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Fantasy, Reality & Animation, Factors in Design

Abstract

Cristine Boyer, author of CyberCities, has addressed some of the most difficult issues confronting design education today. It can be surmised from Boyer that digital technology has unlocked two areas related to urban and architectural design experimentation. First, symbolic representation, especially high level representation, along with its associative development, becomes addressable through digital means. Second, the translation of these symbolic compositions is significantly enhanced by emerging digital capabilities.

It appears that the development of these two areas becomes the focus of contemporary 'creativity.' It is also predictable that the resulting discontinuous (logical) link in the design process (processes of symbolic development and translation) is where the designer intervenes. This paper explores 'creavity' as made possible by digital technology.

Methodology: Experimental digital design processes are examined and evaluated for their ability to assist in understanding the place of animation in the design process. These student projects investigate the evolving capabilities of design through animation.

Resumen

Cristine Boyer aborda en su libro CyberCiudades (CyberCities), algunos de los temas mas complicados a los cuales se enfrenta la enseñanza del diseño en la actualidad. Puede presumirse en la postura de Boyer, que la tecnología digital ha desencadenado dos áreas relacionadas con la experimentación del diseño arquitectónico y urbano. Primero, la representación simbólica, especialmente la representación de alto nivel, en paralelo con su desarrollo asociativo, se convierte en materia de trabajo a través de los medios digitales. Segundo, la traducción de esas composiciones simbólicas es mejorada significativamente por el contínuo surgimiento de herramientas digitales.

Tal parece que el desarrollo de estas dos áreas se convierte en el foco de la «creatividad» contemporánea. De igual forma, es predecible que el eslabón discontínuo (lógico) que resulta en el proceso de diseño (proceso de desarrollo simbólico y traducción) es en donde interviene el diseñador . Este ensayo, explora la «creatividad» al ser hecha posible por la tecnoloía digital.

Metodología: Los procesos de experimentación digital son examinados y evaluados conforme a su habilidad para asistir en el entendimiento del lugar que ocupa la animación dentro del proceso de diseño. Los proyectos de los estudiantes investigan las capacidades evolutivas del diseño através del uso de la animación.

Work in Progress

Two digital design and analysis classes are the subject of this work in progress. Both introductory classes are graduate level offerings in the College of Architecture and Planning at the University of Colorado. The methodologies employed are intended to allow students to focus on emerging digital capabilities through a systematic examination of theory and practice. While the pedagogic intention is similar in each case, this paper examines and compares the successes and failures of the various digital design strategies.

Ghost in the Machine

One of the most frequently expressed opinions of students and architects alike is that computers are "just another tool" to be used in the design process. Primitive man used a shaped stick to extract termites from a rotting log; the Wright brothers formed wire, canvas, wood and an engine into an airplane that allowed man to soar like a bird. Each of these tools extended man's physical mastery of his environment. Are computers then nothing more than complex tools?

In stark contrast with mechanical systems, computers extend the capabilities of the intellect through the acquisition, storage, and processing of information by means of symbolic logic. Since symbolic logic is not a 'real' commodity, computers are not tools in the traditional sense. They derive commodity indirectly, from the machines that they control and from the information that they provide.

Another issue that differentiates computers from their mechanical predecessors is the developing relationship between the computer and the user; sometimes referred to as *ghost in the machine*. Is it possible that man's spirit can infuse these digital devices creating an extension of his own being? Is *ghost in the machine* the initial stage in the inevitable and

inseparable collaboration of man and machine? At the end of this discussion many of these questions will remain unresolved, nevertheless they have shaped the classroom environment that has generated the work that follows.

Design Methodology

The traditional design process usually starts with an idea, it matures in design development, and it is then constructed as a building. The process is generally linear, with the limitation that redesign especially at later stages is often time consuming and costly. The digital design process has a similar timeline, yet it has a major advantage of non-linear editing potential. In digital design, any change in design prior to construction can systemically be applied to all events on the timeline. It is a significant advantage, but one that is difficult to realize since traditional processes resist digital imitation, therefore new design processes must be devised.

The development of new design processes is complicated by the amorphous nature that the term *design* has assumed. When architectural design is input into a computer, the task is commonly referred to as **C**omputer **A**ided **D**esign, CAD. When computers are used for visual validation, construction cost analysis, or construction documents, these functions are also referred to as **C**omputer **A**ided **D**esign. While there is no question that these practical steps are essential to the building of a project, the nature of the final expression is not directly dependent on them. Therefore, for the purposes of this discussion, it is the development of the aesthetic—functional relationship that directly controls architecture, landscape architecture or urban design that is considered **C**omputer **A**ided **D**esign. To meet this requirement, the definition of Computer Aided Design (Flanagan, 1996) is fulfilled when:

1. The digital process becomes integral to the conclusion creating a design that would not have been reasonably anticipated otherwise.

