MANUAL OPERATIONS IN THE AGE OF DIGITAL DESIGN: A CASE OF A BEGINNING DESIGN STUDIO

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0. QUESTION/INTRODUCTION

The recent developments in digital technology demand a new agenda in architectural design and its pedagogy. When and how should architecture design studios introduce and explore the logic, the tools, and the techniques of digital design? Can we identify the representational and perceptual mode of the new digital age, and gain critical insight into how we should incorporate the mode and the knowledge of digital design into the pedagogy of the beginning design studio?

The series of beginning design studio exercises and the student work introduced in this paper deliberately dwell on manual operations, rather than the digital. The studio was devised and developed with awareness toward the three critical aspects of digital technology and the relevant modes of representation and perception. In short, the three aspects are:

1) The interactive nature of today's artwork ensures the participant's self-awareness as both the maker and the audience.

2) The nature of digital design is profoundly genetic rather than mimetic, as it involves formulation of the kernel that performs as the source of self-generation.

3) The authorship in the age of digital design and the strategy of genetic engineering connect to the newly defined site-specificity. The spatial and the temporal phenomena of the site and the collective mass that construct the site are, in this constellation, the significant parameters.

The student work, in other words, is a result of an experiment in cultivating the concerns for these three aspects, yet sustaining the necessary embodiment of the inhabited space and time by not submerging the students into the realm of digital technology. The key concern in conducting the studio was to verify and re-imagine the potential modes of digital production and reception, without adherence to the technology itself. With this concern, the studio followed three phases: 1) exploration of the medium; 2) installation through the generative norm; and 3) site intervention.

1. EXPLORATION OF THE MEDIUM

1-1. Aim and Methodology

One of the major assumptions of the beginning design studio introduced here is to consider each student as a full-fledged designer. In doing so, it is important to let the student acknowledge that she is an active audience of the environment. The students were asked to identify and observe the matters they engage with, and the performative capabilities of such matters and the tools they use to extend and renew their engagement. Through this first phase, the students acknowledged that the two modes of production and reception were constantly in tension and folding onto each other; and that the process of design was the constant feedback between the modes of production and reception.

The first set of exercises exemplified here deals with the various mediums and techniques in perception and representation. The exercises were devised to familiarize the students with the new ways of seeing and experiencing the world they inhabit. It was important to allow the students to acknowledge thinking with their sensory experience, which would be intensified through the mediums and the techniques they use. By familiarizing themselves with the opportunities and the bias of such mediums and techniques, they were guided to de-familiarize and distance themselves from their pre-established concepts.

During their experiments with the different mediums, the students familiarized themselves with the inherent nature of each medium. Once the students understood the capabilities of each medium and the opportunities it offered, the exercises aimed at facilitating the ways of perceiving and representing *through* the medium. In other words, rather than simply describing the visual appearance, the students were asked to *exemplify* the specific properties of what they perceived *through* the medium.

1-2. Student Work

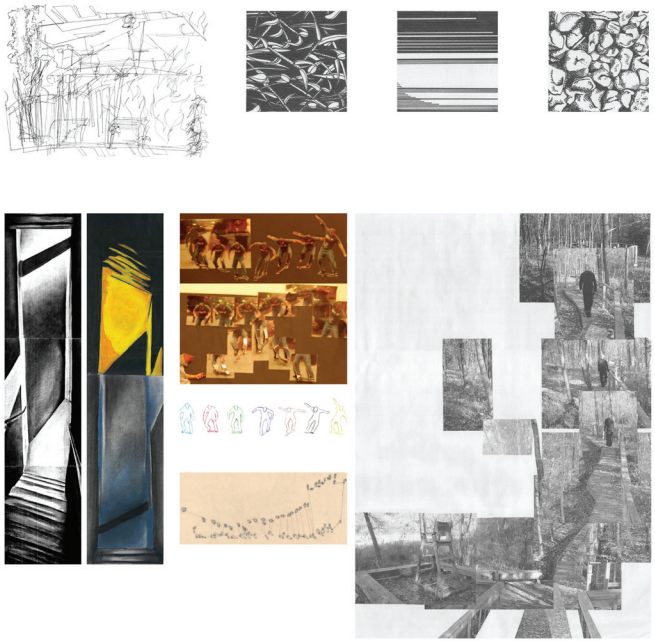

Figure 1. Student works by Jeffrey Pucciano, Sarah Forslund, Shaquita Gray, and Brennan Taylor

The selected works in Figure 1 are some thoughtful and skillful experiments with the given mediums, which include pencil, ink pen, charcoal, pastel, and photography. Using such mediums accompanied with various formats and templates, the students were asked to perceive and exemplify the various matters of natural and built environment seen through window frames, swatches of texture, particular slices of time and space, and human behavior or movement. I should note that the students' works, in effect, did not aim at being documentation or being purely aesthetic. They were intended to embody what the students saw and experienced through exemplification.

