The Cost and Value of Animation for Architectural Designers

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As computer laboratories or studios in architecture schools provide greater access to fast machines and sophisticated software, the opportunity for computer aided animation increases I dimension. Previously the domain of the most enthusiastic, it has now become a relatively simple task to move from 3D to 4D. If the impediments to a common access to these new possibilities (for architects) are no longer a matter of the cost and availability of hardware and media, what measures the extent to which we can value the contribution of animation to studio-based design? This paper reports on our progress in establishing some practical and theoretical benchmarks comparing the cost with the value of computer aided (or mediated) animation.

The Cost and Value of Computer Aided Animation

Animation and the Design Studio

Design tasks involving computer use tend either to have been tailored to the perceived capabilities of media stuck in the groove of some previously acquired release or worse, tuned over-optimistically to the alleged capabilities of a forthcoming release, still to arrive months after being ordered. There has been difficulty in assessing what is a reasonable computer-based task for the calculable time available. In a traditional design studio, for instance, a student will be asked to produce designs with varying degrees of detail for a large building within, say, a semester. A greater number of people would be involved over a far longer timeframe for an equivalent project if it were actually intended for building. Beyond discourse, the student project is contrived to be a reductionist facsimile of a real world situation. The Professions place an expectation on the educational institutions in this respect, tending to view the students' exercise as a selective *précis* of the wide range of skills involved for a real building. The depth of their thinking at both an intellectual and pragmatic levels is a sampler of the decision-making they will later employ in an office, it is assumed.

The drawing, then, is a drawing, one of a set of a small number in design studio, similar to one of a considerably larger set in an office. A ten-minute animation, however, is the same in terms of scope in an architectural school production as it is when made in a special effects studios for Hollywood; the length of time remains the same placing similar demands on content. Whereas it is relatively easy for the student to gauge their production using traditional media, it is difficult to be specific about how the student can keep their computer-based work in proportion with the assignment grade. This is especially so when the working environment and creative opportunities in *3D Studio Max*, for example, are both limitless and intoxicating for the new possibilities for design (presentation) refinement that they represent. Often it is only insufficient access to suitable machines and a running out of available time that can actually bring the project to a halt for hand-in. A sense of proportion with other workloads becomes temporarily lost.

The Value of Computer Aided Animation

Just as the perspective revolutionised the representation of space for the early Renaissance painters, so too has animation assumed an equivalent status. As soon as rendering algorithms began to provide the opportunity

for photorealism, the possibility for animating sequenced rendered images emerged as a natural corollary. The value of animation as a tool for incipient designers and practitioners is hard to contest. The assumption for many seems to be that the producer of the animated walk-through or fly-by is the modern equivalent of the perspectivist. The ability to take a client around, through or over an electronic representation of a building is regarded as a valuable resource despite the fact that very few practices can afford to do so except for large commercial work (Dawson 1996). This virtual walkthrough can proceed unchallenged by the client happy to pay for the disproportionate number of hours required to produce such polished VR simulation. Animated walkthroughs may be the most obvious use of the software in practice but it is more likely to be challenged in the design studio where it can used as an obfuscatory device..The dynamic qualities of an animated presentation can be perceived more as rhetoric than suggestion in the case of the student who risks compromising a weak design by conspicuously spending too many hours preparing the animation.

If a student dedicates their presentation time to the production of an animation as their final, rather than as part of their final submission, they will probably seek to seduce their critics with a highly selective and manipulative piece of work. Indeed, studio projects have been presented where students have specifically entered the film world from an architectural position (Goldman, 1996). It is difficult for the critic to derive a purely personal feeling for the inner quality of a project through reading a combination of conventional drawings and sketches if they have been exposed to an overly elaborate and contrived prescriptive view.

Ironically, the less photorealistic the animation, the more other-worldly or ethereal the effect, the more the animation itself can be appreciated as a design tool. Curiously, by avoiding photorealism and accepting happy accidents and serendipity, or by using some of the sophisticated tools for unlikely and unintended adventures, extraordinary layers of richness can be added to the exploration of design that cannot be imagined in other media. An example is the examination of the interior and the exterior of a space by modeling walls with varying degrees of translucency. Lighting can be applied to accent or play down the degree of presence of objects and building fabric. Such contrivance, difficult to emulate using any other means, can be achieved satisfactorily using rendered still images. The challenge becomes the determination of what will be gained through the addition of movement. In many cases the answer is very little. Too many things happening in the frame can be very distracting. A change from solid to transparent, day to night or the passing shadows from a moving sun might be more effective when both the viewer and the building remain still. Other opportunities are the representation of aging and weathering. These images are less film-making and more architectural and painterly; they will have particular qualities that are paradoxically easier to achieve and truly personal. They also induce a sense of compressed time by revealing the accelerated effects of time.

The Cost of Computer Aided Animation

Animation exploits a rare mix of creative, perceptual and technical skills. In the film industry, large teams have developed ways to collaborate seamlessly without the particular authorship of any one participant being identified. A director's desires are expressed as a storyboard that provides a scripted representation of the transitory. This linear format is a simple enough means to communicate movement for the technical implementation by a collaborating animator-artist. The act of animating itself is at once personal as it is collaborative. The fine-tuning of the many variables such as camera angle, position, number and colour of lights, camera tracking path, tracking speed, movement of object(s) in relationship to the camera and vice versa, combine with the refinement of the colour and texture of the subject. They are best determined actively by the animator whose individuality may be subsumed into the collective will of a group.

