About the Cover

Overlapping Images and Ideas

Craig Caldwell, Northern Arizona University

The image on the cover and others on these pages were created to help find a medium that could make it easier to visualize overlapping images and ideas. New perceptions, through a combining and stacking of images, are an ongoing research interest of mine. My search for the medium with the capability to orchestrate images from different views of reality has been ongoing. Though originally trained as a traditional artist, I found that traditional media were not sufficiently responsive for these ideas. The integration of diverse media were not sufficiently responsive either. In addition, I found my ability to manipulate or play out variations was too restricted. While working with established techniques, my mind would be racing ahead to numerous variations of the final piece. I found pixels a great equalizer. This equalizing led me to 3D computer graphics animation. Though I was initially looking for the equivalent of complex paint programs, I found a vastly larger world than I had anticipated.

Organic spheres

High-quality computer graphic access was available at the Computer Graphics Lab at West Coast University (director, Tony Longson). The organic sphere images are from the “Blobby Molecule” program by Jim Blinn and from in-house software. The visual interface consisted of a Command Language Interpreter, in which color, size, light, transformations, blobbiness factor,
and negative or positive parameters were specified. The element of blobbiness controlled how a sphere would change shape as it came into the area of influence around another sphere. The negative and positive parameter controlled whether the image added mass to the scene or subtracted an equivalent amount of mass from an adjoining sphere.

Surface was not determined until the actual rendering took place. This gave the image a beautiful interactive determination of its color, surface, and space. I combined images with parts of other images through a layering process to increase the texture and enhance the perceived detail.

The images were calculated on a VAX 11/750 and displayed on either an 8-bit or a 24-bit frame buffer. A special color map program by Willie Phaffen at West Coast University allowed a completely interactive and viewable selection of colors with the 8-bit buffer.

**Realistic imagery**

The image of the man and room are from the animation *Looking In*, which was created at the Advanced Computing Center for the Arts and Design (ACCAD) at Ohio State University (directors, Charles Csuri, Tom Linehan, Kris Conrad). This animation deals with the multidimensional perceptions of ourselves and our images. Through the keyframes of an animation, I experimented with numerous variations that have intrigued me.

The ACCAD system gave me the ability to create realistic imagery of a pseudo man. The subtle color was intentionally selected to establish an introspective and narcissistic outlook. During the layering process, experimentation with different rendering parameters changed the construction of the mirror. The mirror was originally planned only to be reflective, but the addition of a transparent quality to the mirror suggested an ambiguous quality of our existence in space. This ambiguous quality is consistent with that feeling of reexamination as we look into a mirror, changing our frame of reference constantly.

*Green, Purple and White Spin.* These calculations would take about eight hours on a VAX 11/750. The display device was a Ramtek 9600 with an 8-bit buffer. This was done at West Coast University.

*What in the World* is a surreal world juxtaposed against a more familiar interior setting. The outside landscape is by Tom Hutchinson and Bill Sadler. The room data was done by Greg Foss.
Teamwork
At ACCAD artists and computer scientists are working side by side. That environment encourages the exploration of alternatives and different points of view. The artist and programmer have different mind sets, allowing insights that would be inconceivable from one point of view. The result is extremely creative teamwork.

At one point, for example, the sequence of images for Looking In was not eliciting the correct response. A programmer, Tom Phillips, was working on different approaches to color cycling for a medical application. Tom adapted his program to interface with my work. After experimenting with the program, I found it provided my work with the appropriate changes in value and color for the responses I needed. In addition, the collective environment allowed a sharing of images. The room was done by Greg Foss and the chair by Rick Balabuck. The environment combining artist and programmer has proved to be very productive, qualitatively as well as quantitatively. I can't really say that any of "my" images were done alone. They are the products of a number of people, essential people, without whom the images would not have the quality that they do. All are important.

Hardware and software
To create Looking In and the accompanying still images, hardware and software from the ACCAD and CGRG (Computer Graphics Research Group) were employed. Much of the data was plotted by hand, then inspected and converted to the ACCAD data format using a Megatek 7200 and software by Paul MacDougal. The transformation and rendering specifications used the Twixt program developed by Julian Gomez. With Twixt the orientation of the objects was set interactively, using a real-time calligraphic system, the Evans & Sutherland PS300. Final orientation of the objects would be written back to the script by Twixt. Different layers of the image were checked and masked separately, before the final image was assembled during rendering on August 1987
the frame buffer. This approach permitted me to take artistic license with the data and produce a convincing placement of image parts that would have proved difficult with ray tracing.

**Future**

As the sequence of images evolved through a keyframe animation system, I found myself becoming more and more interested in the motion research conducted at ACCAD, Ohio State. In the animation *Looking In*, the motion was directed through a keyframe animation system. This required numerous generations of different motion sequences.

Working one-on-one with several members of ACAD I find new possibilities are evolving. I am currently researching the possible uses of simulation programs and how they may be applied to computer animation. In the future, by using simulations of physical laws, articulated figures, and soft tissue, we can realize the potential of computer animation. We will be able to incorporate the complex motions of many different actions. This marriage of the diverse fields of science and art will allow new forms of art and visual communication to evolve, along with the tools to yield such products. Surely, as has happened with electronic music, computer graphics and animation will find itself as a distinct art form.

The *OSU Gallery*. This image is composed of different images from the archives at the Advanced Computing Center for the Arts and Design. The art work is by Susan Amkraut, Chris Wedge, Susan Van Bearle, Doug Kingsbury, and David Zeltzer.

The gallery of images are all of himself.

Craig Caldwell has been associate professor of computer graphics animation at Northern State Arizona University since 1976. He is working at Ohio State University toward his doctorate. He has also worked at West Coast University, the University of Florida. He received his BA from Florida Southern College and his MFA from the University of Florida.

Caldwell can be contacted through the Art Department or College of Engineering at Northern Arizona University, Flagstaff, AZ 86011.