

## NEWS

# The Promise of Parallel Universes

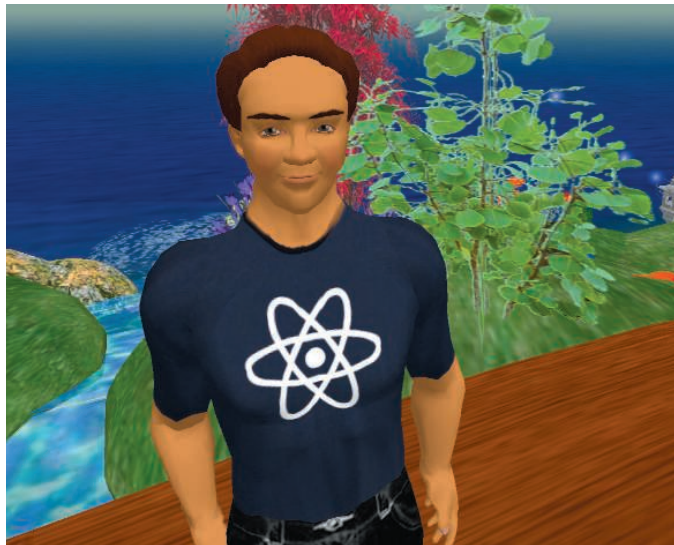
For social psychologists, computer-generated realities provide exciting new terrain for exploring human behavior and complex social interactions

In Second Life, there's no need for liposuction. Participants in this computer-generated world can slim down by simply sliding a bar on the computer screen that controls the body fat of their virtual self, or avatar. Receding hair fills out with similar ease and, if the whim strikes, turns electric blue with a click of the mouse.

The freedom to try out different looks, and even different personas, contributes to the growing appeal of virtual worlds such as Second Life, where residents socialize in real time, often forming groups to pursue business, artistic, and other endeavors. These parallel universes have attracted millions of users in recent years. They've also begun to attract the attention of scholars of human social behavior.

For researchers, virtual worlds are uncharted territory, test beds for seeing what people do when freed from real-world physical and social constraints. "It's a deep, deep rabbit hole," says Dmitri Williams, who studies the social impact of new media at the University of Illinois, Urbana-Champaign. Social scientists are investigating whether social norms, such as the concept of personal space, persist in these modern-day Wonderlands. They're also looking into whether, by creating better-than-life avatars, virtual-world visitors set themselves up to have different online identities: For example, can a tall, handsome avatar transform a shy nerd into a smooth operator? In turn, can experiences in the virtual realm change how people behave and think of themselves in real life?

Already, they are seeing signs that computer-generated representations of people can be deviously manipulative, with the potential to impact real-world decisions (see sidebar, p. 1343). Thus, answering these questions will be of fundamental importance as virtual environments increasingly enter the mainstream,



**Instant makeover.** The malleability of avatars adds a new dimension to social interactions in virtual environments.

says Williams. "It's possible that one large category of human interactions in the future is going to be based on avatars," he adds.

At the same time, some researchers see opportunities to tackle previously intractable research questions. They can do experiments in virtual environments on social networks and crowd behavior, for example, that would otherwise be impossible for practical or ethical reasons. "This is a very exciting way forward for

social psychology and sociology," says Mel Slater, a computer scientist with joint appointments at University College London and the Universitat Politècnica de Catalunya in Barcelona, Spain.

## Science in wonderland

Science-fiction authors have written about virtual worlds for decades, but only in recent years have more powerful computers and widespread broadband Internet access made it possible for people to interact in real time in computer-generated settings. Virtual environments vary in content and character. Some are games with set rules. The most popular of this genre is World of Warcraft, in which, simultaneously, thousands of players battle monsters and enemy players, accumulating points and booty and risking their avatars' lives in the process. In contrast, Second Life is a safer but more freeform world, with few limits on situations encountered.

