

Robert B Trempe Jr

**Investigation/Translation:
Teaching an Introductory Digital Studio
with Analog Breakouts**

Robert B Trempe Jr

Assistant Professor
TYLER School of Art
Architecture department
Temple University
USA
trempe@temple.edu

Robert B Trempe Jr

Investigation/Translation: Teaching an Introductory Digital Studio with Analog Breakouts

...When there is a change in the basic framework of thought, then there has to be a shift in architecture because this, like other forms of cultural expression, is embedded in the reigning mental paradigms.¹

INTRODUCTION

The role of this Architectural Design Studio (treated as an introduction to digital theory and technique) was to teach students that digital media offers more than the ability to represent final constructions. Too often (in architectural design and lower-level education) digital media is seen as being an end-game move, a technique and process reserved for the final moments of architectural investigation when it is time to display the results of process (a final building). Digital toolsets² afford us the opportunity to articulate much more than just the resultant construction, so long as the means by which techniques are introduced are tightly choreographed. These toolsets afford us the chance to explore qualitative conditions of site, user, experience, and event, visualizing quantitative AND qualitative data in ways often infeasible and inappropriate through analog techniques.

However, there have been (and continue to be) worries about introductory studios immersed in digital technique, from the ways in which students become mired in worlds without quantitative scale to the overwhelming amounts of technology that must be mastered as a means of bringing conceptual ideas to fruition. From animation to fabrication and every technique and toolset in-between, without clear guidance and a mastery of at least one toolset, students often rely on the resultant operation of the tool as the final result, letting the computer decide the direction of the project without clear articulation from the student.

This paper serves as a vehicle for presenting the results of two studio iterations addressing these issues as well as speculating on how the resultant information can and will affect future introductory studios and introductory digital media-based pedagogies. Each studio introduced digital techniques to students while tightly choreographing moments of analog translations as a means of breaking students from the problems described above. Through a process of investigation involving the deviations in graphical field systems (diagrammatic and mapping techniques using a field of singular or “universal” elements) students were able to visualize abstract qualitative relationships in behavior, perception, and time. When students reached a critical moment

whereby their process in a digital realm slowed, translation assignments based in analog model making techniques using scalar subjects were interjected as a means of freeing their minds and grounding them in the most fundamental issues of process and construction, forcing students to use the accumulated latent knowledge of their projects as a means of translating information from one state to the next. In this vein, students talents became the instigators of articulation with toolsets operating as just that: tools to further their visions and ideas rather decision-making devices.

PROCEDURAL INVESTIGATION 01: QUALITATIVE TIME

That's just what is so remarkable about the scales of geological time – the fact that they're not arbitrary. Every year I make my students commit the sequence of geological eras to memory. All the teaching staff do the same, and the students complain. Why, they ask, are you making us learn these arbitrary names, these divisions of time, by heart? But I tell them that these distinctions aren't arbitrary, quite the reverse. When the geological scale was established in the nineteenth century, the boundaries were placed between eras which corresponded to mass extinctions. Not because, empirically, the major changes in the fossil archives coincide with the time they took place.³

A key propagation for both iterations of the studio is that architecture (and in the larger scope design) is four-dimensional⁴ with time playing a critical role in the investigatory process. As such, both studio iterations began with the analysis and visualization of a time-based condition whereby students were tasked with developing qualitative construction of seemingly intangible information. Through techniques in abstract qualitative modeling using packages such as Form-Z, AutoCAD, and 3-D Studio Max, students articulated time-based experiences that notated both hierarchical conditions as well as perceptual shifts in the experience. In the first iteration of the studio, students chose a condition of modern mobility, notating how the mobile device modified their perception of space. Examples of such devices include mobile phones, mp3 players, and bicycles. In the second iteration of the studio, students examined specific movies and music as a means of understanding the hierarchy of narration in time. Examples of the chosen media include the films Four Rooms, The Jacket, and Sin City.