2. The intention of the designer is substantially dependent on the interaction of digital process to accomplish the intended result.

3. The complexity of the task exceeds the ability of the designer to accomplish that task by any other reasonable available means.

The Software

The software used in any design process has the potential to significantly alter the design process. The software used in this study was:

1. Autodesk's Autocad — developed in the 1980's as a two—dimensional construction documentation program and it has since evolved in to a three—dimensional modeling package. It was not intended to be used in the creative design process. The most significant factor in Autocad's core program is the ability to manage geometry through blocks and layers. Note that Autocad was used in case study #1 only and it does not have animation capabilities.

2. Autodesk's 3DStudio — launched in the early 1990's, it was specifically developed for the design community. It was intended for artists, animators and broadcast producers. It has superior form generation capabilities relative to Autocad, but it lacks Autocad's inherent ability to management blocks and layers. Unlike Autocad, it has extensive mapping capabilities that allow the surface application of pictures and transparencies. It also has advanced animation capabilities to control geometry, maps, cameras, and lights.

3. Adobe's Photoshop — used for scanning, composition and presentation.

4. Adobe's Premiere — the animation package used to record the design process in case study #2, and to create the final presentations in both case studies #1 and #2.

Case Study 1

The objective of the first group was the creation and development of a 'design blueprint'. The design blueprint is hybrid two/three Dimensional diagram of form, space, and design logic. Elements of the design blueprint may find literal, figurative or implied interpretation in the final architectural, landscape architectural or urban design forms. That interpretation is the subject of a subsequent assignment not discussed here.

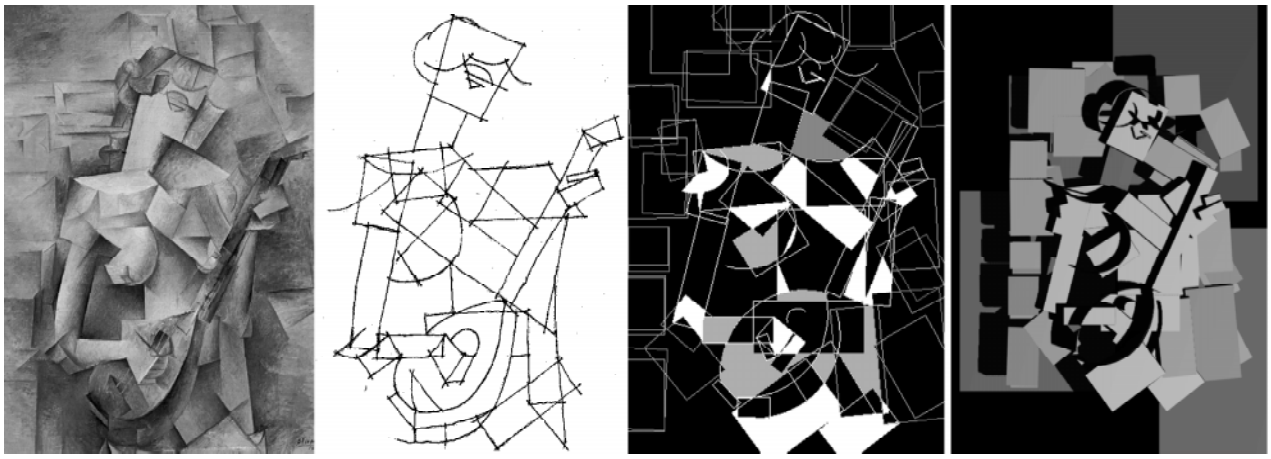

Fig. 1, Pablo Picasso (1881-1973), Girl with a Mandolin, Student analysis and interpretation by Miranda Karli. ARCH6490, Summer 2000.

Fig. 2, Chalk board sketch by Instructor, Robert Flanagan. Design process recorded on digital tape and interpreted. Summer 2000.

Methodologies of Case Study #1, Developing the Design Blueprint:

1. Interpretation. The student chooses artwork of personal interest, researches its origins and presents a summary in the classroom; the presentation includes a profile of the artist, a contextual interpretation of the artwork and ends with a proposed strategy for digital interpretation. Photographs, hand sketches, and printed computer strategies usually accompany the work.

