

## **Confidence in the Presence of Conflict: Digital and Analog Media in Architectural Representation**

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### **Introduction: pedagogical context**

In general, successful architectural design processes depend upon a designer's ability to operate confidently in the presence of disparate approaches and conflicting information, and by their ability to create representations which have the potential to bear multiple readings. The struggle to do this is evident in the use of media which compartmentalize attention, such as software with proprietary formats. Such tools place sharply defined limitations on the structuring of thought.

In response to this recognition, I have developed a series of academic exercises which promote the layering and superimposition of disparate ideas, information, and modes of inquiry through a combination of digital and analog media. I am implementing the most successful of these exercises in the Visual Communications Techniques course which I teach at the University of Minnesota. In this course, students engage observations of local architecture in parallel with observations of remote architecture made possible through media. Students draw conclusions regarding the ability of media to structure thought as their observations shift from the local to the remote.

This paper summarizes the exercises, places them in a pedagogical context, and illustrates successful examples of student work produced over two years. I conclude with speculations about new exercises which I hope to implement in the course.

### **The course**

Visual Communication Techniques in Architecture (ARCH 5313) is a seminar course open to students from the University of Minnesota's graduate and undergraduate programs in architecture. I developed the course to enable students to develop confident bases by which to judge the usefulness of specific media in their design processes. More generally, I encourage the students to observe, question, and challenge the conditions of production surrounding their creative processes. I believe these abilities to be necessary preconditions to producing deeply felt and convincing architectural design work.

The course is structured around ten exercises, which are designed to build a collective understanding of media as they operate to structure thought concerning architecture. The course makes specific reference to the progression in design education from analog to digital media: successive exercises question choice in media selection, physicality and scale, issues of the remote and local, and relationships between digital formatting and physical production.

### **Choice of media**

As designers and educators, we are confronted with choices about media. The choices are consequences of a never-fully-resolved need to select productive combinations of media in ways which promote effective testing of questions and executions of ideas. The progression in design education in general, and in architectural education in particular, from analog to digital media has made our choices more complex even as options expand in scope.

ARCH 5313 proceeds from the assumption that effective media selection demands knowledge of each medium's inherent properties, limitations, and capabilities. Effective media selection is defined as the ability to develop productive lines of inquiry through the application of well-developed sensibilities concerning media, or as the ability to decide whether one medium or another (or a combination of media) is better-suited to the asking of a particular set of questions.

A well-developed sensibility about watercolor, for example, would include the knowledge that the medium is almost incredibly sensitive to the speed of the human hand in motion, and to the moisture content of the paper; about photography, would include knowledge of the significance to artifact production of light, time, movement, framing, focus, and depth of field; while drawing sensibly with pencil on paper would require an understanding of relationships between the weight and texture of the paper and the hardness of the lead. Each of these analog media, as a consequence of its inherent properties, is well-suited to particular lines of inquiry.

Digital media, like analog media, possess inherent properties, limitations, and capabilities, and informed selection demands knowledge as specific and sensibilities as well-developed as those required for analog media. In the sense that digital media exist as consequences of programmers' explicit decisions, their capabilities are more strongly inherent than those of analog media: a pencil or a wet rag may be used to push paint around on a canvas, but Photoshop can't be used to build a three-dimensional digital model. An ARCH 5313 exercise seeks to raise questions about media selection by structuring a side-by-side comparison between analog and digital media in response to an observation within a finite field of operation. The premise of the exercise, titled STRATIFICATION + RESPONSE, is that digital media may be used to algorithmically alter an image in accordance with a set of instructions or commands, and that considering the

altered image may in turn enable discovery of structures within the original image, especially if that consideration involves action accompanied by judgment.

To begin the exercise, each student selects an image from any source. The image must include a full range of tonal value. Each student uses Adobe Photoshop's Posterize command to stratify the image into a fixed number of tones, beginning with two and proceeding incrementally to nine.