As stated, students were asked with both sets of studies to determine a method of visualizing the intangible, the qualitative, and the hierarchical. In Melissa Shilling's (Temple '06) study of the effect of a mobile phone on her perception of space and time, she was "transported" 1000 miles south as she talked to a sister who was (at that very moment) in the midst of a hurricane. This level of "virtual displacement" becomes the exact quality that is mapped in three dimensions using modeling software. Time becomes a system of measure by which the various "events" of the experience can be compared and contrasted.

Even though techniques (and process-oriented exercises) such as this can be readily performed using any type of media, the power of using digital media can be found in the relational and

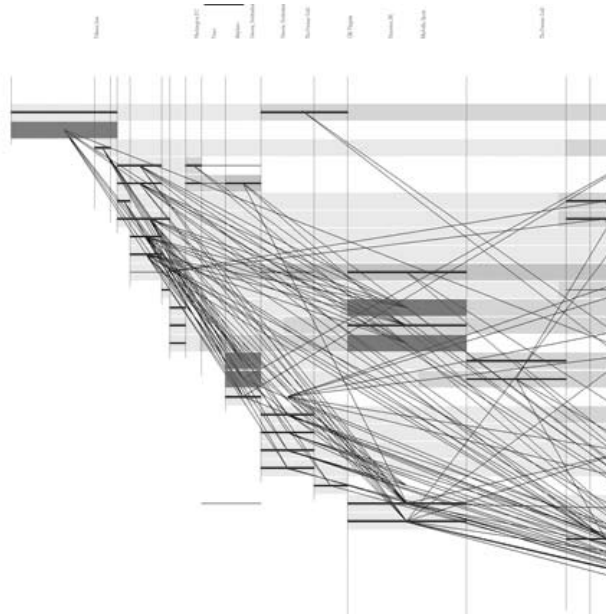


Figure 1
Detail of Melissa Shilling's mapping of a conversation with her sister, notating moments of virtual disconnect in the conversation.

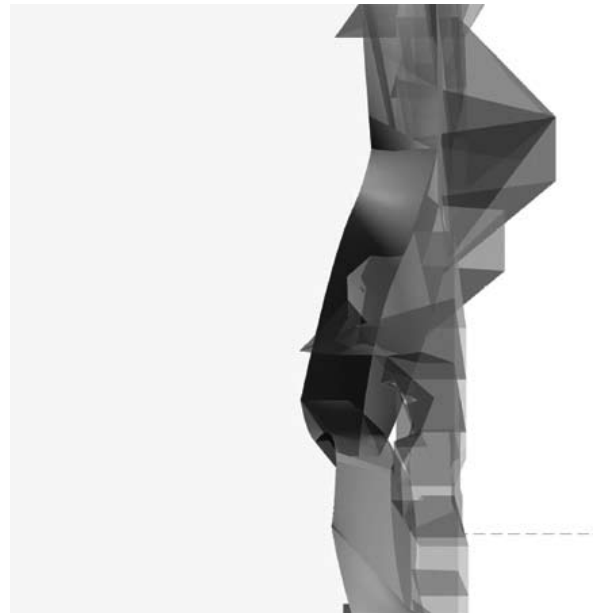


Figure 2 – top right
Detail of Adam Mercier's mapping of the film *Syriana*.

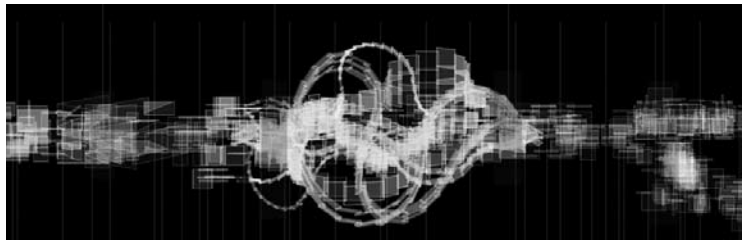


Figure 3
Pawel Ostrowski's mapping of the film *Four Rooms*.

