

## Quickness₃

Early in a speculative project or design a nimble mind moves easily between conflicting sources. There is alacrity within the modes of representation and an ability to hold several provisional solutions in mind surrounded by possible conflicting sources and elements. The quickness is not a hurried movement to solve or make hasty judgements but the ability to quickly form intellectual connections. These might be rational, or technical, or reside in a wholly ridiculous notion. The designer must not wait to commit marks to the page, cut, sever, attach, or alter the drawing.

#### Precision<sub>4</sub>

Measuring is not the goal of precision. Precision is meant to suggest the author is precise in the means and application of the media or technique used in the development of the project. Three levels of precision are used the first is to be precise in understanding and applying the specific rule s of a project. These rules can be generated before the projects starts or altered while searching for possibilities within the drawings. Another mode of precision can be to place and object, figure, or mark with precision, located at a precise moment in space with enough breathing room around the mark (Figure 2)<sup>5</sup>. Finally, related to the hierarchy of elements, precision can mean a certain

<sup>3</sup> Wallick

<sup>4</sup> Gregotti

<sup>5</sup> Romoser

higher level of clarity; a precise use of word or intentions.

#### Revealing

Related to quickness and precision, the designer or author must be openly concerned with the revealing of the technique used or overly concerned with the technicalities of making a mark. A careless mark might interfere with the project but also might introduce an error of opportunity, which will transform the project. Apparent error can be paralleled to mutations in the process of evolution. Those that do not kill the organism survive to influence future generations (Figure 3)<sup>6</sup>.

### Multiplicity

Connections to other elements, concepts, or ideas need to occur in multiple layers (Figure 4)<sup>7</sup>. If the drawing lives in the realm of singularity this falls from the realm of speculation and becomes direct or pictorial representation. Multiplicity is not the layering of elements or the generation of elements for the sake of complexity or density, while density is often the result, this density would could to connote alternate meaning within the drawing. For a line to be understood as a possible element of another thing it must exist partially in at least two reference systems.

## The Drawings

This commissioned design project uses watercolour drawings to form a spatial composition for use as the basis for a stage set (Figure 5)8. Original watercolour drawings reference a classical narrative of Pelops, son of Tantalus, a story of transformation, rebirth, deception, lust, and a haunted progeny. Pelops is a tragic figure linking the desires of Poseidon, the Peloponnesian wars, and the tragedies of Agamemnon, his descendant. In modern usage, Pelops is the root of something formed from the mud, or earth, or nothing9. The design work presented explores the unforming of a formal narrative. The structure of a narrative is called into question and revealed by the transformation from one media to another. Within the draw-

- 6 Martin
- 7 Barker
- 8 2009
- 9 Summarized story of Pelops in Appendix.







FIGURE 4:

ings bits of time, luminance, and hue become erratic sounds captured with wood and air and seemingly nonsensical automatic poems forming operatic compositions striving to elude the categorization, mastery, canonization and other traps of discourse. By shifting from perspectival or proscenium compositions and allying these with mechanical modes of representation found in industrial representation layered with constructed elements and the human figure the work is striving to not only constructively leave the page but to, in some manner, leave the western canon of composition and the planar perspectival representation of the eastern canon behind. This could be considered the stochastic representation of the subject perhaps borrowing in spirit the contraposto figure of renaissance models and applying this



FIGURE 5:



FIGURE 6:

notion to the tortured body of the chosen media. Is the media and perspective laid bare?

#### Modes of Working

Based upon research into the technicalities of shifting from one mode of expression to another in both digital and analogue media as a means to understand both learning and creativity.

When the technicalities of each is understood: image becomes text,

- video is audio,
- text becomes audio,

panorama shifts to automatic writing, then dialog image leads to form,

form to narration,

deep rooted psychosis becomes opera.

Errors in translation are embraced<sup>10</sup>. Beginning with an initial shallow reading of a classical Greek myth the text of the narrative is read through the lens of a formal language of architecture, focusing on the geometric description of the character and events and the analogous descriptions of the characters interrelationship. For example the description of the primary character Pelops is translated into a series 10 Nicholson or set of similar object which when combined begin to describe the whole. His father chops the character up for so much human stew. The father is placed in a position to slice or separate the pieces of Pelops into individual components (Figure 6)<sup>11</sup>. Connections between the objects and components allow for the continuity and individuality of the character. When the arm of Pelops is reformed the drawing becomes one of a series of planes, lines, and hues beginning to reassemble themselves. In a similar manner the representations of the characters can be joined or transformed when brought into the proximity of others. Simple questions that begin to formalize the narrative can be in the nature of the following:

Is this element from the other? If so in what manner is it related or connected (quickly, with friction, a slippage, a breaking, an extension)? Is the element near or far from? How is this relationship reinforced or subverted? Is there a hierarchy of size, of value, of complexity?

Within the frame of the drawing these relationships are questioned again as the lines, planes, and figures begin to leave the page. Expanding beyond the surface of the page reinforces two notions related to transformation. The first is a notion of straddling one form of representation and another which allows for a more fluid dialogue or inquiry of each; there is a possible simultaneous reading of a graphite line or a wooden line as being two dimensional or three dimensional. The other notion is one of questioning the media itself and denying the categorization of either model or drawing, painting or sculpture.

These studies illustrate a space as concrete as any space filtered through or considerate of the human experience.

Is a greater understanding of the client, the authors complex path, or even of the myth formed? Likely not. Can considering multiple spatial configurations simultaneously transform the pre-conceived notions surrounding the start of a new project? Likely yes.

Realizing a component or kernel of connection between media allows for the translation or transformation of one mode of representation to another. When a two dimensional image is considered as a graph or plotting with 11 Humphries

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the horizontal line representing time and the vertical component being pitch each image (whether individually extracted hues, a bridge, or of grandma) can generate a sound (Figure 7)<sup>12</sup>. A further investigation into visual synthesizing can extract the redness or greenness relating to right or left audio channel, luminosity can be volume, and blur or transition between each pixel can be something sneakily similar to timbre. The individual hues once extracted and processed from each of the images can suggest tones or voices or instruments. Blues, Oranges, Reds, Greens, and Blacks become an acoustical representation of the image.

With an acoustical representation of the narrative generated, this multi-layered sound can be sent through speech recognition equipment and generate a sort of automatic poem. This new series of texts, one for each drawing, becomes a sort of text or dialogue or monologue two or three steps removed. Filtration by grammar and spell checking software there is, at first, a seeming sense to the texts (Figure 8)<sup>13</sup>.

Lastly the text, image, hue, and acoustical representations are used to generate a series of three-dimensional forms. A surface for the execution of the operatic performance is generated next (Figure 9)<sup>14</sup>.

Perhaps an equivalent analogy might be of industrial food production where nearly inedible industrial corn can be translated into ethanol, Xanthin gum, acoustical ceiling tiles, or chicken nuggets. The nutritional value of the process is yet to be determined or evaluated by the FDA.

#### Appendix 1

Summarized story of Pelops from wikipedia. org: Pelops' father was Tantalus (origin of the word tantalize). Wanting to make an offering to the Olympians of human flesh (which would debase them and dissolve their godliness and authority), Tantalus cut Pelops into pieces and made his flesh into a stew, then served it to the gods. Demeter, deep in grief

13 Combined texts generated by four hues

14 Detail of digital surface



FIGURE 7:





FIGURE 9:

after the abduction of her daughter Persephone by Hades, absentmindedly accepted the offering and ate the left shoulder. The other gods sensed the plot, however, and held off from eating of the boy's body. Pelops was ritually reassembled and brought back to life, his shoulder replaced with one of ivory made for him by Hephaestus. After Pelops' resurrection,

<sup>12</sup> It must be noted that the term sound is used, as the acoustical representation is far from the complexities of music.

Poseidon took him to Olympus, and made the youth his eromenos, teaching him also to drive the divine chariot. Later, Zeus threw Pelops out of Olympus, angry that his father, Tantalus, had stolen the food of the gods, given it to his subjects, and revealed the secrets of the gods.

Having grown to manhood, Pelops wanted to marry Hippodamia. King Oenomaus, her father, fearful of a prophecy that claimed his son-in-law would kill him, had killed thirteen suitors of Hippodamia after defeating them in a chariot race and affixed their heads to the wooden columns of his palace. Pelops came to ask for her hand and prepared to race Oenomaus. Worried about losing, Pelops went to the seaside and invoked Poseidon, his former lover. Reminding Poseidon of their love he asked Poseidon for help. Smiling, Poseidon caused a chariot drawn by winged horses to appear. Pelops, still unsure of himself, convinced Oenomaus' charioteer, Myrtilus, a son of Hermes, to help him win. Pelops convinced Myrtilus by promising him half of Oenomaus' kingdom and the first night in bed with Hippodamia. The night before the race, while Myrtilus was putting together Oenomaus' chariot, he replaced the bronze linchpins attaching the wheels to the chariot axle with fake ones made of beeswax. The race started, and went on for a long time. But just as Oenomaus was catching up to Pelops and readying to kill him, the wheels flew off and the chariot broke apart. Myrtilus survived, but Oenomaus was dragged to death by his horses. Pelops then killed Myrtilus after the attempted rape of Hippodamia.

As Myrtilus died, he cursed Pelops for his ultimate betrayal. This was one of the sources of the curse that destroyed his family (two of his sons, Atreus and Thyestes killed a third, Chrysippus, who was his favorite son and was meant to inherit the kingdom; Atreus and Thyestes were banished by him together with Hippodamia, their mother, who then hanged herself) and haunted Pelops' children, grandchildren, and great-grandchildren including Atreus, Thyestes, Agamemnon, Aegisthus, Menelaus and Orestes.

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# NEW TOOLS FOR OLD MAKERS Making Drawings

ZACH PAULS, VISITING ASSISTANT PROFESSOR TEXAS TECH UNIVERSITY

"The true architect's concern for meaning cannot be properly embodied in a drawing whose explicit or implicit role is the reduction or "picture" of a building."

Alberto Perez Gomez

"The architectural drawing is TRANSITIVE in nature, uniquely capable of producing something new from something else. Far from being ideal constructions, architectural drawings are marked by their contact with a messy & inconsistent reality."

Stan Allen in "Mapping the Unmappable": This studio <sup>1</sup> sought to engage students in envisioning, constructing and utilizing custom drawing tools to assist them in identifying with a chosen 'Old World Maker'. This Maker would give the students direction as a source for inspiration in; how to view the world? How to make their drawings? And how their Maker wished to live and work? The ending project for this studio asked the students to design a live/work residence for their Maker based on the intimate knowledge gained during the preceding exercises.

Each student was assigned a craftsperson, a specialist producer of the pre-Industrial Age. (Figure 1)<sup>2</sup> These craftspeople, called "Makers" served two purposes in the studio. First, they would be the 'characters' for whom the students would design a dwelling/working space. Second, these Makers would serve as inspiration in an analytical drawing and design process that would eventually generate plan, section, and elevation.

A starting point of this project began with the students selecting a Makers job title that would direct the students through a series of



FIGURE 1: Meindertsma, Christien. PIG05049 1:1.

exercises over the duration of the studio. Each student would draw from a container a piece of paper listing the title of a Maker. The list of Makers were attained from records of preindustrial professions, many of which are no longer common place, but were once prevalent in the development of handmade versions of many objects we use today.

A critical motivation for using these old world Makers as opposed to current Makers was to guarantee a limited initial knowledge and certainty for each of the students. This ensured that each student was coupled with a Maker that was new and strange to him or her. This strangeness required serious investigation and research to determine a base comprehension of the attributes of the Maker. This foundation could then be challenged and developed over the course of the semester. Students eventually became a mini expert within the studio for their selected Maker. They acquired an intimate knowledge of all details pertaining to their Maker and established themselves as the authority on the Maker's origins, skills, processes, tendencies, and motivations.

<sup>1</sup> The studio was taught in collaboration with Jeppe Langer Jensen, a visiting professor from Copenhagen, Denmark.

<sup>2</sup> Figure 1, Example of one of the Makers. Character collage of "The Cooper" by Samantha Peters, Arch2502 Spring 2009.

The family of vocations given for selection by the students were: Amanuensis, Antigropelos Maker, Arkwright, Armourer, Axle Tree Maker, Baven Maker, Belly Builder, Besom Maker, Bottler, Cartographer, Caster Or Castor, Chapeler, Clower, Cooper, Coracle Maker, Dry Stone Waller, Eyer, Foot Straightener, Heck Maker, Jack-Smith, Loriner, MaleMaker, Nob Thatcher, Pad Maker, Scagiola Maker, SkipMaker, Stay Maker, TieMaker and Wire Drawer. <sup>3</sup>

These names have a mysterious quality to modern students. The unexplainable helps create a necessary confusion preventing the students from grounding these professions in their current scope of knowledge and experience. This inhibits preconceived notions from invading the students' early comprehension as to who the Makers are and what purpose they might serve. This is significant, because it assures that the early moves each student makes is honest, sincere, and un-biased. The students must engage in the work with an open mind since the framework given does not allow for a reliance on previous knowledge or design process skills developed in earlier studios.

Students first generated a concise straightforward definition of their Maker through researching the Maker's origins, activities, and situation within the primary context of their way of life. Building a comprehensive understanding of the Maker was imperative for the students in developing unique and personal interpretation of this Maker. An elaborate comprehension of the underlying attributes discovered within the character gave students a foundation to build a dense narrative of that Maker. The constant evolution and development of the students understanding of the Maker requires full engagement. The initial forced interactions between the student and their Maker will become less premeditated, slowly and naturally developing into a bond that unites the two, thus the student becomes the Maker. This intimate familiarity of the Maker is what will guide the students in their design decisions for all the exercises during the studio duration, so an intimate connection is essential.

To activate the analytical process, the students developed large 60"x120" collaborative drawings, making marks that expressed movements, or defined attributes or behaviors of their Maker's occupation. These drawings led to the creation of three distinct tools built for mark making. The tools were custom-made and designed to perform specific drawing tasks. The students could not use tools that were intended for other purposes. All of these tools needed to be carefully made of original parts and components. These new drawing tools were intended to perform specific tasks and movements to reveal aspects of their Maker's occupation.

All of these Makers were fabricators whose work required the basic necessity to repeat tasks multiple times in the creation of their product. Similarly the students' drawings tools needed to produce repeatable marks, through making the drawings. The specificity of the tools needed to address the possibility of different authors, thus the marks created needed to vary depending on the person operating the instrument. The entire process was a negotiation between the user, the tool, and the paper. Initial versions of the tools were crude, but embedded within them were ideas of specificity, repetition, and making. The tools evolved through multiple iterations as the students adjusted the intentions of their instruments, influencing both the constructing of the tool and how the student was captivated by their own work.

All of these pre-industrial professions were carefully selected based upon the unifying factor that they were Makers of things. These laborers used their hands to craft and assemble a variety of objects, like precise timepieces or sturdy barriers. These skilled trades people made hats, saddles and boots. They fabricated barrels, boats, and jacks. They also constructed walls and railroads, and created maps and transcribed text. The act of making, inextricably tied to the performance of these occupations, is essential to the progress of the studio at this point. This relationship is important because of the processes and sensibilities that can be studied, acquired and developed from the acts in which these Makers engage and can be reused in the process of designing for this Maker. Focusing on the "Maker" allows for a dynamic

<sup>3</sup> This list of Makers was developed from a comprehensive list of old occupation names at the Hall Genealogy Website. http://rmhh.co.uk/occup/

union with the subject matter as well as the acts required to produce work interrelated to that subject matter.<sup>4</sup>

These collaborative drawings required the students to communicate ideas relating to their Maker in the form of a mapping. The observations shown on maps are always selective; some maps show us the location of buildings, some show us the typology of the land while others try to predict the weather. MapMakers have their own agendas, they have the power to reveal and conceal what ever they want. In that sense a map embodies only certain selective views on the world. A map tells us something about the world that we would otherwise not be able to understand. In this phase of the project, each student took on the role of a Mapmaker. They constructed mappings, which revealed things that usually remain inaccessible.

MapMakers use conventions and signs to inform and guide the reader. In the first mapping project the students must invent their own system of conventions. The focus is to start mapping the world through the eyes of their Maker. From the information collected the students will develop a way of mapping the world that corresponds to the way their characters profession engages in space. These initial maps were all created using graphite on brown craft paper made using direct manual manipulations by the hand.

This is a first connection where their Maker directly influences the student in working on the architecture in a similar way that the Maker would produce the things they make. Through repetition the students increase their skills in mark making and begin to refine a definition of attributes they have associated with their Makers. Each repeated map requires the students to edit, purging marks on the drawing that do not specifically reveal characteristics of their Maker. Other elements on the drawings are saved and are improved to



FIGURE 2: Student performing as the maker into a drawing. "The Tiemaker" by Adrian Pantoja, Arch2502 Spring 2009.

explicitly tell the specific and idealized version of the Maker's story.

"You probably think of a tool as something to hold in your hand. It is something to extend your powers: a piece of technology, or applied intelligence, for overcoming the limitations of the body. The hand-held tool comes to mind because more than any other it demands an especially active sort of skill. It

<sup>4</sup> Maker |ĐmĐkĐr| New Oxford American Dictionary noun - 1 [usu. in combination ] a person or thing that makes or produces something : a cabinetMaker. -2 ( our, the, etc., Maker) God; the Creator. Maker – synonyms [the Makers of fine furniture: creator, manufacturer, constructor, builder, producer, fabricator, inventor, architect, designer.]



FIGURE 3: Various Tools for specified mark making. Ryan Woods, Tyler Zalmanzig, Aaron Ayala, Chad Bunnell, Arch2502 Spring 2009.

requires your participation, and for that reason it engages your imagination."<sup>5</sup>

All of the characters are Makers and all use tools in their profession to execute their tasks. These tools tell much about how the Maker occupies space. The "foot straightener" who assembles watches thus exists in a tiny, precise space, as opposed to the "tieMaker" (Figure  $2)^6$  who works in the unforgiving outdoors and uses tools that are robust, broad and require a greater expanse of space. These spatial



FIGURE 4: Various Tools for specified mark making. Ryan Woods, Tyler Zalmanzig, Aaron Ayala, Chad Bunnell, Arch2502 Spring 2009.

needs are directly related to the types of tools the Makers utilize and specifically how they use them.

The Maker's tools restrict the movements into a meticulous set of motions, similarly the students must establish key repetitive marks for their drawings. Conventions are a common and necessary set of codes that help the viewer to understand the relationship and hierarchy of information on the drawn sheet. By determining a set of rules to work within, the students were creating a repetition in their work that would make it understandable and accessible. They begin to recognize the significance of conventions within a drawing, a necessity in all architectural drawings. Striving for con-

<sup>5</sup> McCullough, Malcolm. *Abstracting Craft, The Practiced Digital Hand*, 59

<sup>6</sup> Figure 2, Student performing as the maker into a drawing. "The Tiemaker" by Adrian Pantoja, Arch2502 Spring 2009.

vention-filled non-conventional drawing, certain tools of mark making were developed by the students in the construction of the maps. Stamps, templates, guides, jigs, and measures allowed the students to create specific variable marks that related back to the vital attributes of their Makers.

The first series of maps created through the direct hand to paper techniques were repeated until each student found a working method and marking system that emerged from the production of the Makers. Out of this series of marked sheets the students drew out compelling details to use in the construction of a set of drawing instruments. Any ineffective hand-made marks would be dropped and the explicit marks would be carried forward. Each chosen detail was identified with a specific meaning in relation to the Maker's occupation. As the student becomes increasingly connected to their Maker, the practice of working through the eyes of their Maker ensures the development of a guiding narrative.

This insightful relationship is formed through extended durations of thinking, working, and being the Maker. An authoritative understanding of the movements, desires, dreams, fears, and tendencies of the character help guide each new choice and action. Since these details are specific to each character, decisions cannot be generic or universal. Each step needs to be informed by the narrative. The students create tools that assist them in redrawing their earlier maps. These tools and templates cannot simply be the shape of a circle or a rectangle. All newly drawn marks need to have a specific meaning to both the author and the Maker, so they will have value as the work continues. (Figure 3, 4)<sup>7</sup> These tools must demonstrate a measure of how the Maker engages with the world.

Early maps exhibited the activities and experiences of the Makers. Newer versions required evolution of those explorations through the creation of three different drawing instruments. These tools were not merely stencils but custom-made and designed to perform specific marking tasks. Malcolm McCullough expresses this notion in Abstracting Craft: "A particular tool may indeed be the only way to work a particular medium, and it may only be for working that medium. Thus a medium is likely to distinguish a particular class of tools." <sup>8</sup>

This thought is analogous to the method of Makers using precise tools in the performance of specific tasks required by their occupations. Just as the Makers' tools which were invented, modified and refined to assist in the activities of their craft, the drawing tools needed to be developed in a similar manner to assist in the articulation of the students ideas.

"Getting better at using tools comes to us, in part, when the tools challenge us, and this challenge often occurs just because the tools are not fit-for-purpose. In both creation and repair, the challenge can be met by adapting the form of a tool, or improving with it as it is, using it in ways it was not meant for. However we come to use it, the very incompleteness of the tool has taught us something." <sup>9</sup>

Throughout the sequence of drawings, instrument creation, and architectural proposition, the Maker should be present in every decision. Not merely as the figure who attains the design of a space for both living and working, but something that has explicitly influenced all aspects of the design process including the development of the completed design. These utilization of making new tools for old Makers, builds an essential bond between the student author and the subject Maker. It provides direct access to the project, where the students begin their design project by working on the thing, rather than working on a drawing to work on the thing. The act and the performance of this making is an analog of the work, performed by the original Maker, directing the student into new territories of engagement into their project and provides for new and unexpected visions.

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<sup>8</sup> McCullough, Malcolm. *Abstracting Craft, The Practiced Digital Hand*, 62

<sup>9</sup> Sennett, Richard. The Craftsman, 194.

#### ART HISTORY AND THE ART + DESIGN STUDENT: EXPERIMENTS IN ASSESSMENT AND ASSIGN-MENTS AT RMCAD Making Survey

KIKI GILDERHUS, HEAD OF ART HISTORY DEPARTMENT OF LIBERAL STUDIES, ROCKY MOUNTAIN COLLEGE OF ART + DESIGN

Situating art history within the context of an art and design school is a unique challenge. At the Rocky Mountain College of Art + Design in Lakewood, Colorado, the art history curriculum is designed with a dual focus. Students train within the discipline of art history by reading scholarship, conducting research, and developing their writing and critical thinking skills through a variety of assignments ranging from formal analysis to more extensive research papers. We want to prepare students to take graduate level courses within an MFA or an Art History program. At the same time, they learn to use art history as a tool for their own development as artists and designers. Through coursework they gain a rich catalog of images from which to draw, numerous examples of visual and conceptual problem solving, and practice research and writing in preparation for artist statements, grant writing, and communication with clients. In this paper, I will briefly consider the institutional context of art history at RMCAD, and then address ways the art history division seeks to create methods of assessment, writing assignments, and classroom strategies that successfully integrate this relationship between art history and art and design education.

The artist Philip J. Steele founded RMCAD in Denver in 1963. As the college grew it moved to various locations in the city. Currently it is located on a 23-acre campus that once served as a tuberculosis hospital and village. It is a designated historic site, and many of the buildings are listed on the National Historic Register. Philip Steele was committed to a vision of artistic expression grounded in academic excellence. In 2000 RMCAD attained The Higher Learning Commission (HLC) accreditation, and then the National Association of Schools of Art and Design (NASAD) accreditation in 2003. RMCAD transformed from a technical school to an art and design college grounded strongly in the liberal arts, and art history emerged as an important component of the curriculum.

At RMCAD students are required to take a sequence of four art history courses. This includes two surveys, Ancient to Medieval Art and Renaissance to Contemporary Art. Nonwestern art focuses on the arts of Asia, India, and Africa depending on faculty expertise, and the last course Advanced Studies in Art History offers a range of topics including Abstract Expressionism, the History of Photography, and Modern Latin American Art. When I was hired in 2006 as Head of the art history division, the sequence was in place but there was no established curriculum. Since then, with the help of a hard working and dedicated faculty, I've engaged in an on-going and exciting process of designing the art history curriculum. At RMCAD, we have two full time faculty and four adjunct instructors. The small size facilitates a spirit of experimentation and collaboration. The four-course sequence serves as a laboratory in which we can test new methods of assessment, writing assignments, and classroom strategies. When something works, it is easy to implement across the courses.

One of the first projects the art history faculty tackled was constructing a better art history exam, particularly with regard to slide identifications. A typical exam consists of an array of image identifications, short answer questions, and an essay comparing and contrasting two works of art. In the survey courses, Ancient to Medieval and Renaissance to Contemporary art, the image identifications are crucial to building a visual vocabulary of significant artists, works, and styles. For the exam, students learned thirty to forty images and identified ten of them by artist, title, date, and style. Yet this particular aspect of the exam created an excessive amount of anxiety for students, especially freshmen in Ancient to Medieval Art during their first semester of college.



FIGURE 1: Purse Cover from Sutton Hoo, 625 CE, Anglo Saxon Art

Many objected outright to memorizing dates, refused to do so, and then scored poorly on the exam. This prompted us to redesign the slide identifications

In the new format students learn twenty to thirty images, identify six or seven by artist, title, date, and style, and then they discuss why the image is significant. Their answer should consider medium, country or region of origin, purpose, symbolism, and meaning. Additionally they must incorporate at least two vocabulary terms into their answers. Student answers changed from simply "Artist, Title, Date, and Style" to:

This was found in a medieval ship burial in England. The purse cover is an example of cloissoné, a gold frame filled with garnets and enamel with hinges at the top. In the upper register are polygons with abstract designs and four animals whose bodies create a ribbon interlace pattern. On the bottom are Swedish hawks with ducks in their mouths and men between two beasts. The artifacts found at Sutton Hoo were fine and precious, indicative of the high status of the person buried there.<sup>1</sup>

The new format includes the "hard data" of the work (artist, title, date, style) but allows for a much fuller description and discussion of the image. Students have greater flexibility in their answer, and it better demonstrates what they know. Further, student test scores improved from one semester to the next when we changed the identification format. In a sample of six sections of Ancient to Medieval Art, exam averages jumped from 68 to 75. We also noticed that most students successfully memorized the "hard data" for each image. In class evaluations, students thought the exam was harder but they preferred the new slide identification format because it moved away from rote memorization and required a more meaningful discussion of the work of art.

In all of the art history courses, it is critical that students read beyond Marilyn Stokstad's Art History, the survey textbook. I want to focus on ways we introduce research and writing within the discipline of art history. In Renaissance to Contemporary Art, students are assigned a scholarly article analysis using the electronic databases available through the library.<sup>2</sup> Students choose a specific work like Picasso's painting Les Demoiselles d'Avignon, or an artist, which is defined broadly to encompass the majors. Using electronic databases including JSTOR, Project Muse, and Academic Search Premiere, they find three scholarly articles on their topic. In many cases, they can access the full text of the article online. Students also track down the articles at research libraries in the Denver area.

In the paper, students briefly summarize the articles, identifying and describing the thesis and argument made by each author. Then in the process of comparing and contrasting them, students consider the following questions:

What kind of evidence do the authors use to substantiate their arguments?

What theoretical framework do they use? Do the authors employ formal analysis? Do they agree or disagree with each other? What's in the footnotes? Did you find anything interesting there?

In this way, students develop expertise with electronic databases, and learn to distinguish between popular and scholarly articles. In the analysis, they examine different methods and theories in the field, and they think critically about the arguments presented. The assignment allows students to examine three views of a single piece, or to look more broadly at aspects of an artist's work. In the best papers I've received, students also begin to develop an awareness of the history of art history and how the scholarship is constructed over time. The assignment prepares them for lengthier research papers in the Nonwestern and Advanced Studies courses.

<sup>1</sup> I've adapted this example from an exam written by Elyse Shillito for AH1010: Ancient to Medieval Art at Rocky Mountain College of Art + Design, December 9, 2009.

<sup>2</sup> This assignment is a modified version designed by Dr. Laura Gelfand at the University of Akron.

In the upper division courses, faculty experimented with research papers that combine an element of professional practice. In the Nonwestern Art course of fall 2009, students chose an aspect of Chinese, Japanese, or Indian art to research, and then they created a visual proect.<sup>3</sup> Additionally they composed a paper in the form of an extended artist statement with research presented on their chosen work of art or aesthetic concept. The paper required minimally five sources, two scholarly articles, two books, and at least one reputable website. For example, one student chose to interpret a Ming Dynasty silk painting.<sup>4</sup> She ordered raw silk from China and then experimented with paint manufactured specifically for the material. For her artist statement, she researched and then discussed her work in relation to Yin Hong's late 15th century hanging scroll Hundred Birds Admiring the Peacocks.

The assignment pairing a visual project with a well-researched artist statement achieves a number of goals. Students research and write within the discipline of art history, but synthesize and apply that research to their own art making. They practice formal analysis and work towards writing a better artist statement, one that articulates their approach to materials, process, content, and concept in order to educate the viewer. The research and writing becomes personal and practical, a skill they can develop to better succeed as artists and designers after college.