1-3. Theoretical Implication

Exemplification is one of the particular modes of denotation suggested by the renowned analytical philosopher, Nelson Goodman. In Goodman's terms, a symbol that exemplifies *directs to* a set of selective properties of the referent; and the symbol does this by *possessing* the properties of the referent. Exemplification, therefore, is reference plus partial possession of the properties of the referent. Consider, as an example of exemplification, a tailor's swatch. The swatch exemplifies the properties that it both has and refers to. The swatch (symbol) functions as a sample, which exemplifies the color, the texture, or the pattern (properties) of the cloth (referent).[1]

Goodman's theory of exemplification helps to understand that our engagement with the world through representation and perception is, in itself, an act of making. Note that to exemplify, the author has to embody in her work the properties of what is being exemplified. Through selection and possession, we refer to a renewed construct of the world. In other words, we critically yield to the opportunities that our means of representation and perception offer, and dwell inside the disciplines that they construct. For students in a discursive studio setting, such critical means are often the medium available to them. By playing with the opportunities and respecting the disciplines of these means, the students reconstitute their world.

The aim of the exercises, in other words, was to allow the students to acknowledge that their intervention within the environment and their selective exemplification of that environment are significant activities of making. Such an acknowledgment is a necessary prestage for the experience of interaction, particularly the kind of dynamic interaction that not only enjoys the output but also engages in the input, which produces the output.[2] The process of selective exemplification, in fact, is the process of identifying the particular elements of output, which are potential elements of input.

2. INSTALLATION THROUGH THE GENERATIVE NORM

2-1. Aim and Methodology

The aim of the second-phase exercise was to introduce to the students the notion of the generative norm. The students began by establishing a physical module, and were guided to consider the various ways in which the module could expand and perform. Through their understanding of the given material and its properties, the students then developed multiple strategies through which the modules could be accumulated into an expanded and performative artifact.

Before producing the modular prototypes for expansion and performance, two distinct preliminary research exercises were given to the students. First, the students conducted hands-on experiments with the given material. The material, again, was to be fully explored as another medium. Second, the students were asked to select and study the natural or enforced processes of performance. To be more specific, they were asked to observe and document, using the appropriate mediums and techniques, the phenomena of a changing organism and the factors that affect the change.

After the two research exercises, the students incorporated the learning into the making of the modular prototype, and into its expansion and installation at a particular site. By asking the students to consider the module to expand spatially, the notion of generative norm was inexplicitly introduced. The students had to devise various ways in which the module could be a variable, which conjoin to one another for expansion. They, furthermore, proceeded to install the expanded modules within the existing structure of the site. Through these processes, the students learned to embrace indeterminacy of their work, and communicate their intentionality in interaction with such conditions of constant and unexpected changes.

