VISUALIZING THE NON-VISUAL NATURE OF ARCHITECTURE

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Abstract. During the last several years our architecture school has gone through the process of fully digitizing the studios. We, as faculty are learning much about the advantages and difficulties of teaching architectural design in this new electronic environment. This knowledge has been included in our development of a beginning design communications course that offers an important improvement in regards to our changing teaching situation. This paper presents one project from this course that introduces our students to the use of digital media for dealing with non-visual and subjective content —something quite contrary to what is usually associated with the teaching of digital graphics. We believe that this project breaks new ground for teaching and investigating the nature of computer graphics and through it into the very essence of our experience and understanding of architecture.

1. Introduction

"*Art does not reproduce the visible; it renders visible.*"*(* Paul Klee)

Architects depend on representations for the description, design, communication, and criticism of architecture. There are at least two reasons for this. First, architectural designs cannot be developed and tested in full scale for obvious economic and practical inconveniences. Second, the human mind has clear limitations in generating, sustaining, and communicating credible simulations of architecture without external recordings. By using representations to articulate and communicate architectural actions and thoughts, architects not only give solution to these problems but also create a *language of visual depictions*.

A major task of architectural education is to teach beginning students this language. Most effort is understandably devoted to mastering the conventions, rules, and techniques of architectural representations (i.e., orthographics, perspectives, sketching, model building). Although some attention is paid to depicting the phenomenological nature of architecture, these efforts are typically devoted to cover only its visual aspects. In other words, little or no attempts are made to cover the wider, richer and perhaps most profound issues of architectural phenomenology. This has been recognized by many authors long ago (Alexander, 1979; Bachellard, 1964; Rasmussen, 1959).

Our pedagogic intention was to address this shortcoming in our architectural education and discipline. For this reason, we designed an exercise that addresses the multiple non-visual dimensions of our architectural experience. The premise was simple. Since what cannot be represented cannot be thought or communicated and since architects and designers are highly visually literate people, it would be more accessible to them if these invisible aspects of architecture (i.e., sound, touch, smell, etc.) were made visible by presenting them graphically. In other words, by developing visualization means to depict non-visual phenomena, we would not only acknowledge these dimensions but more importantly we might then consider them seriously in our design and teaching work. We were interested in investigating the potential for a representational methodology to explore and inquire (study, ideate, criticize) these concerns. *As a result, we developed a project that addresses this shortcoming and that we termed "Visualizing the Invisible"*

2. The Project

"Visualizing the Invisible" was the last representation project in a semester long process of getting to know (architecturally) the new UMFA (University Museum of Fine Arts) on the University of Utah campus, designed by Machado-Silvetti Architects, c.2001. See figure 1 below. Of particular interest to us was the building's great hall (see figure 2)

We organized the semester in three parts following a carefully crafted pedagogy that moved from direct experience and perceptual awareness to analytical and critical studies to experimental representation studies. This process went from individual (part one) to team projects (part two and three) to accommodate dialogue and debate about the issues under investigation. The team-based work also served to address the normal disparities present in beginning design students. The first two parts took care of the graphics

fundamentals and prepare the environment for the final project we are to focus in.

Figure 1. The University of Utah Museum of Fine Arts. The large central volume in the exterior view (left) is where the museum's great hall is located. The photos in the center and right show the interior of the great hall when it was under construction.

During the first part of the semester we asked our students to produce a series of conventional hand drawings of the new campus Art Museum. The results were freehand experiential sketches and then orthographic drawings that built out of each student's own direct experiences with the museum. The pedagogic emphasis here was about developing perceptual awareness, discipline, freehand drawing skills, and knowledge of architectural representation conventions.

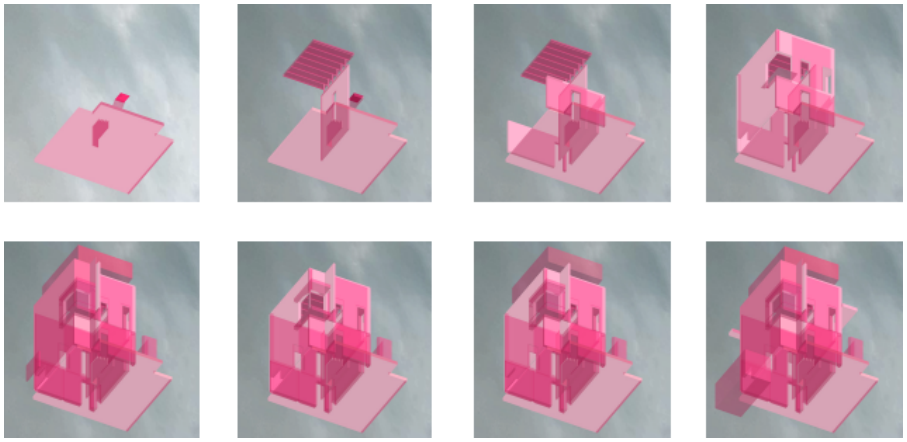


Figure 2. Recomposition study of analytical pull-apart demonstrating the building grammar. Students: Larry Curtis & James Nelson.