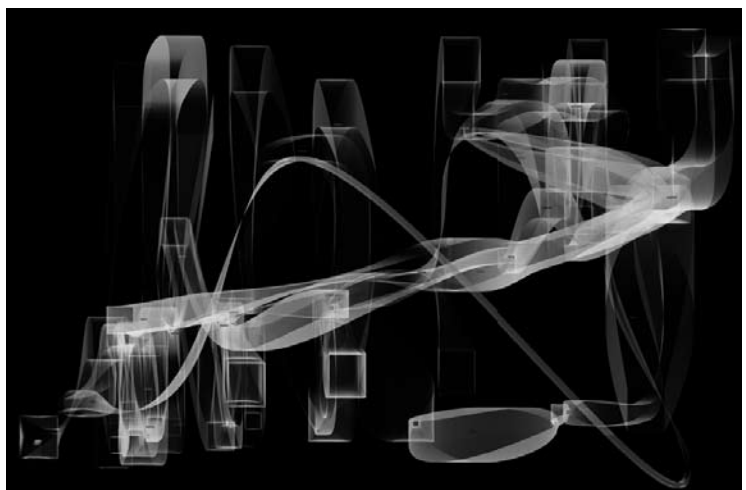


Figure 4
Melissa Chapman-Smith's mapping of the film *The Jacket*.

hierarchical methods by which you can model and manipulate this information. Through techniques of constraints⁵ such as parenting and joining, simple “measured⁶” systems can be generated and then mutated based on the changing qualitative experience. This efficient system allows a user (student) the ability to quickly set up the most basic of measured systems, copy the information, and begin the process of manipulating the copied information to show qualitative shifts in the experience.

In Adam Mercier’s (Temple ’07) mapping of character interactions found in the film *Syriana*, an incredibly dense network of inter-dependent characters was mapped as a method of showing the complex hierarchical relationships from one character to the next. These linkages are virtual in the sense that a quantitative system of measure cannot be used to determine the linkages. What a study like this does display to the student is the time-based dependencies associated with such a level of complexity. Again, through nothing more than basic constraints, it becomes clear how the adjustment of time-position of one character can shift the entire focus of the larger event (film.)

While the power of these exercises is the way in which students are forced to develop information in qualitative (relational) terms through a process of constraint and modification, a potential pitfall is that if students stay in this relationally-scaled environment for too long, the process of translation of information from investigation to built construction becomes that much harder to execute. In the end, we are (and train people to become) architects, a discipline that requires us to both think conceptually (relationally) and act rationally (scalar).

PROCEDURAL TRANSLATION A: ARMOR

The well-disciplined body of the soldier, for example, is “instrumentally coded” with an “obligatory syntax” which is invested with as much representational value as the uniform covering his skin.

The uniform is the institutional skin which makes the disciplined body most intelligible. As a system of representation, it identifies a body’s specific function in a given institution and thus defines the behavior of others.⁷

As a way to break students from the mire of the relationally-scaled world while also teaching students how information can be used from one process to the next, students were asked to use the logic⁸ developed and qualities found in their time-based models as a set of instructions towards the development of a more tangible, scalar, and physical interpretation of this digital information of experience. By interpreting the complex three-dimensional forms generated digitally into a series of easily fabricated surfaces, students would be able to physically build what they had only (as of now) seen as somewhat scale-less geometries in the computer. Using the time-based models as a reference and the human body as a site (linkage), physical “armor” systems were generated using analog model building techniques. In building their body armor by hand, students are forced to rely on their own sense of craft and translation rather than that of the computer. In using the body as a scalar system, students are forced to take the qualita-

tively-scalar information from the computer and translate / evolve it into information suited to a “site” familiar to each. Here students not only translate the qualitative geometries and relationships found in their body, but also address the potential linkages of both experience and geometry to a site that is at the most fundamental ideal to the Architect: The human body.