Yet even in virtual worlds, the mind follows some real-world rules. "In a lot of these online games, it's possible to actually walk through another character, but almost no one ever does that because it's so uncomfortable psychologically," explains Nick Yee, who recently completed a Ph.D. at Stanford University in Palo Alto, California, on the psychology of online games and virtual environments. Indeed, Yee and others have

found that people maintain a certain distance when interacting with other avatars. Just as in the physical world, pairs of female avatars in Second Life made more eye contact while talking and tended to stand closer together than did pairs of males, Yee and colleagues, including his graduate adviser Jeremy Bailenson, reported in the February issue of *CyberPsychology & Behavior*. Avatars also tended to reduce eye contact as the distance between them shrunk,



the researchers found. “There are some things that are so hard-wired culturally that it’s hard to switch them off, even in a virtual environment,” Yee says.

In another study, now in press at the *International Journal of Multimedia Tools and Applications*, Yee and Bailenson asked student volunteers to clean “dirt spots” off several virtual objects and people using a joystick that measures the force applied by the user’s hand. The subjects applied more force when wiping the dirt from the objects than from the people, Yee and Bailenson found. Volunteers also applied a softer touch to faces relative to torsos and to females relative to males, mirroring real-world tendencies regarding touch.

On the other hand, virtual worlds offer visitors a chance to break away from their normal habits. In a paper in press at *Human Communication Research*, Bailenson and Yee report that undergraduate volunteers given an attractive avatar more readily approached and conversed with an avatar of the opposite sex than did volunteers given a less attractive avatar. In another experiment, they found that volunteers given a taller avatar negotiated more confidently when they had to split money with another avatar and were less likely to accept a lopsided deal than were volunteers given a shorter avatar. “How your avatar appears affects how you behave online,” says Yee. Moreover, he has found that those given taller avatars gained confidence in a subsequent face-to-face negotiation task in real life.

Other researchers have also seen evidence of a carryover from the virtual world to the physical one. Psychologist Jeffrey Hancock and his graduate student Jorge Peña at Cornell University recently asked volunteers to explore a virtual environment as an avatar wearing a doctor’s coat or one wearing the white robe and hood of the Ku Klux Klan. Afterward, a person-

ality test revealed that those dressed as a member of the white-supremacist group rated themselves more aggressive than did the virtual M.D.’s, who gave themselves high marks for friendliness. The difference in the responses of the two groups was too large to be explained by chance differences in the personalities of the people assigned to the two groups. Hancock says: “These questionnaires are supposed to examine stable traits about somebody that aren’t supposed to change over time. Yet here we’re seeing that they’re actually thinking about themselves differently” after a brief experience in a virtual environment.

### Group dynamics

Whereas researchers such as Bailenson and Hancock have focused primarily on individual behavior, others see unprecedented opportunities to investigate the behavior of larger groups. “Virtual worlds provide an outstanding exploratorium for us to gather data and test models,” says Noshir Contractor, who studies social networks at Northwestern University in Evanston, Illinois.

In the real world, collecting data on how people create, maintain, and dissolve links with one another is incredibly labor- and time-intensive, Contractor says. For example, beginning in 1999, he spent \$1.5 million and 3 years on a project that examined how groups of people access the expertise of their members when they work collaboratively

**Brave new worlds.** Social scientists are finding that virtual environments provide prime opportunities to study group behavior.

on a problem. Companies and organizations often assume that if they create a directory listing the expertise of their members, people will seek out the most knowledgeable person when they need help with a particular aspect of a job. To see if that was really happening, he and his colleagues conducted in-depth surveys with more than 30 working groups at places such as NASA, Boeing, and Charles Schwab. “Getting the data for that was very time-consuming and very painstaking,” Contractor recalls. His team found that when people need help with a particular aspect of a job, they don’t necessarily go to the person with the most expertise in that area; instead, they often get help from people with whom they have close social ties.

More recently, Contractor and co-workers conducted a similar experiment in *World of Warcraft*. This time around, the experiment took only a few months, and the findings turned out much the same: Even though the game provides lists of players best able to craft deadly weapons or construct defenses, when players needed help, they typically turned instead to other players they already knew or had worked with in the past.

Contractor is now extending this line of investigation with studies on social networks in *EverQuest II*, a monster-slaying game produced by Sony, and in *Second Life*, which will enable him to study thousands of individuals instead of just a few dozen, as in his real-world study. Contractor hopes these more comprehensive data sets will shed light on how social networks change over time, something that has been very difficult to track. In the case of *EverQuest*, Sony has granted the researchers access to 15 months of in-world action archived second by second as players form and dissolve groups for quests and raids. “We essentially have a movie of the networks as they’re unfolding in time,” says Contractor.