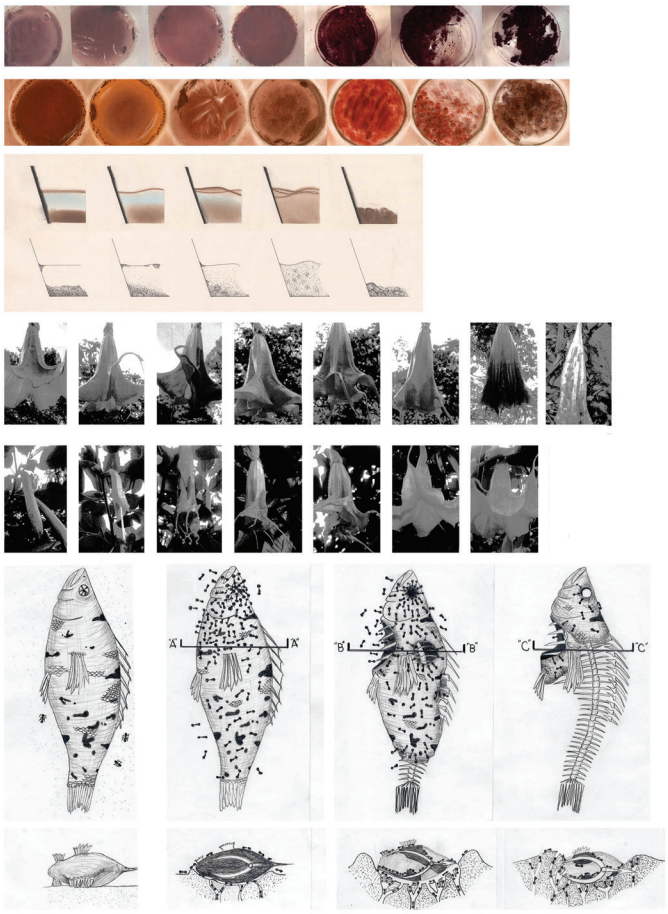

Figure 2. Student works by Amanda Rabah, Sarah Forslund, and Keith Causey

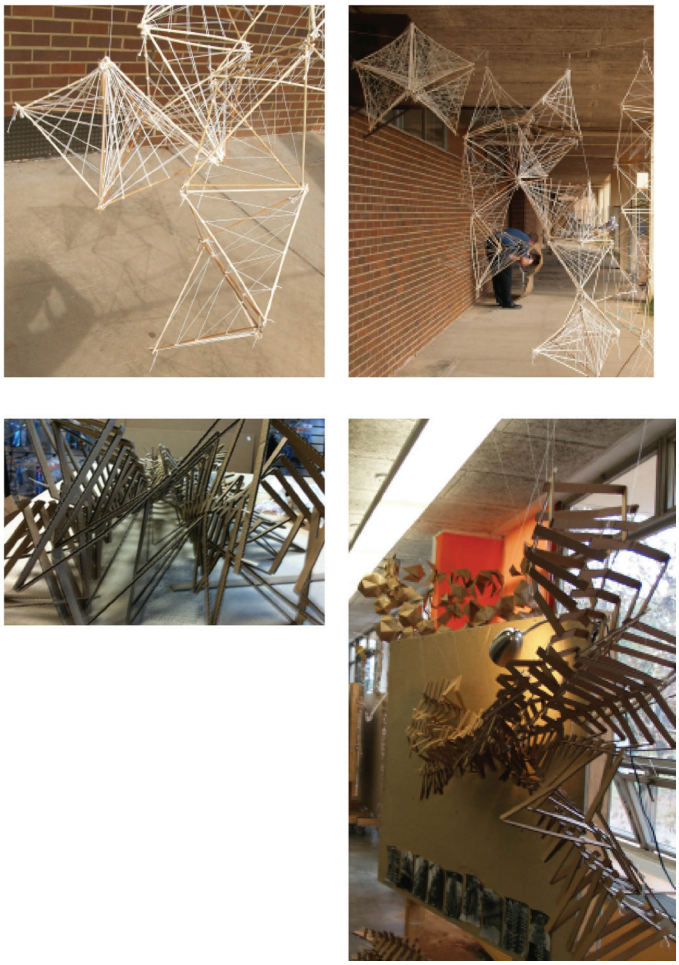

Figure 3. Student works by Eric Moritz and Amanda Rabah

2-2. Student Work

The selected works in Figure 2 are research projects that document the natural or enforced processes of performance. The projects, for example, documented how water and earth in combination reacted to different temperature and time, how natural changes of a flower blossom occurred, or how a fish decayed under certain conditions. The students were asked to observe through drawing such changes with a clear understanding of what causes them, and thoroughly identify the performative aspects of the changing process using the various mediums.

Figure 3 includes two student works of modular expansion and installation. As apparent, the properties of the given material, the logic of conjoining the modules for expansion and installation to the existing structure, and the performative capabilities of the work in response to the factors of natural and built environment were all factors of consideration in expansion and installation of the initial module.

2-3. Theoretical Implication

Generative norm, or the Deleuzian *objectile* that possesses the genes for variance, has become the definitive concept for understanding today's digital practice. It is important to note, however, that the notion is not something exclusive to the digital technology. As Mario Carpo insightfully points out, this notion was a key undercurrent of Alberti's theory and practice.[3] We can find the logic of the generative norm in the examples of modernist practice as well. Le Corbusier's *tracé régulateur* (regulating line), likewise, function as a norm that generates particular relationships between the formal elements of a design. The *tracé* is potentially a counter-dependent design tool that transmits minute differences of the plan to the façade and vice versa. Such transmission of differences between the plan and the façade is apparent in the design of Le Corbusier's early villas, and foreshadows the recent architectural design based on digital formulation that register as form the non-discrete differences from a generative norm.

