Making Sense of Presenting Design Ideas through Animated Form

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This paper describes both conventional and computational ways of expressing and exploring design concepts with the use of models. We explain the role and function of the model in the design process, and investigate the ways in which models become reflections and representations of architects' design thinking. We compare and contrast the physical properties of conventional models with those of three-dimensional computer models, and the corresponding processes of model creation, model development, and model modification. The paper includes a brief overview of commonly used forms of computer representations often encountered in Computer Aided Design applications.

Whatever the visual richness of computer models in virtual environments can be, we believe that, just as in the use of conventional two-dimensional architectural drawings, computational presentations of architectural design concepts have their own conventions of use. This paper addresses the need to more accurately understand these conventions of using computer models for the representation of architectural design concepts. Therefore, we will illustrate the more dynamic qualities of computer models, which have the potential to allow designers to escape from the restrictions and constraints of physical form. In particular, we demonstrate these qualities in the context of architectural presentations in the medium of computer animation. These new forms of expression of design thoughts and ideas go beyond mere model making, and move more towards scenemaking and storytelling. The latter represents new methods of expression within computational environments for architects and designers.

***Keywords**: Animation; Presentation; Representation, Visualisation, Time.*

Introduction

Most research in the architectural representation of buildings is focused on the technology of representation techniques. Realistic rendered images or abstract representations can both give viewers an understanding or spatial experience of a design. However, we believe that there is another trend in the architectural profession today, namely, that we should pull back from the technological enthusiasm to look at some original questions, such as why architects need representational media for their work; how traditional media (images of drawings, photos and physical models) work and how do they function properly? Can these traditional media actually represent an architect's design concept of a building? Can new digitally transformed representational techniques (such as animation) provide alternative methods for architects to present design concepts of buildings which were previously unavailable? Most importantly, when we are using a 'model' (this word refers to the traditional understanding of three-dimensional physical models) for presenting

design concepts, are we still using the same theoretical approach to produce our models? Animation clips produced nowadays, as criticised by some researchers (Eshaq, 1999), are simply 'cramp sequences' resulting in many viewers failing to interpret the design positively. After more than two decades of CAAD development, we are still thinking in traditional ways of presenting our works, and perhaps we are bound and tied to traditional constraints. It's now time for architects to rethink some of the questions above.

Architectural Presentations

Architectural conception and realisation usually assume a one-to-one correspondence between the represented idea and the final designed building. But if we ask what is the best correspondence for the represented idea, then the answer is simple and very straightforward: the architecture itself. There is a long process before we can actually construct the final product in the real world, and it is likely that just as architects don't carry out construction work on site, neither do they express their design concepts explicitly without using mediating artifacts such as drawings, prints, models, photographs, or computer graphics. These artifacts, therefore, play diverse roles in the design process, and they are regarded most often as necessary surrogates or automatic transcriptions of the built work.

The process of creating two-dimensional graphical drawings in the architectural profession today assumes that a conventional set of projections, at various scales from site to detail, adds up to a complete and objective idea of a building. These projective drawings rely on reductive syntactic connections; each projection constitutes part of a whole design project. They are expected to be absolutely unambiguous to prevent possible misinterpretations. The architectural design of buildings is mainly concerned with creating three-dimensional objects occupying space. Two-dimensional graphical drawings typically do not convey the conceptual idea of spatial arrangements completely. To eliminate misinterpretation of a design, the most fundamental way is to build a physical prototype, at various scales, to explore the spatial experience and to examine the potential design problems of a building. Therefore a conventional physical model is typically a demonstration of a final design project or for experimenting and examining a situation for finding the solution for a design problem. Due to physical constraints, it is difficult to adopt physical models for representing diverse and dynamic thinking, which architects may have encountered during the early stages of forming the design idea. This is where the digital technology of animation can play an important role in the architectural profession.