2. Symbolic Development. The student continues development of the proposed strategy with the introduction of restricted and unrestricted variables. The restricted variables are two symbols, shapes defined as blocks, used to re—present the original composition. The unrestricted variables are scale, color, position and repetition. The resulting composition is a composite of unrestricted variables applied to the two blocks.

3. Design Blueprint. The next allowed variable is the addition of the third dimension. Once the third dimension is introduced, creative interpretation continues in plan, section, elevation, and perspective – using four active viewports. The resulting 'design blueprint' is a three dimensional elaboration of the artist's original concept. It is neither building nor object, but an idea diagram that informs design.

4. Animation Factor. My original intention was to animate the final 'blueprint.' Initially, there was no animation design agenda, nevertheless animation assumed a significant role in student design in case study #1. Animation is therefore evaluated for two 'post—intentional' design factors: the first is design rigor and the second is the effects of music on composition.

Case Study 2

The objective of Case Study #1 and #2 were the same, the creation and development of a 'design blueprint.' When 3DStudio MAX was implemented as the primary design program, it required significant changes in design methodologies from Case Study #1. While 3Dstudio Max's form generation capabilities are generally more flexible and comprehensive than Autocad's, there is limited access to references (blocks) and layers (no parallel).

Methodologies of Case Study #2, Developing the Design Blueprint:

1. Interpretation. Same as case study #1.

2. Rule implementation. The designer develops the proposed strategy based on re-interpretation of the original artwork. This interpretation is derived from the capabilities of the program. Extrusion and repetition of form are the primary variables available in this process.

3. Design Blueprint. Design continues through simultaneous development (four active viewports) of plan, section, elevation, and perspective. The resulting 'design blueprint' is intended to represent the idea of the original artist. It is neither building nor object; these are specifically discouraged since they obscure creative design implementation.

4. The Animation Factor. A sketch was drawn on a chalkboard Fig. 2, and the design process was recorded on video tape (alternately, a painting was interpreted as in case study #1). Since 3Dstudio Max allows the integration of the design process into the animation, the translation from sketch to three dimensional form was developed through superimposition of form on the video image (the sketch). It appeared that there was significant potential to expand interactive design capabilities; I intended to investigate how **C**omputer **A**ided **D**esign could work with hand sketches in an iterative developmental cycle.

Comparative Factors in Design

From the beginning, the case study group #1 generated a more convincingly creative body of work than the case study group #2. The room was the same, the timeframe was the same, the computers were the same and the objective of both groups was the same — to create a design blueprint. Difference in the design process was the apparent reason for the overall superiority in the Autocad group's work. This result was counter—intuitive since Autocad was not developed as a design program, but 3Dstudio MAX was.

The group using Autocad was required to re—interpret the original composition using a two dimensional representation using no more than two blocks. For instance, a waterfall represented by an array of squares would be uniform at the top and as the water progresses downward it might twist and turn. In group two, students were unrestricted in their representation of the waterfall, they could represent it in any way that the program allowed. It was the design or failure to define this component that proved significant.

Contrary to the software manufacturers claim that design programs like FormZ and 3Dstudio MAX bring greater creativity to the design process, their increased design capabilities often have the opposite effect. The problem is with unrestricted choice. "Many ill defined problems seem difficult, not because we are swamped by the enormous number of alternative possibilities, but because we have trouble thinking even of one worth pursuing" (Goldenberg, 1999).

Even tightly restrictive rules can allow greater apparent creativity through more completely understood variables. The nature of a brick is very restrictive but it allows for apparent limitless creativity in walls and arches. In the classroom, basswood models rely on restrictive properties of the material to enhance coherence and apparent creativity. "To be creative, you must perceive a problem clearly and correctly" (Edwards 1979).

The Unexpected Role of Animation

In case study #1, two potential factors in design development became apparent: First, there was an increased rigor in the review of the design blueprint. It appears that the improved ability to visualize the design blueprint prompted self—critical review and redesign. The second factor was music, it had a complimentary synergistic effect. The design blueprint became a choreographed interpretive composition. The music appeared to structure the choreography of the original composition and it also prompted self-critical review. It appears that the visual composition assumes or perhaps conforms to the expectations of a composite composition of music and video. The final design was no longer a static blueprint but a choreographed interpretive composition of moving ideas. Sequential visualization and music therefore appear to have a demonstrable and beneficial effect on the design sequencing of the student.

In the Context of the Profession, Factors in Design

The top line of the above diagram Fig. 3 illustrates a traditional understanding of design development process in the pre-computer era. The bottom line represents the organization of digital process in this study. Presently, several architects are implementing digital processes along the **C**omputer **A**ided **D**esign timeline. At issue is the potential for digital technology to leverage the creative contribution of the individual designer in a systemic and directed manner. I have chosen the work of three architects/firms to provide context to this study with respect to **C**omputer **A**ided **D**esign and the design profession.