Regarding the notion of the generative norm, the aim of the research and installation exercises introduced here was to guide the students in acknowledging the mode of digital design without the use of digital tools. The students developed their sense of digital production based on discreteness of components through generative norms via manual engagement with the mediums, the techniques, and the material that they had gained familiarity; and via hands-on intervention within the continuum of the physical site.

3. SITE INTERVENTION

3-1. Aim and Methodology

During the second-phase exercise of installation and post-installation observation, the students became aware of the site and its significant role as a key factor of their work. It was important for the students to acknowledge that the performative qualities of the their installation, in fact, were largely determined by the parameters of the site, which the students are forced to take into consideration. Through the constant manual corrections necessary in response to the imposed conditions of the site and the nature of the module, the students understood the principles of parametric design.

In connection with the second-phase exercise, the aim of the third-phase exercise was to guide the students to investigate the parameters and the phenomena existing within the spatial and the temporal dimensions; and to understand and investigate the design principles based on such parameters. In particular, each student was asked to identify for herself a "salient moment," the moment of intense awareness toward a phenomenon at a particular place and time. The students, then, documented, analyzed, and reconstructed the parameters of their selected moments. Afterwards, they investigated through schematic design how an artifact might perform within the site – that is, what changes the artifact, and what is, in turn, changed by the artifact.

3-2. Student Work

Figures 4 and 5 show a selection of student works successfully adopting the manual operations in perceiving and representing the properties of the site. The works include a schematic design of a viewing machine based on the on-site isovist studies; an echoing device based on the recordings of sound and their visual documentation when moving through space and time; a thorough documentation of the various phenomena caused by light; and a study of cast shadows, deformed by the topographic contours and time.

3-3. Theoretical Implication

The students, in producing the research and the proposal documents, particularly those of the hand-drawn analyses, were asked to attend to the processes of reiterative exploration and precision. The reiterative quality and the issue of precision are critical components of transmission between the mediums, which is a profound aspect of digital design.