This moment was choreographed in such a way as to occur exactly when the students began to get lost in their own research. At first skepticism from the students occurred, but as each student took to analyzing the previous work produced (a step critical in any process-based studio), specific relationships became quite clear to each. In the work of Mark Faulkner (Temple '05), multiple experiences of traveling the same route on a bike generated a series of singular modeled paths that, once overlapped to form a composite experience, notated how exterior forces together with the mode of transit shaped his experience of space and time. In looking for a “body” site, he was able to determine a series of relationships between the digital qualitative model and that of his spine.

PROCEDURAL INVESTIGATION 02: QUALITATIVE MAP

The technique of mapping is an increasingly vital activity, one that undergirds diverse disciplines and transcends the supposed physical/digital divide. To map is a core aspect of design as it is to invent strategies for visualizing information that make new interpretations possible. The act of mapping is embedded in methodologies of traditional cartography but is not limited to the production of a physical artifact that is seen as a completed document communicating static form. Rather mapping refers to a process which is ongoing, incomplete and of an indeterminate, mutable character.

“Far from holding up a simply mirror of nature that is true or false, maps redescribe the world – like any other document – in terms of relations of power and of cultural practices, preferences, and priorities.”⁹

The qualitative information gained from both the time-based modeling exercise and body armor serves as a guide for the next step of this studio process: the analysis of a tangible building site. In both studio iterations the actual program of the building was left to the determination of each student, with the mapping of time-based qualities and characteristics of site operating as a continuation of a set of design logics leading to the articulation of a final building. By now students had experience both with qualitative, relationally-scaled digital modeling and the translation to quantitatively-scaled physical constructions. The introduction of digital, two-dimensional mapping of time-based site qualities is now much easier for the students to comprehend given the previous exercises.

Complex maps were generated through simple tools of filtering (2-D) and modeling (3-D). These techniques use the most basic toolsets (move, copy, array) of a singular primitive shape in an innovative fashion to articulate issues of patterning and behavior in a site through a time-based

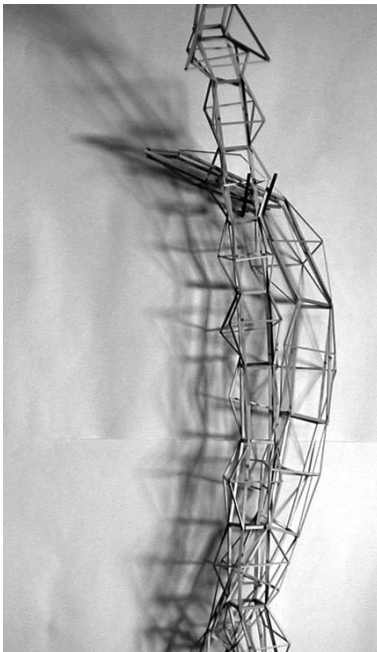


Figure 8
Mark Faulkner's time-based programmatic site map.

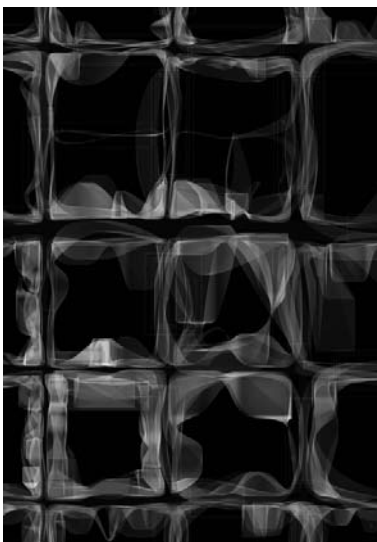


Figure 9
Melissa Chapman-Smith's time-based programmatic site map.

Figure 5 – top left
Melissa Shilling's "Armor," a series of interwoven fabrics that delaminate at moments of muscle transition.