Another way to emphasize the connection between writing and art is through the use of artist statements. During the semester I assign three or four artist statements, and while students write responses to these readings, I really like to have students read them out loud in class. This started in my Modern Latin American art course during a discussion of Brazilian avant-garde artists of the 1920s. In order to understand Tarsila do Amaral's painting *Abaporú* [Figure 2], which translates as "man eats," students read Oswald de Andrade's *Anthropophagite Manifesto*. De Andrade was



FIGURE 2: Tarsila do Amaral

a poet and married to Tarsila. In his manifesto, de Andrade establishes the relationship between Latin American and European Modernism using the idea of anthropophagy or cannibalism. He argues that Brazilian artists should cannibalize European art forms the way indigenous people cannibalized the first explorers. For examples, he writes:

Only anthropophagy unites us. Socially. Economically. Philosophically. The world's only law. The disguised expression of all individualisms, of all collectivisms. Of all religions. Of all peace treaties. Tupy or not Tupy, that is the question. Down with the all catechisms. And down with the mother of the Gracchi. The only thing that interests me are those that are not mine. The laws of men. The laws of the anthropophagites.<sup>5</sup>

The manifesto is funny and rhetorically extreme. He makes numerous references to European literature and history. The line "Tupy or not Tupy, that is the question" replaces Hamlet's "To be or not be" with name of the Tupí-Guaraní, a tribe of Indians from the Amazon basin said to practice cannibalism. Reading this dense, difficult text out loud, students could hear how de Andrade intended the manifesto to sound. They appreciated the humor and began to understand the way he

5 Patrick Frank, ed., *Readings in Latin American Art* (New Haven: Yale University Press, 2004), 24.

<sup>3</sup> Two faculty members, Phil Gerace and Neely Patton, designed the visual project / artist statement project.

<sup>4</sup> Student Katie Maxwell made the silk painting of a peacock for AH2010: Nonwestern Art at Rocky Mountain College of Art + Design, Fall 2009.

employed the strategy of anthropophagy in his own writing. In the discussion that followed, they were full of questions and insights about his source material, and the relationship between the manifesto and Tarsila's depiction of a Brazilian Indian. Most students have not read out loud since they were children. Later, some told me that they felt a little selfconscious, but that it was a lot of fun. The act of reading out loud transforms the words into vital ideas, and now I use this strategy in all of my classes, asking students to read excerpts from Michelangelo's letters, the Futurist Manifesto, or the poetry of Kurt Schwitters. It shakes up the energy of lecture and allows students to think about artists in their capacity as writers.

The challenge of integrating art history with art and design education shapes the art history curriculum at RMCAD. We design the methods of assessment, writing assignments, and classroom strategies for each course with a dual focus. We strive to train students within balance the academic discipline of art history while teaching them to use art history within their own creative process. In this way art history is an integral part of a well-rounded artist and designer.

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### THE SPACE BETWEEN: A WIKI FOR LANDSCAPE ARCHITECTURE HISTORY AND THEORY Making the Survey

LORN CLEMENT AND ELLEN URTON ASSOCIATE PROFESSOR OF LANDSCAPE ARCHITECTURE AND VISUAL ARTS LIBRARIAN KANSAS STATE UNIVERSITY

### Abstract

This paper describes a new approach to teaching the history and theory of landscape architecture which incorporates a significant collaborative effort among students and faculty (including our college librarian) at Kansas State University. Developed by students with considerable faculty direction, The Space Between wiki served as the primary instructional tool for the history course required in the second year of the Landscape Architecture program. Rather than attending slide-illustrated lectures, students were guided to create a wiki for presentation, discussion and continued access to course materials. The wiki structure developed from the required book, Elizabeth Barlow Rogers's Landscape Design, and library research skills were emphasized in the course of building the wiki pages and associated PowerPoint presentations. In addition to these assignments, midterm and final summary integration papers demonstrated comprehension and abilities to think critically while applying course content in a creative, synthetic manner. The anticipated results include an inclusive and reasonably deep investigation of landscape design history and theory, an empowered approach to investigation, use of resources and citation, team work and leadership experience, and opportunities for critical thinking, conceptualization and self-expression. Linkages to studio work and other courses in the curriculum were established and emphasized through explicit use of professional language and analysis of precedent. Conclusions indicate the efficacy of this method of study, and anticipated revisions for the next round of teaching the course.

#### Introduction

The Department of Landscape Architecture/ Regional & Community Planning in the College of Architecture, Planning & Design (CAPD) at Kansas State University (KSU) offers two MLA programs. The first is a five-year master's program and these students are known as non-baccalaureates (NBs). The second is a three-year program which accepts established graduate students and they are known as postbaccalaureates (PBs). Admission to the CAPD is competitive and the students entering the second year of study on the NB MLA program are typically nineteen years old. There is a common first year curriculum that offers two semesters of History of the Designed Environment, taught by very capable lecturers who have many years of experience and hold professional degrees in architecture and PhDs in architectural history.

The MLA programs offered in Landscape Architecture were reaccredited in the fall of 2009 and the review team expressed some apprehension regarding the conversion of the program from the five-year BLA to the five-year MLA (for the NBs). The outcome was very positive, however, with recommendations that full accreditation for both programs be renewed. The accreditation report included one 'Suggestion for Improvement' concerning the history and seminar sequence of courses. This suggestion is consistent with departmental concerns and has provided additional motivation for writing this paper:

• Examine the curriculum and reflect on the depth of the offerings in Landscape History, Theory and Criticism.

As a landscape architect and design studio instructor of many years, and a non-practicing attorney, I enjoy interacting with students in ways that build capacity in both critical thinking and creativity. The required history course was a new teaching assignment for me and although I am eager to be effective as a teacher of history and theory, I viewed myself as a coach rather than an authority figure. I intended to move students from being dependent learners to becoming independent learners as quickly as possible. This course required active learning, not passively listening to lectures. Leadership and teamwork skills were important and individual expression expected.

The Space Between wiki was a product of the History and Theory of Landscape Architecture course offered in the 2009 fall semester. This course is required in the second year of the non-baccalaureate (NB) program and in the first year of the post-baccalaureate (PB) program. In the fall of 2009 there were two groups of students in the history course (27 NBs and 6 PBs). Both NB and PB MLA students are in concurrent foundation-level design studios. They are also enrolled in a technical module/computer applications course, and a natural systems and site analysis class in the same semester (this is a heavy load). The first formal theory seminar in the curriculum for the PBs follows the history class in the spring. The NBs encounter that seminar in the spring semester of their third year.

### Why use a wiki as a primary teaching tool?

I believe that wikis will be used extensively both in academic programs and in practice to organize and share knowledge. The ability of each wiki member to edit any page stimulates an acceptance of responsibility and raises the standard of performance; the product is alive and continually available. KSU colleagues use wikis successfully in their classes and the K-State Libraries regularly employ wikis to arrange and present information. Elizabeth Meyer's graduate students at the University of Virginia use a wiki to share research project information. Additionally, a wiki is being used in professional practice at OLIN (a preeminent landscape architectural firm) where Skip Graffam, principal in charge of research, intends to avoid reinventing the wheel in each project through the use of a 'ramped-up Wikipedia' - a knowledge base he has developed in order to access project information in an efficient manner<sup>1</sup>.

Pedagogical values of using a wiki include motivation stemming from students' active involvement in the production and use of a multitude of resources; a structured approach to content, but also a flexibility that accommodates individual expression. Pedagogical concerns arise out of copyright restrictions on both printed and digital materials (ARTstor images especially), quality control and depth of study. Although we had concerns about capacity, longevity, and reliability of access, over the course of the semester these worries proved to be unfounded. Why use the wiki builder software online at Wetpaint.com? Although the Wetpaint tool is not as 'robust' as MediaWiki (used to power Wikipedia and many others) it is 'student friendly,' intuitive and easy to use. The tool bar for editing pages is clear and simple; the Wetpaint staff in Seattle is committed to quick fixes when upgrades are necessary or glitches occur. Uploading images, renaming and moving pages were not difficult tasks.

## Concept

The concept for this course developed from recent discussions with students in design studios and seminars, with an awareness of how the course had been taught before. These ideas influenced the structure and methods used in the course:

- An engaging way to address history and theory using readily accessible online tools to capitalize on the student inclination to surf the web;
- Active learning through processing information; intellectual organizing by passing knowledge through a conceptual framework; presenting and discussing in class with instructor assistance;
- Create an enduring educational resource for student use at any time of day or night, and available for use in other courses concurrent with and after the history class;
- Utilize the highest quality books and journals available through K-State Libraries;
- Acknowledge the importance of writing as a means of integrating knowledge:
- Respond to the idea that visual communication is as important as writing.

### Guidance

Over the summer I prepared a preliminary syllabus, in the form of web pages, and content outlines for each chapter in the required text. Before classes started I transferred the sylla-

<sup>1</sup> Daniel Jost and Baldev Lamba, eds., 'Dialogues: Making Research Matter,' *Landscape Architecture*, January 2010 v. 100 no. 1, pp 58-69.

bus to the wiki format as I learned the fundamentals of using the Wetpaint software. The content outlines were distributed to teams on the first day of class; one chapter per team of two or three students. Initial wiki pages were created to guide the production of wiki products as well as other course requirements. Ellen Urton, Visual Arts Librarian, also produced wiki pages for guiding research and citation. As the course progressed, pages were edited, and additional guidance was provided as needs became apparent. Class was 'run' through the wiki and other web-based resources (particularly my other web pages for studios and seminars).

I used William Pena's framework (Prob*lem Seeking*), in a general way, to structure the thought and interpretation of reading, and as a beginning way to format The Space Between wiki pages. The Pena framework was used to 'process' and organize content in a way that would facilitate comparisons across time and space. Francis D. K. Ching's framework (Architecture: Form, Space and Order) and vocabulary was recommended for use in description and analysis of built form, and for discussions stemming from the analysis of precedent. The wiki pages that address these ideas are located under the Summary Integration Paper heading in the wiki's navigation bar, because they provide guidance for completing the summary integration papers.

Primary content components of the wiki included sets of pages organized by the chapters and subsections in Rogers, and accompanying PowerPoint Presentations (PPTs) attached to particular pages. These wiki pages and PPTs were the primary resources used for writing the Summary Integration Papers (SIPs). In addition to the wiki, K-State Online (KSOL is an Internet-based learning management system) was used to backup files and for archival purposes. All Word documents, PPTs and SIPs were uploaded to KSOL folders.

The procedures for wiki page production and attachments included:

- working from outlines provided by the instructor;
- finding and working with related library materials (and web-based materials);
- developing Word documents and image files (backups);

- office conference(s) with the instructor;
- making, organizing and editing the wiki pages.

Student teams presented their work over two days with in-class presentations using the wiki pages and associated PowerPoint Presentations. Wiki pages and attachments were then edited with feedback from fellow students and the instructor.

# Research and Citation, support from K-State Libraries

Research and citation support was provided by Ellen Urton, Visual Arts Librarian, in the form of thirteen wiki pages. Recognizing that our students learn through both visual and verbal means she also conducted an in-class overview of 'Research Support' content and demonstrated the navigation of key online library resources.

Useful and important information is increasingly offered in electronic format, yet not all pertinent information is available digitally. Students were therefore required to use the corporeal library and printed books and journals to supplement their online searching. Although students are generally more comfortable with conducting their research online, they also typically lack an understanding of where the information they choose to access originates. Many do not consider questioning resource quality at all. Ellen articulated the differences between information accessed via the K-State Libraries catalog, database subscriptions and several websites and focused her presentation on a demonstration of the ARTstor image database. She also explained why the electronic format can sometimes omit essential information (i.e. images).

In addition to addressing information literacy, she also stressed the importance and necessity of citation for both text and images. Her wiki content included a section on citation with reference examples for information retrieved from a variety of formats. Students were not required to follow any citation format precisely; rather emphasis was placed on the fundamental elements of citation, the notion that these elements must be harvested as part of the research process, and focused on the concept that students must report all of their resources.

## Assignments

Regarding the balance of depth versus breadth in this survey of landscape history and theory, I chose to assign one chapter to each team and to build the wiki together. This meant that all teams could start on research and writing with parallel efforts in the early stage of the course, and then present in sequence during the latter two thirds of it. To find an effective balance of visual and verbal means of expression, I chose to require three products: text-heavy wiki pages (with key illustrations), image-heavy PowerPoint Presentations, and Summary Integration Papers due at mid-term and during finals week.

#### Wiki pages

Wiki pages developed through gathering resources, reading, generating outlines, reviewing content during consultations with the instructor, and constructing the wiki pages – then editing them after obtaining feedback. Images were uploaded and captioned and both text and image citations were required.

Students made both expected and unexpected contributions that substantially improved the learning experience. Memorable choices included the selection of images that communicate spatial qualities and relationships effectively; including portraits of individuals whose words and actions we should remember; uploading relevant video clips of places, projects and products that illustrate the application of theory from particular eras; incorporating poetry, compelling quotations or significant passages of prose; and music videos that portray the ideas from historical periods.

Particular activities that made the wiki pages memorable included the ability to edit and add to the work of others; the use of images as hyperlinks to other materials on the web; the use of humor to make points and transitions in presentations (one student incorporated images of ghosts into his PPT on Mt. Auburn Cemetery); the use of storytelling (effective narrative) by some students during oral presentations; and finally, the use of a quiz game for summarizing key points of each chapter at the conclusion of the semester.

One student developed an extraordinary set of wiki pages for her assigned chapter. She

learned the mechanics of the wiki quickly and then exceeded my expectations by independently learning how to link web-based material to images. Her pages exemplify the depth and scope that a committed student will develop independently given some guidance, resources and encouragement. Utilizing an extensive outline, this student generated a rich multilayered set of pages with vivid imagery of photos, plans, sections and other views; written summaries using the Pena framework and vocabulary from Ching's book, among others; poetry, portraits and other mnemonic devices mentioned above.

#### **PowerPoint Presentations**

It seems that even young students in our program are adept at creating PowerPoint Presentations (PPT) and using them effectively in oral presentations. I recommended that the PPTs be dominated by images and have key words and phrases, in order to complement the textrich wiki pages.

During the semester presentations I consistently noted good depth and quality of material incorporated into the PPTs, and very effective oral comments delivered during their use. I wondered if I would have found the same sources or developed an equivalent thoroughness. The team that addressed Japanese Gardens, for example, created a particularly extensive and well-illustrated PPT, by finding and using excellent sources in the Paul Weigel Library of Architecture, Planning & Design and elsewhere to expand on the content in the required text (Rogers). Feedback from some students suggests that my in-class evaluations of quality were higher, generally, than those of classmates, but I think the authors of these comments may have lost sight of the survey nature of the course.

Certainly the use of PPTs, with the students playing the role of lecturer, reinforced the perception that students were teaching themselves the content of the Wiki.

#### Summary Integration Papers – SIPs

To demonstrate the synthesis and integration of course content and relevance to studio work and professional practice I required that students imagine a research-design scenario for a complex site and a complex program that would utilize the content of the wiki pages. Students were to describe how they would apply selected content as a way to create a tentative 'theory of design' for their hypothetical project. The SIPs were to be coherent and clearly structured essays that demonstrated an understanding of key course content. Students were encouraged to compare and contrast as a means of discussing important points from the authors they had encountered. They were expected to use the Pena framework and Ching vocabulary to describe and analyze specific historical examples and idioms, with some discussion of the relevant cultural and natural environmental context.

The midterm SIP assignment certainly challenged many of the non-baccalaureates, but most completed it successfully, and the postbaccalaureates found the assignment manageable. Grading this midterm assignment, however, forced me to re-assess my expectations as the instructor; I decided there were three acceptable strategies for completing the assignment: 1) developing a strong theme and using it to compare and contrast several idioms (such as the designed response to slope during several time periods); 2) addressing two or three idioms with extraordinary depth; or 3) completing the assignment as anticipated with discussion of several idioms as sources of ideas for application in the hypothetical project.

I decided to use the same assignment for the final SIP, but with increased scope and a recommendation that illustrations accompany the text. My assessment of the SIPs was generally very positive; writing ability proved to be sufficient for coherence and, in some cases, intriguing arguments or considerations of historical knowledge that might be brought to bear in the hypothetical research design scenario of the assignment.

#### Reflection

#### Individual Development & Educational Assessment (IDEA) Form

The IDEA Form is an instrument for assessing and summarizing student reactions to teaching, administered by KSU's Center for the Advancement of Teaching and Learning. The IDEA Form allows instructors to pose course specific questions and provides an opportunity for written comments. The IDEA Report is intended to improve pedagogy; not simply to evaluate the quality of teaching and learning in the course.

Vicky L. Clegg, PhD is the Director of the Center for Advancement of Teaching and Learning. Her interpretation of the feedback, based on many years of experience, included the observation that using a wiki would be a big change from typical second-year expectations, and would cause mixed reactions. Another observation over the years is that authority is an issue for many of our students, and many believe they must be 'told by the professor' to learn.

Considering the Wetpaint software for making the wiki; there was only one complaint in the IDEA Form feedback (below) to the effect that students 'need to be computer savvy' to be successful in the course. This comment would appear to reflect a low degree of motivation on that student's part, because during the same semester students are learning to use the Adobe Creative Suite, ArchGIS, Google Maps, SketchUp, and other software in concurrent courses.

# Student feedback, by individual invitation

Student comments were both rewarding and surprising, providing good insights regarding the perceptions during the course, and providing ideas for changes to the course. Many students suggested that I provide more material in a lecture format ('to cover the basics') and provide an overview; then have teams of students develop some depth in topics, with my guidance, to be presented and discussed in class. On the other hand, others noted that their classmates may not retain very much from such presentations 'because it is being listened to rather than learned.' A number of students felt that their peers were not able to present in an effective manner. Several suggested that every student address every chapter of the required book in some way.

One very strong student appreciated my optimism and my willingness to take a risk in utilizing a new form of teaching – she noted 'the interactive aspect of it helps immensely in improving students' understanding and retention of information, and then presenting it in a clear format is a major plus.' She thinks, '[the Wiki is] the perfect form of condensed research all in one convenient place' but her advice is to adjust the balance of components so that it is supplemental and not the primary teaching tool – she suggests using *The Space Between* as background information for the course, to assist with the overview and to provide a spring board for in-depth studies on particular topics. Perhaps her most important comment concerned an impression that we had not addressed theory per se. and that there should be ample time devoted to discussion, during which 'theory' could be addressed.

This same student commented that she knows I am 'trying desperately to teach [the students] to research like graduate students' and if this were a research methods class the wiki would be a great way to teach. But from her perspective she thinks there was too much focus on format, citation, and vocabulary usage rather than on content; and she did not think there would be a future need to construct a wiki in professional practice. On this last point, I have referred her to Skip Graffam's work at OLIN.

Another very good student offered these thoughts. When asked about 'thoughts for next year' she suggested that 'starting over would be the best way to go about the class ... the wiki we worked on can be used for reference...' *The Space Between* 'could be a good starting/base point, but they might have a different take on the chapter...' and the variation in interpretation or choice of content would be valuable. 'Instead of 'tweaking' the wiki next year, they could start a new wiki and add threads or links back to ours.'

#### Conclusions

Feedback from students, faculty colleagues, and Skip Graffam at OLIN (via e-mail and a phone call) provides useful insights into the perceptions and needs of young design students studying the history and theory of landscape architecture in a professional program.

## Thoughts for Next Year

From whom can we learn? Next year, I will address the question of authority and delivery of knowledge versus self-initiative, the concept of coaching in the process of learning, and active learning (to produce knowledge) on the first day of class. The benefits of lectures versus seminar discussions will be compared. I will also address learning from the process of study (collection, selection, summary, organization, editing) in addition to the explicit presentation of 'history' and 'theory' content.

Start over? Change the balance of components? Use the current wiki for background in a supplemental way instead of being the primary instructional tool? In order to improve the balance of depth to breadth I will modify the strategy and tactics for the course – suggestions from students and colleagues include lectures by the instructor, guest lectures, videos (ARTstor QTVR files – Quick Time Virtual Reality), discussion sessions, and more condensed wiki pages.

Certainly I should develop more sophisticated methods for assessing student-acquired knowledge.

At this moment my plan is to make two substantive changes: 1) to develop study guides for each section or period - to make the 'theory' more explicit, and 2) to use the new book Illustrated History of Landscape Design by Elizabeth Boults and Chip Sullivan (John Wiley & Sons, 2010) as a required text, as a complement to EBR's Landscape Design. Illustrated History addresses the inclination of our students to learn visually and through summaries - it offers an intelligent and engaging approach to history and theory by making them visible in an evocative way. Its use will be consistent with my general strategy of combining visual and verbal means of expression for communication and learning. Working to find the proper balance between these ways of thinking and communicating will no doubt continue into the indefinite future.

I find a final student comment to be influential and motivating as I contemplate the changes for next fall. 'I appreciate what Lorn has to say, and I feel like he would be better at organizing and presenting material than most students, in a way that would be stimulating and memorable.' This quote is from a carefully written and reflective statement; it is a thought to which I must respond.

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# WAKING UP IN THE GARDEN OF KNOWLEDGE Making History

#### TRACEY EVE WINTON, ASSISTANT PROFESSOR OF CULTURAL HISTORY SCHOOL OF ARCHITECTURE, UNIVERSITY OF WATERLOO

### Cultural History at Waterloo

In 1967, the Architecture program at the University of Waterloo was strategically reconceived in order to situate design within the human sciences. From that time, cultural history has centered the curriculum, and is considered fundamental to the understanding and practice of architecture. How we design is inseparably linked with our feeling for the grounds of our humanity, in a present whose experience is thickened and enriched by history and by imaginary space.

The history survey, rather than being a necessary liability, can be grasped as an opportunity to introduce to students ways of thinking about architecture, using historical material as a medium. This approach affirms the relationship between history and the creative imagination, and both the lectures and assignments can rely on storytelling and hermeneutics. The following briefly introduces one course in Waterloo's Cultural History stream.

"We need history, certainly, but we need it for reasons different from those for which the idler in the garden of knowledge needs it, even though he may look nobly down on our rough and charmless requirements. We need it, that is to say, for the sake of life and action, not so as to turn comfortably away."<sup>1</sup>

In the 1944 story "Funes, the Memorious", Jorge Luis Borges' narrator enters the darkened room of a young crippled man with a memory so prodigious that he is neither able to forget any moments of his life, nor distil memories which hold meaning from those which do not. Since his accident, Ireneo Funes has lain so overwhelmed by his perceptions of the uniqueness of every instant in the synaesthetic flux of phenomena, that he can barely understand any abstraction or universal, conceptual images or ideas which sponsor thinking. He confesses to his visitor: "My memory, sir, is like a garbage heap."

The story reinterprets Nietzsche's "The Uses and Disadvantages of History for Life", an essay that propelled the Modernist goal of elevating oneself above history. Yet Borges' message is mixed, for fiction enables him to reveal the complexity and poetic ambiguity of the human situation. It's not memory alone that interests him, but the tension between remembering and forgetting. In responding to Nietzsche's caution not to view history as a picture gallery of curiosities, Borges presents history as a hermeneutic problem of what our proper relation to our cultural



<sup>1</sup> Friedrich Nietzsche, "The Uses and Disadvantages of History for Life", in *Untimely Meditations*, Cambridge University Press 2004, p.59. Nietzsche's words reinforce the need to bring history to life as the resource of the imagination – design creativity in particular – and to see culture as a dynamic process in which through selective intervention we actively cultivate the past.

past ought to be, and as an ethical question to be contemplated in the imagination.

Too often, 'history' is confused with 'the past'. As Maurice Merleau-Ponty wrote, "All human acts and all human creations constitute a single drama, and in this sense we are all saved or lost together. Our life is essentially universal."<sup>2</sup> History, which he notes in the same essay "is no more external to us than language", can be considered to be our selective point of view on this universal world that pre-exists us. The present's dialogue with the past, the abstraction and interpretation of events meaningful to our shared world, is why as architects we need history.<sup>3</sup> As Walter Benjamin wrote in his *Theses on the Philosophy of History*,

"The true picture of the past flits by. The past can be seized only as an image which flashes up at the instant when it can be recognized and is never seen again. ... For every image of the past that is not recognized by the present as one of its own concerns threatens to disappear irretrievably."

Our experience of historical proximity arises from turning our attention, in pertinent interest, in intentional focus. As the aforementioned authors suggest, the act of creation involves this unhistorical present, which selectively evidences its own precursors. The analogy lies in the act of making. This second-year course thus invites the students to conceive history more like a design problem than as a set of facts about the past, offering a framework to suggest that history is less like evolutionary nature than like theatre.

*Renaissance to Revolution*, the fourth of the core courses in the Cultural History curriculum, covers the period from the 1400s to the 1700s.<sup>4</sup> The weekly six hours of class consist of slide lectures anchored by a book, a quiz on the reading, and a movie interpreting one of the iconic themes. To frame our approach to the historical materials, as though through the window of present concerns, we start out by reading from Borges' collection *Labyrinths*, fictions including "Funes the Memorious", and "Pierre Menard, Author of the Quixote".

Borges availed himself of Nietzsche (who had attended Jacob Burckhardt's lectures on Renaissance cultural history — a pleasing circularity from our viewpoint) to study this problem. Thus his stories offer a forum to discuss how we process history and collective memory in the form of culture, though by a poetic means that is at once digestible, richly ambiguous, and ethically provocative: crucial to our considering architecture a branch of moral philosophy. The stories problematize historiography, historical context, varieties of memory, pattern-identification; they debate conflicting ideas; and their 'plots', bound to the narrator's abductive imagination, are invented by means of a perspectival interpretation of cultural fragments.

2 Maurice Merleau-Ponty, "An Unpublished Text: A Prospectus of His Work" in *The Primacy of Perception And Other Essays on Phenomenological Psychology, the Philosophy of Art, History and Politics*, Northwestern University Press 1964, pp. 9-10.

3 This meaning lies beyond any reduction to form, material, or technique, and is constituted in a common language, stories, and shared horizons.

4 In first year, Cultural History begins with an introduction to the twentieth century, then shifts back to Antiquity, followed by the Middle Ages, so that this course is the fourth, and is followed by Romanticism and Enlightenment, ultimately returning to Modernity in the final years of the degree, in which two more specialized courses are taught. It is a double-weighted course introducing students to the period ranging from the Renaissance through the late Baroque. Funes is an idler in the garden of knowledge. Incapable of forgetting, he invents a system of giving names to numbers, memorizes the history of prodigious memory in Pliny, but paralyzed by the weight of his own past, dies soon after. The narrator, who on reflection is able to only paraphrase their conversation in his memory, marvels at this terrible gift – of effectively positivist objectivity applied to human experience. Borges' choice of Pliny is significant: his *Historia Naturalis* lies distant from the scrutiny of empirical scientific truth, instead conveying through legends and folklore, no matter how absurd or fantastic, the world's human meanings.

Through this account, Borges suggests that to prevent immobility we need to selectively forget — to winnow the historical chaos, and awaken the imagination. Yet, because each present needs history to anchor its depth of place, he indicates beacons of orientation for Early Moderni-ty's concerns – with the emergent meaning of History, man's problem of how to situate himself in the world, how the individual validates his own identity. Amongst the fictive works that pepper his stories, Borges affectionately cites real books like Don Quixote and Pliny's Natural History, works authored by Julius Caesar, Raymond Lull, Descartes, Wilkins, Locke, Quicherat, Poe and Valéry, viewing the literary canon as an landscape — yet one that is personal, fragmentary, intentioned, navigable. His model portrays the axiality of metaphor, and how the poetic is vitally rooted in the historical which it serves to re-establish.<sup>5</sup>

To begin with fiction raises the meaning and interpretation of history as open questions to which the maker must return. In the second story, "Pierre Menard: Author of the Quixote", Borges' narrator describes the 'invisible work' of an eccentric Symbolist poet who, with great struggle, composes *verbatim* a few fragments of Cervantes' masterwork, lines which the narrator reads as 'brazenly pragmatic', 'more subtle than Cervantes', and 'almost infinitely richer'. <sup>6</sup> Here, marrying craft with imagination, Borges recuperates the angelic garbage-heap of collective and individual memory using alchemical techniques and Surrealism.<sup>7</sup> He explores the significance of an object's afterlife within history's shifting contexts, and of anachronism, and of the identity of epochs. By analogy one thinks of the complexity of Aldo Rossi's 'urban artifact' as memory in the built environment.

The students are directed to read critically, and to cultivate a conceptual vocabulary. Here, in class discussions, implications of historicism and postmodernism can be confronted. And ultimately, the power of a literary idea to change the way that the world appears,<sup>8</sup> just as a book may transform architecture.

Storytelling by making meaning from fragments of evidence can be compared to the hermeneutic principle of abduction, the creative forging of explanatory narrative. This concept can help students to find an orien-5 Much like the monastic praxis of memory work, one meditatively reads the leg-

ible world as a point of departure for the imaginary and the future.

6 These are accompanied by other lines in which a certain lady perceives 'the influence of Nietzsche'.

7 Recycling, forming narratives from fragments, are the underlying structures of alchemy, changing the *prima materia* into 'philosophical gold'.

8 "'The Quixote', clarifies Menard, 'interests me deeply, but it does not seem — how shall I say it? — inevitable. I cannot imagine the universe without Edgar Allan Poe's exclamation: "Ah, bear in mind this garden was enchanted!"'" J. L. Borges, "Pierre Menard, Author of the Quixote" in *Labyrinths*,

tation within historical material with a view to their own poetic work. The notion that history is a construct, in which we ground our world, therefore looks to the imagination as a source of ethical action in this making. The aim is that the students become personally engaged with history as relevant to the present, and aware that their own creative activities are a form of research.

As a hermeneutic project, design formulates relations between the known and the unknown. Devising history as a bridge linking the present to the past, an analogue of the design process, investigates how to make design a *cultivator* of knowledge, not merely its instrument.