Architectural Animation

Animation has the potential to stimulate our senses for better understanding of ideas. It gives viewers the flexibility to view objects at various angles and positions, which can lead them to identify the potential and problem of the prototype design. Designers are able to test the proposed or predicted prototype mathematically or graphically, a factor which can

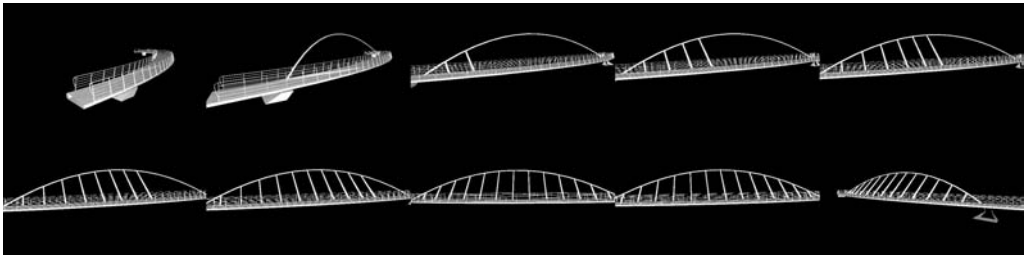

Figure 1. An attempt to use animation for presenting architectural property of rhythm of a bridge design scheme. (Chang, 1999)

eliminate hazards and "eye-sores" within the environment. Designers can therefore control a sequence of images or storylines they want viewers to see, but objectively leave the freedom for interpretation to the viewer's perceived understanding from an animation sequence. Animations allow images to speak their own words, and to tell their own stories, instead of relying upon texts or narratives. Animations that achieve this objective lead to non-prescriptive forms of presentation. Researchers are now searching for using computer animations to show that which could previously only be explained through the use of two-dimensional drawing devices. These types of computer animations can be used to explain the process of developing design ideas.

There is no doubt that architects will still have their own ways of presenting design ideas through their preferred media – drawings, physical block models, etc. Animation is, therefore, just an alternative way for the general public to understand their work in more easily understandable means.

Learning from "The Matrix"

One of the biggest technical revolutions in recent cinematography has been used in films such as The Matrix, namely, the innovation of the "bullet-time" technique. Bullet-time is a stylistic way of showing that the actors are in a constructive reality, but that time and space are not the same, as we normally experience in our living reality. The time element is slowed down to such an extent or even eventually stopped, but the viewing camera can still move around in scenes that create two parallel universes in one space. Perhaps a similar experience in the real world is that of walking backward on an escalator seeing that the surrounding physical structures are static but actually carrying out a momentum activity.

The bullet-time technique for capturing cinematic images is a pioneering one, and most audiences are fascinated by the sensational visual effects produced by it. But the technological aspect behind this technique has never been particularly new for the discipline of computer animation. Perhaps we would be able to create a similar visual effect since actors started to perform in front of 'blue-screens' (a technique known as chroma-keying). If we could investigate and fully understand the important role which the time element has played in animation techniques, perhaps this visual experience would have arrived sooner.

Figure 3. The techniques involved for making the 'bullet-time' film clip have never been new, but the theory behind it is rather revolutionary.

For the architectural design profession, there is still a lack of discussion about manipulating the time element for the purpose of producing architectural animations for presentations. From the example of how time was implemented in filming The Matrix, combined with Lynn's arguments in his book Animate Form (Lynn, 1998), perhaps we should reintroduce the time element to architectural presentation animations not just for transcription of the final design result, but also to translate the process of the design idea.

The Future

A central contention of this paper has been that there are already available techniques of visual presenta-

Figure 2. A film clip from the 'The Matrix' which freezes the time element while the viewing camera is still moving in space. This is a new dimension of animation technology.

tion that are relatively under-exploited in architectural design practice, but that are richly developed in other artistic areas such as in films and video games. Architects still think in terms of the physical ways of presenting architectural models in virtual environments. They still cannot escape from the long tradition of building a model as real as possible, locating it within a context (e.g. in virtual environments), and then observing it. We believe that this traditional approach is only the most basic level that computer graphics can provide to this profession. On top of that, the next generation of computer graphics to be exploited by the architectural design profession should look deeper into the use of computer graphics for the presentation of design ideas and for the process of design development rather than simply producing realistic images or animation.

We hope that this paper does not conclude any argument, but rather opens a debate on a new trend for the future of CAAD developments. Computer graphics has been known to the architectural design profession for the last 40 years, but the exploitation of it is still in its infancy. The video game and film industries are also beginning to have a significant impact upon what computer graphics can do. Perhaps apart from developing new tools to aid architectural design, we should also rethink the new direction of using computer graphics to present architectural design ideas, and with the use of our hands with mouse and keyboard to make those design ideas visual.

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