Figure 6 – top middle
Mark Faulkner's "Armor," a lattice work system of multiple spines meant to be worn (and reflect) conditions of the back.

Figure 7 – top right
Pawel Ostrowski's "Armor" of repetitive panels, the connections of which provide flexibility in accordance with the movement of his arm.

qualitative manner. In the work of Mark Faulkner (Temple '05) the same graphical language used in the development of the time-based experiential model was applied to a mapping of occupancy conditions over a seven-day cycle, yielding information on what sorts of existing programs were active the most as well as reinforcing the rules for a formal design strategy. Mark used this mapping to make his argument for a series of programs that would help to balance-out the sometimes active, sometimes dead programmatic cycles present in the site already.

In the work of Melissa Chapman-Smith (Temple '08), the temporal and graphical logics developed as a result of her analysis of the film *The Jacket* served as the basic set of rules for the programmatic analysis of site conditions. In her initial film analysis, Melissa determined three types of time used in the construction of the film: Sequential Film Time (IE minutes and seconds required to watch the film), Narrative Time (used in establishing the events of the film), and Qualitative Time (used to give effect to the story line and state of the main character.) In her mapping of the programmatic conditions of site, the same sets of time were translated into a system of analysis that looked not only at the moments of most and least programmatic activity, but also the impact these levels of activity had on her overall perceptions of the site, much in the same way that time was used in the film as a method for helping viewers to understand the state of the main character.

PROCEDURAL TRANSLATION B: SKIN AND CUT

This second translation, a precursor to the final site intervention, is an element not present in the first of two studio iterations. At this point in the semester for the first studio, an assignment dealing with speculative representation was initially assigned whereby students developed collage-based images that depicted potential interior views of their proposed site interventions. It was hoped that this speculative imagery (generated using 2-D graphics applications with the same spirit as the collage work of Mies Van Der Rohe) would serve as a transition between the speculative and investigative research and the articulation of the final intervention.

Several students in this studio were hesitant to develop images that clearly notated and translated the potential of their research. Though not a complete loss, it seemed clear that another moment of quantitatively-scaled breakout was needed to help students in translating information. With the second of two studio iterations, a translation assignment dealing with speculative cladding was developed as a method for allowing students to articulate a moment of their intervention at a real scale with scaled materials.

In Adam Mercier's (Temple '07) skin articulation, the same network reliance time-based logic found in his film analysis was tied together with the logic of his "force field-like" site map to produce a skin system that notated different densities of programs through both the density of material and strength or size of aperture.

For Pawel Ostrowski (Temple '08), the organization and coding of information tied to the densities of primitive shapes found in his film analysis and site mapping served as logic for the devel-

opment of a skin system that used transparency and density to notate programmatic conditions. While not successful with every student, this second translation was an excellent method for reinforcing process with the students while forcing them to translate information through different mediums.

PROCEDURAL ARTICULATION: ACCUMULATION

In the final stage of both studio iterations, all previous investigations were accumulated and translated into a constructed intervention embedded within the site analyzed in procedural investigation 02. At this point the information gathered from the previous investigations (information in the form of logics, formal design strategies, programmatic strategies, etc) is now so latent within the mind of the student, they are able to quickly and precisely build their intervention in only one attempt. Information (qualities, characteristics, and tectonics) from these previous investigations shapes the proposed intervention, with the student referring back to the previous studies anytime a question as to the articulation of the intervention arises. In many cases, students used the very same toolsets and techniques employed in previous investigations as the mechanical logic for the development of their final articulation. As with the other investigations, the final output is not meant to be photorealistic nor mimetic in any way: these interventions seek to assemble and embed qualitative information rather than simply represent, using procedural information as a set of rules and logic.