Unlike the old historical surveys that decontextualize works, and foster aesthetic formalism, cultural history sees knowledge as a whole, and values relationships between fields. To map out genetic context, we approach history through an array of cultural forms and practices, drawing on arts, humanities, sciences, even the pseudo-sciences. Distantiation from the earlier era helps students learn to recognize patterns across its disciplines and media, and read them as communicative metaphors.<sup>9</sup>

The course readings form part of the school's larger 'great books' program, which encourages each student to build a personal library. Thus, the students read only primary sources representing the periods; not survey textbooks. This serves to re-orient their focus away from an overwhelming litany of objects and events, and towards developing skills in making sense of original works, as a way to renew history. A facility in interpreting complex cultural data will be pertinent to their building careers, so we foreground practicing basic hermeneutics. The experience of confronting and interpreting primary texts, bringing philosophical conjecture as a key with which to unlock history, builds student research skills, and their hard-won successes enhance motivation.

We evaluate the students' understanding in two ways. Each Friday there is a thirty-minute open-book quiz on the reading, to be answered in no more than five sentences, incorporating a thesis, citations of primary source evidence, and conclusion. The question form produces a kind of active thinking, and students report learning as they write. This learning, in fact, constitutes their own production of knowledge. Students are faced with their responsibility for interpreting what is given, and the necessity of taking up a position in response. The rhetoric of the answer involves the ability to negotiate horizons, organize the field of knowledge, attend to details, and build new prospects. By abstracting ideas from the material, through abduction, hypothesis, imagination and clearly structuring an effective and persuasive argument, they communicate and validate their point of view and moral intentionality. There is a clear analogy to the design process.

Some examples of topics which the course covers: We read Alberti's treatise *On Painting* for his metaphor of the 'picture window' from which the *istoria* is to be contemplated, with the idea of perspective as seeing-through or beyond the sensible world. Through Erasmus and Thomas More we look at notions of manifest and latent content, relating to Luther on hermeneutics. Montaigne's "On Cannibals" enables an investigation of the careful construction (and meaning) of the essay as a form of historiog-

<sup>9</sup> Visual images include paintings and sculpture, historical book illustrations and manuscript illuminations, on topics from botanical science to alchemy to geology to astronomy.

raphy. Descartes' *Meditations* is read alongside *The Matrix* to consider the grounds of knowledge and reality. Through images from Kircher, Locke and Newton we look at the *camera obscura* as a metaphor of empirical knowledge. The inscription of historical experience in physical terms is evidenced in Voltaire's *Candide*, whether inscribed on the human body, or displayed in the museum, or cultivated in the botanical garden as a metaphor for knowledge.

The second project of the term, putting history's generative potentials into action, is the collective production and staging of a play. Theatrical performance makes story-telling vividly present, in participatory and communicative senses: reinterpreting events, forging new relationships with the past, and confronting its renewed relevance to our time. In parallel, the leitmotif of theatre traverses the readings, lectures, and movies, as a mode of representation and metaphor for vision, public space, an archetype of architecture and the city, and as a symbol of memory and knowledge.

As a work, theatre offers a model of interdisciplinary collaboration and design invention comparable to the architectural project for which our students are training. Our aim is not entertainment, but a multivalent investigation into constructing public space at the intersection with the stories we tell about ourselves – the essence of history – and arguably of architecture.

Mounting a play as a means of learning complements models of training that traditionally have dominated professional academic formation, in which the student's reception of knowledge is often too passive. As students shoulder responsibility, and are forced to devise new modes of research and production, this style of pedagogy is transformative and empowering.

The dialectic of self-development in relation to others arises when students are able to pursue their own interests in the subject material, with a view to group goals. While the quizzes oblige students to acknowledge their individual viewpoints, a class of eighty requires them to situate their unique contributions, voices and positions within their larger community. Making choices and alliances enacts the political aspect of diversity, far more important here as a positive factor of synergy and ecology than as statistics in the historical canon. At the project introduction the class is invited to self-organize, top-down and bottom-up, creating a hierarchy of responsibilities, and a communications network, much like a small government.

By constructing a network of relations through communication, the culmination in the wholeness of the event, disclosing the unity within cultural diversity, the group explores how to forge appropriate relations to an existing world. Each person participates according to interest and aptitude – whether playing the cello, writing the script, collecting salvage, designing posters, choreographing dance, wiring the set for lighting, or devising a business plan: yet they largely rely on peer-learning and critiquing. The project thus promotes a rich variety of creative research processes, and outputs related to these processes.<sup>10</sup> This ecosystem model

<sup>10</sup> For example: drawings, models, artifacts, books, built sets, installations, prototypes, choreography, costume designs, site-specific musical performance, lighting, exhibitions, digital projections, video work, collections, posters, scripts and programmatic texts.

helps students in a large and diverse class see culture as a complex ecology in which participation occurs by co-creating, and encourages pride in diversity by emphasizing something they already know from the quiz: that one takes up a position with respect to knowledge.

Our frame of reference for contemporary performance is local: Canadian composer and dramatist R. Murray Schafer grew up only 120 miles away from Waterloo, and his *Patria* cycle of synaesthetic operas are sitespecific performances taking place in locales that range from *The Princess of the Stars* on a remote wilderness lake in the Rocky Mountains, to an all-night performance of *The Alchemical Theatre of Hermes Trismegistus* in Toronto's neoclassical Union Station, or Ra, staged in a nocturnal pilgrimage through the city of Leiden, using the cathedral, the bridge, and the Museum of Egyptian Antiquities as backdrops.

However, a project beyond the group's academic experience arrests preconceptions of 'how or what theatre ought to be', obliging them to think laterally and in historical depth about its potential implications, as an institution, or here and now. The project begins simply by engaging in the Renaissance task of re-interpreting Classical culture.

In July 2009, to complement the Design Studio project for a winery, we produced an interpretation of Euripides' *The Bacchae* (405 BC), entirely rewritten by the students, and renamed '*Ekstasis*' – a *double-entendre* of the performance, not on a stage, but played in different open spaces, stairs, and rooms in the School of Architecture, now representing the city of Thebes, its royal palace, and its countryside,<sup>11</sup> and the Dionysian inspiration from wine in the cult's initiation rites. Class topics like the alchemy of fermentation, theology of the winepress, fundamental symbolism of initiation rites of death and resurrection or rebirth, cosmic order, informed the process of 'designing with history', while its expressive forms reflect the thickened present – site-specific performance, installations, digital projections, crafted artifacts, architectural elements, dance, original musical composition, ancient or dead languages, archaic rituals. The creation of meaning by juxtaposition in history owes much to the art of the Surrealists.

The first step in a creative conversation with history is to cultivate a ground of affirmation, the moment in which we say yes to the past and ask it to tell us a story. Both assignments are aimed at developing skills proper to architects, and to enhance modes of learning, by considering that good design should interpret the pre-existing contextual world from an appropriate point of view, with a desire for the common good. This poetic metamorphosis of our ground includes recognizing patterns in cul-

11 The class performed *Ekstasis* on location in the school of architecture, which itself is a recuperated nineteenth century silk mill, renovated by Levitt Goodman Architects. This was to date the most interesting in terms of spatial adaptation of the existing architecture. It was staged on three different floors, using a fire-stair and a ceremonial staircase to move audience and actors up and down. For example, the audience is 'arrested' along with the actors by soldiers, who march them up the stairs and into the Loft. The Atrium was used as a setting in which the audience, occupying the same space as the actors, were surprised to find themselves inducted into an initiation ritual, while in other scenes they hovered above the action, viewing it in plan. Even the Lecture Hall was used in an unexpected way, with the set being a large illuminated bed suspended over the seating, while the audience watched from the dark margins. The built set pieces were great columns illuminated from within whose geometrical arrangement gradually dissolved to reflect the dissolution of social order in Thebes. ture's communicative media, why we 'delight in the beautiful' (in the words of Hans-Georg Gadamer), and the role of play in representation.

In telling stories about ourselves, we construct narrative wholes from fragmentary and diverse evidence, and the fictive nature of history, in the positive poetic sense, is analogous to how we view architecture today. As Peter Zumthor reminds us, "Construction is the art of making a meaning-ful whole out of many parts."<sup>12</sup> In his plea for wholeness in architecture, he echoes Carlo Scarpa's sentiment that "the quality of the finished object is determined by the quality of the joins."<sup>13</sup>

Ultimately, our approach is 'not to become a gravedigger of the past' (to borrow once more from Nietzsche) but by awakening to awareness of the shared world that pre-exists us, exotic and familiar, to cultivate the garden of knowledge as a place for thinking, storytelling, invention and action, to reveal the relationship between history and the creative imagination. Through such experiences we collectively recall that the past is not behind us, but all around us, and under our very feet, only waiting for someone to once again marvellously render the invisible visible. Our goal in this cultural history program is that, through attention to innate qualities in each situation, sensitive interpretation, suggest strategies to reinvent architectural know-how, using practical wisdom instead of instrumental theorizing. As Alberto Pérez-Gómez says,

"Lacking a living tradition for architectural practice since the nineteenth century, we are in fact called to re-construct it, visiting and interpreting the traces and documents of our past, invariably with fresh eyes, to discover hitherto hidden potentialities for the future, like one recovers coral from the bottom of the ocean, or extracts pearls out of ordinary looking mollusks."<sup>14</sup>

<sup>12</sup> Peter Zumthor, *Thinking Architecture*, p. 11.

<sup>13</sup> Peter Zumthor, Thinking Architecture, p. 14.

<sup>14</sup> Alberto Pérez-Gómez, Keynote address for Constructing Imagination, Virginia

Tech conference at the WAAC, Alexandria VA, Feb. 1, 2010.

### BRINGING HISTORY TO THE BEGINNING DESIGN PROFESSION Making the Survey

#### SEAN M. ROTAR, INSTRUCTOR OF LAND-SCAPE ARCHITECTURE BALL STATE UNIVERSITY

# The Complexities of History in Design Education

Landscape Architecture History is a required course within the accredited curriculum of the Bachelor of Landscape Architecture degree. In this particular course, a focus on American vernacular and designed landscapes allows students to explore the changing American landscape and designers' responses to that landscape through time. Engaging students in the study of design history, however, is often difficult, as students demonstrate weaknesses in critical thinking about history, lack of general knowledge, and at times antipathy or hostility, presumably a result of the inadequate quality of previous history experiences.

For the beginning design student, the sheer amount of historical information in their discipline can be daunting. Students are expected to gain knowledge in a canon of great worksworks that fall squarely into the designed works/ high art end of the spectrum. Students may also be asked to expand their knowledge outside the canon into vernacular expressions (pop art/ low art) of cultural ideas and, importantly, to draw conclusions and make connections between the two realms, connecting high and low. Furthermore, works in both of these areas take on greater meaning if they can be set within a context of intellectual, economic, and cultural history that further encourages students to inquire into the factors shaping the design process. As D.W. Meinig wrote:

'...To see landscapes as history...asks us to see that every landscape—not just those with "historic sites'—as part of a vast, cluttered, complex repository of society, an archive of tangible evidence about our character and experience as a people through all our history—if only we can learn how to read it.'<sup>1</sup>

Students in landscape architecture quickly become aware of the difficulties inherent in concretely defining the works of their profession for historical study. This difficulty exists for many reasons: landscape can be a vague construct that includes many sub-genres and disciplines; built works exist at vast extremes of scale; they have an array of rationales driving their design decisions, from the functional to the ideological to the aesthetic; they are built to suit a variety of needs and purposes; and so on. While students are grappling with the complexities of defining their own discipline, any chance of making critical connections to other arts, or to the wider thread of histories may be lost. History courses within design disciplines must therefore be designed to assist students in defining the important works of their discipline and to strengthen It is the connection to the larger thread of

# Purpose of History in Design Education

Arguments about the purpose of history in design education, and the approaches for teaching history are certainly not new. In a 1995 article in *Landscape Journal*, Robert Riley offered commandments, fundamental principles, and alternative directions for history in the design curriculum. The alternative directions Riley articulated lead to 'three roles worth exploring...the landscape architect as a form giver, as a professional embedded in society, and as an intervener, a manager of change upon the land.<sup>2</sup> In 1997 Dianne Harris responded to these ideas with a further exploration of the topic, arguing in part that "good landscape history is that which examines the built environment within the broadest possible context and that, in essence, treats the land-

<sup>1</sup> Meinig, D.W. Foreword. *The Making of the American Landscape*. By Michael Conzen, ed. New York; Routledge (1990): XV

<sup>2</sup> Riley, Robert. 'What History Should We Teach and Why?' *Landscape Journal* 14 no. 2 (1995): 222

scape as an artifact of material culture.<sup>3</sup> In the intervening fifteen or so years, the questions raised by the authors have not been definitively settled. Within the context of this discussion, the purpose of history in the design curriculum may seem to be unresolved; however, for those teaching design history, purpose must be the means to shape learning objectives and define desired outcomes.

The course in landscape history that I currently teach operates within a framework of several concurrent purposes. First, history is presented to the beginning designer as a foundation of past design ideology and past design solutions to problems which may be similar to those that they will be asked to solve in the present. This does not imply that past design work becomes the solution to a current problem but only that knowledge of how others have solved the problem may be the first step toward a new, creative solution. Second, history must anchor the design discipline in a larger context of the intellectual, economic, political, and cultural history. When this context is seen in its proper role as a factor shaping historical works, students are able to begin drawing conclusions about the context surrounding current problems and how it may influence their design intervention. These two purposes seem to suggest two applications for historical awareness: as a precedent for design intervention, history becomes another influence on design outcome; as part of an analysis process, historical analysis becomes part of an investigation of a particular site and as a mirror to project context.

With these two purposes leading to two applications for historical study, what should a course of history within a design curriculum look like? First, the course should require students to think critically about the connection between the context surrounding a landscape work and the work itself. Second, the course should present designed landscape—what the Department of the Interior calls "historic designed landscapes"—and the ordinary landscape—what the Department of the Interior calls "historic vernacular landscapes"—as two expressions of ideological and cultural ideas, being careful to clearly separate the two general types.<sup>4</sup> Third, the course should encourage students to view particular designed landscapes as case studies in problem solving, requiring *information* on the problem presented to the original designer, *knowledge* of the solution to that problem presented as a design intervention, and *judgment* on the effectiveness of the original design solution as well as applicability of the design ideas to influence a solution to a contemporary problem.

#### **Course Structure**

Many courses in history follow a familiar format: important events, people, and projects, are presented chronologically over the course of a semester's study. These discrete pieces of historical information are often organized into a structure that classifies them, grouping those that share an era, technique, or philosophy. In political history, presidential terms or monarchical reigns are often the organizing structure; in art history, techniques or philosophies may form the framework. For design students, these elements are sometimes broadly categorized into 'movements 'i.e. 'cubism' or 'modernism' which form a kind of short-hand for the philosophical ideology the works express. Design works may also be categorized by purposea typology based on their role in the larger landscape.

Several pedagogical decisions separate this course from the standard history survey. First, the course is organized thematically rather than chronologically. To study landscapes by type rather than to focus on an overall chronology of works allows students to study a particular type of landscape throughout changes in the cultural context. Because the projects share similarities (in purpose, in structure, etc) the differences of ideology, style, rationale that they embody are made more visible. By making visible these differences, students are more able to draw conclusions and insight through comparison.

The course is divided into five units:

1 The Shape of America

<sup>3</sup> Harris, Dianne. 'What History Should We Teach and Why: An Historian's Response.' *Landscape Journal* 16 no. 2 (1997): 194

<sup>4</sup> Birnbaum, Charles. Preservation Brief #36: *Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes*. Preservation Assistance Division, National Park Service (1994):

- 2 The Form of Towns and Cities
- 3 Parks and Open Spaces
- 4 Momuments, Cemeteries, and Civic Structures
- 5 Residences, Estates and Otherwise: Gardens in America.

The course begins by exploring the broadest expressions of landscape design-the factors that gave shape to the American landscape, rather than simply beginning a long trek through specific project examples. Students investigate the ideas of native people and the first continental explorers and settlers, looking for geographic variations in settlement patterns, and linking the purposes, economic systems, and cultural beliefs of those communities to the shape that their settlements took. A basic understanding of American political and social history becomes the framework supporting landscape history and is important to reinforce, especially for students who have insufficient history background. Westward expansion, immigration, the rise of cities, changes in transportation systems, including the subsequent importance of road, waterway, and railroad, are among the lenses through which trends in landscape design are viewed. This broad information base-the impact of the shape of land settlement, subdivision, and transportation on the landscape in general-forms the foundation which supports the investigation of other landscape types.

Throughout the semester, the course focus narrows, first by investigating the ideas influencing the shape of cities and towns in the US and later by exploring specific elements within those settlement places. Students of landscape architecture place large emphasis on the the rationale for the inclusion of parks in cities and the particular philosophies that shaped the design of those parks and park systems; that interest is reflected in the third unit on parks and open spaces within cities. The fourth unit tracks cemeteries, memorials, civic and institutional campuses as components of the American Landscape. Finally, the site specific and often smaller scale focus of residential garden design (though certainly estate gardens of the country place era may not be technically 'small') is a culmination of the techniques and processes they have been exploring up to this time. While it may appear very specific, this

topic has a breadth of expressions across many eras and philosophies, making it a suitable summary of student experience.

# Assignments: 'Making' in the Survey Course

Assignments within the survey course are structured with two goals in mind. First, they make the purposes of history within the design curriculum clear to the students, allowing the critical judgement and application of information. Second, the assignment, as is the goal of any assignment, assesses the students' progress in transforming *information* into *knowledge* and knowledge into judgment. For design students, application seems to be the most appropriate method to achieve these two goals (though the course also uses examinations as a second, complementary assessment tool). This course requires students to apply new knowledge in the creation of two products: a course sketch journal and a project that incorporates research and design.

### Sketchbook Journal

Using drawing as a tool to foster deeper study and deeper comprehension in students is a long-held technique of design education. Not only does drawing reinforce previously learned skills in design communication (i.e. diagramming, sketching, etc.) by recording written and visual notes, the act of drawing may help strengthen links to the experience.

'Architects and Designers have turned to daily note-taking as a means of recording experiences and, equally important, of developing visual acuity which will improve the intensity of their experiences..Recording information...requires a combination of skills: observation, perception, discrimination, and communication.'<sup>5</sup>

The course sketch journal, then, is more than simply a notebook for the course; it is both a recording device for notes and discussion during the class period and a repository for drawings and sketches that help the student explore design projects more deeply. Students use plans, drawings, historic and contemporary photographs, etc, that are presented in class as a basis for their own sketches. In

<sup>5</sup> Crowe, Norman and Paul Laseau. *Visual Notes for Architects and Designers*. New York: Van Nostrand Reinhold, 1984. 19


FIGURE 1: A page from the sketch journal of Greta Peterson showing the interplay of different kinds of drawing with informational and analytical notes.



**FIGURE 2:** The sketch journal of student Kelsey Englert shows differences in style and subject from her classmate's choices.

order to produce a journal that adequately records and analyzes these examples, students must comprehend and internalize these drawings to a greater degree than identification alone may provide.<sup>6</sup> Analytical and informational notes compliment sketches and complete the record.

Because students are free to choose the types of drawings they create and projects they illustrate, the sketch journal also becomes to some degree a personal record of design influences and interests.<sup>7</sup> Additionally, as students become more critical thinkers, the notes and sketches may become more personally meaningful while simultaneously becoming less understandable to others.<sup>8</sup>

## Research and Design Project

The connection between the problem solving of the past and current design process is made explicit in students' semester project. In it, students are asked to research the design philosophies of a particular designer and to demonstrate their understanding of those philosophies through application: the design of outdoor space 'through the eyes' of their chosen designer.

Each student has the opportunity to choose a designer from a list that encompasses a variety of time periods, project types, and ideologies. Each student must then research the designer's works and writings using primary and secondary sources to distill the designer's process, ideology, philosophy, and style. Perhaps more importantly, students analyze the response of the designer to particular design problems.

While the research component leads directly to the creation of a design 'in the mode' of a designer, students are also asked to craft a research paper that presents findings about their designer and a written 'design memo' that records their design decisions and the ways in which they incorporated the designer's

6 Figure 1: A page from the sketch journal of Greta Peterson showing the interplay of different kinds of drawing with informational and analytical notes.

7 Figure 2: The sketch journal of student Kelsey Englert shows differences in style and subject from her classmate's choices.

8 Crowe, Norman and Paul Laseau. *Visual Notes for Architects and Designers*. New York: Van Nostrand Reinhold, 1984. 63



FIGURE 3: A portion of the design response of Student Hans Rasmussen showing spatial definition and organization in the manner of Dan Kiley.

thinking into their site design. While understanding a designer's thinking to the depth required to use it as the foundation of a creative project is a desired outcome, the ability to express those ideas in written form is also important, for several reasons. As Harris warns:

'Design problems or graphic/ drawing assignments, then, should not substitute for research papers in history courses. First, such substitution deprives students of an opportunity to write they already get plenty of practice drawing and designing in their other classes. Second, it sends the wrong message to design students, assuming that they need not develop language and analytical skills, and, worse, that perhaps they are not capable or intelligent enough to complete such an assignment.'<sup>9</sup>

Following the research portion of the project, students are given a local site as the base for a design intervention. The site is small in scale with a detailed program that serves the univer-



FIGURE 4: A portion of the design response of student Brian Main illustrating the design philosophy of landscape architect James Rose, presented in a drawing style imitative of Rose's.

sity community. Student designs do not rely on program creation as a means to demonstrating knowledge; rather the organization of space and the form the spaces take on becomes the demonstration grounds.<sup>10</sup>

Assessing the quality of the students design solutions relies on two equally important criteria. First, the student must demonstrate knowledge of their designer sufficient to create a cohesive design solution and the judgment to use good sources—including appropriately chosen project examples as precedents—in gathering that information. Second, the design solution that already relies on knowledge and judgment must also satisfy the requirements of the detailed program and create well defined, usable landscape places for people. Some students elect to carry the charge even further: In addition to attempting a design that reflects the context, ideology, and style of their

<sup>9</sup> Harris, Dianne. 'What History Should We Teach and Why: An Historian's Response.' Landscape Journal 16 no. 2 (1997): 194

<sup>10</sup> Figure 3: a portion of the design response of Student Hans Rasmussen showing spatial definition and organization in the manner of Dan Kiley.

researched designer, some attempt to communicate their project in the graphic language of the designer as well.<sup>11</sup>

Several potential pitfalls seem obvious to this project process. Students may feel restricted creatively; or they may adopt the attitude that repeating an already realized design solution is an appropriate design solution in itself. However, faculty using this process can correct these assumptions through a careful articulation of the project's goals and reinforcement of expected outcomes. Students will respond with a greater knowledge of the role of precedent and historical research in a design process and, it is hoped, by internalizing another designer's philosophies and expressing them in the familiar format of a design project, students can begin to see value in developing their individual design philosophies.

### Value

Acting as both anchor and foundation, this course has consistently made connections to the ideas, skills, and processes being presented in students' other coursework and has been successful in increasing students' interest in the history of landscape architecture as demonstrated in the quality of student work and in student course evaluation. The structure of the course offers unique opportunities for comparison and connection of the design work to the larger context of history. In addition, the course makes clear history's potential as a source for historical solutions to design challenges and as a precedent for design intervention. The two course projects ask students to delve deeply into the landscape as an expression of other cultural and philosophical ideas and it is in this depth that students are able to apply their knowledge into making new products. Finally, the fundamental roles of designers-as form givers, as professionals who are in dialogue with contemporary culture and as interveners who envision and manage change in the land-are reinforced to beginning design students for whom this guidance is critical.

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<sup>11</sup> Figure 4: A portion of the design response of student Brian Main illustrating the design philosophy of landscape architect James Rose, presented in a drawing style imitative of Rose's.

## UBIQUITOUS CUBE Making Pedagogy

CHARLES GRAVES, ASSOCIATE PROFESSOR KENT STATE UNIVERSITY TOM SOFRANKO, ASSOCIATE DEAN LOUISIANA STATE UNIVERSITY

In the 1920s, German psychology considered how people visually processed their world. Gestalt ("unified whole") theory attempted to understand how one grouped or divided the elements within their visual field in order to process space and depth. In the late 1940s and 1950s, a number of architectural programs in America began to follow the Bauhaus's lead and introduced projects rooted in visual perception. These programs determined that spatial recognition and compositional ordering were the essential foundational skills necessary for beginning an architectural education. Their faculties developed the cube exercise, referencing Gestalt theory, developed the cube exercise and eventually made it the standard for introducing beginning design students to space and form. Today it remains a popular teaching device; but does the cube exercise belong in today's architectural curriculum? This paper explores this topic through the following areas:

- History and development of the cube.
- Arguments by both critics and proponents of the cube.
- Possible new directions for the cube, and new avenues for educators to investigate.

Many critics have argued that carefully bounded design exercises such as the cube are reductionist in that they limit creative potential to the specific attributes of a set of physical elements; syntax is emphasized over semantics. The danger in removing design decisions from both the physical world and a cultural context is that it restrains theoretical sophistication when these students enter upper-level design studios.

Proponents of the cube, on the other hand, assert that starting design education from any other place (tectonics, program, iconography...) reinforces poor design tendencies by forcing a mimetic response to space making. Students who are hence left to recreate known buildings (possibly referencing the weakest examples) may fail to develop the skills to generate original work, they.

No one can deny the cube exercise has played an important role in architecture curricula. Many schools continue to use some version of the same cube exercise that was introduced in the late period of modern architecture. It might be time to adapt the cube exercise to deal with the new vocabulary of architectural design; or at least to combine lessons developed from the cube problem's formative years with today's architectural lexicon.

# History and Development of the Cube Exercise

Circa 1840, Friedrich Fröbel created a series of teaching toys called *Fröbel Gifts* (*Fröbelgaben*), to be used in his first kindergarten at Bad Blankenburg, Germany. This series of six gifts, shown in Fröbel's text, "Pedagogics of the Kindergarten," is considered the tool that sparked the development of the cube exercise. (Figure 1)

Fröbel laid out his diagrams on grid paper 20 squares across by 40 squares down, (Figure 1) a format that strongly recalls the grids J.N.L. Durand used in illustrating his architectural history texts, published between 1799-1805.

" Froebel drew upon two other methods called *Stygmographie* (dot drawing) and *Netzzeichnen* (net drawing). Dot drawing consisted of a grid of dots on student's paper correlated to a similarly gridded slate used by the teacher. Net drawing extended the points to form a continuous grid across the page."<sup>1</sup>

Fröbel believed this squared graph led to the development of the conception of horizontal, vertical, and the natural association to squares within the surface of the grid.<sup>2</sup>

1 The ABC's of Bauhaus, The Bauhaus and Design Theory, by Ellen Lupton, Princeton Architectural Press © 2000 Page: 8

<sup>2</sup> Ibid Page: 9

In the book titled *Inventing kindergarten*, by Norman Brosterman and Kiyoshi Togashi, there is a section of the book devoted to the origin of abstract art and modern architecture; Brosterman and Togashi show how Fröbel's educational program may have influenced the course of art history. Using examples from the work of important artists who attended kindergarten -including Georges Braque, Piet Mondrian, Paul Klee, Wassily Kandinsky, Frank Lloyd Wright, and Le Corbusier, among others -- he demonstrates that the design ideas of kindergarten prefigured modern conceptions of the aesthetic power of geometric abstraction.

In the United States, there developed a school of thought called "Pure Design." This school promoted basic compositions using the square and circle and single line work, and avoided an approach to design based initially on style.3 Arthur Wesley Dow, who taught in a number of institutes in New York City, began to use this method in the late 1800s. His ideas were quite revolutionary for the period. He taught that rather than copying nature, art should be created by elements of the composition, like line, mass and color. In 1899 Dow wrote, Composition: a series of exercises in art *structure for the use of students*. In the fourth chapter he discussed composition in squares and circles.

... Practice in line arrangement is a preparation for all kinds of artwork, be it design, painting, sculpture or architecture. Choose an enclosed area of definite and regular shape, and break it up into a harmonious group of smaller areas by drawing lines. For these elementary exercises in composition, the square and circle are best because their boundaries are unchangeable, and attention must be fixed upon interior lines. Take first the square, using straight lines of equal thickness... The results should be a harmony of well-cut space, a little musical theme in straight lines and grouped areas... Tracing, for the art-purpose of improving proportions and acquiring an expressive brushtouch, is a most valuable help to the production of good work. Architects use tracing-paper for changes in plans."<sup>4</sup>

In his work, Dow depicted a series of single line squares, with a strong similarity to Piet Mondrian's, *Composition with Yellow, Blue, and Red*, 1937-42.

## Gestalt Psychology and Bauhaus Artists5

While discussion of aestheticism can be found in John Ruskin's writing,<sup>6</sup> the Gestalt psychologists represent the first group to attempt to understand through rigorous (although not always scientific) testing, the phenomena related to how human beings process images. In discussions of cube projects the Bauhaus and Gestalt psychology are often cited as driving forces. It is worthwhile to consider what relationships actually existed between the psychologists and the artists. In Design and Form: The Basic Course at the Bauhaus, Johannes Itten described his pedagogy as involving three principle stages: experience, perception, and ability.<sup>7</sup> In describing the reasons why certain compositional effects were perceived, the explanations offered by the Gestaltists' research confirmed and validated his and other artists' intuitions.

In the 1880s and 1890s, Austrian philosopher Christian von Ehrenfels published a paper in which he suggested that melodies are still recognizable even when played in the wrong keys.<sup>8</sup> He argued that given the independence of the melody and its notes, the whole must be more than simply the sum of its parts. In other words, it was a "whole effect" or Gestalt.

In the early 1900s, three German psychologists began experimenting with motion picture illusions or "apparent movement" as it is technically known. Max Wertheimer, Kurt Koffka, and Wolfgang Kohler looked specifically at the optical conditions present when stationary images appeared to move. They concluded that 4 Dow, Arthur Wesley Composition: a series of

exercises in art structure for the use of students (New York, Baker & Taylor) 1899

5 Much of this history has been laid out by Roy Behrens in a 2004 Leonardo article.

- 6 Ruskin, John. Stones of Venice.
- 7 Itten, Johannes. Design and Form. p.12

8 Mary Henle, Julian Jaynes and John J. Sullivan, eds. *Historical Conceptions of Psychology* (New York: Springer, 1973).

