VIRTUAL DA VINCI
Daniel Keefe is a virtual painter...
Literally. by Kathy Walker

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"He's in the Cave" -- so says Daniel Keefe's office at Brown University. I immediately picture Keefe as Batman, as the philosopher in Plato's cave allegory and as early-man the painter. As it turns out, he is all of these.

Caves, first demonstrated at the 1992 SIGGRAPH conference, are the hottest thing in Virtual Reality today. With traditional VR technology, the participant wears a Head Mounted Display (HMD) device, which renders images directly in front of the eyes: The left and right eyes receive slightly different images, creating the 3D effect. But Keefe points out there are several limitations to this old-school HMD VR: The HMD is heavy, constantly reminding the participant that there is a computer attached to her head; the experience is disembodied; and the participant is completely detached from other people in the immediate environment.

VR caves change all of this. Keefe's VR cave is a ten by ten room with three walls, which act as projection screens. The images that would be displayed directly in front of the eyes with HMD VR are projected on the walls. Instead of the HMD, the cave participant wears liquid crystal shutter glasses, which serve two purposes: First, in order to create the 3D effect, the glasses alternately cover the right eye then the left eye 80 to 160 times per second, too fast for our brains to notice. This action is synchronized with the alternation of images on the screens -- so when the left-eye image is projected on the wall, the glasses cover the right eye and vice-versa. Second, the glasses serve to track the participant's perspective: A computer calculates where the glasses are pointed and projects the appropriate images on the wall.

The cave VR technology overcomes the limitations of HMD VR. Gone is the heavy head contraption. Gone is the disembodied dizziness. And gone is the detachment from other people: In the Brown cave, up to ten people can participate in the same VR experience. (Only one person's perspective is tracked, however, so the quality of their experience depends on how close the participants are to the person wearing the glasses with the tracker.)

PROFILE

name: Daniel Keefe
city of residence: Providence, RI
research: Keefe is a Graduate Research Assistant at Brown University, and has co-authored four papers on immersive environments
website: His academic page has links to his publications + research, fav music and sports, and the, um, monkey club
hidden talents: Keefe is an accomplished oil painter, and jams in a latin folk band. Plus, there's that monkey thing.

What's the point? Are the caves just about fancier videogames, or better cyber-porn? Well sure. As with most technological advances, our leisure projects will benefit. But there are some real scientific problems with which the cave VR technology is grappling. Technology has always taken us beyond ourselves -- the wheel took us places our feet could not and the electric light sent us into the night. In the computer age, the situation is extreme -- there is a sense in which our technology is leaving us behind. As Keefe explains, computers can collect more information than human beings can deal with: In one day, a satellite gathers more data than a person can process in an entire year.

VR cave researchers at Brown University are working on the concrete problems of data representation -- how can the enormous amounts of data that describe air-flow currents, neuron activity and the movement of blood through a partially blocked artery be represented? Keefe, motivated by the work of his fellow researchers, has taken a more abstract approach. He has turned to the old adage "a picture is worth a thousand words" and thus to the painter.

The Cave Painting project, spearheaded by Keefe, analyzes the ways in which different brush strokes and techniques work together to form cohesive images. Keefe is working to get inside the artistic process, investigating how creativity can assist scientific research. While the Cave Painting project does not deal directly with the issues mentioned above, it may offer some important insights into the data representation problem.

Being in the cave Painting program is like being inside a 3D version of Adobe Illustrator. There is a paintbrush tool, which can take on different brush characteristics, including a Jackson-Pollock splatter and a paint-bucket tool, which throws paint through the room. While the experience is similar to painting, the final result, as a three-space creation, is more like a sculpture. Keefe notes that unlike other VR cave projects where scientists just stand around looking, here the VR cave artist engages in a very embodied kinetic experience by viewing and creating the 3D painting from all angles. In fact, Keefe was so taken by the ways in which the body moves through the cave painting program, he invited dancers and ninth-grade art classes to join him.

The caves involve cutting-edge technology, and Keefe is Batman. The Cave Painting is art, and Keefe is the early-man painter. The cave research is an endeavor to figure out our world and its representations, and Keefe is Plato's philosopher. Speaking of the Cave Painting project, Keefe comments: "The most exciting part of the project is the way it brings art and science together." Keefe, as scientist, artist and philosopher, is a computer-age Leonardo da Vinci. And his Mona Lisa is going to give the world one smart smile.

Kathy Walker teaches in the Fine Arts department at York University, and is an editor at j_spot: the journal of social and political thought and at The Political Touch.