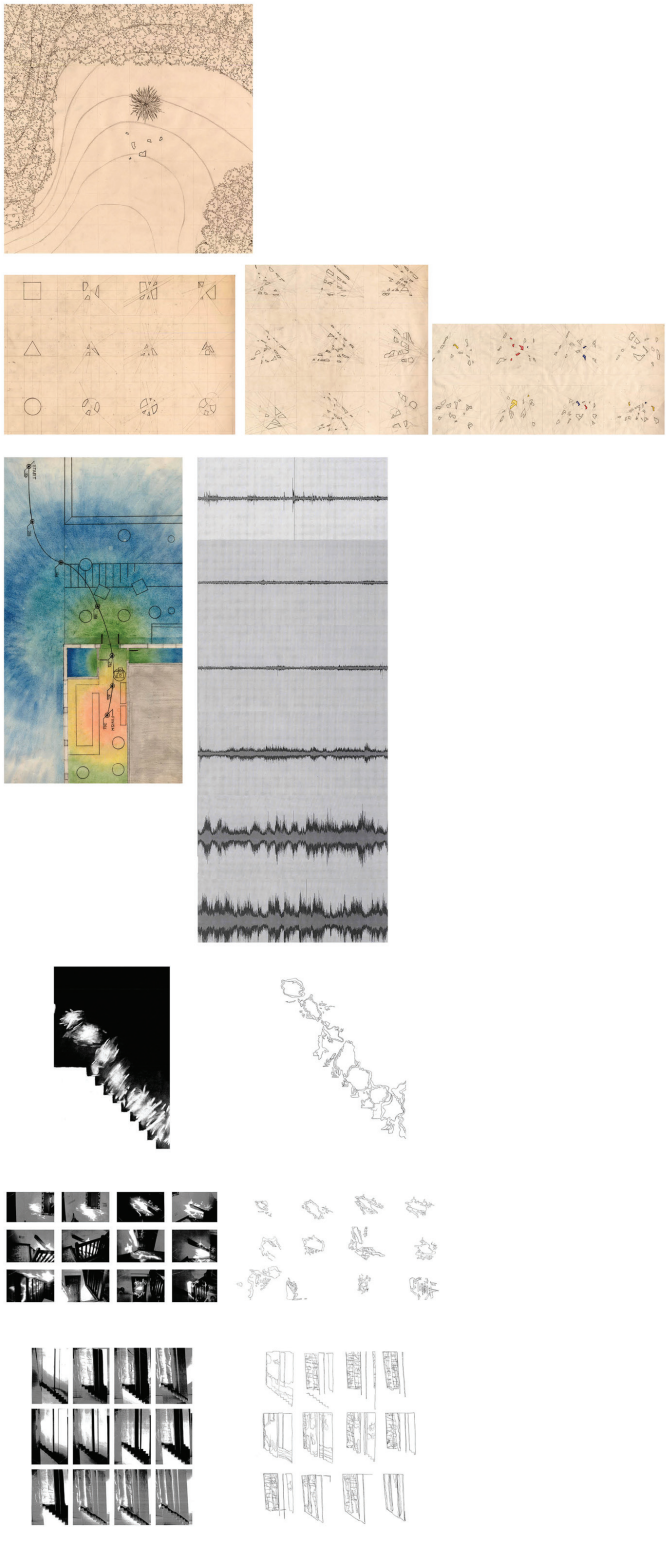

Figure 4. Student works by Brennan Taylor, Keith Causey, and Sarah Forslund

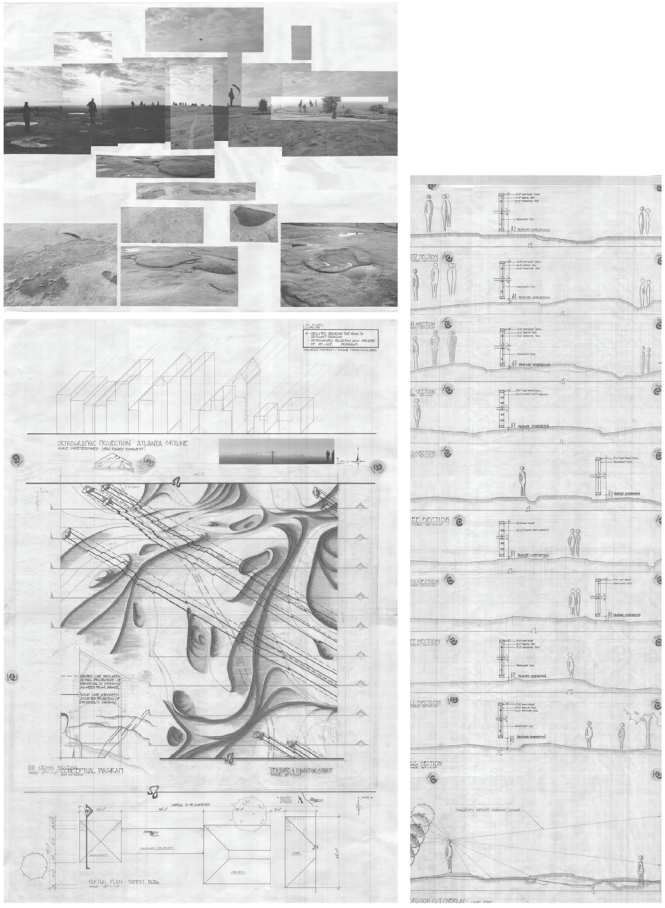

Figure 5. Student work by Jeffrey Pucciano

In addition, it is worth noting that documentation aimed at exemplification of the phenomenal experience. Although the research and design documents were, in essence, visual, note that the works demonstrate a variety of interest in multiple sensory phenomena, and are thus not limited to the formal aspects of the site. The student works, in retrospect, resemble the situationist psycho-geographical works suggested by Guy Debord. It pursues to be a kind of "constructed situation," which attempts to replace the primacy of form and object.

Today, designers are faced with the new territories of space and time. The physical site, wherein the traditional designers used to operate, is now expanding to the limitless virtual site. The question, then, is how the keen awareness toward the phenomena of space and time and the effects of an artifact cultivated through the pedagogical strategies in design studios can be also expanded in response to the new dimensions of the virtual, non-physical site. We are still at the explorative stage in attempting to answer this question; yet my belief is that the new dimensions of the virtual or the augmented reality, in essence, still need to be perceived and conceived as an extension of the embodied reality, as those in the continuum of our bodily habitation. Some of the sharpest and harshest critiques toward digital design and architecture come from the phenomenological circle, yet I believe that our sensitivity toward bodily experience of the physical world can be greatly enhanced through the opportunities offered by digital technology. The beginning design studios, therefore, should devise the ways in bridging the phenomenological and the digital approaches.