<sup>3</sup> See Marie Frank's article titled "Emil Loch, Pure Design and American Architectural Education", *Journal of Architectural Education* Volume 57, Issue 4, Date: May 2004, Pages: 28-40

the motion could not be attributed to the individual still frames, but rather to their dynamic interrelation.<sup>9</sup>

### PRIMARY GESTALT ORGANIZA-TIONAL CONCEPTS

Similarity

Continuation

### Closure

### Proximity

### Figure/Ground

Although separated during World War I, Koffka, & Kohler came together in the early 1920's to establish a graduate program in Gestalt psychology. Located in Berlin in the abandoned rooms of the Imperial Palace they published a journal called *Psychologische Forschung* (Psychological Research: Journal of Psychology and its Neighboring Fields). The students in their program did not attend traditional lectures but rather learned through experimentation and by preparing manuscripts for publication.<sup>10</sup> Later, as controlling pressure from the Nazis began to mount and Jewish professors were dismissed at all universities, Wertheimer, Koffka, and Kohler eventually immigrated to the United States.

Before that trouble, in 1923, Wertheimer had written a paper entitled, "Theory of Form."<sup>11</sup> In the paper, he gave examples using simple dots and lines, and described how we group items based on their proximity or similarity. Some of these dot examples cropped up in Paul Klee's paintings in the 1930s.

Although, Wertheimer, Koffka, and Kohler were not artists, there is much to suggest that there was mutual interest between artists, designers, and Gestalt psychologists. Rudolf Arnheim was perhaps the strongest bridge. In the late 1920s he visited the Bauhaus in Des-

9 Mitchell G. Ash, "Gestalt Psychology in German Culture", *1890--1967: Holism and the Quest for Objectivity* (Cambridge, U.K.: Cambridge Univ. Press, 1995).
10 Rudolf Arnheim, "My Life in the Art World," a talk presented at the School of Art, Univ. of Michigan, Ann Arbor, on 8 February 1984.

11 Marianne Teuber, "Blue Night by Paul Klee," in Mary Henle, ed., *Vision and Artifact* (New York: Springer, 1976) pp. 131--151. sau and subsequently published an article praising the honesty and clarity of the building design. Subsequently, Gestalt psychologist Kurt Lewin hired Peter Behrens (Gropius's teacher) to design his Berlin house. After a disagreement, Marcel Breuer reportedly completed the interior.

In 1929, Kohler was invited by the Bauhaus to give a lecture. Records show that, due to a scheduling conflict, he could not attend and instead sent one of his students. Paul Klee was in the audience and according to some of his work as well as several of his letters, it is apparent that he had been following the Gestaltists since mid-1920s.<sup>12</sup> It is also known that in the early 1930s, Wassily Kandinsky and Josef Albers attended a series of lectures about perception given by Austrian psychologist, Count Karlfried von Durckheim.

In practice, Albers and graphic designer Laszlo Moholoy-Nagy taught a foundations course at the Bauhaus in which students assembled compositions from random items. (They used bits of trash or other found objects). Typically, the instruction given to the students was to improvise or "rig" something. Many have supposed this open-ended type of instruction as coming from Friedrich Fröbel's concept of "education through play." There is also some research to suggest that the background of another foundations course teacher, Johannes Itten, as an elementary school teacher would have inclined him to favor the ideas of and Fröbel the concept of structured play in the studio.<sup>13</sup> It is clear in images of several geometric compositions that students were encouraged to explore continuation, as one form is often seen passing through another.<sup>14</sup> (Figure 2)

A close reading of such books as Klee's Pedagogical Sketchbook or Kandinsky's Point and Line to Plane, shows a concerted attempt to provide mathematical or scientific confirmation of the compositional principles described. It is not too hard to understand why these Bauhaus artists and educators also gravitated to the

<sup>12</sup> Ibid, p.144.

<sup>13</sup> Ellen Lupton and J. Abbott Miller, eds., *The ABC's of XXX: The Bauhaus and Design Theory* (New York: Princeton Architectural Press, 1991); and Norman Brosterman, *Inventing Kindergarten* 

<sup>14</sup> Itten, Johannes. *Design and Form*. p.114, 115

ideas of Gestalt psychology. For those artists to be able to link to the research of the Gestalt psychologists (who themselves pursued their interests like research scientists) would have been of great help in validating their ideas.

### From the Bauhaus to the USA

From Weimar to Dessau and finally Berlin, the Bauhaus was in existence for only twelve years before it was accused of anti-government propaganda and closed by the Nazis. Its shuttering, together with the escalating military and political environment in Germany, flushed a cadre of talented artists and educators out into Europe and beyond to the United States. There and around the world they subsequently disseminated the ideas and ideals of the Bauhaus. Elementary or foundational instruction in art was probably the strongest component to be thus disseminated. Illinois Institute of Technology and Black Mountain College in North Carolina were two institutions that received direct Bauhaus descendents and developed strongly Bauhaus-inspired curricula. IIT truly became the "New Bauhaus" in the US with the construction of Crown Hall signifying that status. Its faculty included Laszlo Moholy-Nagy and then Gyorgy Kepes in the Institute of Design; Mies van der Rohe as director of the School of Architecture; and Ludwig Hilberseimer as head of the department of city and regional planning. In addition, Walter Peterhans taught many introductory courses. At Black Mountain College, Josef Albers created a very strong Bauhaus-type experience that influenced many educators and pedagogies.

Interesting changes occurred within the objectives of the pedagogy as Bauhaus ideals were translated to the States and evolved. In much of Itten's work at the Bauhaus, there had been a clear sense of basic design exercises being pointedly about an exploration of material to find essences. His other teaching idiosyncrasies suggested someone who fostered a master-and-apprentice relationship in the classroom. In contrast, Kepes's interest was more objective: teaching an understanding of perception and visual organization.<sup>15</sup> One can speculate about whose pragmatist values were showing, but it is also possible that the focus of composition got turned toward perception in order for educators to have a more "teachable" doctrine. Such a need to objectify then brought stronger ties between design and Gestalt research.

Following these changes in educational thought, beginning architectural design found itself using projects similarly rooted in understanding three-dimensional geometry, space and form, and figure/ground relationships. Meanwhile, as relationships with the social sciences developed, considerable research throughout the 1960s and 1970s focused on ties between perception and social interaction.

### The Cube Exercise Becomes Deep-Seated in Architecture Programs

In 1951 Harwell Hamilton Harris was appointed the first director of University of Texas School of Architecture in Austin. Harris was interested in the work previously done at the Bauhaus, especially that of Josef Albers, and began to recruit architects and architectural educators with knowledge of the Bauhaus program. These educators, who eventually become known as "The Texas Rangers," consisted of Colin Rowe, Bernhard Hoesli, Robert Slutzky, John Hejduk, Werner Seligmann, Lee Hirsche, Lee Hodgden, and John Shaw.

Between 1951 and 1958 these architects developed, at the University of Texas, a pioneering curriculum that encouraged elaboration of an effective, useful body of architectural theory. The basis of their theorizing was not limited to European Modernism but extended to the architecture throughout history and from various cultures. Their curriculum also encouraged the visualization and organization of architectural space, as distinct from the sculpting and shaping of a building's mass.<sup>16</sup>

In 1958, all of the "Texas Rangers" dispersed to other architectural institutions, taking with them the cube exercise and developing it in divers directions.

<sup>15</sup> Gyorgy Kepes, ed. *Education of Vision*, George Braziller, Inc., NY (1965) p.i

<sup>16</sup> Alexander Caragonne, *The Texas Rangers: Notes from the Architectural Underground*, (Cambridge MA and London: MIT Press) 1995

Cornell- Colin Rowe, Lee Hodgden, and John Shaw.

Cooper Union- John Hejduk Syracuse University- Werner Seligmann ETH-<sup>17</sup> Bernhard Hoesli

Although all of the "Texas Rangers" participated in developing the cube exercise, two of the people listed above, John Hejduk, and Bernhard Hoesli, made especially noteworthy contributions.

While at Texas Hejduk developed theoretical designs and a core curriculum from a set of exercises studying cubes, grids, and frames. While dean of Cooper Union's architectural program, Hejduk headed a program that included in the first year a series of exercises that stemmed from the cube exercise. Part of that series came to be called *The Nine Square Problem*.<sup>18</sup>

When Hoesli arrived at the ETH in 1959, he continued the use of the cube as a design exercise, eventually turning them into small houses. [fig. 3] After Hoesli's death in 1984, Herbert Kramel, Hoesli's chief assistant, took over the basic design year and further developed the cube exercises. His exercises involved nine iterations, and resembled somewhat the Cooper Union's *Kit of Parts* approach.

While at Texas Rowe and Slutzky wrote *Transparency: Literal and Phenomenal*, excerpted in *Perspecta*, Vol. 8. (1963).<sup>19</sup> Their Perspecta article analyzed Le Corbusier's Villa Stein at Garches, France. It proved to play an important role in the design investigations of architects, architectural educators and students, especially on the US east coast.

Outside the academic setting architects repeatedly conducted research and produced building projects directly influenced by the cube exercise. 1972 saw the publication of a key book, *Five architects: Eisenman, Graves, Gwathmey, Hejduk, Meier.*<sup>20</sup> In the book, each

17 ETH: short for *Eidgenössische Technische Hoch-schule* Zürich

18 *Education of an Architect /* John Hejduk, Dean, Richard Henderson, Associate Dean; editors, Elizabeth Diller, Diane Lewis, Kim Shkapich ; the Irwin S. Chanin School of Architecture of the Cooper Union, New York : Rizzoli, 1988

19 Transparency: literal and phenomenal, Colin Rowe;
Robert Slutzky, Perspecta, Vol. 8. (1963), pp. 45-54
20 Five architects: Eisenman, Graves, Gwathmey,

20 Five architects: Eisenman, Graves, Gwathmey Hejduk, Meier [New York] Wittenborn [1972] of the five architects exhibited projects based on the cube. All the projects displayed a strong influence of Le Corbusier's *Villa Stein* of 1927. The impact of the book on architectural education was immediate and continued well into the late 1980s and early 1990s, and can still be seen in recent student 'cube exercise' work. (Figure 4)

### The Advent of Change

In 1988 the Museum of Modern Art in New York City mounted an exhibition on *Deconstructivist Architecture*. It featured works by Peter Eisenman, Frank Gehry, Daniel Libeskind, Rem Koolhaas, Zaha Hadid, Coop Himmelblau, and Bernard Tschumi. Of course the deconstructivist trend had begun earlier -- in the 1970s -- and had already been tested in a number of architectural institutions throughout the world. The contributions by the architects listed above effecting this change are quite large, but to understand the change taking place, which ultimately affects the early cube exercise, only a few pieces of work are needed for study.

In 1970, Daniel Libeskind graduated from the Cooper Union School of Architecture. Shortly thereafter he took a teaching position at the University of Kentucky College of Architecture. There he taught an upper-level studio and a drawing course. The images he presented in both courses began to look at the possibility of combining, plan, axonometric, and multiple perspectival vanishing points. Those images, although drawn with conventional drafting tools, appeared chaotic. They displayed a controlled hard edge but within a random order.

In 1977, Zaha Hadid graduated from the AA in London and started work at the Office for Metropolitan Architecture. During that time, she began her series of investigative watercolors. To quote Lebbeus Woods:

Most architects make drawings. Yet, Zaha's drawings ... are different, and in several ways. Most notably, she had to originate new systems of projection in order to formulate in spatial terms her complex thoughts about architectural forms and the relationships between them. ... [T]hey enabled her to synthesize entire landscapes within which a project she was designing may have been only a small part.  $^{\rm 21}$ 

In both Libeskind's and Hadid's work, the idea of a grounded plan is absent. Their work seems to lack a frame or point of reference, and in some cases appears to be infinite. It therefore seems to differ from the formal controlled aspect of the bounded cube, six-sided and with eight corners. In a sense that work lacks formalism, and thus hearkens back to why the cube exercise was created initially: to eliminate a sense of style as a beginning design point, design without a set of basic rules. The images Libeskind and Hadid produced seem to have arisen from no controlling design process, but rather out of certain work pre-dating Modernism, when design sensibility was apparently based on passion and intuition. In that period of expressionism the building techniques of the modern era had begun to change. For a long time expressionist (deconstructionist) designs existed only on paper, as theoretical exercises, which could not be built.

In the 1990s, however, the introduction of advanced computers and software transformed the architectural design and building worlds. No longer were architects restricted to plans and forms amenable to hand drawing. Intricate, even fanciful forms could now be designed on the computer, sent to the manufacturer, and constructed by robotic machinery. The rules of design changed, and thus the basic design course had to follow.

### **Cube Criticism & Future Directions**

Under those current circumstances, and the conditions existing today, what is the future of the cube, the 9-square grid, and the kit of parts? There is, undeniably, certain logic to design education being founded on the primacy of space. There is also the need to address many difficult distinctions about criticism versus teaching, and carefully crafted objectives versus open-ended play. In many beginning design studios, a misunderstanding of the role of teaching in the academy and the alternative desire for a master/apprentice relationship leaves students struggling to grasp basic design principles that are suggested but never taught. In addition, there is

21 http://lebbeuswoods.wordpress.com/2009/03/23/ zaha-hadids-drawings-1/ often extreme pressure to simply do something "else."

Gestalt theory's principal criticism was that it was too dehumanizing. Postmodern critics suggest that it "isolates visual literacy from linguistic interpretation [and thereby] encourages indifference to cultural meaning."22 In other words, when abstraction is the primary focus, social aspects are trivialized. The 9-Square Grid, the Kit of Parts, and the Cube have all received similar criticism. Many have argued that carefully bounded design exercises such as the cube are reductionist in that they limit creative potential to the specific attributes of a set of physical elements; syntax is emphasized over semantics.<sup>23</sup> Students become 'form monsters,' with geometric gymnastics becoming a means to its own end.

Proponents of Gestalt theory contend that the argument put forth by their critics is itself based on abstraction and over simplification and in fact ignores the cube's very own cultural interpretation.<sup>24</sup> This same reaction can be directed toward critics of the cube who assume every component of the project to be an abstraction. What they fail to realize is that these projects are not completed in a vacuum. They are built with real materials and are subject to the full force of gravity. These projects are certainly as real as the structures class "bridges" and "beams" that use glue or pins to represent welds and bolts. On a more practical level, those who teach cube-based projects contend that alternative approaches to beginning design education reinforces poor design tendencies by leading students to recreate known spaces and buildings (often referencing the weakest of examples) instead of generating original work.

Nevertheless, in the 1980s and early 1990s, as an alternative to the cube and the kit-ofparts, several programs introduced exercises in which students worked with specific materials to understand their character and their possibilities for assemblage. The resulting projects

<sup>22</sup> Ellen Lupton and J. Abbott Miller, *Design Writing Research: Writing on Graphic Design* (New York: Princeton Architectural Press, 1996) p. 62.

<sup>23</sup> Timothy Love, "Kit-of-Parts Conceptualism," *Har-vard Design Magazine*, 2003.

<sup>24</sup> Lupton and Miller [17] p. 62.

are often recognizable by the models produced with (typically) found materials shaped with shop tools or hands-on techniques (casting and poured concrete being favorites). However, when these projects reached their logical conclusions, faculty had to realize that the final models were still simply representations of potential constructions and not in fact authentic artifacts.

The anti-cube argument also failed to recognize a common condition of architectural education: everything cannot be an objective in every course. The variables in architecture are so numerous that suppression of some is necessary in order to provide a focused investigation of others. It is not possible to teach everything and reach meaningful objectives or learning outcomes at every moment. Those that believe that everything should be covered in first-year often fail to recognize this simple fact.

As a means for inculcating spatial cognition, the cube is not likely to be cast aside any time soon. What does need to happen, however, is for more faculty members to recognize the need to establish clear learning objectives and outcomes. Students need instruction on compositional principles, they need to be shown examples, and then they need to be tested, with design problems, to see what they have learned. Open-ended problems that champion discovery can leave students spinning their wheels as they hope to stumble over workable solutions. On the other hand, a well-designed cube problem, part of the larger series of exercises contained in a first year design program, can introduce students to the rigors of testing and experimentation that should be the hallmark of any disciplined design studio (even those taught by upper-level instructors who substitute criticism for instruction). In the end it can foster in students both visual and spatial acuity, and aid in producing students that solve problems through process and experience and not solely from a process of rote learning.

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### TRILOGY OF INTERPRETATION: ON READING AND CREATING SPACES Open Session

ARMANDO MONTILLA CLEMSON UNIVERSITY

[There are] Stories that carry out a labor that constantly transform places into spaces and spaces into places.

Michel De Certeau, The Practice of Everyday Life1

#### Abstract

This paper will examine the pedagogy of making through reading, interpreting and extrapolating spatial iterations from selected fundamental written work by respectively: Henri Lefrebve, Gaston Bachelard and Michel De Certau. Through this trilogy-based analysis, work executed at the context of the Design Studio originating from the essence of ideas - together with a critical interpretation capable of producing program and space as well as form and function - for the purpose of a finalized product/project, will be examined. Being form and function traditional symbols of modernism, the juxtaposition and trans-positioning of these ideas within the context of contemporary realms in the midst of post-modern society, makes the production of space a logical (and sociological) process, and an exercise of interpretation through the creation - not only of specific narratives - but also of a realization of the relevance of the final project, within a given physical and socio-cultural context. A first trilogy examination will look at the use of post-critical work by Roland Barthes, David Harvey, and Paul Virilio, as a base for the production/making of Design Work at a rather complex/advanced Design Studio level, within the parameters of a functional container and/ or vessel funneling the catalyzing of specific keywords producing spatial iterations. This sequence includes the framing of the reading analysis through the proposition of a specific large/public-oriented program, such as a Museum.

This being a rather flexible and malleable program, the exercise here examined dwells on the brainstorming of concepts extracted from the reading of selected chapters by those authors by the Students at Design Studio. Such concepts are later extrapolated into a spatial generator, which later determines not only the logic, the sequence and the narrative of the final Design Studio Project, but also the aesthetics, form, internal organization and implantation in the given site/physical context. The discussion here centers on the capacity of embarking on a deep and critical approach of such ideas extracted from the readings of these chapters, and the careful examination of the keywords, which later turn into the keywords of the Final Project itself. "Mythologies" (Barthes), "The Condition of Postmodernity" (Harvey), and "Speed and Politics", as well as "Negative Horizon" and "The Night of the Museums" (Virilio), become here the object of the analytical work on the part of the Students. Here the comparative approach requires for the Studio Project to be treated and manipulated as a piece of reading, taking the very essence of the material from where it came from. In the second instance, the paper will look at speculative and imaginary abstract Design work produced at the Studio at foundations proficiency level, from the reading and quoting of selected books by these authors in the following order: "The Production of Space" (Lefrebvre), "The Poetics of Space" (Bachelard), and "The Practice of Everyday Life" (De Certeau) As the resulting thesis of the paper, the validity of an approach combining the dynamics of the Design Studio Class with those of a Theory Seminar will be the object of examination, through the description of a specific methodology and the comparative analysis of the work performed by sev-

<sup>1</sup> DE CERTEAU, Michel: *The Practice of Everyday Life* (Translated by Steven Rendall) Berkerley: University of California Press, 2002 (Original in French: DE CERTEAU, Michel: L'invention au quotidien. Tome 1: Arts de faire. Paris: Gallimard, 1990)

eral years/level Students at the specific locus of the Architecture School.

## Trilogy 1: Spaces of Ideology

Can we envision spaces out of the sense of reading, interpreting and translating ideology? When looking at the Architectural Avantgardes of the first quarter of 20th Century in Europe; is commonplace to see the departure towards design and architectural production from the issuing of a Manifesto, which identifies a certain political and aesthetic ideology, a blank canvas for a new society. In today's contemporary Post-modern Society, the sense of ideology has been diffused and filtered through mass media and contemporary phenomena such as consumption, globalization, fear and ecological unbalance. Who do we use as points of departure of a contemporary ideology in order to creates spaces?

The production of space (Lefrebvre) is a result of overlapping social, economical, and psychological, factors, all leading to the accumulation of strata, which simultaneously translates into an a generator of urbanity and architectural space within the context of the contemporary city. We here called to the idea of an *Ideology of space* as a point of departure to the creation of architectural space bearing an intrinsic relationship with Cityspace [or the space of the city]: The resulting production of the built and non-built environment plus the spatial relation between them2. As part of this process, the

definition of *publicness* in the space of the city is also redefined, following historical referential frames now filtered through globalization processes and means of technology today. With this in mind, the purpose of the Studio exercise was that of establishing an ideology of space creation, which will then generate the given architecture as a container and/or a vehicle of cultural and social production, ultimately acting as a catalyst to the creation of urban identity in a section of the city which lacked such. During the course of the Studio specific theories/authors dwelling on the production of contemporary ideology impacting urban and architectural space were chosen then analyzed, followed by a critical debate of cultural and social production in the city today, which will lead to a unique and individual exhibiting (Museum) Letmotiv for each of the projects developed on the part of each student. The interaction of the architectural program of cultural production with an antagonistic program of social production was desired, in order to complete a system responding to the creation of an architecture being generated under the mark of space ideology in the present context of hyper-capitalism.

Continuing with the methodology of the Trilogy of authors analysis within the frame of the Seminar Studio Discussion, three specifics chapters from the following three authors, all of them contemporary Theorist and Philosophers (Ideology Generators) were all read and discussed:

• "State of Emergency" (From Paul Virilio's 'Speed and Politics') 3

tion of the built and non-built environment and the spatial relation between them. These relationships are highly mediated, and so the newly created spatial relation induced by apparent disorganization and anarchy gives a new quality to the city as a whole" Armando Montilla: "Taking the streets/Tomando las calles". Gonzáles, Robert, ed. Aula: Architecture and Urbanism in Las Americas, n. 4 "Import/Export: Latin American Urbanities" New Orleans: Tulane University School of Architecture, 2004.

3 Virilio, Paul: *Speed and Politics* (Translated by Marc Polizzotti) Los Angeles: Semitext(e) 2007 (Original in French: Virlio, Paul: Vitesse et politique. Paris : Galilée, 1997) P. 78-83

<sup>2 &</sup>quot;The social and demographic debate of place, goes beyond the idea of a container, becoming more of an iconic notion. This makes the idea of place, a more ephemeral (rather than physical) concept, so when looking at mechanisms conveying the idea of city perception, one must look at a complex referential system, tied to notions of Heimat and Verhäutnis. The idea of locality is present, but not fixed. It is rather a result of a familiar references' saturated web, territorial understanding and social relationships (both interpersonal and between person-objects); along with both behavioural and interpretation patterns. All of these come from our familiar & environmental backgrounds, leading to specific lifestyles and determining the perception of our immediate surroundings beyond consciousness. In other words, they determine 'how we see the world'. This 'how we see the world' is embedded in our every day perception of the city, in our daily lives, patterns of movement and use of cityspace...[...]...The city, now seen as a living and changing organism, hosts invisible networks and forces that shape the use of its space, the produc-

- "Time Space Compression and the Post-Modern Condition" (From David Harvey's 'The Condition of Post-modernity') 4
- "Myth Today" (From Roland Barthes' 'Mythologies') 5
   E-llawing the Compared discussion

Following the Seminar discussion, we established three series of 'Ideologies' – each series derived from the essence of the Author's chapter - thus successively:

- Dromologism (from Virilio's concept of Dromology – the study of Speedy - in Speed and Politics)
- Flexible Accumulationism, Globalism and Compressionism (from Harvey's ideas of Flexible Accumulation' and Time-Space Compression – both concepts related to the capitalist consumption Society in The Postmodern Condition)
- Mythologism (from Barthes' ideas of Semiology in Mythologies)
   Following the choosing of the individual

Museum Leitmotiv (Cultural Production Program); a number of 'Project Keywords' were established, along with the so-called 'Project's Ideology'; and as such, a 500-word Abstract accompanied the Project throughout its Studio completion.

The code of production itself always aims at the 'infinite receptacle of consumption' But the latter becomes the consumption of total security; the utopian use of defense reflexes leads us to modify esthetics and the nature of production. The meaning of business reform is totally different form the one ascribed to it by the powers that be...[...]...Merchandise in large demand is presented for reasons of 'economy', in 'anonymous' white labels, the company's obtrusive trade mark having disappeared. They are promoted with an immense anti-publicity campaign. They are, so we are told, 'fee products'; in other words they no longer rely on the dubious methods of whorish (sic) old marketing techniques. From now on, repulsion sells more than attraction; this what organizes our new social existence around the objects of protection...

#### Paul Virilio, Speed and Politics." 6

spaces of ideology **museum of the automobile** speed | time | perception



FIGURE 1: Museum of the Automobile

6 Virlio, Paul: *Speed and Politics* (Translated by Marc Polizzotti) Los Angeles: Semitext(e) 2007 (Original in French: Virlio, Paul: Vitesse et politique. Paris : Galilée, 1997) P. 67

<sup>4</sup> Harvey, David: *The condition of Postmodernity*. London: Blackwell, 1990.

<sup>5</sup>Barthes, Roland: *Mythologies* (Translated by Annette Lavers) New York : Hill and Wang, 1972 (Original in French: Barthes, Roland: Mythologies. Paris: Seuil, 1957)

### Ideology 1: Dromologism

Spaces of ideology: Museum of the automobile on Biscayne Boulevard, Miami (Felipe Aldana) Ideology: Dromologism (from Paul Virilio's Dromology) Keywords: Speed, Movement)

The museum of the automobile will explore the idea of speed and movement, specifically applicable to the symbol of mobility in Miami. Conceptually this project is derived from [the reading of] Paul Virilio's Speed and Politics, [and the concept of] Dromology, [the study of] speed in terms of time and technology. Virilio argues that as time passes, technology has decreased distances immensely...[...]...According to his [chapter] State of Emergency "In less than half a century, geographical spaces have kept shrinking as speed has increased" and instances the fact that in 1940, Paris was a six day walk from the border, a three hour drive and a one hour by plane; now Paris, can be reached from any point in France in only a few [hours and some] minutes.

The site is located in the Northeastern corner of NE 85th st. and Biscayne Blvd. [in Miami...[...]...and for the purpose of this project [the same is] seen as a sequence of visual moments, graphic references to moving vehicles. When understanding the continuous, yet variable, flow of the road, perception plays with detail; the faster a vehicle is moving the less detail a spectator can process. The cultural program: Trajectory (exhibition) [is seen] at different perceptive speeds. The museum of the Automobile's goal is to divert the visitor from the notion of the vehicle as a status symbol to rather the design aspect of the car, the admiration of its forms and the reflection of the advances and needs of a particular society. The vehicle has become as significant as any part of our body, in fact the vehicle ergonomically accommodates to the individual.

To incorporate this project to the city, [the] intention is to maintain the normal speed at the site; visitors will be lifted on Biscayne blvd., the access is diverging from the main road unnoticed by the traffic. After the vehicle has been lifted, it stops entering the museum, (threshold) at this point the visitor will depart from the automobile in order for it to be mechanically accommodated into a parking slot. Virilio's study of speed and time is translated in this project by defining three different types of exhibitions at different perceptive speeds:

- 1 High-speed perception: A mechanized walkway where the visitor can rather swiftly admire vehicles displayed, the walkway's wall, as the car, ergonomically contouring the leaning body.
- 2 Medium speed perception: the spectators move at their own pace, distance to vehicle is variable but there is no physical contact, visual contact occurs at walking speed.
- 3 Low speed perception: Direct physical contact with the vehicle [is experienced].

All perceptive exhibitions merge at different points allowing spectatorship to vary. [The] secondary program [Social Production] and logistics occur logically within these trajectories by accommodating spatially to residual areas.

### Ideology 2: Compressionism

Spaces of Ideology: Museum of Human and Data Interface (Alejandra López) Ideology: Compressionism (David Harvey) Keywords: Manipulation in Advertisement Today the design of form becomes intricately linked with the question of interface. Lev Manovich. Friendly Alien: Object and Interface 7

Human and computer interface has evolved into a series of visual connectors, audio convections and material articulation. The new characteristics of form allow computers to leave their early realm and materialize in tactile form as clothing, surfaces, furniture and architecture. The active interface between humans and computers has allowed for a symbiotic relationship were they both coexist and help enhance social experience. The project of cultural/social production is derived in a theoretical form from the ideas of David Harvey in his chapter: 'Time - Space Compression and the Post Modern Condition". The ideology of Compressionism takes root on the idea of the simultaneity of events with no regard to the idea of place as presented by the author in his text. It is my interpretation that the subliminal manipulation of advertisement con-

7 Manovich, Lev: *The Language of New Media* Cambridge: MIT Press 2002

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suming present day society is reversed in the project with the direct relationship between the individual and the constant input to the building around them. The cultural production program for the Human and Data interface derives from the concept of a direct interaction between the individual and the computer, this relationship results in a direct manipulation of the building. The project performs as a double envelope, the outer envelope reacting to individuals from a remote location, and the inner envelope reacting to the individuals within the space. The manipulation of the exterior of the structure is possible by the collectives input into an Internet [Interface] that has a direct effect on the facade of the building. [mean]while, the manipulation of space within the interior is achieved by the direct input of the visitor into the [interaction with the] Video Art [displayed]. The interactive program on the walls creates a direct relationship between the structure and the individual, allowing for a personalized experience for each and every visitor. The experience of space allows the individual to redefine the concept of the museum from a static unapproachable entity separated from the individual, to an active interactive exposition allowing the visitor to feel art, create art, and become art.

