REPRESENTATION AND RE-PRESENTATION: *Emerging Digital Conventions of Architectural Communication*

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Abstract. This paper examines the theoretical and conceptual underpinnings of digital architectural representation. Emerging digital tools, processes, and methods are sponsoring new conventions for the communication of architectural ideas and motives. New conventions yielded through digital media offer fresh and currently uncodified ways to communicate. These new conventions attempt to communicate the same ideas as the old, sometimes subverting the imperative for *drawing* as the representation does not *refer to* information in the abstract, but literally *is* the information. This research explores the use of architectural conventions, such as plan, section, and perspective, to examine re-presentation—not only a way to convey form and content, but to also to be used as a form of communication. The emerging digital conventions are forms of communication situated between representation and re-presentation.

Keywords. Education, design theory, digital design representation

1. Introduction

"To disclose appropriate alternatives to the ideological stagnation plaguing most architectural creation at the end of the second millennium, the first crucial step is to acknowledge that the value-laden tools of representation underlie the conception and realization of architecture."

- Alberto P   rez-G   mez & Louise Pelletier, Architectural Representation and the Perspective Hinge (1997)

As architects move beyond drawing-centric practice into a dynamic process/component oriented *digital practice,* a new conceptual foundation for architectural thought and production is emerging. The emergent digital conventions of architectural communication focus on fluid relationships between design, design documentation, conceptual representation and descriptive re-presentation in which *digital information*, not drawing, is the primary medium. Educational pedagogies must be revisited so students are taught that architecture is more than simply applied knowledge and skills translated through conventions of visual communication. Architecture is a way of seeing and thinking that requires understanding of media beyond the idea of *tool* to an idea of *process*, even methodology. This presumes a convergence of best-of-class technologies that leverage data management and knowledge production as the value of the architect and the true goal of the design process. The greatest potential *digital practice* promises is the opportunity to re-invigorate and re-center digital representation and education

simultaneously on ways of exploring architecture by developing and exposing design processes and methodologies that reprioritize ways of seeing, thinking and making.

Abstraction and its role in architectural representation has traditionally been about fragmentation and isolation of the parts from the whole. Contemporary educational models presume this relationship of the *parts to the whole*. Digital media as a concept or process is much more of a context driven, anti-fragmentation, anti-isolation design process that is dependant on contextual relationships in increasingly simulation based modeling environments to fundamentally re-conceive the relationship of the *whole through the parts*. Speculation about this shift provokes a critical debate about the possibilities and pitfalls of the new trajectory suggested by *digital practice*. Traditional representational conventions of communication like plan, section and elevation are fundamental to the way architects are educated. When avant-guard practitioners such as Thom Mayne proclaim "I haven't drawn a plan in five years." (Mayne, 2006) they expose a significant issue of digital practice's effect on education. Digital modeling fundamentally subverts plan thinking by prioritizing a three-dimensional view of the world. While seasoned practitioners may not need to work in plan does an education in that form of abstract thinking still serve them well? And if so, does it bear continuing its prolific dissemination even at the chagrin of today's avant-guard? When anything is possible how can academia educate students to know good from bad, right from wrong? To find a way forward academics might be well served to expose debate or hybridized transition in the projects themselves.

The challenge is to understand the opportunities presented when digitally driven design, process and production technologies are envisaged more comprehensively than as mere tools (Kolarevic, 2003) to fully embrace them as ways of thinking in and of themselves. One of the dilemmas of *tool thinking* is that it undermines the additive value of skills and intentions working together when conceptualized as a working methodology with its own rules and boundaries to be played against. Digital CAD, BIM and parametric/generative modeling applications are not tools, but instead propose ways of thinking, conceptual positions, to frame the work conducted in these new media types. A tool, like a chisel, is one way to remove material. As a *tool of removal,* a chisel is limiting. Digital applications are not the chisel, but, more precisely, they are the *concept of removal* that the chisel represents. Understanding and positioning digital media and digital applications as a way of thinking is far more powerful than limiting it as a tool. As a methodology it can be developed and dissected into and throughout a curricular structure. Digital design media propose ways of thinking that fundamentally alter the way we conceive and effect the construction of buildings. The method by which digital design processes aided by application methodologies must be considered as design decisions. Students must understand not only the model geometry but also the implications of the ways the model is constructed (Cheng, 2006) to develop a rigorous process of critical evaluation, understanding the elements not only through drawing convention but also design intent.