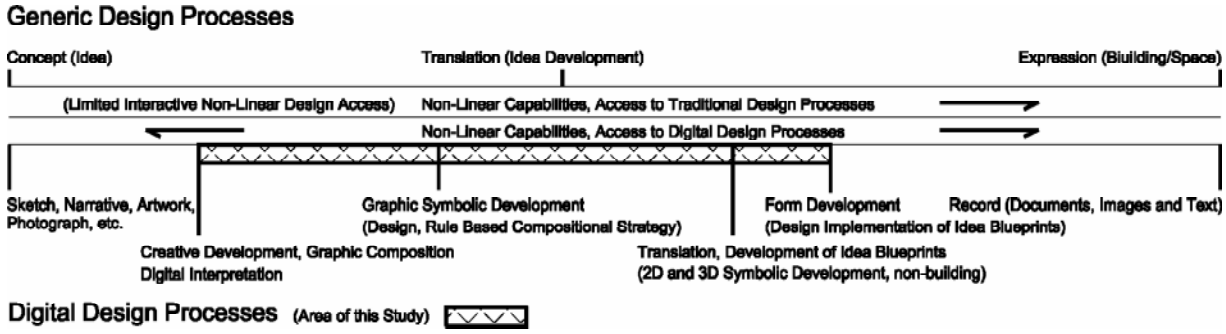

Fig. 3, Chart by author describing digital versus traditional timeline.

MVRDV, Rem Koolhaas, and Frank Gehry

Critic Christine Boyer compared Rem Koolhaas, author of S,M,L,XL, and MVRDV author of FARMAX, for their use of digital technology in urban and architectural design. Their common element was the use of symbolic representation, involving images and text, and recomposing them through digital means. In Koolhaas' view, "But what is for me more interesting is the kind of shamelessness and amorality that basically the computer implies in terms of the ability to combine everything with everything else in single frames, that kind of lack of resistance, and the absence of necessity for discipline, that all these are in effect deeply effecting architecture, but the built form of architecture" (Fecht, 1997). Computers allowed the impossible or at least the improbable in montage.

When Koolhaas' (anti—rule) process is overlaid on the above timeline, Computer Aided Design assumes a discontinuous nonlinear role at the juncture of 'digital interpretation'; in essence, it is a point of departure from rules, digital interpretation, and traditional processes. Koolhaas' break from the ordinary, the expected, and the rational leaves little room to establish a digital process. It appears that fragmented accommodation and opportunistic feeding on the Computer Aided Design process will be Koolhaas' digital legacy.

On the other end of the spectrum is Frank Gehry "He still starts a project by sketching and manipulating physical models. But when his design is put into the computer using CATIA..." (CATIA, 2000), the computer is used as interpreter to manage the complexity of the design task. It is the complexity of the architecture that Gehry has designed that exceed his (or his consultants) ability to accomplish by any other reasonable available means. Sketches are made, models are built, more sketches and more models follow. When these forms are transformed into digital architectural models through the software program CATIA, they become understandable and buildable in terms of current construction technology.

When the computer works of Koolhaas and Gehry are placed on the timeline, it is apparent that their computer design processes are fragments of the whole. Koolhaas occupies the conceptual area to the left of this study, Gehry occupies the practical area to the right of the crosshatch. Neither has succeeded at staging an entire digital design sequence that starts with an idea and ends with form or space. This is not a criticism, it is an acknowledgement that few architects would have any work to place on the digital time line.

The Place of Computer Aided Design

One incontrovertible factor is that when computers are used for documentation and for other notational tasks, they may be indispensable to the building process as a whole, but they are not necessarily creative participants in the design process. While construction documents are an established staple in architectural practice, their use as simple notational devices to inform the builder leaves much to be desired. "To take notation as therefore nothing but a practical aid is to miss its fundamental theoretical role" (Goodman 1976). It is the symbolic content of these systems and the computers ability to manipulate and organize these symbolic gestures that holds the greatest potential in Computer Aided Design.

It is also apparent that unlimited design freedom does not equal creativity, "Nothing stifles inventiveness and artistry more brutally than too much freedom, too much wiggle room for the imagination" (1999, Angier). While there is nothing inherently lacking in 'design programs' like 3Dstudio MAX, it can be concluded that processes and rules must be more thoroughly thought out and more carefully organized if they are to realize a role in true **C**omputer **A**ided **D**esign.

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