The social production program for the project is a proactive solution to the integration of information and communication technologies with the cultural fabric of the site. An Internet-less People Resource Center (INL) located on the site across from the cultural production engine would permit the visitor with 24hr access to current technology free of charge. A collection of computers and touch-screens accessible to the visitor will promote individualization and flexibility of lifestyles.

The project takes in consideration the site located on Biscayne Boulevard, as a sequence of visual signs that direct the individual to a place of activity and production. The social/ cultural production engine would become a catalyst for the undeveloped city-escape. An inflow of capital will be introduced to the site by developing the neighboring areas and accentuating the concept of a cultural block that extends through out Biscayne from the Carnival Center. The project in its totality would be able to measure the pulse of the city



A MUSEUM OF HOUSING DISPARITY ON BISCAYNE BOULEVARD



FIGURE 2: Museum of Human-Data Interface and Museum of Housing Disparity

and translate it to the structure assuring that the individual would constantly be an intricate part of the collective.

What must always be remembered is that myth is a double system; there occurs in it a sort of ubiquity: its point of departure is constituted by the arrival of a meaning. To keep a spatial metaphor, the approximate character of which I have already stressed, I shall say that the signification of the myth is constituted by a sort of constantly moving turnstile which presents alternately the meaning of the signifier and its form, a language-object and a metalanguage, a purely signifying and a purely imagining consciousness. This alternation is, so to speak, gathered up in the concept, which uses it like an ambiguous signifier, at once intellective and imaginary, arbitrary and natural. ... Roland Barthes: Mythologies8

## Ideology 3: Mythologism

Spaces of Ideology: Urban Catalyst, a Museum of Housing Disparity on Biscayne Boulevard, Miami (Willard Staton) Ideology: Mythologism Keywords: Reaction and Message

Language	1- Signi- fier	2- Signified	
МҮТН	3- Sign I- SIGNIFIER		II-SIGNIFIED
	III- SIGN		

The location is divided in two sites, 'A' (designated as the Cultural Production or Museum Site) and 'B' (the Social Production Site) By way of using Barthes' illustration of the concept of Sign and Myth as per the figure below:

I propose [the] plot for the Site [as] the formula [which] follows: Site A

1- Signifier: The site as it is. [Miami as a physical place, including all its social conditions]

+

=

2- Signified: My reaction to the Real-Estate [Housing Situation]: An opinion and illustration of Miami's housing problems, a simulacrum which becomes an ephemeral synthesis of its conditions. 3- Sign: The Museum: the collection of feelings and information received by the spectator.

### Site B

I- SIGNIFIER: The Museum: the collection of feelings and information received by the Spectator.

+

II- SIGNIFIED: My reaction to the new condition.

=

III- MYTH: The complete message, a merger of both sites.

As a sub-plot for the proposal, Site 'B' is also the active, opposite of Site 'A', by way of using Biscayne Boulevard as the axis for parallelism, opposition, and also as a social divider.

# Trilogy 3: Dromological Spaces

Cities don't have roots anymore, they have aerial roots

M. Wark, Virtual Geography: Living with Global Media Events 9

Speed is one prime factor in contemporary society. Speed determines material and immaterial production. Speed sets time and replaces physical measurement. Distance becomes time, which is [then] determined by speed. Time-Space Compression set by Speed is crucial to the creation of a contemporary space of Acceleration:

In the projection of accelerated voyage, territorial space is thrown back, felt behind in the wake of the trajectory territory is exploited by the acceleration of displacement, as if the consumption of space and time follows upon and repeats the consumption of new materials, as if the dimensions of the world stem for its exploitation as a field of action 10

Dromology (or Dromoscopy), the science that studies speed, is explained by Paul Virilio in *Negative Horizon* as:

The astrology of technological objects, the means of communication consisting of simulators of

<sup>8</sup> Barthes, Roland: *Mythologies* (Translated by Annette Lavers) New York : Hill and Wang, 1972 (Original in French: Barthes, Roland: Mythologies. Paris: Seuil, 1957) P. 57

<sup>9</sup> From Thackara, John: *Lost in Space: A traveller's Tale*. Haarlem, 1994

<sup>10</sup> Virilio, Paul: *Negative Horizon* (Translated by Michael Degener) London/New York: Continuum 2005 (Original in French: Virilio, Paul: L'Horizon negatif. Paris : Galilée, 2005) P. 144

space passed through Motors, generator of speed and images, are therefore less the means of transporting the passengers, then of dephasing and desynchronizing [them], to the point that [them] must now learn how to pilot11

The Airport is the Dromological Space per excellence, containing and conducting flows of traffic, both mechanical and human, technological and behavioral, material and immaterial, temporal and extemporal. Here: "the management of time thus necessarily succeeds that of territory, but it is a question of the time of a total mobilization, that is, that of an absolute social deregulation" 12; the one created by Mobility.

"In a pseudo-territory, the late city functions like a residue, or, rather, like the essential fallout of the transportation revolution...[...]...as a communication infrastructure, the habitat henceforth persists merely to form the 'outskirts' of an accelerator errantry; now a mere reminiscence, or semblance, geographic place is no longer the foundation of human experience but rather a pole to be reached in the round-trip exercise" 13

# The Airport is a Museum and the Museum is an Airport

Migration is a changing factor over contemporary urban landscape, where mobility extrapolates in new territories determined by ethnicity and the banal hosts intangible connections beyond geographies as they have been traditionally understood, leading the a city shaped by Multiculturalism:

This extreme congruence puts us to the test, it is not solely, as we might claim, a temporary event, but a cultural and political advent that poses to us, outside the ecological question of limits, the no less important dromological question of residual proximities"14

Miami International Airport (MIA) is among the busiest airports in the world. There are over eighty airlines serving MIA to approximately 150 destinations around the globe. It presently mobilizes 33.1 million passengers out

14 Virilio, Paul: *Negative Horizon* (Translated by Michael Degener) London/New York: Continuum 2005 (Original in French: VIRILIO, Paul: L'Horizon negatif. Paris: Galilée, 2005) P. 77



FIGURE 3: Museum of Immigration

of which, 15.1 million are International passengers, truly acting as a transnational gateway into the US and a cross-point between the Americas, The Caribbean and Europe15. MIA is a Dromological Space and a globalized enclave in the pseudo-territory of the city.

By way of emulating Rem Koolhaas in Generic City when quoting: "Is the Contempo-

15 Statistics from Miami-Dade Aviation Department (2006)

<sup>11</sup> Ibid P. 128

<sup>12</sup> Ibid P. 77

<sup>13</sup> Ibid P. 77

rary City like the Contemporary Airport? all the same? 16 the purpose of the Studio this time around was to counteract this exact statement by redefining public space within the limits of the most-controlled and surveilled spaces: The Airport.

Deriving from Virilio's ideas on Dromoscopy and the Aesthetics of Dissappearance, Surveillance and Control, as well as Speed and Time; the Studio proposed - based on the reading of selected chapters of Virilio's Negative Horizon – a Museum of Immigration, together with an International Transit Lounge + a DHSL (Homeland Security) and US Border Protection Processing Facility in the space of MIA, in connection with the proposed Miami Intermodal Center (MIC) & RCC (Rental Car Center) at NW 42 Ave. and NW 21st Street in Miami. In the present context of energy and sustainability crisis, the Studio suggested the redefinition of one of the most non-carbon neutral spaces in the city, in light of its future evolution while morphing it into a space of social, cultural and ecological balance in the midst of technological saturation.

Dromological Spaces: Paradigm of Reciprocal Morphology [Mutational reciprocity, Reciprocal Link, Reciprocal Shift Reciprocal Capsule, Reciprocal Morphosis] Keywords: Excess, Nihilism, Internationalization, Distillation, Devoid

### Studio Project Abstract

Is there such thing as reciprocal Speed? When is it that we stop and analyze an object, a circumstance, or in a broader scale, a system? Speed dictates directly how much experience we obtain from different events; however, for some this velocity is dictated by physical time itself, and for others [it] is dictated by the marking of an accomplished objective. The difference between these two sets of ideals is that physical time has been accepted as a part of daily life. On the contrary implicit time is one in which the experience mandates. Our mind is a porous entity, relevant situations are stored and carried in these pores eternally, and in this case these relevant situations are referred to ones that happen in implicit time [and] not in physical time. Time and speed are 16 Koolhaas Rem: 'The Generic City' in SMXL, 1997

two correlated units of measurement, if time is equal to zero then speed is equal to zero. It can be compared to a blank state of mind, in which just the image or the ideal that is framed is captured. The suspension of time inside of a capsule, in order for the visitor to capture and understand the feelings, experiences, and sometimes atrocities immigrants have to [experience] when [e]migrating is the purpose of this museum.

The location of the museum [with]in the [perimeter] of [the] Miami International Airport territory is crucial. Airports are in a constant symbiotic relation between the city and them[selves]; absorbing and radiating passenger/migrants. Moreover, airports are more closely related to each other than to their places of origin, they create an implicit aerial/ terrestrial city. In [regards] to immigrants, they live in a constant [state of] uncertainty; in the sense that they [no longer] belong...[...]...to their place of origin...[...]...neither [do they belong] to the place of destination (as airports...[...]...can belong to [a] city [and] to [a] network of airports). The mixture of cultures, ethnicities, religions that immigrate into a country [is] heterogeneous in every aspect; however, they become homogenized in the collective a[s] they are portrayed as just 'Immigrants'. There is an exorbitant list of cases of immigration: Some examples are [so-called] Guest-Workers, Refugees, Asylum Seekers, Exiles, Diaspora groups, Illegal [Aliens]; among others. The exponential growth of Immigrants in [today's] world has [always] been active: In the period from 1800 to 1930 around 40 million people emigrated to the United States due to the demands of industrialization (approx. 300,000 per year); in the year 2000; 850,000 immigrants arrived in the United States. It goes up to the point where birth rates are [presently dictated] by Immigration rates. Due to this excessive numbers of Immigrants, the immigration process has eliminated the physical human being and converted it into a piece of paper granting permission to [access] a particular destination. In other words, the immigrant is devoid from its place of origin by the process of emigration. When permission is granted to immigrate into a new place, the Immigrant is distilled from the past and 'internationalized' in to a new realm. When there

is a negation of the permit to immigrate to another nation there is always a way around; in this case [we] refer[...] to 'Nihilist immigrants'. Migration has always been in the blind spot of host nations, the processes of immigration have not changed since humans [began] being nomadic and decided to [e]migrate, the only change is in its exponential growth. According to Paul Virilio...[...]... "The materialist deconstructs the matter he is analyzing to an excessive point where sooner or later will get to his selfdestruction" 17. Does this mean that the excess of growth in immigration will theoretically lead to a homogenized world? Is the reciprocal of this speed going to manifest the real meaning of immigration?

The [Studio] proposal for the Immigration Museum is not only to manifest the experiences immigrants pass during the complete metamorphosis of becoming another citizen in a host country, but also to create a sense of awareness and a base of knowledge (immigration affects everybody and has to be taken out from that censored blind spot). The experience of visiting the museum is a reciprocal experience; in which the host visitor will 'become' the immigrant immediately upon arrival to the museum. This static change will happen throughout the ride towards the museum in the [MIC - Miami Intermodal Center People Mover], where separate yet visible cabins for transient passengers and visitors are going to be shared. By the time when the [Mover] gets to the entrance of the Museum, the host/visitor will realize that it has become the immigrant in the realm of the transient passenger (which in reality is the immigrant). The spaces (the transient lounge and the museum) are going to be reciprocal of each other and at the same time interlocked with one another. By a series of experiential representation of feelings, desires, visions immigrants have the visitor will understand to his/her own criteria what being an immigrant means. At the same time the [International] Transi[t] lounge will become a desired destination for transient passengers, as well as for inhabitants of Miami and around the country. The in-between spaces between the museum and the [International] Transi[t] Lounge [provide] opportunities for Digital [and] Analog Artists to manifest through their medi-

17 Virilio, Paul: Negative Horizon. P. 88

ums the relationships of th[ese] two realms. The...[...]...result of this Museum is to create a 'Manifesto' [demonstrating that] the processes and experiences Immigrants [experienced] are not in vain.

### One last Trilogy: Reading and creating Spaces in Architectural Foundations

The previous four Design Studio iterations occurred within the context of Senior level Architecture Studios at the School of Architecture of Florida International University in Miami. After two Semesters (over two consecutive Fall Terms, in 2007 and 2008, respectively) of doing the Theory Seminar Design Studio at the level of 4th year, the method proved effective in terms of facilitating the conceptualization of the Studio Project, geared specifically towards certain design considerations and intentions extracted directly from the reading (design governing) chapters. In some cases, difficulty in the design process was overcome by going back to the specific reading. At a Senior Level (Undergraduate), the Students proved to assimilate the Seminar dynamic integrated to the Studio well. But: What about applying these methods to less-advanced/lower year Studios?

The opportunity came in the Fall of 2009, as I conducted the first Design Studio following my appointment at Clemson University. This Coordinated Architectural Foundations I Studio (Sophomore Year); suggested an Abstract, undetermined program, geared to have the Students create a scheme containing three 'moments', spatial instances to which a specific character and a certain atmosphere/phenomenology was to be assigned. In this case, the technique of reading and Seminar technique was simplified, by having the Students read specific excerpts (as supposed to entire Chapters); once again from three different authors ('Trilogy of...'), as follows: Henri Lefrebvre's ("The Production of Space"), Gaston Bachelard's ("The Poetics of Space"); and De Certeau's "The Practice of Everyday Life".

The Students were subsequently asked to select a specific quote/phrase directly form each of the three excerpts, in order to 'assign' it to each of the three 'moments' in the Project. The intention was for the quote to act as a trigger to generate the spatial qualities of the space - or 'moment' - that differentiates itself from the next. A short narrative, depicting the experiential and phenomenological scope of the moment as 'inhabited' by its character, was a requirement as a way to substitute the previous 'Studio Project Abstracts'. The results of one of these design Studio iterations using a simplified methodology of creating spaces through reading, are demonstrated in the following Studio Project exercise:

# Trilogy of Juxtaposition (George W. Hughes)

Moment 1: "It is a strange situation" (Gaston Bachelard, 53)

Le Corbusier witnessed the insult and snapped, "Why does my building hang from the ceiling?" There was no answer, for his dream was mocking his dogma. The many different shapes in the extruded medium furthered the mockery. "There can be no community here." The disorder formed a canopy over him, which stifled his conviction, and violated his science.

Moment 2: "And Harmony [...] is transposed into the visual realm" (Henri Lefebvre, 286)

And then Wotan appeared in a whirling torrent upon his obscure stage, encased in a receding Ring of Fire. "My omnipotence be heeded," said he against the starry backdrop. "May this Ring remind all my subjects of their place!" His bellowing voice and wielding spectre projected and reverberated as far towards the audience as the actual stage elements themselves.

Moment 3: "Space is a practiced place" (Michel de Certeau, 117)

As Constant entered the Situationist City, he realized that he was a lone traveler in a never-used conglomeration of towering masses. Through their verticality he traversed in wandering, no longer caring about the structural function, the spatial rationale. In this disorienting matrix he was content: because the matrix was telling him that his mind was no longer disorienting to him.

### Conclusion

# A premise for new techniques at Design Studio?

The Seminar frame of Design Studio based on target reading proved to be an exciting methodology to introduce students to advanced theory with applicable aspects to spatial design in the context of Design Studio. Due to the contemporary phenomena awareness, as conducted through mass media and mass culture (i.e. fear, consumption); plus the aspect of social and economical identity – leading to the recognition of social stigmas (i.e. exclusion, mediation); Students were able to easily identify topics which they embraced passionately at times of the discussions. However, in order to narrow and target the focus of the individual design, the implementation of specific keywords was instrumental for the purpose of translating these ideas onto the realm of the architectural schematic partie. One aspect that is clear is that this methodology becomes a very personal approach on the part of each Student, nurturing an intrinsic relationship with the Studio Project and a sense of appropriation of the Project goal and target in terms of Social Catalyst of Social Transformer. This makes this methodology a hard to be implemented technique when it comes to Design Studio Project executed by teams and not individually. It proves however to be an effective instrument to induce not only the aspect of reading, but the one of interpretation.t

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### LEARNING FROM DETROIT @ 00:00:55 Open Session

DIAAN VAN DER WESTHUIZEN, PH.D. CANDIDATE, UNIVERSITY OF MICHIGAN DR. ROCHELLE MARTIN, PROFESSOR LAWRENCE TECHNOLOGICAL UNIVERSITY

## Introduction

Filmmakers have created iconic urban images: the Manhattan skyline in the work of Woody Allen; the ocean front promenade in Wem Wenders evocation of Havana in *The Buena Vista Social Club*; and Michelangelo Antonioni's depiction of swinging 1970s London in *Blow-Up*. These films stir our imagination with rich and textured images that are the result of careful observation and craft. However, ultimately they are imperfect windows to reality because they present us with very controlled, deliberate, and edited views of the cityscape.

This situation points to three problems that result from the filmic experience: viewers are removed from the lived reality of the event; they rely on the image to mediate experience; and their experiences are the result of preconceived notions and assumptions that frame views of space, place and context. Applied indiscriminately, these images, signs and norms arrest reflective thought and reduce the city to a series of normative/known representations. "The saturation of the image will therefore promote an uncritical acceptance of the image." <sup>1</sup>

Alternative approaches challenge these abstractions through the concept of experience. The goal is to develop a reflective mode of investigation that captures nuanced representations of urban life as a dynamic and openended system of signification. In the larger culture, the reliance on sight allows the individual to quickly and simplistically perceive the world around them and indiscriminately make assumptions. Through experience, however, the dominance of vision over the other senses (hearing, smell, touch) is counteracted. The process on how to critically frame reality through experience has long been a topic of discussion in the phenomenology literature.

1 Leach, N., *The Anaesthetics of Architecture*. Cambridge, Mass.: MIT Press, 1999, p. 55

Developments in phenomenology resisted the problematic duality between the city as a physical structure for life and the city as a concept of human imagination. Instead, social theorists introduced comprehensive triadic models to overcome this duality. One such model is Henri Lefebvre's spatial triad of the perceived, conceived, and lived. The third term, the lived experience, mediates between the concrete reality of space (perceived) and the abstract thought of space (conceived) (Lefebvre 1991). The triad encourages spontaneous, improvised, contingent engagement rather than the predictable, predetermined and routine. What Lefebvre refers to is not a distant and abstract situation, but rather, an active exchange between the individual and city life. This approach is intended to overthrow predetermined conceptions of the city in order to explore its potential as a site of lived experience.

### Critical Phenomenology and the Construction of Lived Reality

Critical phenomenology, a mode of investigation that merges bodily experience with reflective experience, maintains a resistance to normative cultural signs. It enables an individual to search beneath surface images for the barely visible and the invisible in order to make critical judgments. The modern city offers an intensity and plurality of spatial practices that remains allusive from any single point of view. The city weaves together a network of informal procedures that re-appropriate the formal administrative pathways and overtly and secretly shape everyday reality through social life. The experiential immediacy of moving through the city quickly reveals one of its most important social purposes: the city is a concentrated site for encountering the other: "to practice space is thus to repeat the joyful and silent experience of childhood; it is, in a place, to be other and to move toward the other."  $^{\rm 2}$ 

But it is misguided to expect that the invisible stories will become articulated merely through the encounter alone. In his allegory of the theater. Goffman discusses the interaction between actor and audience in their shared attempt to maintain the coherent surface imagery of the situation. Even if the preferred definition of the plot becomes discredited, actors and audience alike will continue the performance in order to sustain the appearance before each other and avoid discomfort. The audience is rarely able to peak through the curtain to the backstage region. It is here where incoherent, improper and unsanctioned behaviors take place; the actors can take down their guard and find refuge in their daily "unspoken performances" (Goffman 1973: 133).

It is rare for the audience, or outsider, to penetrate the opaque and foreign practices of the city. The relationship of intentionality between actor and audience taints our ability to see the spectacular array of life hidden behind the curtain. Merleau-Ponty suggests that what we perceive of the concrete reality is already infused with intentionality. "Consciousness is always intentional; it always intends or is directed toward objects." <sup>3</sup> In the mundane daily life, purposes are often directed to reinforce the gridlines that social/cultural expectations have imposed on reality, manifested through everyday routines and memories of previous experiences.

Berger and Luckmann suggest that our lived reality is constructed, and we perceive ourselves as free and comfortable to go about our daily routine. We are in contact with both our concrete (perceived) world and our conceptions of (conceived) the world through a system of socially and culturally prearranged signs. We can focus our attention to matters that have to do with *our* 'here-and-now,' convincingly circumventing the lurking questions in our consciousness about the existence of *other* realities and their potential threat to our known existence. Our behaviors are accentuated by images of our own imbedded experience in the places we live, and the people we interact with. We are never fully disengaged from these normative signs and images and we often act out our behaviors in other contexts without scrutiny. Even walking through unfamiliar territory, we make sense of our surroundings through our narrow conceptions of reality. To the naïve viewer, observations feel most convincing when the content is recognizable and consistent with the familiar; like a snapshot from an experienced past.

It is also through the continued embodiment of the constructed reality that apprehensions brewing in the consciousness are suppressed. Our experiences become bodily expressions of known images that comfort us in our selfreinforcing worldviews; and they become lived expressions that we act out. The uncritical interpreter easily falls back on perceptual habits that, by default, piece together an understanding of events that seems necessary, justified, and whole.

It is therefore important to make the distinction: (complacently) living everyday life is different from critically experiencing everyday life. It is exactly within the tension of consciousness, or perhaps awareness, that everyday life also opens up possibilities for expression and transformation. This is by no means easy. Since intentions also maintain social and cultural regulations, the artist/architect needs to question the mechanism of intentionality itself in order to uncover the process of critical investigation into city life.

Umberto Eco's analysis of the 'open work' envisions the artistic project free from any external necessities or prescribed organization. It is open-ended, fluid and undefined with the purpose of widening our experiential horizons to new interpretations. It allows the reader (or viewer) to focus her attention on making connections by participating in a stimulating experience rather than relying on habitual schemas of the mind. The moment of conception summarizes the signification into an 'image,' closing off any further possibilities for interpretation. When contemplation of the image occur in isolation, similar to gazing at an object for too long, one becomes saturated and entranced and start to see connections that

<sup>2</sup> de Certeau, M., *The Practice of Everyday Life*. Berkeley: University of California Press, 1984, p.110

<sup>3</sup> Berger, P.L. and T. Luckmann, *The Social Construction of Reality; a Treatise in the Sociology of Knowledge*. Garden City, N.Y.: Doubleday, 1966, p.20

have limited lived relevance. For the artist to engage in such acts of conscious freedom, she has to admit contradictions and accept complex and incomplete significations rather than complete images.

Eco suggests the way to prolong our experiential attention span is to allow an ongoing movement of thought rather than retracing stimuli to their 'logical' conclusion. Recognizing the dynamic nature of the city will allow an endless supply of experiential content for continued inquisitive engagement, interrogation and reflection.

The second reinforcing dimension of this experiential dynamism is not only the *movement of thought*, but also the physical *movement of the body* through concrete space. As in Goffman's performances on the front stage, the conviction of the 'act' is both in the spoken word and in the way the actors carry themselves through their bodily postures. Latent within our embodied gestures, kinesthetics, and rhythms hides yet another set of regulatory concealments that limit our capacity to penetrate the experiences of the *other*.

Critical phenomenology requires a stance that addresses both content (the city) and medium (the experience or body). We need to push the engagement not only in thought, but also in body in order for the unfamiliar to speak. These bodily gestures include reorienting effects of the body that result from mediating technological paraphernalia such as cameras, phones, and computers. Retracing the movement of the unknown other becomes a means to both record the experience as well as to access the other's everyday life as a work of art. It becomes a continuous interpretive act and performance that both disappoints due to its variety and indefiniteness but also satisfies through the accumulation of new content (Eco 1989). It is through the active presence of the outsider-interpreter, being seen, heard, felt, and thought of, that transformative experiences can occur: the audience becoming actors. It requires this level of commitment and acceptance of complexity in order to accrue knowledge of the lived reality that may ultimately effect change.

## The Assignment

This assignment has evolved over time and is a technique we have used to emphasize the relationship between the urban context and the built environment. Because of Lawrence Technological University's proximity to the city, Detroit was selected as the study site. Many of the students in the program are from either the suburbs or rural areas. Often they are unfamiliar with the city and come with a predetermined set of values and attitudes about Detroit that alienates them from the existing everyday reality of the place.

The city of Detroit has suffered from a negative image since the late 1960's when riots erupted and images of decay, struggle and deterioration proliferated in the media. Although Detroit has undergone many changes since that volatile period, these negative images have become the accepted iconography of the city. There are those who have romanticized these images as the "pleasure of ruins," publishing books and web sites to document their vision. Conversely, there are others who view the city with fear and mistrust, rarely venturing into the area except for sporting events or car shows, and leaving immediately to return to the 'safety' of their homes. Both strategies overlook the actuality of the existential reality confronted by the residents of the city.

Before the students can adequately begin to address design issues, they need to confront a reality different from the constructed reality offered by normative myths. They need to acquire personal information, insight and experience of the urban arena. To achieve this objective, students are given an assignment that compels them to go out into the community and to research and record their experiences. The purpose of this assignment is: first, to acquire knowledge about the ways in which people experience urban space through movement and event; and second, to develop powers of observation and representation (important skills for an architect).

To achieve these goals, the students are asked to work in teams of two to create a 55 second video based on their reading of the city of Detroit. They are encouraged to look beyond the obvious subject matter to objects, events and people that reveal the everyday reality of the urban arena. The team setting is intended to create an ongoing dialogue between team members that enhances the work produced and provides a challenge to the perceptions, preconceived ideas and attitudes of each team member.

The assignment is a two-fold process of observation and creation. Phase One is an exploratory study of the city to seek out elements and activities that reflect an alternative view rather than the obvious subjects. The students are guided to go beyond surface appearances to reveal patterns and actions not easily discernible without a critical approach. Observations are initially undertaken without the use of the camera; reliance on the camera can lead to an uncritical acceptance of the image and a distancing of the individual from reality, as the camera becomes the mediator between the individual and lived experience.

Phase Two involves the making of a 55 second video that records the response of the students to their experience of the city. It is the responsibility of the student to determine the relevance of the camera as a medium of representation. The advantage of the video camera over still photography is that it involves the element of movement rather than fixed images. As a central aspect of urban settings, movement is more than motion— it is the ground of human activity— encompassing change, fluidity and impermanence. The video camera portrays that movement by mapping bodies in space.

Public spaces are often the arena of events and are employed for purposes of commerce, relaxation, and celebration. Some spaces are planned, such as parks, plazas, or bus stops. Other public spaces are appropriated to meet a temporary need such as a street fair or a parade. However, every public space has limitations in terms of appropriate behaviors, language, customs and rituals. As Goffman suggests, it is simultaneously a realm for open performance and private exclusions. Often, these activities leave barely visible and invisible traces of urban events, all of which involve the movement of bodies through space. As Henri Lefebvre writes,

"It is necessary for a space to be occupied. What then occupies space? A body-not bodies in general, not corporality, but a specific body, a body capable of indicating direction by a gesture, of defining rotation by turning around, demarcating and orienting space." <sup>4</sup>

Although the medium of the camera is capable of portraying the movement of bodies in space, this does not address the process of preselecting images and significations. Making a video is an intentional act and it is through these selected images that the values of students are exposed. How, then, does the camera connect to critical phenomenology? As Bernard Tschumi suggested, "any new attitude to architecture had to question its mode of representation."  $^{5}$ 

By approaching the making of the video as a 'derive' (as first imagined by the Situationists drifting through Paris with a map of London), this random, unstructured experience creates unexpected perceptions. Unlike planned straightforward documentation of their observations, the work is not predetermined but allowed to flow with the moment. These fragments of urban life are open-ended and incomplete allowing the students to make new connections and interpretations.

The application of critical phenomenology in the search for an experiential architecture also involves the questioning of normative practices. The moment of contact between the interpretive act and the city entails an awareness of the ever-changing and transient nature of human activity. This moment of awareness is illustrated by the term transgression. As argued earlier, the challenge of applying critical phenomenology is that both human activity and the mode of inquiry are inextricably linked: the interpretive act is also constantly shifting and changing.

For example, in the 1980's, Bernard Tschumi proposed a potential moment of transgression through critiquing modern architects for not embracing the aspect of 'decay' in architecture. According to Tschumi, architecture is appreciated best when it shows signs of deterioration or decay. However this moment of decay that Tschumi calls the 'rotten point' has become somewhat of a normative reference for contemporary architects. At one moment in time,

<sup>4</sup> Lefebvre, H., *The Production of Space*. Cambridge, Mass., USA: Blackwell, 1991, p.170

<sup>5</sup> Tschumi, B., *Architecture and Disjunction*. Cambridge, Mass.: MIT Press, 1996, p.143

Tschumi's metaphor of decay provided content for transgression. Since then, the layers of decay have become no more than fixed images, leading architects to an uncritical fascination with these motifs. Today, architects attempt to go beyond this motif and augment Tschumi's critique. They achieve this by an active interest in the ambiguities and uncertainties that evolve from our contemporary situation (consider the work of Rem Koolhaas).

### **Results: Student Videos**

Before being introduced to critical phenomenology, the students were asked to produce videos of the city. As expected, the exercise yielded narrow conceptions of the urban reality. Most of them depicted the city in ways that has become characteristic of the artists'/architects' fascination with deterioration, decay, and struggle; as if to amplify their defense mechanism of normative images and protect them from the perceivably incoherent content of the city.