A clear lineage from procedural investigation 01 through to the final articulation can be found in the work of Mark Faulkner (Temple '06.) His project, a mixed-use facility with shops, offices, and a carriage / rickshaw station, was shaped formally by both investigations and translations, shaped programmatically by the results of procedural investigation, with programmatic elements linked together much in the way he linked the various bike trips mapped in procedural investigation 01.

SPECULATIONS FOR FUTURE STUDIOS

A major issue that has not as of yet been addressed in either studio iteration is the ability to translate and transform the information gathered over the course of the semester into physical three-dimensional form. While all of the students in both studio iterations became quite adept at working with various toolsets, and while the idea of a process-based design philosophy was reinforced both through the choreographed movements from assignment to assignment and the moments of breakout from a digital environment, students were not afforded the opportunity to develop their projects beyond the virtual representation using even the most basic of planar fabrication toolsets. The results of this introductory digital media-based studio took students far beyond the typical "building visualization," however there was none the less not an opportunity to visualize their project in the form of a physical model or models.

In the next iteration of this studio, the order and content of assignments given in the previous iterations will be augmented by a new final step: the chance to physically build (through planar-fabricated models) these interventions using planer fabrication toolsets at the most base level.

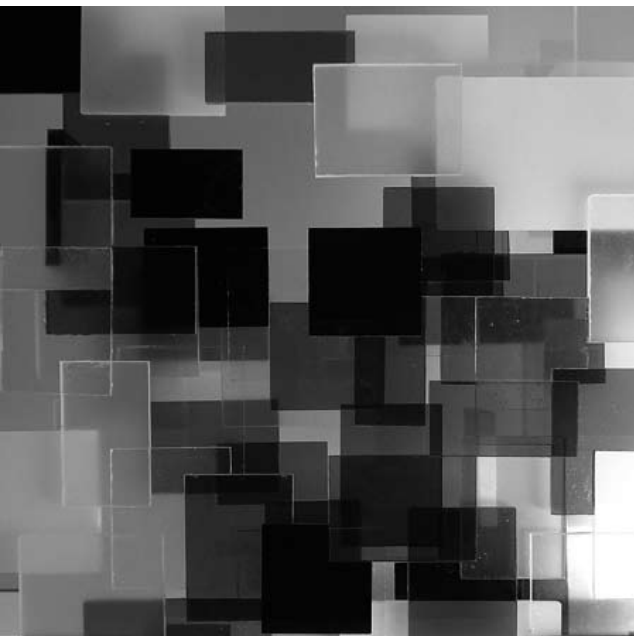


Figure 10

Pawel Ostrowski's pixilated skin study, whereby the accumulation of surfaces notates conditions of public and private space.



Figure 11

Adam Mercier's skin system where deviations in the network of strands generate aperture-like openings.

Given the time constraints of a 14 week semester, several shifts in the content of the studio will be required in order to continue the continuity of learning, but the critical choreography of the studio will still be employed as a method for helping students to visualize their projects while learning about how to operate in a digital environment.

Given these conditions and parameters, the next iteration of the studio will use a prescribed program, small in scale and complexity. The time used for Procedural Evolution 02 will be shrunk to allow students the opportunity in the latter stages of the studio to work with basic fabrication techniques. In this way, the overall pacing of the studio (digital / analog / digital / analog / digital) will now be followed by a hybridized endpoint through basic techniques in digital fabrication.

CONCLUSION

It can be put this way too: find ways of using instruments as though they were tools, i.e., so that they leave no traces. That's precisely what our tape-recorders, amplifiers, microphones, loudspeakers, photo-electric cells, etc., are: things to be used which don't necessarily determine the nature of what is done. There are, of course, pitfalls, but so is one's finger when he points to the moon. What we're dealing with is not things but minds. What else? ¹⁰

