

IN THE EYE OF THE BEHOLDER: A PROPOSAL TO FURTHER THE CRITICAL FRAMEWORK OF COMPUTER GRAPHICS IN ARCHITECTURAL DESIGN

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ABSTRACT

This paper speculates on some of the inherent differences between computer graphics and conventional media when used in architectural design. It suggests that a lot of work and thought has gone into developing computer graphics as a medium for the development and expression of architectural ideas and examines some of the reasons that the fruits of this labor have been slow to find their way into the mainstream of the profession. This slowness to embrace rapidly developing technologies seems to be resulting in an ever widening gap between potential and the mainstream practice.

1. INTRODUCTION

There is no doubt that computer graphics is a powerful medium that deserves wide acceptance as a tool for communicating and developing architectural ideas. Many of us have, from time to time, experienced some frustration in applying what we think we know. The potential is there, the reality is there, but, somehow, when we try to put it all together, the work sometimes communicates, and sometimes it does not.

Work is being done to develop ideas that relate to software and systems. Other work is being done to apply new ideas and techniques to academic and professional design. However, it is still fair to say that the computer as a design medium has yet to attain the level of acceptance in the design community that many of us would like to see. The medium itself is different enough from what has come before that using it with any degree of confidence and satisfaction requires some things to happen that for many people have not happened yet. It is nonetheless there (even though

the tools keep changing - mostly for the better) and what would appear to be a significant body of outstanding work is actually being done. But without a larger frame of reference, a set of critical and developmental languages, the majority of designers and university design instructors are going, of necessity, to stick to that with which they are familiar.

There is a lot to be gained by developing software. The value of both the process and the products themselves can not be denied. And, as software improves, more and more designers will discover the potential of computers and computer graphics for themselves. And the more people use computers, the more they will use the various things that computers can do to communicate. And the more that people try to communicate, the richer and effective the visual languages of computer graphics will become. The problem is that we are producing the new at a much faster rate than our professions can absorb them. The ways in which we generate, share and absorb ideas about form and structure allow for the rapid dissemination of the products of design, but does not respond nearly as rapidly to ideas about how design can be produced. We have to recognize that architectural languages develop slowly even in the electronic age.

In the greater scheme of things, photography is a relatively new technology. A hundred and thirty years ago, give or take a decade or so, photography was a technology without a recognized language of expression. The photograph was the working person's *ersatz* portrait. Today, photography is recognized as a legitimate medium of artistic expression. Only in the last decades have we been able to look back at work done over a hundred years ago and see what has obviously been there all along. It was "art", it just took a hundred years of looking at and talking about photography to find it.

I don't pretend to know any more about photography than I can learn from the occasional TV documentary or college survey course, but I can recognize that there seems to be a pattern to the way in which new media for expression are developed, used, explored and recognized as "legitimate." In the computer, we have technology which, like photography in its infancy, can serve legitimate essentially commercial and industrial needs. As a culture, we are only beginning to explore and develop the language of the art. We can take some comfort in the fact that (in no small measure due to electronic media itself) the pace of absorption is accelerating but fast enough.

2. ARCHITECTURE IS

Just about every piece on any architectural topic sooner or later gets around to a statement of what Architecture Is. Most have some significant strain of validity. It is sufficient here to think of architecture as an activity which uses occupiable space as its ultimate medium. Architecture overlaps most arts in some way or another. There are painters, industrial designers, photographers, film makers and others who, implicitly or explicitly work in architectural ideas. Ideas about space and the occupier(s) of space can be expressed through an endless variety of techniques using just about any medium imaginable.

What is more significant to a working definition of architecture is the fact that architects (and others who do similar work) rarely if ever work directly in the medium of their art. Instead, ideas need to be generated, developed and expressed with diminishing levels of abstraction until, finally, the idea has been translated into a language of building components and specifications that can be understood by the construction managers, contractors and artisans who are retained to create "built form." Architects have to rely on experience, rules, theories which are only loosely codified into visual languages or systems that allow ideas to be explained and projected across levels of development, media and scale onto the final outcome. Musicians have the luxury of composing and modifying rhythms, voicings and even structure in rehearsal or in the process of production. Architects have to rely on experience, built up over generations, that allows them to "fill in" the gaps, to relate the vague implications of very rough expressions to some known reality until the design is accepted and complete. And then construction begins. Regardless of "theoretical context," ideas and expressions are constantly being recompiled and transformed until the final result is achieved. In their work, designers, and design instructors rely on these translations in media, scale and technique of expression to focus and guide design work from idea to completion. There always needs to be a known and comfortable relationship between the early expression of an idea and some of the reality. An idea expressed in a certain way leads to another type of expression which leads to another and so on until the design is complete.