As anticipated, traces of disorder were uncritically equated with sites of urban abandonment and threat. Some students chose to disregard the potential of the video camera to capture movement and proceeded to take still images of dilapidation: houses, buildings, broken windows, and walls covered with graffiti; as if to freeze a drive-by moment into fragmentary urban trophies. Their discomfort with encountering the city on foot is demonstrated by a number of their videos depicting urban life from the protection of the inside of their car. This 'armored' movement through the city disconnects students from finding the urban pulse that occurs only at the level of the experiential body. In addition , the 'movement' that many portray is an aestheticized version by filming vehicles on a highway, replicating historic images of Detroit as the 'Motor City'. Videos are often replayed in fast motion, as if to simplify the urban encounter into a seamless space of flows, always 'moving-through' but never 'moving-within'. (Figure 1)

City neighborhoods are recorded as left over spaces, empty lots, and spaces devoid of function. These spaces simultaneously contain the aftermath of decades of conflict and of economic disinvestment. The intricacies of publicprivate life are reduced to a surface reading of



FIGURE 1: "Deteriorating" by David Kerstetter

the deviant, criminal or the homeless. Meaningful territories remain invisible to the students, fenced in behind razorwire, walls, and window bars. Boundaries of ignorance are materialized by physical boundaries, while the naïve 'marking' of these boundaries exacerbates the spectacle of placelessness. (Figure 2)

After being exposed to the idea of critical phenomenology, a more nuanced response was elicited. One of the students documented the uncanny moment of the late-night cleaning shift through the glass entrance of a downtown



FIGURE 2: "Deteriorating" by David Kerstetter

office lobby. Like the distant main character in the solitary spaces of an Edward Hopper painting, a lady meticulously vacuums this illuminated space. Her embodied rhythms shape the shadows against what seems to be, at first glance, a hostile urban space. Witnessing this scene transforms this urban space into a situation of care, instead of a site of isolation and alienation. Her participation with the student observer is not face-to-face, but her hidden presence is aesthetically insightful and inspired



FIGURE 3: "Deteriorating" by David Kerstetter

her particular framing and documentation.(Figure 3)

Another example is footage from Detroit's Eastern Market, one of the most vibrant public spaces in the city. The camera is placed to record the passing of people's feet and lower extremities, as if the observer were kneeling or sitting down. There was no predetermined decision for placing the camera in this position, but it provides a revealing angle on the dynamics of the crowd. It intensifies people's contact with the ground plane, revealing their freedom of movement and their interactions with other people and objects: companions, children, dogs, bags, strollers, carts, etc. This example suggests one way of liberating the operator from the intentionality that accompanies the act of 'point-and-shoot'. The technique entails setting up the camera in a fixed position within urban spaces that are selected for their potential to be charged with activity. The operator selects the setting, but form and content are left to emerge on their own terms. (Figure 4)

In another video, a fountain is identified on the Detroit riverfront boardwalk as a site for potential action. The first few seconds of the video shows a regular flow of pedestrians. Unexpectedly, a boy releases the affective potential of the space by running through, weaving around, and skipping alongside the fountain's animated water spurts; his spontaneous 'dance' drawing the crowd's attention to what now has become an urban event.

In "Camera Lucida", Roland Barthes explores this process of searching for the unintentional details that often appear in an otherwise 'staged' photograph. By looking at the marginal details rather than what the photog-



FIGURE 4: "Eastern Market' by Rochelle Martin

rapher had composed, the viewer is able to avoid forced rhetoric, and discover subtexts that are far more interesting and insightful. An example, among the student videos, is a scene of an outdoor eating area with a woman on her lunch break reading the newspaper. The viewer becomes aware of an aesthetic display of innercity birds circling around on the ground in synchronized patterns, while the woman remains unaware of the performance occurring beneath her feet.

A less successful video clip using a stationary camera recorded people moving through a bus terminal. In an attempt to be inconspicuous, the student explained how he propped up the camera on the corner of the street and pretended to 'mind his own business' a few feet away. The student expressed reluctance to get closer to the crowd in fear of being challenged. His timid gesture, of being too removed from the activity, disconnects the viewer from the crowd. Instead of maintaining an appropriate distance in order for movement narratives to become visible, the separation between actor and audience became too much to sustain any connection.

In contrast, another student's video portrayed a woman on a concrete bench waiting for the next bus. The participant seems rather unconcerned with the camera and she allows the viewer to follow her distinctive facial expressions. The closeness of this shot enters actor and audience into a relationship of intimacy and trust. Perhaps even more thought provoking is her pensive stare into the distance set against her shiny red boots.

Future design studios may explore other provocative applications of critical phenomenology that address Umberto Eco's 'embodiment' more directly. In the 1929 silent documentary "Man with a Camera," Dziga Vertov, embarks on such a quest to explore industrialization, electrification, and labor in the modern Soviet city. He experiments with various movement sequences, tracking shots, and camera zooms. More importantly, his open-ended use of the camera emulates the movements and rhythms of citizens' engagements with new forms of technology: streetcars, sowing machines, elevators.

In reference to the cinema, Roland Barthes suggests the construction of the cinematic reality becomes convincing as the photograph, taken in flux, becomes drawn toward other views (Barthes 1980). It is perhaps because video generally resembles our natural perceptual processes, or as Ulric Neisser called it 'viewing through movement', that renders it appropriate for experiential analysis. Neisser further suggests that movements and actions are inseparably linked. With each frame of movement, we selectively direct our attention to the coherent and the familiar, followed by a readiness for future actions (frames) of a certain kind (Neisser, Atkinson 1976). Having said that about perception, 'derive' can only be achieved if we consciously resist these anticipatory schemas: instead we may emulate, track, or map the urban experiences of others whom we encounter. As Dziga Vertov showed, the camera needs to be lost in the crowd [in order to be of the crowd].

The application of critical phenomenology offers the potential for investigating the relationship between the individual and the dynamics of urban life. The experience of being a participant observer alters conscious awareness and perception. This approach permits the interpreter to evaluate their preconceived ideas and situate herself into the context of the city. The audience and actors become one.

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## OF THE SAME HAND Open Session

MAHINDROO AMRITA, SMARCHS CANDIDATE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

History has shown us that the most promising leaps in evolution are those which are demonstrative of a certain incongruity, and it is these which are often pregnant with possibilities of a future generation of outcomes which bear little or almost no resemblance to their parent states.

Throughout history the works of numerous artists and architects have shown a signature, as if to say, 'they come from the same hand', regardless of the multitude of hands the idea is drawn, communicated and then finally realized by. The continuity of the hand is more often as a result of the greater intellectual project. It is through the exploration of an idea, or abstract theoretical agenda over the course of multiple projects that the series develops, thus becoming an integral part of the exploratory process of design. The series, as identified in this paper, assumes two distinct branches, the first and perhaps most obvious, is the one in which there is a consistency of a formal or aesthetic language between projects. The second and more interesting series is that in which projects bear no obvious stylistic resemblance to one another, they are more importantly, able to explore a singular theme to its broadest capacity through different techniques pertinent to the context of each project. This paper is an exploration of the friction between the ambitions to negotiate the ever-changing contextual circumstances for and from which works are conceived and the artistic need for identifiable authorship. It will seek to illustrate how technology has changed the nature of continuity of the 'hand' through history, transitioning from the skilled hand of technique prior to modernization, to the hand of abstraction through the 20<sup>th</sup> century, leading to questions of its present ambiguity in the age of digital design.

## The Hand

In 1880 Auguste Rodin received the commission for the 'Gates of Hell' (Figure 1) from Edmund Turquet, for a portal to a museum of decorative arts, which was ultimately never built. The piece was a depiction of a scene from Dante Alighieri's 'The Inferno'<sup>1</sup>. Indicative of remarkable heterogeneity and craftsmanship, the gates are in fact a compilation of 180 clones of two or three figures which have been repeatedly reconfigured into a new narra-



FIGURE 1: Auguste Rodin, 'The Gates of Hell', Musee Rodin, Paris, 1917.

tive giving each a unique identity in the overall work. Rodin worked on the piece over the course of 4 decades, and from it came some of

1 Le Normand-Romain, Antoinette (1999). *Rodin: The Gates of Hell*. Paris: Musee Rodin, 2002.

his most recognized sculptures, such as 'The Thinker' and 'The Kiss'. The gates in essence became the testing ground for many of Rodin's ideas, finally materializing as themselves a culmination of his body of work.

Rodin saw the end of an era where the expressive nature of the work of art was defined by the skilled hand of the artist. The dramatic changes in techniques of production which followed the industrial revolution slowly edged their way into the arts via the applied arts and industrial design, ultimately exchanging the skilled hand for the precision and efficiencies offered by new technologies. The romantic notions of the hand crafted or handmade were largely undermined in the early 20th century with modernisms affinity for abstraction, the beginnings of which were already becoming apparent in the work of Rodin, and some of his students, such as Antoine Bourdelle. The value of a contemporary work of art is measured primarily by its conceptual rigour. The series today can very rarely be justified as pure explorations of technique, as was the case in an earlier age. This need for abstraction requires that the works which emerge from a series, demonstrate constant reinvention or mutation so that the conceptual lineage is seen to progress in its physical form across the body of work.

## The Dynamic Type

Quatremere de Quincy, an architectural theorist of the enlightenment period, wrote extensively on the subject of architectural mutations. His underlying argument lies in the distinction between the model and the type, in his work *Dictionnaire Historique d'Architecture;* 

'The word 'type' represents not so much the image of a thing to be copied or perfectly imitated as the idea of an element that must itself serve as the rule for the model...The model, understood in terms of the practical execution of art, is an object that must be repeated such as it is; type, on the contrary, is an object according to which one can conceive works that do not resemble one another at all.'<sup>2</sup>

2 Antoine Quatremere de Quincy, 'Type', quoted in Aldo Rossi, *The Architecture of the City*, trans. Diane Ghirardo and Joan Ockman (Cambridge, Mass: MIT Press, 1982), p.40 Passage originally published in Quatremere de Quincy, *Dictionnaire historique d'architecture*, vol. 2 (Paris: n.p., 1832)

The type thus provides the source through which a formal language evolves, allowing for the development of a series without compromising the creative independence of the individual oeuvre. Whilst traditional 20th century reading of the type has been most closely linked to the idea of formal composition, its contemporary resurgence should be under more dynamic pretences, as identified by Detlif Mertin's in his essay titled 'Same Difference'. In his study of Mies van de Rohe's idea of modularity, Mertin's makes an analogous reference to Goethe's theories on biological forms, which allow the parent theme to remain an abstract notion, read only through the sophistication of each unique response;

'Consider a selection of leaves from the field buttercup (Ranunculus acris), arranged from the bottom of the stem to the top. Despite its extensive range, the series nevertheless gives the impression of an overall unity. No one leaf however suffices as a measure or model for all the others. Rather their unity remains implied, contingent on the progression and transformation of the series, on what Goethe called the metamorphosis of the plant – 'the process by which the same organ presents itself to us in manifold forms'. This unity remains open to the possibility that a new form will take its place among the others and inflect the series.'<sup>3</sup>

The model on the other hand implies an established aesthetic or formal grammar, which today is closely related to the aesthetic continuities which result from technique based explorations of form. Technique is defined as specific a way of carrying out a particular task<sup>4</sup>. It is pre-established and implies a mechanical methodology with an emphasis on skill. Art theorist Susan Langer stresses that the artist's ability to weave layers of meaning into the exercise of crafting comes from the cultivation of a greater ambition of expressing ideologies beyond the inanimate object, thus distinguishing between artistic expression and the mere crafting of expressive forms.<sup>5</sup>

5 Langer, S. ' Feeling and Form', published in *Aesthetics a Comprehensive Anthology*, ed. Steven M.

<sup>3</sup> Mertins, D. 'Same Difference', Published in *Phylogensis, FOA's Ark Foreign office architects*, Actar, 2003.pg 278

<sup>4</sup> Definition of Technique, *Oxford English Dictionnary*, 2009.

## Antony Gormley

It is for this reason that the type has to be thought of as more than a device for generating a formal or aesthetic language. The idea of an individualized contextual response and the development of an overarching architectural language are almost completely at opposing ends of the game. That which constitutes the context of a work, is highly specific and more importantly an externally controlled factor, it cannot be, and rarely is controlled by the author who is required to work within and simultaneously create anew its definition. The dynamic type therefore needs to generate works which demonstrate autonomy in each context, however can be continually identified as building on a thesis, as seen in the works of British Artist Antony Gormley.

In his retrospective exhibition titled 'Blind Light', held at the Hayward Gallery in London in 2007, Gormley showcased a collection of works on the broad theme of the human form in space. Each piece offered the potential to be read both as an individual oeuvre and as part of a series, tailoring itself to its environment whilst retaining its integrity as a whole.

His earlier explorations of the theme resulted in 'Field for the British Isles' (Figure 2) which comprised of 40 000 handmade terracotta figures created in collaboration with the local communities of the British Isles in 1993. Gormley requested simply that each figure bet between 10 and 20cm high and have two eyes, the rest was at the discretion of the hands that



FIGURE 2: Field for the British Isles, 1993, Antony Gormley

# produced them. Gormley's exploration has as much to do with the community that pro-

Cahn and Aaron Meskin, Blackwell Publishing, Malden MA, 2008, pg. 325

duced them as it does with his own intellectual project, of how reflective the configuration of the human figure is of a society at a specific moment in time.

His retrospective exhibition took this idea to a new level of complexity as he discarded any consistencies of aesthetic language to explore the theme in a broader sense, expanding the study of his context (that being the society within which his works were exhibited) well beyond the walls of the gallery, to the parapets of the building itself, and as far afield as the surrounding area in his piece titled Event Horizon (Figure 3) Gormley strategically placed human scale bronze clones on bridges, and the inaccessible rooftops of various buildings, all



FIGURE 3: Event Horizon, 2007, Antony Gormley, Hayward Gallery London

facing the gallery. The unprepared observer, sees a man precariously perched on a parapet; perhaps protesting or making an artistic statement or perhaps ready to take his life, incurring strangely overwhelming emotions of both awe and fear, until one understands what they are seeing is a narrative constructed around Gormley's own observations of societal behavior toward these issues.

The works which followed were of a similarly dynamic nature each creating an independent yet unified discourse around the theme of the peripheral space around the body. Gormley's thesis that the figure is present only as a consequence of its surrounding environment is seen in every piece, from the analogous



FIGURE 4: *Matrices and Explosions*, 2007, Antony Gormley, Hayward Gallery London



FIGURE 5: *Blind Light*, 2007, Antony Gormley, Hayward Gallery London

models in allotment, where the form of the body is abstracted into concrete sarcophagi or the embryonically suspended figures in 'Matrices and explosions' (Figure 4) held in tension in a net of stainless steel cables, to the purely abstract in Blind Light (Figure 5) where the inanimate figure is substituted by the observer's body as they move through the volumes designed to heighten one's own experience of the peripheral space defined by their own body. There is never a more intense sensation of being both alone and surrounded by the unseen figures within a thick white cloud. From the exterior the artwork is constantly reconfiguring itself, as the dark silhouettes of the figures which occupy the volume, surface time and again from the boundary-less white fog.

In his observations, art critic David Leader, articulates how Gormley's works are constantly challenging the peripheries of the physical form.

Gormley speaks of his fascination with "negotiating and renegotiating the edge, in terms of whether it's within or without". Edges, he says, are "the relation between something and nothing", and they "both define and release us".<sup>6</sup>

Gormley's works show no firm aesthetic thread; his version of the 'dynamic type' emerges as an abstract idea which becomes the rule for his explorations across various medium, materialization techniques (both from the trained and untrained hand) and contextual surrounds. The emphasis here is that the open work is as much the outcome of a contextual dialogue as it is the development of a thesis. His work allows for an evolution which has far greater elasticity than the formal evolution of a predetermined aesthetic agenda. Whilst in recent times context has been discarded as a false parameter through which to measure the success or relevance of a project, even in its temporality one might consider context a rich vessel of information which provides the linguistic palette for the exploration of unique outcomes. It is of great value to think of the body of work as having an ideological certitude that allows a confident departure from palette, line, profile, and above all technique, ultimately allowing for a greater freedom of expression.

## Copyright

Gormley's bronze clones strategically positioned across central London are not so far removed from Rodin's figures in the Gate's of Hell. Both demonstrate the possibilities of perceived variation in the unit due to evolving context. In giving each 'clone' a new identity through a constructed contextual narrative, Rodin was able to exploit the technologies of reproduction available to him. Ultimately it was his skill at choreographing the work to

6 Leader, D. 'Antony Gormley; Drawing in Space' Published in *Making Space*, by Baltic Centre of Contemporary Art, Gateshead 2004. layer meaning into each individual figure that allowed the work to transcend the 'disenchantment' associated with each figure's reproducibility, and to extend it to the layered and complex work of art, which it came to be recognized as. In the words of Rosalind Krauss,

'The gates themselves are another example of the modular working of Rodin's imagination, with the same figure compulsively repeated, repositioned, recoupled, recombined. If bronze casting is that end of the sculptural spectrum which is inherently multiple, the forming of the figurative originals is, we would have thought at the other end – the pole consecrated to uniqueness. But Rodin's working procedures force the fact of reproduction to traverse the full length of this spectrum.'<sup>7</sup>

In her reading of Rodin's work Rosalind Krauss makes a marked reference to Walter Benjamin's seminal essay on 'The Work of Art in the Age of Mechanical Reproducibility'. Benjamin raises critical concerns in an age where technological reproducibility reduces the work of art from its earlier associations with aura (that which inspires awe) as the originality of the work becomes obscured by its consistent reproduction. She argues however that because the gates were stylistically autonomous from the techniques associated with bronze casting, they were sealed with a copyright, and hence able to transcend the philosophical tribulations associated with reproduction. The evolution of his works were wholly defined by the nuances and imperfections of his own stylistic techniques and furthermore by his own ideological thesis. It is perhaps to this end that Rodin had little difficulty in handing over the rights of his works to the French Government allowing for their re-casting. He acknowledged the arrival of a new age in which the skilled hand of the artist was losing its relevance, allowing that which he had produced (and was subsequently reproduced) to be infinitely tied to his own hand and to the time in which they were conceived, therefore beyond the need for the original<sup>8</sup>.

## The Hand in the Digital Age

What then becomes of the hand in the digital age? Our contemporary infatuations with technique, as seen in many a digital landscape, demonstrate a shift from the abstract to the analogue, through forms which represent through tectonics the technological instruments facilitating their conception. Digital techniques have opened great doors in the realm of design over the last decade, exhibiting extraordinary potential for the conception of complex forms and geometries with remarkable ease. They are however in the realm of the skilled hand. Whilst it can be argued that the objective of digital techniques in form finding is to allow for the emergence of unexpected results and new types, their disconnection with environmental parameters and contextual implications gives them a remarkable homogeneity as a consequence of their introspective nature. The dangers of allowing technique the role of both philosophy and tool jeopardizes the criticality of the work, regressing into a craft based mode of thinking and allowing the type to transition into what Quatremere de Quincy refers to as a model, defined by an aesthetic language. Whilst it is undoubtedly important to maintain the relevance of these techniques as a means to an end, it should be noted that techniques, in being contemporary are by nature temporary and almost entirely dependent on the technologies which permit them and supersede them with equal diligence. Their role is foremost to create the bridges between the development of a formal language and new technologies, both as an extension of the mind and the hand as it oscillates between the distant poles of the mind's eye and the material realization of a project, they cannot however be substituted for the training required for the mind to tailor a response to varying environmental circumstances, which inform the building of an ideological thesis.

Works, whose evolution depends on the evolution of technology, open themselves up to a greater risk of imitation. Some of the greatest protagonists of such thinking, for whom the body of work is the result of pursuing a stylistic agenda through digital techniques, have spurred future generations of referential forms in the works of other designers

<sup>7</sup> Krauss, R. 'The Originality of the Avant-Garde and Other Modernist Myths', MIT Press, Cambridge 1985. Pg 154

<sup>8</sup> Krauss, R. 'The Originality of the Avant-Garde and Other Modernist Myths', MIT Press, Cambridge 1985. pg 154

and furthermore endorsed these techniques through pedagogical models where the master-class assumes an earlier apprenticeship approach to teaching design, breeding entire future generations of similar designers.

In an age where technique based explorations of form develop a measurable arbitrariness, it leaves continuum in formal language at a dead end. The dogmatic pursuit of an aesthetic language through new digital techniques has resulted in a certain homogeneity of forms which leaves much of what we see as open to reproduction because of their apparent modes of conception. The ability to transcend the aesthetic limitations of the technology of a time, comes from an ambition to represent ideas outside of the techniques which can be attributed to their materialisation, as seen in the figures of both Rodin and Gormley. In an age in which technological reproducibility reduces the mysticism associated with not only the material but now also the conceptual origins of the work, it needs to be substantiated through a continuously evolving aesthetic, and its consistencies need to come through an ideological channel, a channel which will perhaps surmount our own digital adolescence, and push it in the direction where the extraordinary breadth of techniques we so introspectively use will be engaged to make connections between social, cultural and environmental factors. Somewhere in this union lie the next generation of types, we need only challenge the existing.

'it is constantly becoming other in order to remain itself. Its identity is founded precisely on the potency to be otherwise, demanding that the visible form be superseded again and again in an endless production of sameness and difference.'<sup>9</sup>

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### Art Works

Antony Gormley, 'Field for the British Isles' 1993
Antony Gormley, retrospective exhibition 'Blind Light', held at the Hayward Gallery in London in 2007; comprised of;
A.Gormley, Allotment
A.Gormley, Hatch
A.Gormley, Matrices and Explosions
A.Gormley, Blind Light
Auguste Rodin, 'The Gates of Hell', Musee Rodin, Paris, 1917.
Auguste Rodin, 'The Kiss'
Auguste Rodin, 'The Thinker

### Sources of Images

- Fig.1 Auguste Rodin, 'The Gates of Hell', Musee Rodin, Paris, 1917. Author of Photograph: Andreas Witzel, Source: Wikimedia Commons
- Fig. 2 Field for the British Isles, 1993, Antony Gormley, Author of Photograph: Matt Gorecki, Source: icommons
- Fig. 3 Event Horizon, 2007, Antony Gormley Hayward Gallery London, Source: Artobserved
- Fig.4 Matrices and Explosions, 2007, Antony Gormley, Hayward Gallery London, Source: Synaptic
- Fig.5 Blind Light, 2007, Antony Gormley, Hayward Gallery London, Source: Stephen White

<sup>9</sup> Mertins, D. 'Same Difference', Published in Phylogensis, FOA's Ark Foreign office architects, Actar, 2003.pg 278

## NOLLI BLOCK PROJECT Poster

### DEREK HAM, ELIZABETH LEWIS & GRETCHEN MILLER FLORIDA A&M UNIVERSITY



## HANNAH MENDOZA KANSAS STATE UNIVERSITY

## THE WIKI IN DESIGN: AN ALTERNATIVE APPROACH TO THE BODY OF KNOWLEDGE Poster


## SITUATING Poster

HANS HERRMANN MISSISSIPPI STATE UNIVERSITY



SIT·U·AT·ING





# UNDERSTANDING THE REAL WORLD OF SPACE: USING MODELS TO STUDY PROXEMIC Poster

Understanding the Real World of Space: Using Models to Study Proxemics in Foundation Design Studio



Clie Par Dev

of volume. of space and stand how

Assignment and Study Model

Basic Construction Constraints Façade E façade wil

space. As



Hand Drafting Component 1/4'' = 1' - 0'' Scale



## PARA\_SITE Poster

MICHAEL RICHARDS



Para\_site is a 72 hour sketch project that challenged students to capitalize on the unwanted margins of our built environment, to provide opportunist and ephemeral parasitic propositions to celebrate the mundane.

Whether students wished to view Para\_site as a realistic, microcosmic design proposition: or critique-through-design investigation; they were invited to create a Para\_site as if a scaled-prototype designed to exploit a site already in possession of so many key factors in constructing and micromologinal environmental control. Instead of designing at a size to accommodate the thruman body, each team of students was asked that ther Para\_site houses a pair of shoes belonging to each student in the learn. No pur on pair was intended here but there was more than a passing achieved belonging of comparison of the student in the learn. No pur on pair was intended here but there was more than a passing achieved belongement of cliches such as fool in the door. Test moder that their and shoes, signifying opportunity and occupation.

Each team's collected pairs of shoes operated as a scale substitute for a human body whilst themselves being at the scale of the body. They necessarily provided a performance-criteria load for the **Para\_site** to carry, though they also provided potentially useful ballast to help with strategies of interference fit, etc. The shoes chosen were selected for desired weight, but also for what they might inclicate about the individuality of the owner. Importantly the way students designed their **Para\_site** as a "shoe box" clearly had great potential for articularing the way they chose to arrange their shoes individuality of their pairs of shoes to observes note their **Para\_site** as a "shoe box" clearly had great potential for articularing the way they chose to arrange their shoes inside: and why. For this reason whilst I was not an absolute requirement, groups were invited to consider how they might display the chosen arrangement of their pairs of shoes to observes note their **Para\_site** as a "shoe box". absolute requirement installed in the gap.



K.Stuhlmacher P.A.R.A.S.I.T.E. Thomas Beck: Rucksack Haus Student design sketch

Creative review

PROJECT OBJECTIVES and ASSESMENT CRITERIA

Para\_site was graded out of 100 available points, and accounted for 3.67% of the overall available grade for the semester. All members of an individual Para\_site team received the same grade for this project. The Objectives were also the criteria on which the project was graded:

Installation: Leb Woods

- To develop an understanding of the effects of gravity and how it applies to design.
  To develop an understanding of forces applied through Tension: Compression: Friction.
  To develop an understanding of the importance of Context in design.
  To develop an understanding of materiality; materiality; and mass as it relates to a performative project program.
  To further develop problem solving and design communication skills.
  To develop an awareness for alternative housing strategies.

#### CONCLUSION

Para\_site was framed by discussions of real-world housing precedents and the societal, physical and economic conditions which have given rise to a variety of opportunistic parasitic responses and negoliated boundary conditions developed outside the formal discipline of Architecture. Students generally felt that they were engaged by a superficially whimsical challenge to inhabit an overhooked and forgotten space. They developed a greater avareness of alternative housing strategies and non-western architectural responses to acteme population densities and economic systems not experience within the United States. Through the performative nousing strategies and non-western architectural responses to acteme population densities and economic systems not experience within the United States. Through the performative requirements *Para\_s* list inther developed an understanding of the effects of gravity and its implications on the use of internative housing strategies and the subsective with therein and compressive forces mediated through friction. This was achieved by exaggerating the challenges of engaging with a site through the carefully understanding of context and framing of the rule of engagement for students with that context.

Para\_site also asked students to reexamine what they understood as context by situating the project at the coalescence of issues related to orientation and ownership.

#### ted Stud



# TRACI SCOOTER

# EGGSTREME LESSONS IN DESIGN Poster



Eggstreme lessons in design 42 students, diversity of majors, faculty & staff design/build Chicken House for Extreme Makeover: Home Edition Family



the plot is not use exolors and values is in taking in a stan is the effective star is the effective star in the effective star is the effective star in the effective star is t

To our surprise, students not only guined experience in designing and there building that design, but many guined valuable experience when they became leaders at all one students when the the older multitudents moders in the student students. The student students are always shown in a student student is a student when the student student student students. The student students are always shown in a student student student student student student student student students. The student student student student students are always shown in a student students student student students student studen



# THE WIKI IN DESIGN: AN ALTERNATIVE APPROACH TO THE BODY OF KNOWLEDGE Poster

HANNAH MENDOZA



# BETH BILEK-GOLIAS KENT STATE UNIVERSITY

# DESIGNING CURRICULUM Poster



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conversation of education as in engages the dense field of architeter. Curriculum videom 's an unitaced decision making focustion. Curriculum videom 's an unitaced decision making focusing ordering democratic values' [Veneteren & Korszo, 1991]. Henderen & Gorn (2007) statte hat he curvillation of exe democray requires an obscitolo for despider imatter, self, and seal unstatement. Democratic values' instances and a seal unrequires an obscitolo for despider imatter, self, and seal unstatement. The self-self despider instances and the self of the self-self despider instances and the self of the self of the self-self despider instances and the self of the self of the self-self despider of the self of the self of the self of the self-self despider of the self of the the self of the term of the self of the term of the self of the term of the self of the term of the self of the term of the self of the term of the self of the term of the self of the term of the self of the term of the self of the term of the self of the term of the self of

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# NCBDS EXECUTIVE SYMPOSIUM

## Part one-Introduction:

Chris Jarrett: Welcome to our beginning design dinner. This is both a dinner and also a meeting. So, enjoy the wine but also...

Michael Swisher: Stay sober.

- **CJ:** ...stay sober (*Laughter*). I think we need to begin the dinner and the conference with a toast to Jeff and Chris for working so hard in putting this together. Of course, there were a lot of other folks...
- Jeff Balmer: Everyone around this table has been of tremendous help to
- Chris Beorkrem: Absolutely.
- **CJ:** As I look around the table, I have start by saying that I'm not only new to the School: I'm also the newcomer to this conference.
- MS: You are at the only good conference in architecture, as far as I'm concerned (Laughter). This is one of the few conferences where everybody is there to talk, as opposed to lecture, and everybody is there to listen, as opposed to just sort of get their stamp and go home.
- Jim Sullivan: Everybody is there to learn.
- José Gámez: It's always been a working conference. That's been its value. The thing that I always drew from it was that you could come to this conference and get ideas about teaching, and they were applicable at any level. Moreover, people were serious about teaching. It was the first conference that I came to.
- Bill Willoughby: It was the first conference that I came to, and it was a great place to cut your teeth.