The command works by automatically replacing original with new pixels, the tone of which approximates the originals as closely as possible given the limited number of new tones. When used to stratify an image into two tones, the Posterize command replaces every pixel which is darker than 50% gray with a black pixel; every pixel lighter than 50% gray is replaced with a white pixel. As the number of tones increases incrementally from two, to three, and on up to nine, the approximation of the stratified image to the original image becomes closer. (The approximation would continue to improve if the number of tones increased to its software-limited maximum of 256, although for some images, the number of tones required to produce a stratified image visually indistinguishable from the original is much smaller than the allowable maximum.)

Following alteration of the original, students respond to each stratification with a manually produced pencil-on-paper drawing, attempting to reproduce the visible tones as closely as possible. The conditions of the exercise assume that the human processes engaged – observation, interpretation, judgment, and action – are guided by a sensibility regarding the production of pencil-on-paper artifacts. The exercise relates the software's stratification to the human act of applying graphite to paper.

As a consequence of the exercise, students come to improve their understandings of the distinctions which characterize digital and analog media as separate types of fields for operation. The digital operation is almost mechanical in its execution and tends to be carried out with an almost complete lack of critical engagement, while the analog operation is difficult, time-consuming, unforgiving of error, dependent on practiced skill and individual judgment, and hence strongly idiosyncratic.



Fig. 1. STRATIFICATION + RESPONSE – Christina Wagner, 2004

Christina Wagner's digitally stratified images illustrate the algorithmic decomposition of the original image into an increasing number of tones. Unpredictability emerges as areas within the stratified images become alternately dark and light, narrowing in on a tone which approximates that in the original unstratified image. The pencil-on-paper responses strive to engage the consistency of tone present in the Photoshop images as they simultaneously betray an apparent need to find patterns and objects within neutral tone. Taken as a whole, the work is a powerful analysis of light in space – forthrightly engaging the complexity of this behavior within a simple composition.

Through exercises such as STRATIFICATION + RESPONSE which raise the promise of choice in media selection, students gain the empowerment to speculate as to the promise of media in their own investigations.

### Measuring and scale

Understanding the progression from analog to digital media within the architectural discipline demands a close examination of artifactual and representational scales. An artifact's representational scale is defined as an expression relating the measured size of the artifact to the measured size of its subject; its artifactual scale is defined as a quantifiable relationship between ourselves (as producers of the artifact), our tools of production (or our methods of measurement) and the artifact itself.

Consider a hand-drawn architectural plan drawn to a specific representational scale (e. g. 1:50 or 1:100). Regardless of its representational scale, the scale of the artifact – as measured by its physical characteristics and those of our hands and our pencil – is constant. A pencil does not become sharper, nor does paper become more receptive to our action, as we work at increasingly fine representational scales.

The pencil line assumes a representational scale of its own. Similarly, the measurement of a building to support the production of a scaled plan is conditioned by the physical scale of the measuring device relative to the thing being measured. (1)

In this spirit, the course assumes it to be characteristic of analog media that its artifacts exist, and are executed and measured at, a full artifactual scale: the measurable relationships between ourselves, our tools, and the objects of our physical action exist at a relationship of 1:1. We can't scale our fingers to half their size if we need to draw more precisely.

Digital artifacts also have a well-defined though changeable representational scale. An AutoCAD drawing can be viewed at a scale of 1:48, and then viewed again at a different representational scale. However, in direct contrast to analog artifacts, digital artifacts do not have a well-defined artifactual scale: there is no way to consistently measure the physical size relationship between ourselves, the tool (the software) and the medium (bits). If an AutoCAD drawing becomes too small to work on, we zoom in. If we need to improve the resolution of a Photoshop image, we do so without physical consequence: the software redefines each existing pixel into new, smaller pixels. And while there is a limit to the total number of pixels in an image, this is not a physical limit of the medium – it is a computational limit which grows with every new version of the software.

