

UC SANTA BARBARA

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UC SANTA BARBARA RECEIVES \$1.8 MILLION TO STUDY VIRTUAL ENVIRONMENTS AND BEHAVIOR

In a major new study, participants in an unusual university lab enter carefully created "virtual" worlds of illusion.

Their reactions speak volumes about the inner workings of the human mind, helping scientists to gather unique data that will not only increase our basic understanding of human behavior, but will be applied eventually to a host of new technologies.

A new grant of \$1.8 million from the National Science Foundation (NSF) is funding scientists at the University of California, Santa Barbara to conduct in-depth research on basic human processes ranging from visual and spatial perception to learning and social interaction through the use of immersive virtual environments, including virtual humans.

In recent years, virtual environments have emerged as a vitally important tool for the study of human perception and behavior, according to researchers. These computer-simulated representations of reality, which participants enter by wearing a headset, give the user the impression of being "immersed" inside a compelling, three-dimensional setting that is under the control of the virtual environment creators.

In scenarios being developed for the new grant, researchers will determine the learning value of having participants "enter" into a biological system such as the human respiratory system. Participants can learn about such systems from the inside, taking the role of say, a molecule moving through the lungs. Other "inside" learning scenarios may include the formation of a lightning storm, the working of a car's braking system, or the operation of the Internet.

Behavioral scientists at UC Santa Barbara are pioneering research in virtual environments through the recently established Research Center for Virtual Environments and Behavior co-directed by Jim Blascovich and Jack Loomis, professors of psychology.

The Research Center and ultimately the major NSF grant proposal were facilitated by a seed money award of just \$21,000 from the "Research Across Disciplines" program in UC Santa Barbara's Office of Research. Designed by Vice Chancellor for Research France Córdova, this internal seed grant program encourages the interdisciplinary research for which the university is internationally known. With these grants, the faculty are given an opportunity to collaborate with researchers outside of their fields to "stretch out and develop their dreams," according to Córdova.

The type of system to be used in the new project was developed in Loomis' lab, with support from UC Santa Barbara and the U.S. Office of Naval Research. Using advanced computer graphic technology, body tracking systems, and head-mounted visual displays, project researchers can create and control specific virtual environments.

Wearing the head-mounted visual display, participants experience these environments simply by walking around a computer-rendered setting. Most individuals respond quickly to stimuli in the virtual environment. For example, many become anxious as they cross a narrow bridge over a virtual pit or are curious about seeing their image in a virtual mirror, an image which can be made to look like anything.

The NSF grant, part of an initiative entitled "Knowledge and Distributed Intelligence," will support four major areas of research at UC Santa Barbara: learning; visual perception; spatial perception and cognition; and social interaction.

According to researchers, immersion in virtual systems may enhance learning by prompting more active cognitive processing of information compared to, for

example, the experience of learning through a computer desktop simulation.

Several research projects concerned with issues of visual perception will be carried out. Researchers will assess how three-dimensional shape influences the participants' perception of surface color under changing illumination. The accuracy of participants' distance perception within the context of judging the gaze directions of others will be measured.

To learn about spatial perception and cognition, project researchers will use immersive virtual environments to investigate how individuals form a unitary mental representation or map of an environment after starting with only the knowledge of isolated regions. They will also investigate why the perspective from which one views an environment so strongly influences the stored knowledge one has about it.

Social interaction and social influence will be observed by using immersive virtual environments to explore and identify nonverbal communication characteristics that are essential to meaningful social interaction.

What does it take to really communicate? Processes such as social facilitation versus inhibition, group risk taking, and ostracism will be studied. In one particularly innovative project, researchers will study prejudice by setting up experiments in which participants peer into a virtual mirror and see themselves as a member of a different ethnic group or gender.

In addition to Loomis and Blascovich, contributors to the NSF-funded project include: Reginald Golledge, professor of geography; Daniel Montello, associate professor of geography; Mary Hegarty, professor of psychology; David Brainard, associate professor of psychology; John Foley, research professor of psychology; Michael Gerber, professor of education; Richard Mayer, professor of psychology, and Philip Walker, professor of anthropology.

About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we

draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.