One of the charms of contemplating something as powerful as computer graphics is the promise of continuity of medium and "language" and expression across various levels of abstraction and realization. Drawing, "imaging," collage, drafting, modeling, animation and various types of analysis and transformation can all take place in one medium and at a certain level become interchangeable. The options, - the flexibility - can subvert the theories, techniques and processes on which many of us are accustomed to base our work. Designers and even critics who have built

up a lifetime of experience in moving ideas from abstraction to reality and back again will certainly experience difficulty in "transplanting" their entire frame of reference. The very power, flexibility and continuity that is so intriguing can, in the absence of rules, conventions and languages, become overwhelming. As designers and teachers, we have to discover what sets of rules (integrity) and "outcomes" are inherent in the wealth of new images, transform familiar vocabularies or reduce our reliance on some graphic conventions, especially those which are media based, and learn to rely on the integrity of the ideas themselves.

3. DESIGN LANGUAGE

In practice, architectural designers gravitate towards means of expression which appear to be most efficient or most appropriate to the nature and level of development of the idea or ideas. Given a choice of media and requirement for economy imposed by time, money and aesthetics, most designers stick with what is comfortable, familiar and what they think will allow the idea to be most rapidly developed to an appropriate level.

Design, when taught in the schools, is primarily a process of exploiting ideas for the purpose of discovering consequences. We build out courses around carefully devised sequences of drawings, models and other representations. Each assigned element is selected for very specific reasons. The theoretical basis for the representations varies greatly from individual to individual, from issue to issue and level to level. But without the familiar armature provided by the specification of intermediate and final products, many designers, instructors and critics seem feel lost. And without confidence in his or her ability to move from idea to reality and back again, the critical process fails.

Most design work is not done using a single medium. Every time there is a change in medium, drawing scale or technique, ideas and organizations have to be reexpressed, reexplored and reinterpreted. In teaching and in practice, we all use this effect in both a forward fashion to design and in reverse to analyze what we see. In doing this over significant portions of a lifetime, we come to associate representations with reality and expression with ideas. In effect, we develop a visual shorthand or jargon that somehow fits our view of architecture and design. When other people understand this shorthand, we can use it in working and teaching to improve the speed and accuracy of communication. This is why so many of us begin design courses by asking students to analyze built or published work in a way that relates to our ideas about how the term's design work will proceed and what kinds of "language" and techniques will be emphasized. In

considering computer graphics as a design medium, we have to be aware that some of the conventions, techniques and "formulae" that we have become accustomed to, especially those which are media based, can change, lose their relevance or assume added significance.

In teaching design, we call upon students to make formal presentations of their ideas and the product which has emerged from them to "outside" jurors or critics. Typically, discussion at these events revolves around the appropriateness of the ideas, their development and the degree to which the results of the work reflect the ideas. Projects and "styles" make the rounds as each critic finds something that is exciting, adds to it, uses it and passes it along to another group of jurors. Outside the schools, the kind of idea based design review goes on in a much less public forum. The ultimate review usually revolves more about presenting descriptive rather than more abstract developmental material and the larger scale critical process is somehow slower and less abstract.

Properly selected and executed, materials presented to an academic design jury communicate in a language that allows jurors to quickly grasp the ideas and issues that the instructor and the students have developed and to compare them to a "universe" of similar ideas similarly expressed. Critics get frustrated and the critical process either slows or breaks down completely when student, instructor and jurors do not share common languages for expressing and manipulating the ideas under discussion.

It is interesting to observe juries which are presented with design work done with computers. Actual drawings of any type made with computers and printed or plotted generally present no particular problems if they are crafted according to the customary rules. Problems do seem to crop up when screen images, be they photographic or video, are used. Two things appear to happen. Either the jury falls in love with the image itself and discussion of ideas stops or the jury does not like the image and discussion stops. Either way, the result is not terribly productive. Images which are fundamentally descriptive seem to be more successful than images which are more abstract or analytical. The difficulty seems to arise from the fact that many very skillful design critics, lacking the necessary common references, seem to have trouble "reading" abstract ideas from media with which they are not familiar even when the images themselves presented on a piece of paper would do just fine.