The second part required the students to develop a series of computer graphics that demonstrated their architectural understanding of the museum's great hall. The result was a sequence of images explaining the architectural syntax of the building (i.e., architectural diagrams, fundamental building assembly, massing and tectonics, circulations, envelope and structure). The purpose was to develop analytical skills to study the formal order of the space in conjunction with learning the architectural communication and digital media skills to convey this logically and appropriately. (See figure 2)

3.Seeing the Invisible…

The last part of the semester involved the subjective qualities of the UMFA's great hall Here representation was to become an expressive yet abstract instrument used to capture the metaphoric nature of architectural sensations. The students were asked to represent the intangible, the unmeasurable, the unseen and only felt as the end result of a progressive realization of architectural attributes. Using the 3D digital models they had developed in phase two, our students were to create four alternative depictions of the art museum's great hall that dealt with. 1) the ***sound*** of the place, 2) the ***smell/taste*** of the place, 3) the ***feeling of the body*** in the place (kinesthetics), and 4) ***synthesis*** (an edited combination of all three). Each representation was to express different sensorial conditions found subjectively in the objective realm. Following is a detailed description of each of these four facets of the project.

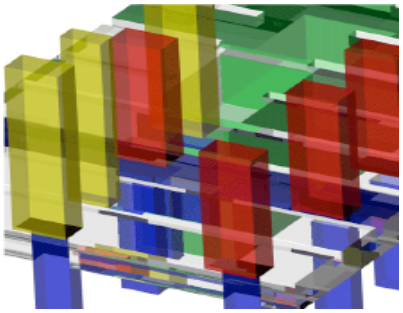
4.The sound of the place

German philosopher Schopenhauer called architecture, frozen music. Students were asked to consider and act on this famous 'statement'. They were encouraged to unleash the compositional sound of the great hall through a careful, intentional and yet intuitive play of the architectural "pentagram", "notes", and spaces at their disposal. The procedure was simple and required them to:

(1) Build a full wireframe of their 3D model (decomposed or not). This was to allow them to perceive the whole "musical composition" at once, frozen. The fact that such notation was 'architectural' encouraged them to act.

(2) Selectively enhance, delete, or (de)(re)form this notation so that it expressed the music they 'heard'. Lines, shapes, spaces, etc., were to play loud and clear.
(3) Probably begin with CAD and then move to image processing software (i.e., Photoshop) for further work.
(4) Look at concepts of notation, composition, rhythm

Two examples of student work are shown in figures 3a and 4a.



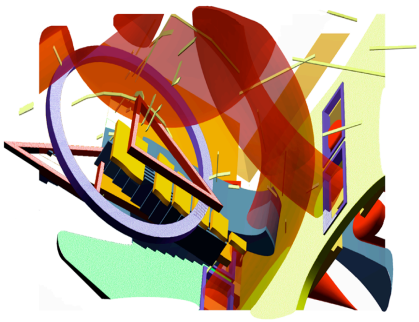


Figure 3a. (left) Visualizing the sound of architecture using principles of rhythm, repetition and dynamism. Students: Clio Miller & Susan Allred. *Figure 3b*. (right) The smell/taste of architecture is expressed using geometrical and color associations to atmospheric and textural qualities. Students: David Henderson & Kris Larsen.

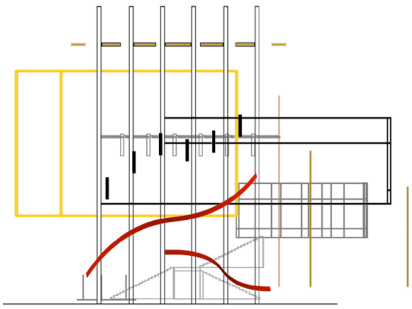


Figure 4a. (left) Example of a visual representation of the sound of the museum's great hall utilizing a notation system of rhythm to create a composition. *Figure 4b*. (right) Presents a visualization of the smell/taste of the architecture Students: Larry Curtis & James Nielsen.