As a consequence of our inability to easily define the artifactual scale of digital artifacts, digital media has a strong tendency to separate the physical act of measuring from the physical act of representing. The production of an AutoCAD drawing is an act removed from the physical sensation of size.

Two exercises in ARCH 5313 are designed to examine relationships between the physical act of measuring and the physical act of representing, considered with regard to both analog and digital artifacts. The exercises question the degree to which the act of measurement can be made apparent in the representational artifact, or how representational artifacts might be structured to foreground the physical act of measuring.

The first of two exercises, titled STICKS + WALL, exists entirely within analog media and tools. The exercise requires students to produce elevation drawings of long corridors in the basement of the University of Minnesota's Architecture Building. Students are provided paper, pens, and straightedges, and each team is responsible for producing an elevation drawing to fit on the paper, correct in its proportions, but at whatever representational scale the team determines most appropriate.

The assignment asks the students to not use predefined units of measurement, but rather to observe the inherent scales and proportions within the artifact and the tools of measurement and production. The physical act of measuring becomes paramount. Without easy access to conventional units of measurement, students find themselves developing techniques for counting repetitive units, marking the straightedges, folding the paper to establish proportions, and so on, all of which are means for transferring their observations into representation through human action. The final documents physically reflect upon the act of measurement as it becomes the act of producing the drawing.

Following STICKS + WALL, students measure and digitally draw a plan of the Frank Gehry FISH sculpture in the courtyard of the Architecture building. Because the sculpture doesn't have a predictable rectangular order, students must adapt or abandon their own preconceptions about observation and measurement. The introduction of digital media into this exercise is designed to push the act of production away from physical sensibility. Problems of production are evident in the projects which fail to reconcile two apparently contradictory and unrelated organizational systems: the complex curved sculpture and the gridded floor system on which it sits. In work which fails to reconcile observation, measurement, and action, spatial relationships are compromised as the easy sweep of the sculpture's volume becomes difficult and twisted. Successful students allow the artifact's physicality and the act of measurement to guide production, and in so doing, demonstrate an intense combination of careful questioning and broadly based observation.