The primary question is; does architectural education still require representational abstraction in the age of digital design methods and processes? What are the issues and knowledge that academia should now address to enable the new emergent identity of the digital design process? What current issues and knowledge get displaced? Many academics and scholars favor a reductionist approach (Guidera, 2006) that seeks to mediate the complexities and simultaneities that digital media brings to bear. Perhaps academia might hybridize existing educational models with the goals of *digital practice* and reformulate the underlying value of technology and process and the comprehensive nature of architectural design and representation.

2. Representation and Re-Presentation

This research explores the representational and conceptual structures that inform the creation of a physical construct from digitally produced models through an examination of the conventions of design communication. Conventional architectural communication relies on fundamental symbolic systems, accompanied by legal reference, and fragmentation and isolation of information risking high levels of indirection. New conventions of architectural communication that evolve out of relationships, data, and information eliminate the dependence on symbolism and reintroduce the poetics and science of geometry, form and space. Information can be more complete without symbolically referencing other information and conventional standards. This simple specificity produces artfulness; the language of the drawing is potentially unique to itself. The drawings represent the process of designing, the process of making and the process of fabricating a physical construct.

Drawings have been the primary mode of communication in architectural representation since the Renaissance. Standardization and codification of drawing techniques shifted the craft of architecture from construction to representation and abstraction. Representation has evolved with the development of digital craft. Today, digital modeling has allowed for more direct drawings than standard late twentieth century architectural communication. During this period, production was standardized, regularized and codified; technology supported this trend resulting in standard conventions of architectural communication, systems of symbols and contextual referencing. These drawings are more indirect. Between the impossible extremes of the completely direct *thing itself* (Figure 1) and the entirely metaphorical collection of symbols we find a spectrum of direction. Drawings can also be evocative of a broader and abstract concept. Evaluating and appreciating emergent drawing qualities allows architects to place what is a beautiful and compelling artifact into the context of the design process and culture. In the image below (Figure 1) the use of transparency, wireframe, section and perspective are combined in unique ways that constitute one of the new conventions emergent within digital media. This convention, while currently uncodified, takes traditional conventions of section and perspective and combines with the digital convention of wireframe and the digital possibility of easily achieved transparency to find a new for of representation that transcends any of the original conventional types.

With new digital capabilities, the drawing or artifact is parallel to architecture. The same systems and rules that apply to the making of the drawing also apply to the architecture. Each drawing has its own internal convention that cannot be reapplied directly to any other drawing. Each drawing, with these internal conventions, communicates relationships and systems introducing a perceptual bias. Each drawing is explicit about the design process. The drawing no longer isolates specific pieces of information. A drawing is descriptive of any one part or the whole. No single drawing in a conventional drawing set could communicate a comprehensive view of an architectural project on its own. Such a set would have no value outside of the specific language of conventions such as specific references and the meaning symbols that apply to the set as a whole and all sets generally. These conventions made drawings very limited because of the drawing's necessity to communicate exactly. If standards were broken and the drawings became more general and abstract, they would lose their meaning.
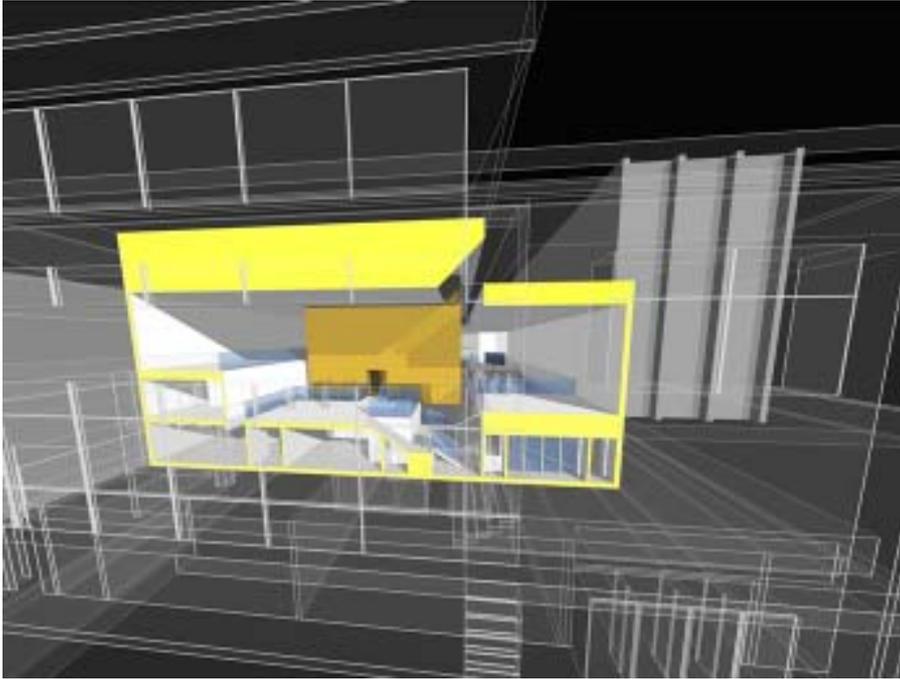
Figure 1. Student Work - University of Maryland – ARCH 402 Timothy Kiser.