5. The smell/taste of the place

This part of the assignment requested students to wonder about the aroma and taste of architecture. Aromas are probably the most powerful means to bring back memories, suggesting a deep and lasting connection to our experience of being alive and arguably of architecture. Yet, they are mostly invisible and rarely discussed in our discipline. Expressing aromas visually suggests some surrounding "airy' or gaseous interpretation. And what about tasting? Flavors have association to intimate probings of solid and liquid substances. Expressing flavors visually suggests textural and liquid interpretations. The pedagogical procedure prompted students to:

(1) Consider representations that address the seeming contradictions that smelling and tasting pose to the solid, tectonic and stable nature of architecture.
(2) Construct/develop renditions of their concepts.
(3) use CAD and non-CAD resources to work with. In the analog realm, they were to consider freehand sketches out of print-outs, charcoal-pastel studies, emotional diagrams, etc. In the digital realm they were to explore Photoshop tools, 3D Max/Form-Z rendering effects, etc. They were warned that digital tricks were NOT the point but that they may help if they were intentionally used. The medium was NOT the message.
(4) Look at concepts *of evanescent, immersive, plastic, atmospheric*

Figures 3b and 4b are samples of student work

6. The "bodily feel" of the place (Kinesthetics)

Perhaps one of the most important ways to experience architecture comes from our bodily sensations associated with movement, gravity, resistance, etc. However, we are often unaware of this essential component of our architectural engagement. Students were asked to consider how their ***physical*** self (not their mental or emotional self) sensed the UMFA great hall. Did architecture pull or push them in some particular direction? Did the wall attract or repel them? What invisible but very real physical tensions were present that made them look up, turn around, or stop and pause? How would they dance them? In this case, the learning steps were to

(1) Develop a 'structural' analysis of the architectural/sensorial forces causing strong kinesthetic sensations.
(2) Create as simple a 3D tension diagram addressing only the essentials of how their bodies felt.
(3) Include abstract depictions of
    - the source(s) of the force(s),
    - the dynamic effect(s) resulting from the forces at play (i.e., the dance), and/or
    - the one that feels the force(s).

(4) Use CAD, scanned freehand diagrams, photo-captured 3D analog model, Photoshop, etc., as media and tools at their disposal.
(5) Study the concepts of *tension, dynamic, force*

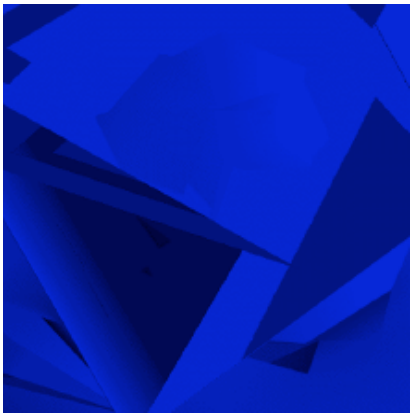
Two examples of student work are shown in figures 5a and 6a.

7.Synthesis

A mature encounter with architecture involves the experiential co-presence of multiple sensations, emotions and thoughts. Yet, this multifold is at no time unclear and chaotic. Rather it is a synthesis of all, weighed by interest, knowledge, and openness. Although such an experience invites many different interpretations, what we believe ultimately matters is the overall sensual impact of the place which we intuit without words or reflection. For our ordinary perception is a holistic construction out of our 5+ senses. Hence, the students were asked to produce a graphic summary that resulted form the synergy of the previous three layers. In this final phase, the assigned procedure was to:

(1) Overlap all three previous representations.
(2) Study and play with the result(s) to get familiar with the whole.
(3) Edit the work so as to produce a totalizing and clear view that expressed a ***new*** realization of the place. This outcome was NOT merely the sum of the parts, but a lot more than that.
(4) Use CAD and/or Photoshop to accomplish this work.
(5) Study the principles behind *layering, comprehensive, surprising, synergy*

Figures 5b and 6b are examples of student work.



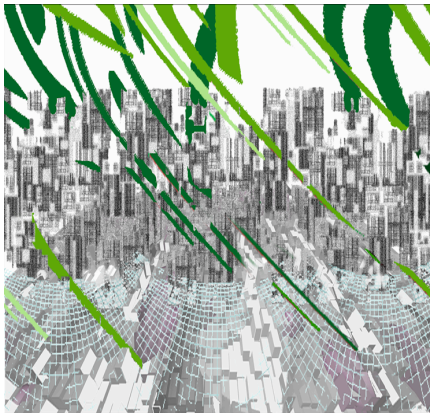


Figure 5a. (left) Kinesthetics is expressed using formal manifestations of constrain and release —twisting, pulling, bulging. Students: Clio Miller & Susan Allred. *Figure 5b*. (right) In this synthesis, the non-visual senses are synergistically combined to produce an altogether new interpretation of the whole. The sound is constant and penetrated by movement revealing variations. Smell and taste hover in the air, filling it or leaving only faintness. Students: Elpitha Sifantonakis & Arezoo Farhang.