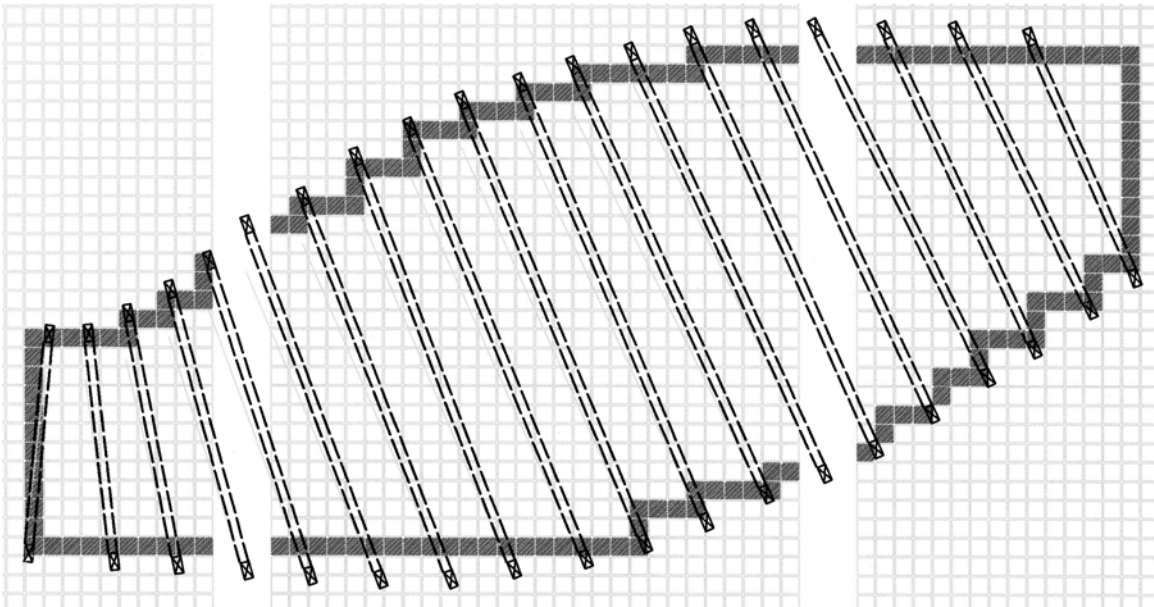


Fig. 2. FISH view of existing sculpture (top left), process document (top right), and final drawing (bottom) – Christina Wagner, 2004

Christina Wagner's process document consists of a collage of photographs on which she recorded her measurements of the curved sculpture as it relates to the floor grid. The grid remains visible in her final plan, with strong visual emphasis on those tiles which enabled her work.

Conflicts which emerge as a consequence of the progression from analog to digital media exist between measurement and production, and between observation and action. The premise of ARCH 5313 holds that students who are willing to reconcile observations across visible systems of ordering and production develop confidence for action in production, and hence in design.

### Local and remote

In the production of representational artifacts by analog means, *local* may be defined to mean at close spatial and temporal proximity, with implications of being immediately touchable and changeable. *Remote* may be defined to mean outside of proximity, or distant. To be local is to be "here", to be remote is to be "there." The distinction applies to the objects as well as the subjects of representation. Analog representations of remote architecture have a physical existence: they are published in books or periodicals, which themselves may be local or remote, and by implication, may be immediately and physically accessible, touchable and changeable, if local; or not, if remote.

A familiar effect of digital media on the definitions of remote and local is the compression of distance and time brought about by the internet, through which the digital contents of a remote archival collection may be made accessible to a computer anywhere. Once the remote is gathered near to become local, it also becomes touchable and changeable. Through digital means, representational artifacts are not only gathered from multiple remote sources, they are also easily combined, overlapped, reframed (or *repurposed*) to serve agendas quite different from those for which they were originally intended. Repurposing is the beginning of design: it marks the point at which information search and analysis begins to translate into action.

In ARCH 5313, three assignments promote reflection upon the meaning and presence of remote architecture as distinct from local architecture, and the degree to which thought and perception of both the

local and the remote are shaped by representational media. The first exercise, FRAMING + EMPHASIS, questions the effects which framing has upon perception. The second exercise, JUXTAPOSITION, considers overlay, superimposition, and graphically asserted analogy. A final exercise requires the design and production of a COMPREHENSIVE DOCUMENT addressing a synthesis of ideas developed during the semester, focusing on distinctions between local and remote, and between digital and analog production. Students are assigned to work with either Tadao Ando's TIMES Building in Kyoto, Japan, Peter Zumthor's Kunsthhaus (Art Museum) in Bregenz, Austria, or Le Corbusier's Sanskar Kendra (City Museum) in Ahmedabad, India. All three buildings are publicly accessible and well-documented in the available literature. (2) Students begin their work for the exercises by gathering documentation of their buildings through library and internet searches. That documentation includes, but is not limited to, traditionally published text, photographs, drawings, and maps, and digital scans of these artifacts, as well as text or images downloaded from web sources.

The FRAMING + EMPHASIS exercise assumes that the documentation will retain the observable and definable presence of someone else's agenda. For example, photographs include and exclude certain aspects of visual experience; labels, captions, and color-coding emphasize certain aspects of images at the expense of others. Students *deliberately manipulate* their found documentation to produce a document illustrating the experience of approaching the building through its urban context, as that experience is understood from documentary research. Acts of deliberate manipulation include, but are not limited to: altering components, blurring, combining, cutting, distorting, enlarging, erasing, forcing together, highlighting, inverting, overlapping, redrawing, separating, shifting, shrinking, stretching, superimposing, transposing, unfolding, and wrinkling.