JS: It was the only place that would have me, to be honest (Laughter).

MS: I would only add that, last year, when Jim was running it, and he has since then actually made good on the threat to build the history of this conference as a presence. It compelled us to discuss having this session, now, to address the question that you brought up last year at this meeting: 'How can we move this conference to another place?' In other words, how does the conference become something that has a presence for anybody, for people beyond those of us that toil at it in first- and second-year?

The impetus for tonight's symposium was to measure, to get into a discussion about what needs to happen to establish standards for evaluating beginning design contributions, in a serious way, for tenure.

Stephen Temple: It's a worthy discussion.

MS: I think that beginning design asks different questions, and I'll actually give kudos to Sabir Kahn for raising it with the Georgia Tech conference, which is: we are not the same as foundation arts theory and evaluation. We are not the same

**BW:** It's a particular question.

#### Executive session prompts

The four questions below address some of the impediments to the consideration of beginning design-both pedagogy and subject matteras valid venue for either scholarship or research. We offered them to begin the conversation.

- 1. In order to make the argument that 'beginning design' is distinct from 'basic design', what points do we need to raise and answer?
- 2. How do we convince people that beginning design is a rigorous intellectual venue?
- 3. Can we make a proper distinction in research and scholarship between those questions that sub-divide and refine an existing paradigm, and those approaches that attempt to reify a paradigm as the basis for practice?
- 4. Are these questions sufficient to bring to light a coherent argument for beginning design as a discipline embedded in the practice of teaching?

#### The cast (in order of appearance):

- Chris Jarrett: Director, SoA. UNC Charlotte
- · Michael Swisher, Associate Professor, SoA, UNC Charlotte
- Jeff Balmer, conference cochair, Assistant Professor, SoA, UNC Charlotte
- · Chris Beorkrem, conference cochair, Assistant Professor, SoA, UNC Charlotte
- Jim Sullivan, Associate Professor, SoA, Louisiana State University
- · José Gámez, Associate Professor, SoA, UNC Charlotte
- Bill Willoughby, Associate Dean, Louisiana Tech University
- Stephen Temple, Professor,
- CoA, University of Texas, San Antonio Scott Wall, Director,
- SoA, University of Tennessee, Knoxville

**MS:** The question on the table is: what happens in beginning design and how long does that stretch? It's not a question of a generic formula. It's to start a dialog so that the local ecologies, as I argued at the administrator's conference, at every school can develop their own, and they recognize that it's an intellectual challenge and not merely a teaching challenge.

JG: It's not a skill-based scenario; it's an intellectual pedagogy.

- **MS:** It may be skill-based in the teaching, but it's intellectually based in the inquiry to establish a framework for skills.
- **Scott Wall:** I don't think there's really a discourse other than at this conference. There's not a formal discourse, or a way in which that discourse can continue. This is the first evidence after 26 years, as far as I can tell, that there's actually some thought going into, not just how you carry it forward, but what its relevance is, in terms of having a long-term conversation about the value of pedagogical models that exist or might exist.
- JS: Well, for the last twenty-five years that conversation has been going on.
- SW: It hasn't gone anywhere.
- JS: Well, it hasn't gone anywhere in a way, but it hasn't left the community.
- **CJ:** How can you say that? After all, there are 86 registrants for this conference. When the economy is in such dire straits, and yet people found a way to get here. They even wrote the papers. People were funded to come to this thing. Therefore, I'm not sure to what kind of language that you're referring.
- **MS:** We're like the 'flat-earth society' we need to meet, despite the fact that no one gives us credence.
- JG: The other thing is that, for a while, it was perceived as a *regional* conference. It wasn't until '99 that it went to the West coast. In addition, in the early 2000s it was in Vegas—went Portland at one point.

CJ: Did you chair it at Vegas?

- JG: I chaired it at Los Angeles, at UCLA as a PHD student.
- JS: You did? Do you have the proceedings for that? (Laughter)
- JG: I can find them.
- JS: We'll work on that. We'll work on that.
- **JG:** But it was a Southeastern thing until about that point. Then it was a bit of a West coast thing.
- **MS:** That's right because Tim (McGinty) started it when he was in the Southwest, even though he brought the idea with him from Milwaukee.
- **CJ:** Scott has a suggestion and I will act on it as the distinguished moderator. We would like to do around the table, to introduce yourselves, say where you are teaching and what your relationship is to beginning design—a history, perhaps, in a few words, Michael. How long have you been teaching beginning design and how many conferences have you attended?
- **MS:** Well I attended early ones, and then I started re-attending three years ago. I've been teaching in beginning design since 1973 at Washington University, as a teaching assistant. Then I taught in Boston at a number of beginning design venues including the Graduate School of Design's Careers Discovery, and the Boston Architectural Center.

CJ: So you've been at the beginning for a long time?

- **MS:** My goal, as a teacher has always been to be at beginning *anything*. Peter Blake was the first one to convince me that I could teach at the beginning architecture level.
- JS: I was the chair of last year's conference at Baton Rouge. We were happy to celebrate the 25<sup>th</sup> anniversary of the conference there. I'm the undergraduate coordinator at the school, and I basically run the firstyear design program, and I've been doing that for about six years, and I've been teaching overall for nine years. My relationship to beginning design is kind of an unrequited love—no, actually it's been just the opposite.

MS: Requited love? (Laughter)

- JS: Whatever the opposite is.
- **BW:** I'm at Louisiana Tech University. I feel like an interloper here because I'm not a past chair. Jeff and Michael invited me to come and to see what I might be able to offer. I'm currently an associate dean at Louisiana Tech University in the college of Liberal Arts. I'm a professor of architecture, arts is one of our disciplines as well as communication, design, and interior design, so I hope to bring a perspective on tenure and promotion to the conference.
- JB: I'm one of the co-chairs of this year's conference. I teach primarily first and second year design studio here at Charlotte. My history with the beginning design conference began a few years back, when it was held at Iowa State University where I was teaching. Igor Marjanovich and Clare Robinson were the co-chairs. By then, I had been to a couple of conferences, ACSA and the like, and I was struck, in my first experience with Beginning Design, by how engaged people were by talking about what they were doing, actually doing, in the classroom. I was immediately, hooked.

I didn't realize at the time that I was about a week away from getting a job offer from UNC Charlotte. So, one of the first things I started working on when I got here four years ago was to try to get the conference here, and I guess it was two years ago, at a lunch at the outset of the conference at Georgia Tech that Michael and I met with the past chairs and essentially 'sealed the deal' and here we are, tonight, two years later.

CB: That was where I recruited him to come to UNC Charlotte.

- **JB:** Yes, Chris Beorkrem recruited me to come to UNC Charlotte at a Beginning Design conference.
- **CB:** I teach fourth and fifth year in the undergraduate program at UNC Charlotte. Three years ago, when Jeff and I were attempting to get the conference in Charlotte, I was primarily teaching second year, and realized at that point, through discussions with Michael about how essential pedagogy was to the development of both young faculty and students as they move through the curriculum, and how a conference like this really frames that discussion in a particularly important way. Moreover, I think my investment still lies in that place, and that's why I'm still here now.
- JG: I feel like an interloper as well. I co-chaired the Beginning Design conference in 1999 at UCLA with an esteemed colleague, Dora Epstein Jones at SCIARC. I petitioned to co-chair the conference in part because I had gone to a conference in Louisiana that I realize now is further

back in my memory than I thought (*Laughter*), which makes me question all kinds of things, but I found it to be really productive as a graduate student. I became a big fan (and have participated as often as I could ever since) either as an attendee or as a moderator in Las Vegas. And I found it to be very different from ACSA conferences, which are clearly very valuable. I've always described this conference as a working conference, where ideas that were not fully formed were very welcome, where ideas that were failures were even more welcomed. In fact, there was a themed conference on failed projects, at one point, about five years ago. And so the conversations were always so productive that I've always felt really a part of it, and part because I think that it provided a venue for me, as an early academic, to test some ideas about pedagogy that didn't really seem to have an outlet otherwise. So that's where I've been, and how, I guess, I ended up at this table.

**ST:** I'm at the University of Texas at San Antonio right now. I hosted the conference in 2005, and I've always taught beginning design. I started teaching it in '94 in the interiors program, and I moved on to a Junior University where I taught it there. I've always been the coordinator of it, too, ever since I started teaching. Moreover, I came to teaching as an established practitioner. I was thirty-three and went back to school. One of the things that make this conference ring so true to me was my experience at Carnegie Mellon as a freshman, and as a senior teaching the freshman. It's that cycle of doing it and not knowing what the heck you're doing during your education as an 18 year old and figuring it out a little later-not completely, but enough to teach it again in the same room. They had a solid wood shop component, and that's still what I try to support in my own conference. Making things is what I started with, and what I still do. This conference is not so much about theory as about the practice of implementation—it's really about education. I think the university always forgets that it's about education-they think it's about graduation rates, or something else. In addition, I think the students know that it's about education, and that's what I get from this conference all the time—that re-connection with *teaching*.

MS: It's nice to know that you're not crazy and alone, right?

- **ST:** I think the notion that rings true for me in this conference is still my own experience in first year. That strong first year program is the one that lasts with you forever. It becomes the basis for all of one's further inquiries.
- **SW:** I'm the Director at Tennessee, which has absolutely nothing to do with why I'm here. The reason that I'm here is devoted to how we teach, and I learned that devotion at Tulane, where I was the co-chair of the tenth annual conference in 1992 with Don Gadsky (who is now the Dean at UT Arlington). Many of the people I met at those conferences have moved to administrative, leadership positions. They recognized that this conference stands aside and outside of ACSA for precisely all the right reasons and that true conversations can occur here. Very little posturing occurs here, and there's very little pretense here. People really are passionate about teaching. At Tulane, I was the first-and second-year coordinator, and ironically, I don't reflect back on my first-year experience because I had probably one of the worst first-year experiences I can imagine... (*Laughter*). In order to remedy that, I've spent the rest of my life trying to figure out what first-year is all about,

because it wasn't about anything at that time. In many respects, I built my case for tenure in the early to mid-nineties on writing about pedagogy. The beginning design conference was a very important part of that because I was able to host the ACSA special focus session for about five consecutive years from about '92 to about '96 because it was interesting to me, it was important to me, and it was a great thing to be a part of.

- CJ: I'm the Director of the School of Architecture at UNC Charlotte, and your host for this conference. My very first teaching appointment (if we're discounting TA work) was in second-year at the University of Southern California in 1990 and I taught second-year for four years. It was, more or less, all that I knew at that time, and I recall feeling that I was absolutely thankful that I wasn't given the appointment of teaching first-year (Laughter). And to this day, I have a fear of teaching first year. I'm not sure exactly what I would do or how I would go about doing it. Those who teach first year, particularly at the undergraduate level, always impress me. In terms of introducing to them, the discipline and the profession of architecture, I think that's an extraordinary challenge, and I've always had the utmost respect for those who are slated that assignment. However, I love teaching second-year because it really seemed like a different angle. And I think that when one talks about foundation teaching, I'm not sure where one draws the line between foundation and whatever comes after I think is an interesting question. Things folks have said around the table inspire me.
- **ST:** I teach with a lot of faculty that hate first-year, and that's different from how you describe it.
- **SW:** Because it's pretty damn hard.
- ST: They see it as 'not architecture'.
- **MS:** I think the difficulty is that first year should not be the same at any two schools: this is Gropius' notion. You have to examine who's coming in, you have to examine where they're going to go, and then you have to build something unique. Every school has a different 'inflow'. Programmatically, schools can vary: at many schools, the first semester is essentially the application process.

# Part two—Toward a Discipline:

- **CJ:** Jeff and Michael have provided a framework for this, and I think we can use that as a basis to jump from and carry the conversation in any way it wants to go, as far as I'm concerned. In addition, I don't know if there's a conclusion or if there's a charge, frankly. You all are chairs, and you've wrestled with these issues for years relative to where we want to arrive, at some point, at the end of this conversation.
- JS: I'd be interested in talking about how we get to know ourselves as a discipline, with a history and body of knowledge created before this conference. One of the things I noticed when I went about posting the past proceedings online was a lot of reiteration, and the rehashing of the same arguments. It seemed to me that if people knew what had been said before, they could build upon that, and I think we'd see a growth as a discipline.

CJ: Growth in scholarship?

MS: Yes!

- **CJ:** The Beginning Design website that you've put together so beautifully—it's interesting in thinking about framing the next conference or set of conferences in relationship to this body of work as an example. Because it can't be just a library that *sits*, if you want to, in a sense, *charge* that work.
- JG: We want to avoid the reiteration and rehashing thing. Part of the archive was to help us establish what questions have been asked, and what new questions are emerging might help us direct where we want to go in future topic proposals.
- **SW:** If the same arguments are being made and made and made, it's a vicious cycle.
- **MS:** One of the consequences is that nothing moves forward.
- **SW:** Right. Therefore, the question is: what question do you *ask* that breaks the logic chain?
- JG: It may not always break the chain. I mean there are some questions that probably do need to be asked again - that's worth thinking about. Now what that does to the direction of the questions as they come forward afterwards, I'm not sure. I don't think questions get re-posed in exactly the same way. Some questions might be foundational, right? Given the consequences of the technology, or whatever, we ask them differently.
- **MS:** I do believe there is a nexus, at least for now, and I don't know whether this is going to continue. There is a nexus of threads or pressures on us that are really relevant in architecture. The first is that we are dealing with an argument about 'what a foundation is' that's nearly a hundred years old. When we get around to the birth of the Bauhaus, we're looking at the educational theory that created the whole idea of a foundation. And, I remember thirty years ago listening to Lucian Krukowsky—who was the former dean of the Fine Arts program at Washington University and at that moment was the chair of the Department of Philosophy and Aesthetics—he essentially, as an former foundations teacher, said the entire premise was wrong—and proved it.
- **SW:** Verbally, or graphically?
- **MS:** Verbally. The underlying assumptions that powered the Bauhaus foundations were the same as Wittgenstein's critique of language, and the assumption was that form followed language. And we hear this iterated over and over again.
- JB: Which is a question of representation.
- **MS:** Well, there's that, and secondly in America I think that one of the issues that was never really brought up, it was *sotto voce*, is the democratization of architecture by the increase in the numbers of schools of architecture. Meaning, architecture—when all of that was founded—was still a wealthy man's game, and underline the word *man*. And the nature of architecture, the questions of architecture in that post-modern era I think are really fundamentally still largely unan-swered even if they're still shaky. The third component, is the death of the Hegelian notion that we would find one ideal, and it would be applicable everywhere. The notion of ecology is an intellectual explosion, which suggests that locality has to be in consideration or you're just talking fuzz, such that if you teach the same class as I teach—we're somehow wrong. That there's an inflection to your teaching, there's an inflection in my teaching, there's in an inflection in your place and

my place, that if we do not take account of, is robbing our students of really understanding what architecture is in its diversity. And I raise those three points only because I just heard David Leatherbarrow say the same damn thing this afternoon when he was talking about being able to critique architecture.

So I'm leaving a few things off the list, but we're at a moment of great flux, and we haven't yet talked about what bringing the computer really means to the matrix of looking at architecture. I suppose I'm both a major Luddite, and the person who teaches the students how to use the computer at the same moment. I'm still looking for someone to develop an intelligent analysis of computation that makes sense at a conceptual, as opposed to a utilitarian level in teaching foundations. That's one of the reasons why I'm so happy that we just hired Nick Senske, because I think he's one of the few people I've ever heard ask that question well.

- JG: You're asking two things that contradict each other. On the one hand, if we pick up on postmodern undefined definition of things that there are many voices, that there are a plethora of value systems that might eventually apply to architecture. At the foundation level, we may not be speaking about architecture quite yet. But on the other hand, slicing the chasm of a postmodern kind of critique and what might now be called late-modern or neo-modern, late-capitalist set of critiques is that we can't expect the universal, we can't teach a 'foundation', because there is no set agreement of what that might be—and no possibility of achieving that agreement. And I think...
- MS: I don't see that as detrimental
- JG: I'm not suggesting that it's detrimental. I'm just suggesting that it sets into play a whole host of conversations that could be, and this is the critique of the early postmodern and everything that came after, is that it's *all* value-driven, it's *all* subjective, and if everything is at play, then nothing is concrete. I think that is a misguided critique of it, but I just wanted to know where we fall on that before we enter into that conversation.
- **SW:** I just want to bring that back to the ground that we started from. Rather than having a value system in which everyone reaches consensus, the fundamental thing that has driven beginning design, the Beginning Design conference is seeking alignment, and if not alignment then *complementarian*, without value judgment.
- **BW:** Without value judgment, but also I think that at the same time, it is a venue for discourse, which I think it really important, and that it's fundamental is developing what Boyer said was the scholarship of pedagogy, that we have at the Beginning Design conference that other conferences have, ACSA of course has these pedagogical presentations but Beginning Design is fundamentally about that. And we actually learn a lot when we go to these, when we go to this conference as to what we teach, how we teach and how we might teach in the future.

One more point I want to make is that, and this really bothers me as an associate dean in a college of liberal arts and having another college of engineering and sciences; they get a lot of money for STEM—research for science, technology and engineering. There are a different set of criteria, and an expectation that science is somehow method-ologically superior to design as a methodology, and design *is* a meth-

odology. In addition, it seems to me that when we talk about beginning design we could set an analogy up that it is like beginning science, and therefore I think there are parallels between program and program. I think the idea of locality is very important, but simultaneously, design as a method—I don't think it ought to be disputed.

- JG: There's a completely parallel literature in education. This is where architecture often falls short relative to pedagogy. Michael is better steeped in the literature than I am, but there's a whole literature on pedagogy and learning—in the educational field. One of which actually parallels Boyer's stuff, and it's relatively new–perhaps ten years old: George Cue is one of the primary authors in it. The idea of a kind of immersion, for lack of a better word, or 'experiential', the kind of conversation that folks often have around 'service learning' as having great impact. Which is what we do all the time, what Boyer suggested to us as the value of the studio environment. Which is why business got interested in a cased-based, experiential, collaborative, task-based teaching, where teaching actually came from their peers.
- **SW:** But it's also consequence-based, in that there's a consequence to the methodology of teaching that is evident...
- **MS:** But you can't be able to teach successfully if you don't know how to illuminate, elucidate to yourself and your students what the expected outcome is. I'm not suggesting that it has to be totally prescriptive, but you ought to be able to say why you're doing this and what you should expect to get out of it. Even if you give them an assignment and say, 'Look, I'm going to give you this assignment so you can get thoroughly confused.' We can debate whether that is a reasonable outcome, but at least it's declared.
- JS: But that's a statement that points to what most people consider sound teaching practices, where one has a clear outcome, a set of assessment mechanisms that are going to get to that, and then an educational assignment that leads to those kinds of things, where all of that comes together. I'd like to come back to Bill's suggestion to start looking to education theory and educational practices outside of architecture and within the field of education. One thing I always tell my colleagues is that we're so far behind that we don't even know we're ahead. We have so many of the things that other disciplines have just begun to discover. We're the pioneers in studio-based education, in case-based education.
- **BW:** Right, the guys in STEM, we teach this integrated engineering and science, and they really want the design studio. They don't know that... they have this class/lab, class/lab.
- **SW:** Why are we incapable of communicating that, in reality, the basis of foundational design, as a pedagogical model, is actually relevant across a very broad range of disciplines. What's the mystery about the teaching of architecture that no one gets?
- **MS:** Well this is the same thing that destroyed rhetoric programs in the late 'fifties and 'sixties and had them removed from the university. It used to be that the English department had two components: it had the rhetoric faculty and it had the literature faculty. Beginning in the late forties, and, I don't know when the last one went, I know Michigan shut theirs down in sixty....

SW: It was right after McCarthy.

- MS: There emerged the notion that somehow—and Albert Borgmann writes about this a lot more coherently than I'm expressing it—that the content was separable from means, that you could have ideas about literature without being literate, that you didn't have to know that somehow there were these ideas and then there was just doing it.
- JG: It's actually a slightly different conversation, and I don't think you would disagree, Michael. But I think that we were hitting on it, one of the side comments we were making is that there's a distinction between vocational and intellectual learning. And we have universities that deteriorated on this distinction. One of the things that educators do well in their disciplines is that they measure really well. They measure pedagogical ideas. One of the things that we do very poorly is to turn back the lens on ourselves, partly because we're not trained educators.
- BW: They assess incredibly well.

JG: They assess sometimes beyond what we would think is necessary. MS: They do it well and we do it badly.

- JG: And we're not trained to do that well. So, as educators, few of us have gone through anything more than a tutorial that says, 'you know what you're doing, you've got a seminar this week, and you've got twenty kids."
- **CJ:** Architectural education is attached to a profession, and we're trained to become professionals, not educators.
- **JG:** I think the question of foundation design is actually a pedagogical educational professional conversation.
- **MS:** I think Chris raises a really interesting point, and it's been in hiding in the closets of the university ever since the university decided to get democratic. The older notion was, you got there and very quickly it was determined whether you deserved to be there. What the university did was it didn't educate, it just raised the bar. So they'd say, 'Okay, you've got to go over this bar.... Okay, now you can to go in this class and go over this bar. And we don't have to teach you anything, we just have to tell you that you missed the bar' 'And this is just not in architecture, you can go all the way back and start reading about how Cambridge started, and it was essentially a test. And to this day, if you go to Cambridge, you just say, 'I'm ready for the test. You can stay there three years, two years, whatever it is, you take the test, you hop over it. Nobody has to teach you. You can do it by reading.
- CJ: You'd teach yourself.
- **MS:** Exactly. The notion of education was like the notion of 1Q: that certain privileges allowed some people to get this. And I think it wasn't because we were enlightened, somewhere around 1940, we realized that it wouldn't leave us with enough smart people. That system *fails* us. Natural selection was going to fail us if we didn't actually teach people that came from other classes. You know, we couldn't deal with just the fourteen guys who graduated from Yale.
- JS: I would like to come back for a second to your question, about why we can't quite convince people, or even convince ourselves of what we do. Here's an underlying issue: I find it remarkable when I talk to people and I do it myself, making the distinction when describing students, on the difference of being smart but not talented or being talented but not smart. And we draw that strange distinction, there's an

underlying notion of talent as something that's innate to a person, and it's not a transferable process. It's simply there to water and nurture, and if you have it, you have it. As opposed to someone who's smart, and that you can educate.

One of the biggest difficulties that I have is trying to convince my colleagues that we have to move away from the thinking of talent, or accepting talent, simply as 'okay we got lucky with that one' and look to education. When you look to education, then you have to set a series of objectives, a series of ways of measuring those objectives, and a way of crafting particular assignments to teach specific things. This means that in specific classes, you teach specific things. You don't teach architecture, you teach something specific to architecture.

**BW:** We need to get scientific in the way that we develop the problems.

- **MS:** But we really know better. Talent has been dismissed by most everyone as simply innate. For instance, look at perfect pitch. It most likely means that when you were a small kid, you were subjected to a lot of sounds and so you learned to sort it out. How many languages did you learn growing up? Does that mean you have a talent for language? I don't think so.
- JS: That's the difference between a critic, and an instructor, or an educator. We teach college as critics, which assumes that the students are bringing us something, we give them our comments on it, we're not really teaching.
- SW: How do you teach intuition?
- **JG:** You're teaching an experience that allows someone to develop the intuition. The other big question is: How do they absorb it? And what are the ways by which they can absorb the range?
- JB: That was a revelation to me when I got to Charlotte. I knew that I would be teaching beginning design studios, but it took me about to year to really decipher what Michael and Greg were doing in the first semester studio. It took me a long time. It crystallized when Michael said, 'We generally learn to teach as if we were not exceptional.' And it reminded me that I would have trouble understanding why first year students often didn't understand what I was trying to get across. I might have used the crutch of 'talent or no talent'. And that's based on the premise that we think of ourselves, those of us who teach, as having been representative of our class, and, of course, we are not.
- JG: There's a lot of evidence that points the other way in my case. And I'm putting that out there on the record (*Laughter*).
- **JB:** Once I recognized that, then I realized, 'okay when Michael and Greg say that they are teaching to the *entire* class', they're working on the project for how to make things clear to *all* students in the class, and not just the students who think like we do, the top 25%. Everything that they were attempting to do became clear to me. It was a revelation.
- **SW:** I think that's a really powerful thing, and I remember Karl Puljak, who is now Director of the School of Architecture at Louisiana Tech. I remember having this conversation with him, fifteen years ago, when he was developing the first year curriculum. It was amazing because what he said was, "What we're going to do is we're going to have one project, everyday. We're just going to do one thing. Whatever that thing is, it's just going to be 'one and done'. And we're going to com-

plete it. If it's laying out chalk lines, that's today's exercise, or whatever it is.

BW: And then, the students reflect on it.

- **SW:** Right, so that every single day in the entire year was a complete pedagogical entity that you could look at and say, 'Oh, I understand what that is, and oh, I could put that together with tomorrow, and I can put that together with the next day.'
- BW: You're making exercises.
- **SW:** Right. And it was really amazing, because it was never extended past the day. It was always capable of being completed within the four-hour time frame of studio, and it was just remarkable to me that anybody would put that much effort into an entire year. It was great.
- **BW:** The students received a series of questions that they then reflected on, and it was really about this journal. The real product of first year was this journal, that is a reflection on what they did.
- **ST:** You want them to make a discovery. The key thing of teaching firstyear, and I think it even goes back to the Bauhaus, because it's what the Bauhaus wanted their students to do—they wanted *them* to make a discovery, and not be told what it was. And they were making inquiries about a lot of different things. About a lot of different media, about a lot of different methodologies, representation, lots of different issues. And if they didn't make a discovery, there wasn't any teaching being done.
- **BW:** I want to say that our students who are not innately thoughtful, when they're in junior year and senior year, they reflect back on what they did first-year, and they are actually quite thoughtful about it. So, I mean, they actually see, 'Oh well that's what that exercise was about.' That exercise with Popsicle sticks gave me an insight into what I'm doing now.
- **CJ:** Absolutely. Quick question about the tradition of first-year being a place where a lot of students come in and then a few are left standing, and move into sophomore year. Relative to the notion that Jeff described of a pedagogy directed toward the collective, the widespread attitude among schools of architecture across the country is that there's a gate, or significant attrition where is that coming from? Why this tradition of starting with 150 students and ending up with 60 sophomore year?
- **MS:** Well, historically we forget to talk about the 'Vorkors', which was a six-week class at the Bauhaus—their form of an entrance exam. You arrived there, you took it, and that was it, and after six weeks they said, 'you, you and you: no, no, no, yes, yes.'
- JG: It is a circumstance, though, that some places *don't* have that entrance exam, that they don't have the choice. If folks want by major selection or by elective selection to come into your first-year class, in some cases, they can. It might mean that you have three hundred, four hundred.
- **CJ:** In Charlotte, we don't have that system, but I know that in many other schools, there is that system.
- JS: We have that, though. We call it 'the Game'. It's at the end of the second year.
- **SW:** Tulane does it. A lot of schools do it at the end of second-year, which is a portfolio or some kind of document.

JG: And it's not just architecture. Graphic design schools do it. Industrial design schools will do it.

**MS:** What an amazing waste of time for two years. I mean, I'm sorry... **SW:** I totally disagree.

**MS:** Well let me explain. Do let's say that Chris (Jarrett) decided that he wanted to wipe out our admission process of interviewing applicants. So if we're going to let two hundred people, we'll make a big class of twenty, that's ten faculty I need. Not to mention a lot of square footage, I mean a HUGE amount of square footage.

SW: What does that have to do with the gate at second year.

- **MS:** Well, all of a sudden, we have to put all these resources to teach that first year, or you just use it as a test, in that case, they didn't learn anything.
- **SW:** One of the points that we are continually making, although, again, we don't make it very well is that, and the reason I disagreed with your particular statement that it's a waste of time, is that one of the real strengths of an architectural education in those first two foundational years, even if you leave, is that we collectively make the argument that it teaches a critical thinking process or methodology that can then go somewhere else.

MS: Agreed. But how do you teach that to a hundred and twenty people?

- **SW:** Well, I'm not disagreeing with that, but what I'm saying is if in fact there is a gate and those people in two years go and become anthropologists or history majors or scientists or whatever, they've learned something of real value that we as a discipline are not communicating beyond ourselves. Now does the president of our universities know how friggin' good our educational system is in architecture? No. It's like, 'you guys do something mysterious. Who the hell are you? And you've only got twelve people in your class? Jeez.'
- **CB:** These things are often state-mandated. At Iowa State, they actually accept everyone who makes it through the top half of their high school class. The other side of that is that we're training clients, especially in a place like Iowa.
- **MS:** I completely agree with you. That's why I believe that every school has a different environment. Therefore, the beginning design question may be a universal question, but there are a lot of really local answers.
- JG: But this where something like that day-to-day, that 'one and done' kind of conversations that Scott brought up. The idea that you might teach the discipline to say that within a four hour time frame you're going to do something that you can reflect on overnight rather than stay up all night to finish. I'm not suggesting that it's a gateway condition, but as a teachable condition, as a time-management condition, as a critical thinking condition, there's something to that format that seems really powerful.
- **BW:** I just wanted to say that there is a regional, cultural difference between places. Having taught at Kent State for a number of years, having taught at UNCC in the mid-nineties, then teaching at Louisiana Tech, each place was different, and I characterize them differently. The students at Kent were not very thoughtful, but they were really professional; the students at UNCC were thoughtful but not great makers... that may have changed, but that was not my perception. At Tech, they were good makers, but they aren't very thoughtful. So, our pedagogy

does change relative to the context in which we are teaching. Now whether that is a true statement, a relevant statement, a critical statement, I don't know.