3. Process is the Product

The New York firm SHoP Architects PC brings forth new conventions of architectural communication that evolve out of digital fabrication information. (SHoP, 2004) The computational processes used for their projects demonstrate fluidity between design process and design product. In the image below (Figure 2) red lines and blue lines describe the placement of individual elements in the actual architectural construct. The emergent color purple comes where red system pieces overlap with blue system pieces. The drawing is not trying to represent the intention it *is* the intention. Re-presenting the information in it's unadulterated truth, speaks more accurately to the design process and architectural product liberated from any representational obligation or agenda.
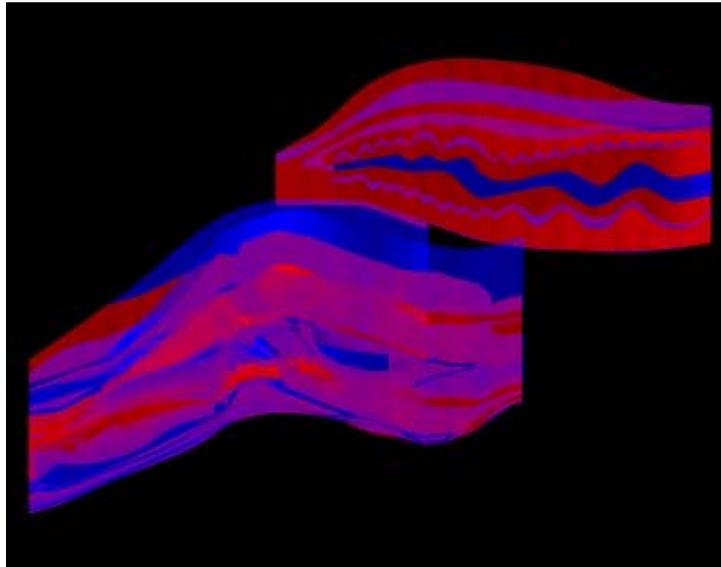
Figure 2. P.S.1 Dunescape - SHoP Architects, PC.

Formal, tectonic, and experiential performative requirements are often the driving force in SHoP's projects and are communicated in each drawing or form of architectural communication simultaneously. Parti development based on massing and type is not necessary or even beneficial in their process. The initial stages of their projects are based on the coalescence of the computational study of parameters and restrictions derived from the site, program and requirements of the space that is being designed (SHoP, 2003). This digital modeling analysis generates architecture that informs the spatial, formal, and temporal properties throughout the entire design process. (Rahim, 2002) From this digital model, physical dimensions are extrapolated and recorded on a spread sheet and another software is used to separate the pieces of the digital model and organize them on cut sheets in a way that minimizes the amount of materials used. The cut sheets are sent directly to a machine to be cut or produced. (SHoP, 2004) There is no need for symbolism or traditional convention to communicate what the piece does or how it looks. The drawing becomes the actual information for the thing itself. Information is more complete without symbolically referencing other information and conventional standards in construction documentation. These construction drawings can be tied to design as they are rooted in generative geometric processes. (McCullough, 2004) The drawings represent the process of designing, the process of making and the process of fabricating.

The computational processes used for SHoP's Camera Obscura project (Figure 3) demonstrate fluidity between design documentation and fabrication. Parameters for this project are based on three-dimensional position and orientation. The parameters are created by the need for a dark enclosure with apertures that reflect images of the outdoors. The form and site are decided through an analysis of concentric boundaries of space defined by the limitations of cone of vision, focal distance, and lines of sight Ultimately the goal for the project is to frame a very specific view, making the physical position and orientation very critical. The repetitive position and orientation of the drawings for this project indirectly represent the critical position and orientation to capture that specific view and also directly re-presents the assembly of the whole.
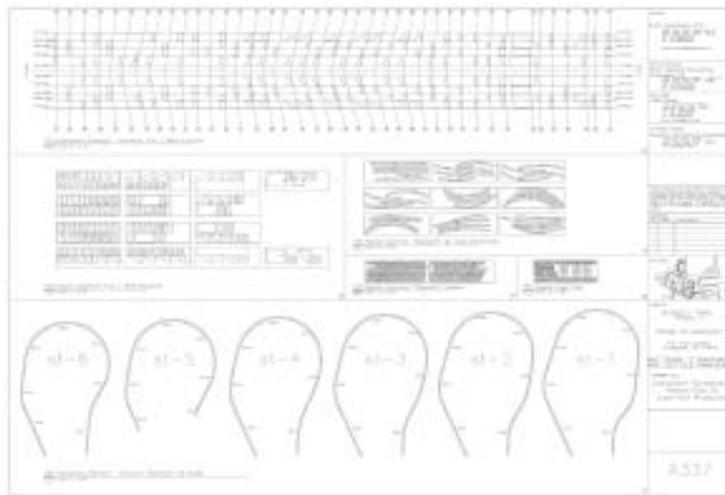
Figure 3. Camera Obscura - Construction Drawings – ShoP Architects, PC.