Even designs which are liked and appreciated are often viewed with suspicion. Critics may like the work, to the point of fascination, but their discomfort with the

source of the ideas and the direction which they might take in subsequent development often shows..

4. DISCONNECTIONS

Regardless of the "idea" or theoretical content of design, the design professions are using computers to develop and express some types of images with obvious success. This process works because the products function according to known principles and can be substituted for products that are already readily accepted. The computer is used as a tool.

As everybody who has worked with Computer Aided Drafting systems knows, the trick to using the tool to its fullest potential lies in first organizing the physical and production environment in which the system operates, educating the various levels of users and consumers of the system and then "fine tuning" the elements of the system, procedures and standards which make it work. Every organization is different and every project has the potential to be different, so it is essential to spend more time up front designing the processes and procedures than it is if computers are not being used. And the most significant things that have to be organized and understood are external to the computer.

A significant underlying idea in a "Computer Aided Drafting" approach derives from the fact that the point at which a project is put on the computer is a point of disconnection in the process. Organizations which successfully use CAD as a tool take advantage of this fact.

The graphic language of architectural drafting is well known. Rules about line weight, symbols, layout and the like can easily be transported from the drafting board to the computer. Designers already know how to convert their sketches into draftable products. And estimators, contractors and artisans know how to interpret them. Objectively, drafting is an extremely abstract form of expressing reality, but the symbols, conventions and ideas are well understood and widely accepted. So, in spite of the presence of a high level of abstraction, the process can be easily transferred to computer based production. It is, however, interesting to observe the reaction of designers and managers to the images which appear on the screen during construction of the drawings.

Representational drawing for presentation to non-designers is also a fairly well understood process, obeying all of the rules of presentation drawing, descriptive geometry and rendering. transferring this work to the computer is not a great leap,

especially considering that models and renderings rarely provide experienced designers with any surprises about their work.

It is significant that both drafting and rendering are design related activities that can be, and frequently are, subcontracted to people and firms that are not otherwise involved in the design process. Disconnection is accepted. It works because the languages are standardized and the activities come at a point in which the idea related development of the design is completed or, for the purposes of the graphics which are generated, suspended.

Disconnections are generally built into design courses. As instructors, we set up points at which projects change scale, scope and content and exploit the situation to introduce new material. It seems such a natural thing to do. But with computers as a design medium, the disconnections are not as "natural" and sometimes have to be contrived. I have often wanted to again try a design problem that had some currency about a decade or so ago using computers. Students are asked to design a tee shirt, then asked to build a model of their design and then asked to transform the idea into a building. The problem is designed around artificially imposed disconnections, but has, until recently, seemed a bit too formal and abstract.

Given a well defined process, fixed points of disconnection and well understood graphic languages and conventions, the computer has proven itself to be a tremendous "tool." In design, where the promise of the computer is continuity between image, idea and product and there is, built in to most systems, an intriguing ambiguity between image, drawing and three dimensional representation (and even construction documents) it seems that benefits and pitfalls of the devices of externally imposed discontinuity need to be explored.

5. THE POWER OF THE MEDIUM

Computer graphics are inherently video. And video has been in use in our culture for commercial purposes for at least three decades. There are people who call themselves "video artists," who are engaged in exploring the more abstract potential of video as a medium for expression, but most of them exist in universities where they can play with ideas without having to make a living from their products. Commercial video has not yet been accepted into our high culture in its own right. It is still a tool for selling products (its most abstract form), a tool for journalism, a tool for presenting drama. Advertising in particular is exploring and exploiting the power of the medium. Some of the better architectural images and videos of unbuilt buildings are composed as actual commercials for the buildings! They actually

carry a lot of "hard" information, but the net effect seems more to communicate an image or an impression rather than to communicate the "facts" that are obviously there. Some conventional wisdom says that video lacks the subtlety to be an effective design tool, but if we look at video advertising and even at the "MTV" genre, we have to recognize that video images are inherently powerful, but there is, for better or worse, an incredibly potential for communication of complex and subtle ideas and associations.