- JG: That's where the colleges temporalize: it's dependent on a cast of characters, who are usually not from the same place.
- MS: Right! And it's always changing.
- **BW:** It's also what we get from the school system and the context for the students who come into our institution.
- JG: There are variables that influence that ecology; there are variables that influence that regional identity or that ethos.
- **BW:** One thing that Glenn Murcutt said that I've always liked was this notion of 'design literacy', and he rails against Australians as not having any design literacy or *visual* literacy. We are not a visually literate society.
- JG: I don't know. We may not be visually literate in the stuff that we consider to be proper literacy, but I think those categories are not welldefined, and I think all of us at the table would agree with the distinction between the vocational and the intellectual in architecture makes very little sense. But it's the way that we structure higher education.
- JS: I think the other thing that I'd come back to your question about is that I generally try to avoid arguments that are based are architecture's *exceptionalism*, that we're so different from everyone else, that we have special, unique conditions, and so that. I like to avoid those, but in this case, I'd like to say that...
- JG: We can fly, which is better than the other disciplines (Laughter).
- JS: But we do require, early in our educational process, a level of what I've learned is called 'ill-structuredness' in the educational process, where we do not have a clear set of procedures or methods with which we can tell students to arrive at answers. And this is something that usually only occurs at the upper level, the expert level, of the educational process. It's very difficult, and none of the standardized testing mechanisms that we have to allow people to get into our universities adequately assesses that. We simply don't know whom those people are, and so one way of doing that is to take a whole bunch in, and shake them up, and see what happens. And at the primary and secondary levels of education, those things that we need students to know as they begin to study architecture simply aren't taught. So, the testing mechanisms that we have to allow people to come into the university aren't really useful to us, so we just bring in a whole bunch. Now, part of it is just laziness on our part-not figuring out what it is we want them to know, and coming up with admissions tests to do that.
- **MS:** It's a pain in the ass. We've refined it for twenty years. What questions do you ask people to see if they have capacity? I can get an applicant who has a lousy portfolio, but whose embarrassingly simple drawing shows analysis of what's going on in that drawing shows intelligence. We get students whose capacity is intellectual, as if they've got raw horsepower. Then we get students that have really good hands, and then we get the whole breed in the middle. And I can deal with that whole range, but in either case, they have to be pretty good.
- **CJ:** The thing that we have to come back to is the idea of—and I think Jim, you made this point earlier—of foundational pedagogy as a disci-

pline, and what that means with respect to two different kinds of systems: one that says you evaluate who enters the program in terms of being prepared for the discipline as opposed to those you just take, people that meet the GPA and SAT scores and then you teach them, half of which may just go in one ear and out the other. There's something about those two different systems that just don't rub up against the notion of a particular kind of pedagogy or a discipline that requires a specific kind of preparation.

- **MS:** In the longer run of pedagogy, if your interest is in first year at some point or another—and Steven you should tell me what went wrong—but when you are teaching you need to recognize if you're the right person for the circumstance in which you're teaching. There's a certain level of athleticism to teaching, and there's also a certain level of belief in teaching. When I started teaching at UNCC, I was just there for a semester. And I really believed in the fact that they had a very small, although once people failed out, but there was a really small intimate school that was trying, at that point, to let people in and recognize that there was going to be a really high level of graduation. That was really the goal of the school. You know, that was the question that was asked, 'We're going to have thirty graduates'—that was the line—'how many do we have to let in?'
- **MS:** If you go to a school, and they have an open admissions process, then you can have an honest discussion about what kind of filtering that is, and what has to be expected in that local environment. You know, a person that is running a big program, and I ran that program at Nebraska, I had two hundred twenty-five students, eight graduate students. That's doable, sort of, but that's going to be a very different outcome than the kind of intimate group of sixty-four students that have been hand-selected. There has an honest discussion with the whole school with what they're all about or you're just dead in the water. What's your sense of that?
- ST: Well our context is the same as that. We let in three hundred, and we send ninety to second-year. So there's a gateway, and we have to cut them off. Some of them go forward and most of them don't, some of them wait a year and try to come back. But I try to teach all of them what they're going to think about as an architect, as a designer. We teach architecture and interior design together, and I think it's not about making models and the kinds of drawings they're going to make. It's not about the skills; it's about how they are going to think about those kinds of things. Not what they're going to think, because I don't want to teach them that...that's beyond first year. But how they're going to think about it, and the way their thinking happens for them and their commitment to that. That's one thing we try to measure is their commitment to their own sense of they can be a thinker about this kind of stuff. And we want them to be critical thinkers and creative thinkers at the same time, and that's something that's hard to measure, but the projects are structured to do that. And it's the level of engagement that matters, not the quality.
- JG: That gets a little bit to your question earlier, Chris, I think. If there's a gate, what's being measured? That's one way I took your question. Is it creativity, is it vocation, is it skill-set, is it critical-thinking ability and how do you measure that? Do you measure that at the interview pro-

cess before they come in? Is it possible to measure it at various points? I suppose we're doing it at various points across every semester, in every studio. If you've got a gate-condition, if you've got a big influx after which you filter, what are you measuring? If it's critical-thinking, what are the metrics? That's a difficult question to try to answer. (Break.)

## Part three—Tenure:

- **BW:** Michael, you said you really need the best faculty teaching foundation design.
- **MS:** Yes, the ones that really want to teach foundation design.
- **BW:** The one's that really want to teach, want to teach foundations.
- **Unknown:** You're stuck with the ones who really want to teach. Because at the upper level it's more like practice. The practitioners, the ones who really want to teach. Because I teach with people who want to teach like practice sometimes. They don't know how to teach.

MS: They want to critique, they don't want to teach.

- **ST:** There's some of that, they tend to teach how they were taught and they can't adapt to a discussion about objectives and issues of education, they don't understand that. Someone who has been teaching for a while can relate to that, but they might not be a good teacher. And if they teach first year, they're just going through the motions. And the other problem we probably all have this is that you get people thrown into first year as a form of punishment sometimes.
- JG: It's typically not seen as a glorious place to be.
- SW: No, it's not a plum.
- JG: It's very few people's first choice, put it that way.
- ST: It doesn't look architectural sometimes.
- MS: It's the only place you can ask your serious questions
- **BW:** I will say it on the record; it is the purgatory for incompetents, in a lot of cases (*Laughter*).
- CJ: First-year teaching?
- **BW:** Yeah, and I think that that is a real problem. I mean, I always fall back on what Michael said, and that is that you need your best teachers in foundation design, the ones who really understand pedagogy and can establish a regimen for learning design.
- **ST:** And that can really reach the students, too. Sometimes, the upper level students want to be taught by someone practicing because they see that as their model.
- BW: That's exactly it.
- **ST:** Base level, foundation level, the students don't necessarily have stars in their eyes.
- **CJ:** The students want instructors that are ten years older than they are.
- **MS:** I used to wear a tie because I wasn't. (*Pause*) I heard an interesting description of what pedagogy was; it was a critique of Obama's health care from somebody who supported it. And he said that what the Obama administration had failed to do was pedagogical. They had failed to remember that they had to tell people why they were doing this. Obama had done so much arguing with the people who had told him he *couldn't* do it; he didn't go out and teach people why what he's doing is a good idea. He neglected the pedagogy. Pedagogy,

which is often thought of as just mere *practicum*, is actually asking the question 'How do you explain this in a meaningful way'.

- **SW:** The reason that's all failed is because we no longer have rhetoric in English (*Laughter*).
- **MS:** One of the things that we forget is that we are really *educating*. For the first thing, if we can't educate our architects about why they're doing architecture, if we only harvest the talent, then we're not actually teaching them how to go out and make the argument that architecture ought to be made. I mean, I would go beyond what Iowa State said—one of the things that every architect has to be able to do is make the argument for architecture, or ultimately it's a losing game. And that's pedagogical.
- JG: That exact reason is why I've been interested in graduate level conversation of teaching foundations. You get folks who are coming from a different set of disciplines. Sometimes it's a significant sacrifice, and they're thrown into a world that makes no sense to them. In our beginning graduate studio, we spend every night, talking them off the ledge, so they stay in the program (*Laughter*). You find the one kernel of goodness in the stuff on their desk, and you say, 'look, you're doing all right there, *but* we can...' So there's a psychological *boostering*. And then you tell them to go home so they get some sleep and start developing a lifestyle that isn't just slavery.
- That's part of why I'm really interested in that short, one-day model for assignments: you get in, get out, you've got a sense of accomplishment, you get some sleep, you come back. You're not abusing yourself physically and psychologically, and you build upon things in a kind of sequential fashion that students can see as evidentiary, they can see it. 'I did that, I can now do this' rather than 'I've still got to complete that thing and I'm not sure where I'm going to go with it.' Teaching it at the graduate level, particularly in whatever bridge program, at least in the experiences I've had here and at UCLA, is ninety percent psychology. Keep people in, because you know they're talented. Give them the confidence to make that next decision they need to make, and help them make it, but don't spell it out for them, and then make sure they're healthy, so that by the time they get to the fall semester, they're going to succeed.
- JS: It's a different game; it's the same content as the undergraduates, but a completely different way you have to conceptualize it. The biggest difference is that they're less willing to accept a lot of the absurdities...
- JG: They won't stand for the ambiguity and the BS. They want clear and concise, and they've got four years of some kind of degree, they're not dumb.
- CB: But what's similar?
- JG: There's a sophistication with visual literacy, it has to do with how to read information, how to decipher, discern from competing bits of information, how to *value* things is another way to describe it. How to categorize it and deploy it, in some productive measure, so that it affects another set of decisions. It doesn't necessarily mean that they're going to be the most skillful at making the thing that comes out the other end. It's about that decision path. It's about *access*, as Scott described it earlier, it's about taking in information and then reorganizing it somehow, using it strategically.

**SW:** That's the most pivotal idea, the notion of *decision*. It's the one place where I can look at this conference and say, over the ten years of my participation, that the decision path that I had set up as a pedagogical model for my students was continually challenged. I would think I had it all down, and then someone would say, 'well, what about *x*?' And all of a sudden, my pedagogical model had to change and evolve. That's what's missing from being able to put the findings of this conference forward, not just historically, but in many respects, unless we come to these conferences, we are simply the product of the person who taught us.

JG: Sometimes that's an insult to the people who taught us (Laughter).

- **SW:** Indeed. And I will volunteer as one of those insulters. Peter Waldman would crucify me, and then Michael Graves (*Laughter*). What's interesting about this conference, is that I am no longer a product of the people who taught me originally, because I have had conversations with everybody at this table, or people in that history, that have changed the way I approach what I do. And I feel that's a huge gift. There are eighty people here? That's not very many, compared to the potential of this discourse to actually be shared in some meaningful way, where these kinds of conversations go forward.
- **BW:** Well, I just wanted to add something that Scott is saying, and something that Jim said early on: he's looked at the proceedings of the Beginning Design conferences, and he sees five themes. It would seem to me that we need five journals on beginning design that would focus on those five themes...
- SW: Or one journal that's published five times...
- BS: Or one journal that's published five times a year and this is not unusual in the humanities.
- JS: My feeling is that we should have a journal.
- BW: Every school would subscribe to it!
- CJ: How would that situate itself with respect to the JAE?
- MS: It would be better (Laughter).
- **BW:** But now, I just want to say that these things happen amorphously in other disciplines. It's a series of scholars who have an interest in a specific area. We have historians who are Latin Americanists around the country, and they decided that it's important to have a Latin American history journal. So, basically, they make bids on university to university to host the journal. They have to have a location, they have to have an editor, they have a staff, and basically, they have the journal for five years, and then it rotates place to place. Various people make bids. It's the foundation of scholarship that we really don't have in architectural education or in design education that we need to have in order to establish, not just credibility around the university setting, but also something that we can look at as a foundation upon which we can build.
- JS: It can only happen in a serious way. Not to disparage the DCA, but the DCA is simply the best papers out of that one particular conference. It would have to been a peer-reviewed journal in order to be taken seriously, and then for that to happen, to get really good articles, people would have to begin to have read past papers in beginning design and understand what we've written in the past.

- JG: You've got eminent scholars, not me included, but these folks over here have done that. The core of it is here.
- **MS:** You know, I want to remind everyone that in the 'thirties, a guy named Gilbert Rile, who was at Oxford while Wittgenstein was at Cambridge in the philosophy department, was getting really tired of hearing everybody talk about Wittgenstein so he decided...
- JG: You would get tired of that.
- **MS:** Well, Wittgenstein was really a turk there, and Ryle just thought that language was a very small way to talk about mind. So he asked five people he knew, who were very smart, to write articles, and he published the first volume of *Mind*. Thereafter, everyone wanted in the pool. He was at Oxford. It stayed there, I believe, twelve years. Ryle was the sole editor. It was, and remains, one of the more prestigious vevues in philosophy. And I think one of the things that we have to ask ourselves is, 'What is a good tactic by which we publish something that everybody wants to read for now?' And then ask if they can be in the second one.
- JG: There's no reason it has to follow a traditional model. I mean, *Places* is going digital. You don't get a more scholarly, environmental...

**BW:** As long as we get a series of editors and a peer review process.

- JG: There are esteemed folks at this table and associated with this conference. The only thing I would say is that we're not a very diverse bunch; we've got to work on that.
- **JB:** For the record, we *tried*.
- JG: But I do think about the collective wisdom of the group that's shown up repeatedly, Scott, Jim, Michael, Steven as a core group to launch this thing.
- **CJ:** It seems to me they do, and it seems to be a good time. You've got a quarter of a century with this conference.
- JS: I've been out at LSU, we've been publishing *Batture* for the last five years. It's a modest scholarly journal that we put out. It's not peer-reviewed we invite people to submit. We did *Batture* last year as past papers, and that turned out pretty well. And I've run that for about five years. We have a visiting critic, a guest critic, that handles content and then I handle logistics, because it's relatively straightforward at that point. We could work with that model.
- JG: If each of us lined up to do one issue, you've got five going on ten candidates. Then need to recruit a couple other brilliant folks who don't look like any of us.
- **SW:** I'd like to go through the past proceedings, and see what those five themes, see if we agree on those five themes, and see if we can build on that set.
- JG: Can we brainstorm, though, and recruit? Again, I'm not going to keep on harping on this, I know we've all tried before.
- **CJ:** The question is whether you've already got the body of work to move from one place to another before recruiting. If there is a body of work there, maybe there is some excellence embedded in all of that archiving.
- **BW:** It's true, but there are some current ideas. We could pull from past articles from the beginning design conferences, and then simultaneously there are contemporary issues...

**MS:** This gets around to the central issue of 'what do we have to do for people to see this as the kind of intellectually rigorous debate as we're having at this table? As opposed to it's all about how to teach well or it's all about this or that. Frankly, foundations, whether they're the *Quattro Libri* or from point to line to plane, or the pedagogical sketchbooks, are attempts by some people with a lot of brash to say, 'This is what it's all about.'

JG: You make it so overtly peer-review that you can't argue with it.

- **BW:** What I would want would be what happened in my experience, which is that one of my colleagues came into a discussion and said, 'I found this thing called *What We Do Now*.' And in looking through it, I thought, 'Hey! I know those people. I've taught with those people. I could get Michael Swisher to come talk about this.' It was this weird confluence of things...
- MS: Did that really happen? (Laughter)
- **BW:** It did happen! One of my colleagues, Damon Caldwell, he brought it in.
- JG: Okay, Michael, you'll be the first editor!
- MS: I will do it all day long.
- JG: You're the rock star at the table for the moment. My question about recruitment wasn't about articles, it was about people on the vetting panel, I think we can't sit here at this table and agree that we are qualified to represent this discipline. I think that that would be problematic. We need to get other voices.
- **JB:** That's why an edited version of this conversation will be sent around to all of you.
- **SW:** And we can delete as much as we want (*Laughter*).
- **MS:** A number of years ago, Brian McGee did a radio show on the BBC in which he interrogated serious philosophers and philosophical scholars about the nature of philosophy. It was actually a big hit. And what he did was take the tapes, and he sent them to the people who had talked and said, 'Okay, that's what you said, now what do you want to say that you said?' And we edit it so that we make sure, and we find a forum, so that all the people sitting around the room have a reflection on what was said.
- **CB:** I think there are some unique questions about the difference here, though. The distinction between JAE, assuming that everything we have to say has something to do with design as scholarship or the scholarship as design, I think that's a point where we can start to distinguish ourselves from that.
- **SW:** The power of Beginning Design is in the twenty-five year history of autonomy that this conference has had, and by virtue of that implacable desire for autonomy is the fundamental content of what this thing is about, and that in itself establishes its difference.
- JG: Can we think about it as an emerging conversation about a discipline unto itself?
- **BW:** Well, I want to say that I think we can talk about it, and I keep thinking of Boyer. I read Boyer's book, *Scholarship Reconsidered*. Basically, he talks about four different kinds of scholarship, and that we need to expand that, one of which is the scholarship of teaching. And I think that that's where beginning design comes in, because it's about pedagogy and it's about the definitional nature of design.

- JG: That's broader than what I was suggesting. Foundation doesn't fit, necessarily, in the title of the thing—it's broader. I don't think you were suggesting that it was about a product, per se, but what gets to that product.
- **MS:** It seems to me that first we have to sort out what issues beginning design bring to the floor that other discussions don't. One of the premises of beginning design is that it's not enough that you're a designer. You have to be able to actually teach, and what that means is that you have to be able to identify what the fundamental issues are, because that makes the intellectual point, and just as when we run a search for someone in sustainability, we don't look for an architect who says, 'Oh well, I think about it a lot.'
- **SW:** Neither do we go looking for a person who can teach foundational design. Rarely is there an ad for someone who can teach foundational design.
- **BW:** The expectation in most places is that you can simply stick someone in there.
- JS: I want to bring up a reservation of mine, a reservation I have, late at night when I'm left to my thoughts, is that a journal typically is about scholarship and research, which indicates that one is expanding and creating new knowledge relative to the knowledge that they're working within. Yet, this conference is largely successful because it doesn't burden itself with that, and it looks, instead, to a more practical sense of simply how you teach certain things. There is a quality about this conference, that we aren't necessarily doing research in a traditional sense of the term, we're simply honing our skills as educators within the particular context of beginning design.

Now, I think that there are some unique issues within that which could be brought out to become scholarship. There's no doubt about it. But I wouldn't feel comfortable simply saying talking about how we teach is scholarship.

- **BW:** But we don't throw the baby out with the bath water. We keep the conference, obviously, and it becomes the place for that.
- JG: And the conference isn't a teenager anymore either, right? We have a bunch of us here, and we're getting old. I'm not as experimental as Michael, that young punk over there, is. He's got a lot of ideas that have been honed. They've failed a few times, and they've been built upon. I think part of the autonomy and the beauty of our working environment is the idea that failure is part of the conversation. That's what is vibrant, useful and attractive about it. The model of JAE is not the model of this thing, it's maybe a little looser and this is again, why I think a digital format is appropriate.
- **BW:** If you look at the history of JAE, though, it was pretty rambunctious and exciting in the late '70s, early '80s.
- **MS:** I recently read a biography of Newton, as a consideration of what his contributions were. I was really struck by the reminder that Newton's major contribution was not to calculus, but the ability to describe the world. He didn't invent the scientific method, but the scientific *descriptive* method. He said at one point 'I do not invent the world, I describe it more clearly.' And I think that one of the things that we understand when we start talking about teaching is that it is both a constant through the history of the world, but also a constantly shift-

ing thing, because the nature of the world changes in front of us. We don't have to invent new things, we're not researching to invent new things, we're not doing scholarship because we're not really looking at old things, we are, as architects, describing the way things happen to parse themselves out. I've been doing this a long time, and it is not the same as it was thirty years ago.

- **CJ:** We were talking earlier about the purpose of the journal, and whether it is in a sense an audience of future teachers...
- **SW:** One of the things Michael's implying, which I think is really great about this conference and the journal, is that neither is static, and that the conference is continually describing the immediate past, within two or three years of the paper being given. I suspect you could go through every journal of every school in the last twenty years, and track the evolution of beginning design pedagogy and looking at that. There's a resource right there, and there's evidence of pedagogical value systems that are in place.
- JG: And that's where the outside's perception of rigor and scholarly aptitude might come through a consortium of schools that have contributed, with the idea that things have been vetted; that it's not just a bunch of one-offs, it might be a series of refinements or a series of recursive questions, I think that's fine...
- **MS:** They have the editorial decision to make sure that it absolutely comes off clear...
- JG: I agree, and I was going to add about audience, if it's educators or future educators, it's also folks who sit on the other side who don't understand what the architectural educators do. Because there are a whole host of folks, in the trenches so to speak, who come up for peer review at tenure and promotion, who don't have very many venues, they've got the JAE and ACSA, and they don't have the opportunity to build the pedagogy, the pedigree that gets them qualified
- **CJ:** This is one of the issues in the brief that Jeff and Michael prepared, and that we've talked so much about. We're zeroing in on the idea of a journal, which connects with this question about tenure, and that seems to be embedded in this brief, which raises the question of teaching's relationship to tenure, and secondarily the value of beginning design pedagogy in relationship to tenure. And I'll ask what the problem is in relationship to those things, in relationship to beginning design and tenure.
- JG: It's a question about where folks on either on the tenure-track side perceive a blockage or an inability to move forward, and on the other side from an administrative perspective, where is the lack of scholarship? Part of it is in the limited venues for beginning design faculty. This has been a venue that's not had the same accolades that ACSA has had, which is not a critique of them, but it is a situation, a circumstance of the conference sustaining a perception of being less rigorous.

My suspicion is that the bias that people often bring to beginning design is the same bias that they bring to the conference - that beginning design is somehow less rigorous than thesis, or capstone studio, or theory. And I think it's a false perception, because in fact beginning design is the hardest work that you can do in a program, period. But it doesn't have the same set of venues.

- **JB:** Can I ask a question now that I've got a couple of past chairs around the table? I recently asked this same question at our faculty NAAB team meeting...
- **CB:** On *top* of this conference, we just went through our NAAB visit two weeks ago.

SW: So you have a NAAB hangover (Laughter).

JB: My question was, 'has there been any recognition that over the past three or four years, acceptance rates at conferences, including ours, have gone way down?' It is much, much harder...

BW: It's true.

JB: Maybe one of the reasons why this conference historically has had less credibility was based on acceptance rate levels. If memory serves me correctly, because I was close to Igor and Clare when they were chairing the Iowa State conference, there was this perception that the acceptance rate at Beginning Design was high, because it had to be self-financing. So, you basically accepted anyone who was interested in presenting. Is that true, or is that something of an urban legend?

We were at twenty-eight to twenty-nine percent acceptance rate to this conference.

ST: We were just the same, about twenty-nine to thirty percent.

- **SW:** Ours was in '92. I don't remember what the percentage was. What I do remember was—and I went to every session we had—was that the papers, the issues and the debates were the liveliest, most engaged and substantive that I can recall anywhere. It wasn't an issue of peer review and paper quality. It was an issue of the activity that was occurring at that place. So, in some respects, I would say that there were no bad papers. Okay, there probably were a few, but largely, and this was almost 20 years ago, the quality of papers were very high because the people who were presenting were asking difficult questions of their own work. It wasn't as much about scholarship as it was about learning.
- JG: One of the things that you talk about is that foundations is used as purgatory. It was where people *started* their careers, not made their careers.
- BW: Or they fell back into it.
- JG: Or they fell back into it. And you've got folks who either are not necessarily intellectually developing a scholarly agenda around beginning design; they were on their way up the rung onto some other level into the curriculum. And, as an entry-level post, that's where they got into the conversation. Or they were in this other situation where they were being penalized. And so, for a lot of folks, I think the perception has been that you don't want to be in Foundations. That's not the scholarly place.
- **BW:** I think there's a good argument in this is that the people who teach the upper-level seminars are able to hone their arguments for scholarship.
- JG: And it supports their research more directly.
- JS: We've just finished searching for three positions. One is beginning design, one is computation and one is sustainability. It was easy to evaluate the sustainability and computational because those are more understood, at least people tend to perceive it as an area of specialization.

- JG: Where beginning design is like, 'Everybody can do that.'
- JS: Yes, as in 'we can find somebody that can teach how to do that. And just as long as they're good designers, we'll be fine...'
- JG: As opposed to a real specialty, which it is. I mean, I think, and I've told you this before, 'I'm not good in foundations, I could never teach first-year undergrad. I can barely do graduate. I would ruin the program.'
- **MS:** I find this amusing because Chris and Jeff are here, and I remember when we were interviewing Jeff. I had him in a bar, at like one o'clock in the morning, and I was still shaking him down, saying, 'Are you *really serious about this stuff* before we hire you? Because i'm really tired of losing people.' (*Laughter*)

JB: Longest day of my life.

- **CB:** As soon as Michael left, I was like, 'Oh my god, I'm so sorry about that!' (*Laughter*)
- **MS:** But I walked out of there totally convinced that he was the guy to hire.
- JS: I was hired as a general design faculty member. I was an architect. I practiced, and after ten years, and the director said, 'we need someone here; this is what you're going to do. Figure out what that means', because it didn't have any meaning at our school at the time. And it was only because I was apt to find it particularly interesting; that there was something to chew on intellectually, and it became what it is to me now. But I think for the majority, it's simply not that—they come across it through happenstance.
- **SW:** In a way, what was interesting about that period when there seemed to be clear models, whether it was the Bauhaus model or the Cornell model that evolved from that. There was a point of resistance against which beginning design could be measured. In a lot of respects, what's happened is that we've evolved through and past that, and we're trying to find, not true north, but an orientation for what constitutes the foundation, when point, line, plane as an abstract system of organization, or whatever it might be, ceases to be universally applicable.
- JS: You just used the term *foundation*. I think there's something to the fact that the founders of this conference called it *beginning design* not *foundation design*, and the only reason I link onto that is when you take foundations it has some quality about it that says what's done down here solely dictates what's based on what's going to happen up here. And for me, with 'beginning', there's something less utilitarian.

It's more of an initiation into a particular thing going on in context to that school, instead of something that is foundational, both to that school and that program, and architecture in general. That's something to keep in mind as we do this because, I went back and I looked at the early conferences, and it never says, 'foundation'.

**BW:** But the title of the conference changes

- **SW:** The Conference on Beginning Design or the Beginning Design Conference. They've always, beginning and design. It's been rephrased in a variety of ways, but it's always been those two words together.
- MS: I would only point out, my teacher, Leslie Laskey, who taught at Washington University, and was a student at Moholy-Nagy; he's the whole reason why I'm in the business. When he was still in his early seventies, we brought him to the school for three years running, and

he would play with the first year students. And Leslie would say to me afterwards, 'You teach things too much.' And I would say, 'Okay, thank you very much.' And then he would say, 'I had so much fun.' adding 'you talk too much.'

That conversation really made me think about the difference between the tier-one university, and the state school, where I get raw horsepower. Now I like the people I went to school with—some of them are still my friends—but I like my students better. They are more interesting as human beings; they bring more to the table, even if they didn't get the Jesuit education I did. In some ways, they are more earnest, and grounded, than that high-falootin' model when there were only 46 schools of architecture in the world, and students were already good when they walked in the door.

One of the things that was taught—and this was about refinement was what do you look at? That's what I spent the first two years of school learning: How do you look at things, and what's important? The currency for us as students was being able to point at something really good before anyone else in the group did. You would walk down the street and say, 'Look at *that* window!' It was this vetting of the world for interesting design experiences. Well, to be able to do that, you have to have so much on the plate before you start. I'm sorry, but the students that we get—they've much more about raw horsepower, and so they have to learn that by doing. I'm convinced of that. One of the things that Leslie told me the last time I saw him, just a while ago, in St. Louis was, 'Humph, your students draw better than you do.' That was the greatest compliment I ever got. 'Your students draw better than you do.'

- **CB:** The trouble with putting so many people like this in the same room is that we're going to want to stay here forever. I just want to make sure if there's anything else that we want to draw together so we can let Chris Tangora, our IT hero, go.
- **MS:** I hope that this discussion will be part of the proceedings, because this conversation needs to happen at a high level. And the people who have to ask this are the people who already have tenure, and can support the youngsters coming up. I will scream all day long at my director and my dean, who I like, about the value of this activity from the safety of my tenure, but I think we really have to bring this up as a group. We owe it to all the youngsters out there. We need to help them, because they need to cut through the same damn foliage that we did in order to get tenure.
- **SW:** Well, I just want to frame it; I want to keep this in mind that that's critical, but I would like us to be able to frame this, and I think I'm speaking as an administrator for the first time. I think that beginning design and teaching the things that we teach in our various ways is much more broadly applicable than within our institutions and within the tenure process.

One of the things that I want to be able to do twenty years from now, if I'm still around, is to say that what we did tonight was start making beginning design into something that became universally recognized as a fundamental part of the way in which the rest of the world now operates. Instead of the goal being 'let's get our colleagues tenure' let's change the way the world thinks about design. **MS:** Okay so now, as an administrator, you're going to tell your beginning design students, you're beginning design teachers, that they can invite someone to come and crit them at that level.

**SW:** Yeah, in fact, you're welcome to come.

MS: Send me an invitation, and he'll let me go.

SW: I'll pay ya. I'll pay ya.

JG: You may be stuck with him, you know.

- **CJ:** You'll have to pay him to go back(*Laughter*).
- **SW:** I think that's something to build on. I think that you'll find that there were at that first conference who are now deans and directors and actually value this conference, and I think one of the networks we need to build is that network of people that have participated in this over that twenty-five year time span. Let's work those people.
- **JB:** With that, I'd like thank everyone around the table for being here tonight.

(Applause, glasses clinking)

**SW:** Cheers to you guys, I have to go watch the end of the Tennessee game to be sure one team in my bracket actually loses.

**CB:** Thank you everyone.