In FRAMING + EMPHASIS, students consider how ideas such as sequence of movement are depicted in the original and repurposed imagery. The act of manipulating the imagery to serve a new representational purpose demands each student to define their position regarding acceptance of preexisting agendas: to what degree are students willing to accept agendas inherent in the photographs someone else has taken? The exercise forces the transition from gathering and analysis into action, as students are asked to manipulate images to strengthen a perception which they believe exists, or which should exist, at the remote building.



Fig. 3. FRAMING + EMPHASIS – Jenny Roets, 2005

In her response, Jenny Roets explores effects of a popular published image of the Sanskar Kendra. She repeats the image in fragments, juxtaposing it with itself and overlapping it with sampled text; the technique suggests the indiscriminate, almost mechanical nature of digitally enabled photographic reproducibility, and also the loss of a privileged observational position which accompanies remote study of any building. The technique is appropriate to Le Corbusier's modernist structure set within the densely mixed postcolonial fabric of the city, as it proposes that while the building may make sense when considered from an intellectual distance, its reality on the ground remains somewhat elusive, even foreign.

In the JUXTAPOSITION exercise, each student selects two images in response to each of six one-word concepts ("Material", "Order", "Frame", "Sequence", "Boundary", and a word of their choice). The first image must be of the assigned building, or a component thereof; the second image is open to each student's choice, and need not be of the assigned building. Students arrange the images in a rectangular grid and then produce a third image for each of the five sets, where the third image must contain graphic elements from both of the previous images.

## material



## frame



## order

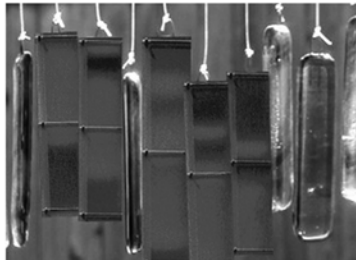


Fig. 4. JUXTAPOSITION – Matt Griewski, 2005 (left), Tim Fikkert, 2005 (right)

Matt Griewski's response to JUXTAPOSITION ("Material") draws a graphic parallel between the raked gravel of a Japanese garden with the concrete gallery floor of the Kunsthau. The raked gravel suggests a fluidity of surface in the museum; the rocks become heavy benches. "Frame" suggests the weightlessness and translucency of the museum's ordered steel and glass facade. Tim Fikkert, for "Order," proposes an understanding of the museum's gridded interior facade which sets it in parallel with stacked crates in an anonymous warehouse. In these examples, specific understandings of the remote are created by graphic analogy, not by univalent text or persuasive narrative. Student responses as a whole reinforce the implicit premise of the exercise that the remote is made accessible through image, and that as Marshall McLuhan wrote, "environments are not just containers, but are processes that change the content totally." (3) The semester's final exercise is a comprehensive document, by means of which the students reflect upon the semester's work. The document must be submitted in physical form of a given size; no fully digital submittals are allowed. It must comprehensively describe the effects which the student's work has on the structuring of thought regarding the perception of local and remote architecture. Digital media are used as a means to prepare the physical form of the document, to define its structure and appearance, and to some degree, to attempt to predict human interaction with an as-yet-unproduced physical object: the document itself. Considered in this way, the design of the document convincingly parallels architectural design (of a building). The best projects were those in which a reader's physical interaction with the document operated in direct support of the conceptual organization of its content.