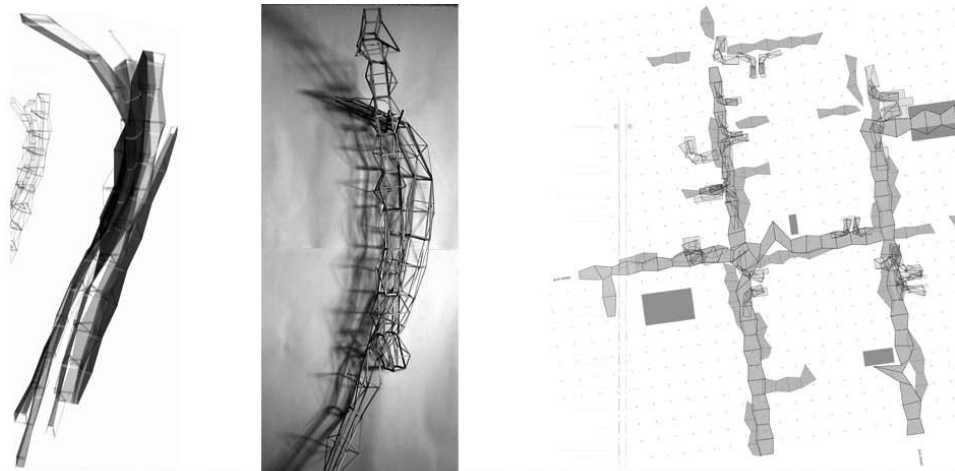
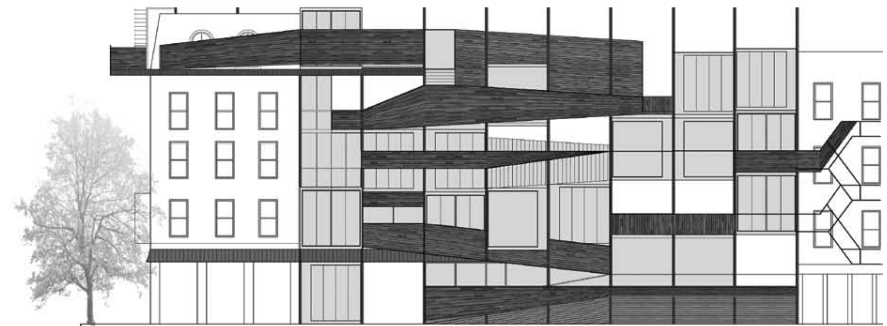


Figure 12
Mark Faulkner's process, from time-based modeling to final intervention.

Figure 13 – right
Melissa Shilling's process, from time-based modeling to final intervention.



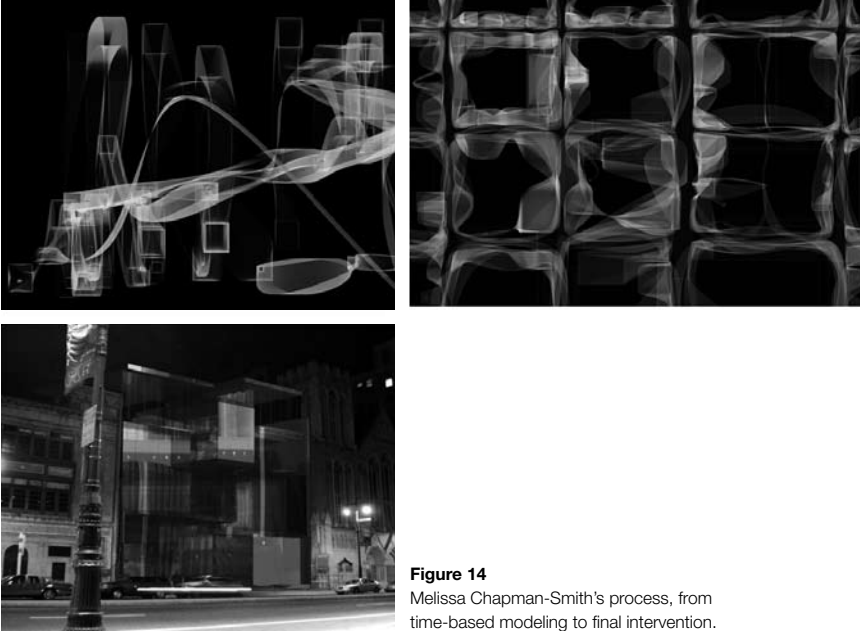


Figure 14
Melissa Chapman-Smith's process, from time-based modeling to final intervention.