The ability to focus attention on the image on the screen is the power. When used analytically, as in the Gordon Brooks video of Richard Meir's Atheneum that many of us saw in Ann Arbor in 1988, the images have a lush quality and the messages are striking. In design drawing, our tradition leans towards very spare and abbreviated images. In using computers, we are using an inherently very lavish medium to express and explore ideas that, in the initial stages demand absolute ambiguity.

Creating images that carry an appropriate level of ambiguity, the proverbial five line sketch, with a computer is, as we all know, no problem. For the designer who created the image, its meaning and its potential may (or in reality may not) be clear. The problem is that to be usable for discussion purposes, the image has communicate the designer's intent and direction to a fair sized variety of people. The problem is in the eye and mind and frame of reference of the beholder, not necessarily in the images.

True enough, computer images have some properties that other drawings do not. The mechanics of the screen, paintings in flickering light, have a definite impact on perception. All images are, for better or worse, framed. Images have no permanence, at least not in the sense of a piece of paper. It is just as easy to erase as it is to add to the "drawing." None of these differences seem to account for the objections to the computer as a design medium.

As time goes on, I am beginning to suspect that the most significant barrier to communication is this lack of a requisite base of language, with all of its implications, styles, structures and ambiguities to provide the critical base that our profession craves. Video images are accepted as being definitive rather than speculative, a necessity in using the computer as a tool, but not terribly useful or evocative in and of themselves.

6. CONCLUSION

In a situation where the new is being created much faster than the old can be absorbed and understood and made productive, it is easy to say that it is time to slow down or dismiss the whole business as just one of those things. Instead, I think that it is time to look for some ways to accelerate the rate of absorption, not for the sake of gratifying some need for self justification, but in order to understand what it is that we really do, with or without computers.

The process of design, the process of creation, is something that has an aura of mystery to it. We study it, we teach it, we talk about it and we do it. But, somehow when we start using computers, the structures that we have developed around design do not always seem to be conducive to developing the languages that we need to discuss it. How will computers change design? My question is, "if the computer as a medium has an effect on design, how will we know?"

The first thing we might look at is the way in which design problems are conceived and conducted in the schools, particularly the way in which the intermediate products of design are defined and used. If a computer is used to manufacture a product, then that product can be compared to a universe of similar products, but if the product is not a paper drawing, the specification becomes more difficult. Reviews are much more difficult to conduct on a computer than on the boards. The problem is not so much one of logistics, but one of too many options and too few known paths through the options.

And then there is the jury system that we have evolved. It is one thing to look at a finished product, regardless of the level of development of the project. In an environment where just about everyone has some experience in understanding how a designer moves from a parti diagram and some simple sketches to a drawing of a particular type, a product can be understood in the light of a known procedure. In an environment where drawings and models can be one in the same, where transformations and collages can be done with a stroke of a key or two, where certain types of analysis visual analysis can be built into the software, it is a lot harder for critics who are not familiar with the media to identify with intermediate products. In fact, where the sketches become the final product, it is very difficult to reassemble a project, especially an incomplete one, for presentation to an academic jury of one of five or whatever.

And finally, there is the problem that our design languages have evolved around assumptions based on media, drawing types, styles. Without a certain body of

experience seeing and expressing images in different media, it is difficult for even the best critics to read ideas and intent from images that to others seem to be extremely straightforward. The objection that computer graphics lack the tentative and expressive qualities of hand drawings may be valid, but the reason does not necessarily lie in the media, but in the way it is perceived, its lack of tradition, its lack of connection to experienced.

It is entirely possible that the computer is not the ideal medium for all types of architectural expression. But it would be interesting to make a concerted effort from time to time to explore either what the limits are or what they seem to be. One step might be to spend some time figuring out how to share more than just the final products of design efforts. In the professions, this is difficult, but in the schools, one might organize a group of studios at different schools and recruit a modest number of critics some of whom are accustomed to working with computers and some of whom are not to design a series of exercises and periodically visit different studios. While some interesting work would doubtless emerge, the anticipated result would be some additional comparative experience with process and procedure.

There are a host of other things that might be done, competitions, juried shows where work and commentary are published, and so on.

We are making progress, especially in the last year or so, but the process of creating the shared experience necessary to build not one, but a full range of critical languages or frames of reference is one that needs to be moved along just a little bit faster.

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