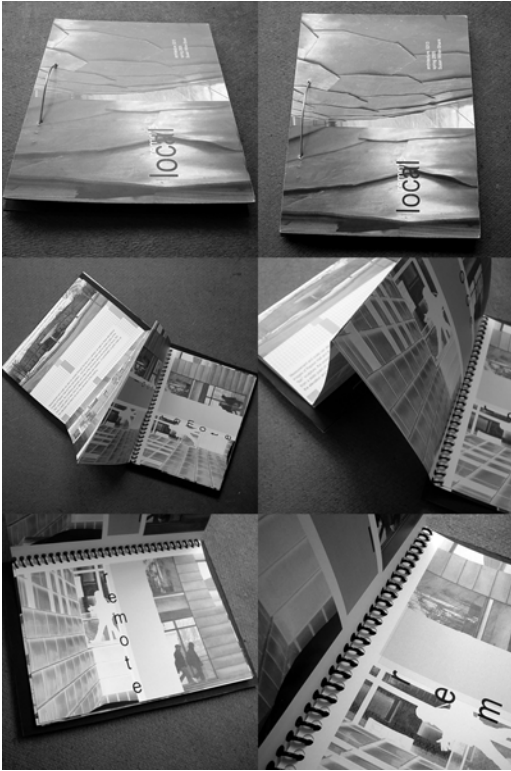


Fig. 5. COMPREHENSIVE DOCUMENT – Susan Witter-Shank, 2005

Susan Witter-Shank structured her examples of local representation on double-sided paper which folds out accordion-style from between two stiff cardboard covers. Her remote work is mechanically bound at the side and opens up like a book. The two sets of physical interaction provide a convincing, yet not dogmatic, parallel to conceptual understanding of her research.

### **Conclusion/Speculation**

An initially unexpected but thoroughly gratifying result of offering ARCH 5313 to students at all levels of the graduate and undergraduate programs is the evolution of a “course culture”: vast differences in experience among the students diminish throughout the semester in relative to the shared experiences and challenges of 5313. The less experienced students tend to observe the work around them and confidently begin to shift their own work in promising new directions. Simultaneously, the more experienced students become increasingly eager to bring advanced skills to bear on the problems. A common language develops in each semester as the students implicitly challenge each other to raise new questions.

My current speculation regarding course development concerns the introduction of a project which requires the students to design architectural form (as distinct from the existing document design project). I believe the introduction of such a project could happen in two ways, the first of which I considered the first semester I taught the course: to attempt integration between the coursework and concurrent design studio projects. This initial attempt failed, as it was clear that the outside work was in most cases done in response to the specific conditions and assumptions of design studio: it was very easy for students to operate within the familiar culture of studio rather than to riskily and forcefully challenge the conditions of production on the basis of issues raised in 5313. Nevertheless, even those students whose outside work was of the most conventional and predictable character were able to discuss and question their work and that of others with confidence, suggesting that although these students felt themselves unable to risk making direct challenges to the conditions of production in other courses, they were empowered to question those conditions.

Second, and more speculatively, is the possibility of introducing a design project to 5313 independent of design studio. In summer of 2005, as a testing ground for the seminar course, I will introduce a design project in another course I teach (ARCH 5351 – AutoCAD). In this project, students will find a discarded object, fragment, machine part, or tool which does not clearly possess a base and which fits within an imagined 12” cube. Students will design and fabricate a three-dimensional stand/enclosure for their object, fulfilling the conditions that it will hold the object off of the ground, and will be constructed of sheet material (e. g. chipboard, thin plywood or acrylic) cut on the college’s laser cutter. I hope that this exercise will, in the

spirit of ARCH 5313, question and challenge the aspects of progression from analog to digital media as they relate to architectural representation.

**Notes**

1. See related discussions in James Gleick, *Chaos: Making a New Science* (New York, Penguin, 1987), e. g. coastline measurements.
2. See, for example, Tadao Ando, *Complete Works* (London, Phaidon Press Limited, 1995); Peter Zumthor, Friedrich Achleitner, and Helene Binet, *Kunsthaus Bregenz* (Ostfildern, Hatje Cantz, 1999); and Balkrishna Doshi, "Legacies of Le Corbusier and Louis I. Kahn in Ahmedabad," *Architecture + Urbanism* 368 (May 2001): 42-49.
3. See Eric McLuhan and Frank Zingrone (eds.), *The Essential McLuhan* (London, Routledge, 1987).