It may seem counter-intuitive to force students to work with analog forms of media while in a digitally-immersed environment. However, in a studio that operates as the students first true digital media-specific studio, these choreographic analog breakouts are a critical method of transition for students from one media to another, and as seen, these transitions or breakouts helped ground the students, forcing each to make decision for themselves rather than allowing the software the opportunity to make decisions for them.

While teaching students to learn various forms of media (from pencil to mouse) is a critical step in the process of any architectural curriculum, even more critical is to teach students the potential of their own work once they have achieved an understanding of the various forms of media, and that THEY are the ones in control of the media in that any production should be articulated by the author, not the media. In this vein, both iterations of the studio were quite successful. Students were immersed in a digital media environment much in the same way they would be immersed in an analog environment whereby the media operates as a part of the process, NOT the process by itself.

Students can be taught that the computer offers us more than a method of representing final buildings. More importantly, students can be immersed in a digital environment and still output projects that have, at their most base level, a linkage to architectural tectonics, qualitative relationships, and theoretical propositions while still maintaining a tactile sense of space.

Notes

- 1 "Non Linear Architecture: New Science = New Architecture?." Charles Jencks, *Architectural Design*, 1997, p.7.
- 2 Toolset: In speaking about toolsets, I am referring to the phylums of tools offered in a typical 2-D and 3-D computer applications. Such examples would include vector tools in 2-D graphics applications and surface tools such as sweeps and lofts within 3-D modeling applications.
- 3 Umberto Eco, Stephen Jay Gould, Jean-Claude Carriere, and Jean Delumeau. *Conversations About the End of Time*. New York, Fromm IP, 2000. p21.
- 4 Four-Dimensional: Design takes into account not only Cartesian coordinates as a method of articulation (x,y, and z axis) but also time.
- 5 Constraints: A constraint operates as a linkage or reference between two or more objects in a model space. For example, the act of lofting a surface relies on a surface being shaped by a set of objects. In this case, the profile lines operate as the parent objects, with the resulting surface operating as the child or "constrained" object. Moving or distorting a profile shape forces the child-object to deform as well.
- 6 Measured: In this example, a measured system can be thought of as the quantitative input, time.
- 7 Diller + Scofidio. *Flesh*. New York, Princeton Architectural Press, 1994. p37
- 8 In speaking about logics, I am referring to the idea that in a process-based design, the very first "move" made in an investigatory process embeds within the results a basic set of instructions or "logics" that will inform the user of the next step in a process. As the user approaches the final moments of articulation in a process, determining the results and visioning the final intervention becomes incredibly easy as all of the "rules" needed to develop the output are already known through the procedural work.
- 9 Harley, J.B. *The New Nature of Maps: Essays in the History of Cartography*. Baltimore, The Johns Hopkins University Press, 2002. p51
- 10 Cage, John. *A Year From Monday*. Middletown: Wesleyan University Press, 1963. p124

References

- Cage, John. *A Year From Monday*. Middletown: Wesleyan University Press, 1963.
- Diller + Scofidio. *Flesh*. New York, Princeton Architectural Press, 1994.
- Harley, J.B. *The New Nature of Maps: Essays in the History of Cartography*. Baltimore, The Johns Hopkins University Press, 2002.
- "Non Linear Architecture: New Science = New Architecture?." Charles Jencks, *Architectural Design*, 1997.
- Umberto Eco, Stephen Jay Gould, Jean-Claude Carriere, and Jean Delumeau. *Conversations About the End of Time*. New York, Fromm IP, 2000.