

Computers for Artists Who Work Alone

Barbara Meier

For the last year or so, I've been studying children's book illustration. A picture book is an equal partnership between the vision of the author and that of the illustrator. Each brings her own experience, interpretation and style to the finished product. One of the things I admire most about these artists is how purely their visions emerge in their books — they seem to come straight from the heart. Of course, they have some input from their editors and art directors, but most of the content comes from the individual working away in a home studio. I think there is a lot of value in having a story told by a single voice.

I recently heard the author/illustrator David Macaulay speak about working on the CD-ROM version of his book, *The Way Things Work*. He said it was an interesting experience, but it took 40 people to do all the work, and he wasn't interested in working in that way in the future: "What I really like to do is draw in my studio at home."

In my work in visual effects, I have seen a director's vision become muddled and homogenized into a pedestrian product through committee-style approvals and group input. Creating a feature film or CD-ROM requires the specialized talents of many people and I enjoy working on these projects as well as experiencing the finished work, but more and more I am drawn to work that is closer to the originator and more personal.

Individual Animators Need the Tools

Like picture books, short animations can also have enormous impact and have experienced a surge in interest in the last few years. However, the sheer amount of work that it takes to create one, coupled with a weak commercial market, deters many projects. I would like to empower individual illustrators and animators with some good affordable computer tools that would allow them to create works that have the qualities of good picture books or "animation festival" films in their home studios. A computer should help them with the tedium or complexity of their work, but not significantly impact their style and preferred ways of thinking and working. Artists may have been turned off by the look of computer graphics in the past, but I believe they would be interested in non-photorealistic rendering methods if presented in a way that could be integrated into their existing process.

I believe the best software comes from a meeting of the minds of the software developers ("here are the things we know how to do") and the expert end users ("here are the things we'd like to have"). Each group can stretch their scope of understanding to create a better product. But computer graphics software has evolved to a point where certain paradigms are assumed and new developments are built on these. Early graphics software was developed by mathematicians and scientists to explore and solve their own scientific problems and to them the underlying structure made sense. Gradually graphics software has trickled down to people who are simply trained to use it the way it is written. Only in the last few years does it seem like people who have actual visual arts training are using graphics software in significant numbers to create imagery. But even these people have probably received a certain amount of their education in the form of training to use particular software — to follow the developers' paradigm for creating a result. I question whether some of these cornerstones of graphics software are still appropriate for creating some kinds of imagery. I think it is time to involve artists and find out how graphics software could be written to help them with their work instead of requiring them to adapt to how graphics has been done in the past.

When I started my work on painterly rendering for animation [1], I was motivated as an artist who wanted to use the tool to create aesthetic works. But I have also been a computer scientist and software developer and so were the other team members, so we built the work on the existing framework of the traditional 3D modeling and animation pipeline. We applied pastel and oil painting methods to guide the process and to create better-looking painterly results, but much of our process had nothing to do with traditional painting. I'd wager that no nineteenth century painters built 3D virtual models and populated their surfaces with imaginary particles before painting them! In non-photorealistic rendering's infancy, we are impressed with our sudden ability to copy a drawing or painting style and are willing to put up with nonsense like particles. There are many non-photorealistic rendering methods to explore for the creation of both still and animated imagery, in 2D and 3D, using the traditional graphics pipeline or not. I'm looking forward to the day when computers are just another tool like a pencil, compass or photocopy machine that can help artists make an anima-

tion at home using the methods that seem most appropriate for each step of the way.

Know How Artists Work

So what would these tools look like? I don't have all the answers, but I can speculate a bit. I think a good basic philosophy is to not try to solve all the problems with computer software. The developers should respect both the way that artists work and the limitations of software. Some software pitfalls I've experienced include systems that are too complex for anyone but the developers to use, problem-solving approaches that are so different from the traditional method that I've had to learn a whole new way of doing something I'm already good at and simplification of a process to a few button pushes with no means of intervention. Developers should start with the simple and obvious ways to make users more efficient, get the software in their hands and then let them help drive the development of the more sophisticated aspects. The whole process doesn't need to be replaced in one step.

Perhaps a good starting point for augmenting an independent animator's tools would be a way to render hand-drawn animation frames using a computer. For some animation styles, the last step in creating an animation frame is to "color" a drawing. Large animation studios employ computer operators who "ink and paint" scanned drawings. I think it would be very interesting to extend this idea to provide for a wide range of non-cel, non-photorealistic rendering styles. Perhaps the animator could submit some samples or teach the computer to create a particular look. A computer could then render frames with a level of complexity and richness that would make an animator's arm fall off were he to attempt it manually!

Traditional animation studios are also using computers to manipulate multiplane backgrounds with pan, zoom and changes in focus to create 2.5D environments and complex staging possibilities. Again, using an appropriate rendering style, if these backgrounds were recreated frame by frame, viewers might feel more like they were immersed in the environment, rather than like they were watching paintings move by them.

Computers may or may not be appropriate for the actual animation of shapes and characters. Some movements and transformations cannot easily be specified geometrically, so the traditional modeling, choreography, rendering pipeline is inappropriate. I would like to find a way to integrate the

traditional 3D pipeline with other animation methods such as image manipulation (morphing, warping, etc.) and hand-drawn animation in a way that is comfortable for an artist to use. The mathematical rigor behind the imagery is not important; it only has to look good.

I believe that non-photorealistic rendering will allow for a more simplified specification of models and choreography and this may leave room for fudging the boundaries between the animation methods. Perhaps there are ways of creating models from sketches. Animation controls could be refined and customized from generic controls. Specific and exaggerated motions could be drawn in by hand. Or they could be sketched to guide the computer to draw them appropriately. Again, the idea is to use the best tool for each step — maybe drawing facial expressions by hand is much more expressive and

efficient than creating hundreds of specialized control knobs that force the animator to be a step removed from the characters.

Do It Now

Some of these software ideas are almost available now, and some are research topics. We'll see them in the next wave of commercials and feature films. What I look forward to most, however, is having them available to individual artists, as they are invented, in a form that allows them to be integrated into the artist's way of working. Let them use computers to do what they are good at doing now. As they learn to incorporate computers into their set of tools, they will start demanding more and the development process can be fueled from both the user and the developer sides. Let's not wait for a quiet evolution and slow trickle-down — let's get appropriate tools into the hands of these visionaries now.

References

1. Meier, Barbara. "Painterly Rendering for Animation," SIGGRAPH 96 conference proceedings, ACM, pp. 477-484.

Barbara Meier graduated from Brown University and worked in Hollywood on feature film visual effects, publishing work on painterly rendering for animation. She recently moved back to Rhode Island and is looking for a way to combine computer graphics, illustration and animation into works for children.

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