4. CONCLUSIVE NOTE

Walter Benjamin, in his renowned essay, "The Work of Art in the Age of Mechanical Reproduction" (1936), introduces the compelling metaphor of the painter/magician and the cameraman/surgeon.[4] The painter works like a magician, who only reduces *slightly* the distance between the hand and the body. She merely touches the body to cure. The cameraman, on the other hand, works like a surgeon, who reduces *considerably* the distance by dissecting with the surgical knife the body, and enters into the body. The painter sees the appearance of the subject and mimics its wholeness through depiction, maintaining the distance to secure the aura. The cameraman penetrates within the subject, analyzing the subject into components and re-contextualizing them through re-assembly.

Benjamin's metaphor signifies the change of art itself in response to the change in the media technology and the representational and perceptual mode. This Benjaminian view brought insight into the tendencies of fragmentation apparent in the architectural works of the historical avant-garde; and the common approach in modern architecture based on analytical and diagrammatical processes.[5] The Benjaminian metaphor and its suggestive framework is profoundly dialectic. Benjamin, by attending to the mode of production and reception, poses the artwork as not merely a response to the technology, but as its counterthesis. The students' work introduced in this paper, likewise, draws attention to the mode of production and reception apparent in the digital technology, but through the counter-processes of manual work.

Although the changes implied by digital technology seem radical, our perception of the world still relies on our bodily and physical experience. Like photography has extended and enhanced our perceptual capacity in Benjamin's time, digital technology, perhaps, is another species of technology that further extends and enhances our perceptual capacities. Rather than detaching the design studio completely from the physical and the phenomenal reality, the pedagogical framework introduced here attempts to remap the future designers' capacities through acknowledgment of the core digital features, yet still maintaining the principle of manual operations intact.

To support the suggested principle of manual operations at the stage of beginning design studio, I would like to note the argument by Harry Francis Mallgrave, who has established a critical view toward the early adoption of digital practice based on Warren Niedich's assertion.[6] Neidich, whose interest expands to neuroaesthetic concerns in art and media, maintains that cultivation of visual and cognitive mapping of the human brain is critical to our aesthetic perception and creation. Such "amplified maps," he says, "develop efficient connections between their constituent neurons, and this in turn gives them an ad-

vantage when competing for information with other networks." What becomes important, Neidich continues, is the "relationship between organic/real stimuli and those that are artificial and phatic."[7] Establishing a proper and balanced relationship between the two, in fact, is the key task in today's architectural pedagogy, as we are exposed to the overwhelming stimuli of the virtual and the augmented reality. Should we not expose the students to the actual stimuli of the physical reality first; and should we not cultivate the students' neural maps that can perceive and conceive the physical world first, before letting the students submerge into the realm of digital technology? Meanwhile, we should attend to the principles of digital design that underlie the apparent digital operations through research-based exercises, and guide the students to equip the sensibility necessary for the new age of digital design.

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ENDNOTES

1 Goodman, Nelson. 1976. *Languages of Art: An Approach to a Theory of Symbols*. 2nd ed. Indianapolis: Hackett.

2 This notion of "interaction" has become critical to digital art. In particular, to use Usman Haque's terms, it is a notion that should be distinguished from that of circular mutual reaction. It is "about affecting not just actual output (in response to input) but also about affecting the way that output is calculated." In this constellation of interactivity, Haque continues, "both the input criteria and the output criteria are dynamic, and constructed collaboratively." See Haque, Usman. 2007. Distinguishing Concepts: Lexicons of Interactive Art and Architecture. *Architectural Design* 77(4).

3 Carpo, Mario. 2001. *Architecture in the Age of Printing: Orality, Writing, Typography, and Printed Images in the History of Architectural Theory*. Cambridge: MIT Press; and Carpo, Mario. 2011. *The Alphabet and the Algorithm*. Cambridge: MIT Press.

4 Benjamin, Walter. 1969 (originally 1936). The Work of Art in the Age of Mechanical Reproduction. *Illuminations: Essays and Reflections*. Ed. Hannah Arendt. New York: Schocken Books.

5 The Benjaminian metaphor has been discussed in the context of architectural discipline by Tafuri, Manfredo. 1980 (originally 1968). *Theories and History of Architecture*. Trans. Giorgio Verrecchia. London: Granada; and more recently in Pai, Hyungmin. 2002. *The Portfolio and the Diagram: Architecture, Discourse, and Modernity in America*. Cambridge: MIT Press.

6 Mallgrave, Harry Francis. 2010. Epilogue: The Architect's Brain. *The Architect's Brain: Neuroscience, Creativity, and Architecture*. Chichester: Wiley-Blackwell.

7 Neidich, Warren. 2003. Blow-Up: Photography, Cinema, and the Brain. Riverside: DAP/UCR/California Museum of Photography. p.81.