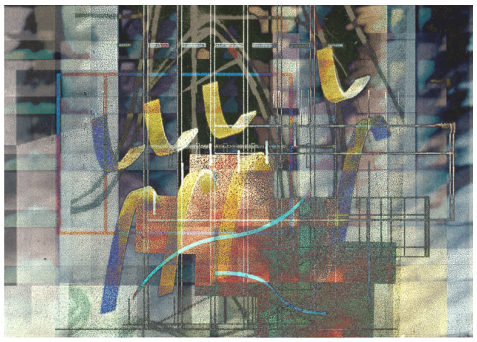


Figure 6a. (left) The kinesthetic sensations are captured using visual elements that suggest deformation, movement, and lightness. A background of relatively stable patterns is employed to imply other body tensions of lower intensity. *Figure 6b*. (right) The synthesis is a reconstruction of the three previous interpretations to generate a higher experience conveying what Alexander called the 'quality without a name' (1979). In this case, figure 6b synergistically combines the representations shown in *figures 4a, 4b* and *6a*. Students: Larry Curtis & James Nielsen.

8. Results and Conclusions

The job was to make *visual* phenomena that by their very definition were *non-visual*. The fact that this appears impossible made it a most remarkable and useful tool to investigate architectural graphics. After all architecture is indeed experienced as multifold sensory phenomena, much of which we cannot see.

The project required students to realize (i.e., make aware and make real) by themselves the "subjective" and dialogic conditions necessary to engage the objective realm of architecture. The students had to tune to their own sensations, figuring out what each particular sense meant and how it was perceived in relationship to the other ones (i.e., how sound is different from taste). Second, doing so demanded students to move away from the analytical mindset they had been working on (second part of the semester) and take a more 'pre-cognitive' or 'a-critical' attitude towards their pure sensation of architecture. It became quickly evident that the best responses came from designers who immediately responded instead of from those who over-intellectualized or tried to understand each move. Third, in order to make the non-visual to visual translations, students had to establish new and original metaphoric correlations to the graphics field that made sense as architectural expression. Doing so demanded radical and abstract transformations of the existing architectural grammar. As earlier, the more successful works came from students willing to improvise and experiment within a large framework (as opposed to force a pre-conceived idea into a literal graphic representation). This process opened up their overall understanding of space and architecture and extended their representation and media toolbox.

More precisely, the final project made our students learn:

(a) The multiple and rich layers of sensations that compose our experience of architecture.
(b) The nature of non-visual perceptions and the incredible power that we can find in visualizing them because it allows us to think, communicate, and hence use them for design.
(c) The potential of the computer to address and expand the metaphoric world of the designer and thus challenge the unfortunate and limiting preconception/association of digital media to drafting.
(d) That digital media can allow us to inquire about architecture in new and hitherto impossible way.
(e) The nature and role of conceptualization, metaphor, analogy, caricature, grotesqueness, exaggeration and symbolism.
(f) A new set of skills and vocabulary in digital media.

Successfully teaching beginning architectural communication courses that combine conventional graphic techniques with subjective non-visual architectural issues is never an easy task. We have found that developing and running projects that attempt such combinations can be extremely time consuming, requiring much class discussion. However, as faculty we strongly believe this extra effort is worthwhile because this teaching strategy has even more pedagogical advantages than the ones described above. For example, the final project brought important self-esteem to students that had not performed that well in the previous phase (analytical, critical). It was remarkable to observe that those same students that had difficulty in analyzing the building tended to have the easiest time at accessing and experimenting with their perceptions. Although we are tempted to theorize about the apparent difficulty to balance intuitive and analytical processes, we will only observe the benefits that this situation brought to the studio. Spontaneous discussions arouse in each group and then in the classroom as a whole regarding this fascinating and seemingly actual dichotomy. The obvious was concluded: designers need to strike a balance in their empirical, intellectual and emotional engagement of architecture. But, more importantly, students realized first hand that the best guarantee to achieve such balance is by means of counting with a healthy diversity of people.

Although a few students demonstrated some initial frustration regarding the subjective nature of the job and the lack of existing conventional tools to do it, they were themselves surprised to see the results of their work. In general, the studio was full of excitement and a true pioneering atmosphere of experimental inquiry. We believe that the success of this project was due to the fact that the class was provided with a strong foundation in architectural graphics conventions (part one and two of the semester) allowing the students to expand and improvise in new and unusual areas.

Architectural graphics were thus used as a way not only to feel and think but also to “define” the unknown, unmeasurable, invisible.

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