As evident in the drawings of Dunescape, the temporary installation in the P.S.1 courtyard, the parameters are the dimensional requirements for certain actions (Figure 4) or contours drawn as sections, directly resulting in the architectural form. The process is the product, the image at 1:1 is the representation of every component and is literally the construction document for the architectural assembly. Interconnected spline lines generate a continuous surface out of instances between the contours and the contours themselves. The form reveals other parameters based on size and availability of material. These drawings represent the process, fabrication, and form. The drawings directly expose an overlay of many different instances simultaneously. The drawings directly represent the experience without simulating it by implying a variety of human functions that take place on a beach through this continuous form. No instance between contours has the same coordinates so that the spliced wood pieces abstract the organic erosion and variation in height of the sand.

4. New Conventions of Communication for Digital Design

The conventional practice of architecture today assumes a traditional set of orthographic projections (plan, section, elevation, etc.) at varied scales and levels of detail, that when taken in concert signifies a whole, complete idea of a building. Contemporary architectural practice assumes a simple one-to-one correspondence between design intent and interpretation, between the representation of ideas (Lonna, 1997) and the interpretation of the design of buildings. Contemporary construction documents reveal this assumption, these abstract, fragmented representations of the building and its components rely on reductive syntactic connections (Lonna, 1997) where each abstraction is part of a dissected whole and taken as a summation these fragments exceed their individual abstraction and constitute a literal description of the complete building. Digital and computational media conversely begin with the virtual construction (simulation) of the whole, which is then viewed as a series of isolated assemblies of constituent components. Is there an inherent value in the translation of ideas into abstract representation or is there a greater value a transcription of ideas in to a simulated construction?

Often digital media and computational design shifts the focus away from representational development (drawings) and towards formal and spatial development (ideas) through the development of the three-dimensional model. It is this gap between design theory and digital practice that exposes a possible path for engaging digital design media in education that explores how fundamentally new digital conventions of communication might reshape the design process, digital practice and educational priorities. The new emergent digital conventions of architectural communication will conceptually shift the production of architectural ideas and objects like nothing has since orthographic and perspective projection in the fifteenth and sixteenth centuries.
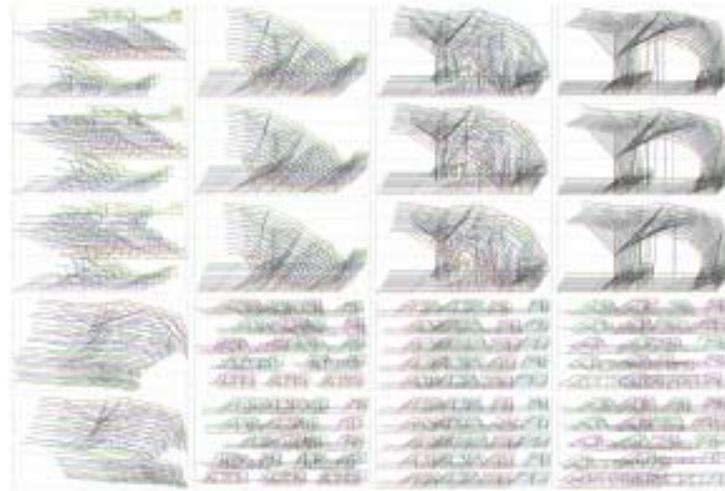

Figure 4. P.S.1. Dunescape 1:1 Construction Drawings – ShoP Architects, PC.

5. Conclusion

The effect of digital media on the design process can produce new conventions or visual constructs that are in effect an alternate media, one based on information rather than image, devised to explore architectural issues while still requiring a transformation to become architecture. These new conventions or alternate media are fundamentally changing what and how architects and more importantly architecture students, are communicating about design and the design process. Further iterations of this study will seek to reveal ideas of scale and proportion embedded in the work through a series of new conventions that describe the architectural (spatial) significance or potential of the forms generated in digital media.

Acknowledgements

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