Animation in the movie industry tends to focus on action. Its application to architectural situations will most likely be one of providing mood or as an explanation of something unlikely to be revealed using other means. This may or may not include fly-bys and walk-throughs. My experience suggests that the quieter and more reflective animations can involve the least work but have greater value. At the other end of the scale are the animations which are compiled to show assembly. Whether the clip shows how hi-tech components come together and how they control movement and flexion, for example, or whether they are intended to demonstrate the construction sequence to the self-builder, there is a considerable task in both learning the software and implementation.

Having experienced computer applications teaching and the apparently disproportionate time students put into animations, we decided to count the cost in hours in learning software use and acquiring computer animation skills. Two students were given scholarships to spend six weeks (180 hours each) during the summer recess learning to model o the computer and to make animation videos. They came to the project with minimal 2D *AutoCAD* experience and no experience in rendering or animation. Their work was measured as a straightforward audit of their time and compared with the effectiveness (value) of their output. Despite the contrived and luxurious experience of having uninterrupted time to first learn then apply these skills (compared with the normal classroom experience) the experiment duplicated the typical situation of minimal tutorial support. Indeed, the brief determined that they would self-tutor as well as they could from the manuals and work together when appropriate. We were particularly keen to learn how much tutoring is actually needed; if less than previously considered appropriate, computer applications tutoring work might be tailored to more exacting intellectual tasks rather than purely technical. It would be better to devote more time to tutoring in the area of design implications of animation rather than design applications.

The results were encouraging and a little startling. Bearing in mind that these were two very motivated students (so not necessarily a representative group) it was interesting how quickly they gained access

to most of the high-level operations within each software (*AutoCAD, 3DStudio Max and Adobe Premiere*). They chose tasks that were challenging and ambitious.

Three buildings were explored. The brief was to take a 3D representation from a book on construction detailing and to use animation to state something of the quality of the assembly that was missing from the drawings. They chose Paxton's Crystal Palace (by virtue of its virtuality), Renzo Piano & Richard Rogers' Centre Georges Pompidou and Richard Rogers & Partners' Inmos Centre. They commenced by modelling a few minor details in order to gain an impression of the opportunities and pitfalls.

The assemblies were modelled mostly using the *ACIS* modeler in *AutoCAD* - itself a difficult task. The models were then imported into *3D Studio* for a progressive rendering and assembly. This task included experiments in loosening the physical definition such as making some of the components semi-transparent, a contemporary version of the cutaway. Having made various clips, *Adobe Premier* was used to assemble the clips, stills, images and drawings with sound to make a polished production.

Their output was impressive, but possibly more for the amount the students had done from a standing start than the inherent quality of their production. 180 hours of intensive and uninterrupted application brought them to a point of competency; how many students get the opportunity to devote 180 hours to acquiring these skills? They were attempting one of the more difficult spatial gymnastic exercises: bringing many items into a central area, at different times and different speeds. Their conclusion, however, was revealing. By having to choose materials and construction sequences, they had learned more from the doing than they would have learned by simply studying the original drawing source. Regardless of outcome, the intensity of modeling the components had been a valuable task in itself. Animation is,as a minimum, an creative act that emphasises relativity.

Concluding remarks

Taken individually, friendlier interfaces and more widely available increased computer power mean that each of the many variables can be tested quite quickly. Taken as a combination, the number of variables multiplied by the enormous range of subtle changes that can be effected within each variable present an abundance of choice. The more capable the software, the greater the degree of choice and time needed for the animating; the process is essentially one of iterative experimentation. Experience brings judgement, of course, but only after many hundreds of hours practice. The benefits of a course at film school may not be so easily acquired within the conflicting demands on the students and the equipment at a typical school of architecture.

I believe that it is appropriate for the architectural animator to be sceptical about the value of walk-throughs, for example. While such animation appears to be an answer to the architect's prayer for the

representation of space without the clutter of people, such work seems to carry a sterility which becomes worse the more realistic the work purports to be. The drive for more realistic rendering, and the subsequent thrust towards animation, has been sponsored more by those gifted enough to conjure and develop the required algorithms than those accustomed to thinking as designers. For students to devote too much time in animating an otherwise lack-lustre design the cost is too high, both in terms of the equipment being tied-up and the low value of the output. The cost, too, of dedicating time to learning technical craft in a higher education environment might also need to be questioned in relation to the use of other computer applications. Programming, for example, may be a better use of the intellect than experimenting with the myriad of variables with insufficient expert tutoring. Programming, of course, has much in common with design in terms of understanding a problem in order to resolve it.

We are probably at a watershed. The instinct to move headlong into animation was originally tempered by the relatively high cost of hardware and software. Now that this has bee removed, and while schools are slow to introduce film craft to the curriculum, the chances are that the experimentation which has been unfettered by any scholarship in film theory or the practical insight gained from apprenticeship will yield surprising and valuable paradigms specific to architecture. The cost and value of computer aided animation may not have reached parity yet. But there is every indication that it soon will through the generation of design strategies previously not considered rather than simply making realistic 4D representations more simple to achieve.

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References

Dawson, A., Computerisation of Architectural Practices: ITS Development in Victoria, Australia, doctoral thesis, 1996

Goldman, G., Reconstructions, Remakes and Sequels: Architecture and Motion Pictures, Design Computation Collaboration, Reasoning, Pedagogy, ACADIA 1996

figuren pag1

figuren p2