**Shocking.** A virtual woman receives increasingly painful shocks in a 21st century version of Stanley Milgram’s infamous obedience experiment.

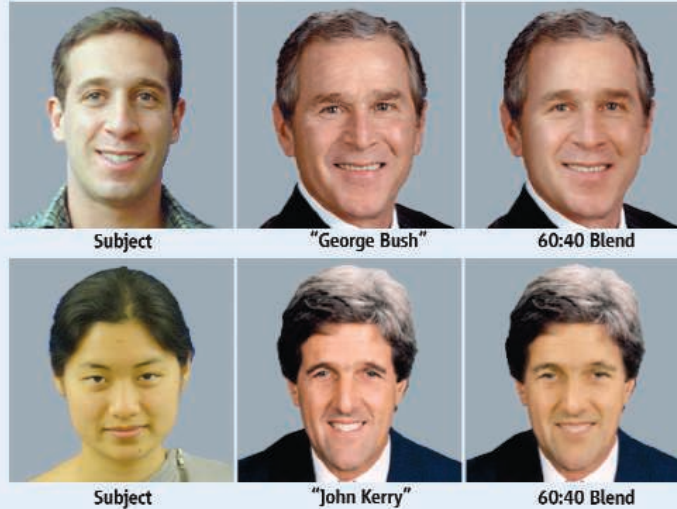


## THE ART OF VIRTUAL PERSUASION

If virtual worlds go the way of the World Wide Web, eventually hundreds of millions of people will be logging in daily for a spin around their favorite computer-generated world. But they will have to keep their wits about them. Social scientists are finding that online experiences influence offline thinking (see main text) and that manipulation—for political, advertising, or other purposes—may be much more sophisticated in virtual environments.

A variety of studies have shown that people who mimic the gestures or speech of others are often perceived by those they mimic as more likable and influential. In virtual environments, where everything is generated by computers, the potential for manipulation by mimicry can reach frightening new levels.

For example, a week before the 2004 U.S. presidential election, Jeremy Bailenson and colleagues at Stanford University asked 240 volunteers to fill out surveys regarding the two main candidates, President George W. Bush and Senator John Kerry, while viewing side-by-side photographs of the two men. For a randomly selected third of the subjects, the researchers used software to merge Bush's photo with a photo of the subject, making Bush look more like the subject without the subject noticing. Another third faced a Kerry doctored with their features, and for the remainder, the photos were unaltered. After viewing the photos, those subjects without strong partisan views tended to endorse the candidate whose face had been morphed with their own.



**How do you like me now?** Undecided voters gravitate toward a candidate whose face has been morphed with their own.

In another experiment, in 2005, Bailenson and colleagues asked undergraduate volunteers to don a virtual-reality helmet to watch someone argue for an unpopular real-life proposal that students carry an ID card at all times. When the virtual talking head mimicked the viewer's own head movements (as recorded and relayed by the helmet), the student responded more favorably to questions about the policy.

Such findings have potentially creepy implications. "It gets kind of icky if you think about politicians in the future that will change what they look like according to who's looking at them," says Jeffrey Hancock, a psychologist at Cornell University. Of course, politicians already do that to some extent in the real world—donning overalls for a meeting with farmers, then switching to a suit for a meeting with business executives—but in virtual environments, computer algorithms could potentially enable a politician's (or a salesperson's) avatar to adjust his appearance and mannerisms instantly and automatically to maximize his influence in any given situation. In Second Life and other virtual environments, Bailenson points out, computer servers keep a running log of everything—every glance, nod, or flick of the hand that happens. "You have this huge database, and someone could grab it in real time and mimic you at a subtle level," he says. "I think it's important for people to realize how difficult it is to detect this when it happens in the digital world and how powerful it is."

At the same time, Bailenson says, the power of mimicry could have beneficial uses as well—to create avatars for teachers that are personalized for each student, for example. "If I'm a teacher and I really want to reach a student, I have a new tool," he says.

—G.M.

Other researchers have begun toying with virtual worlds as settings for experiments that could not pass muster with ethical review boards if done with real people, yet which have the potential to provide valuable insights into human behavior. Slater recently explored this potential by conducting a virtual version of a controversial 1960s experiment designed by psychologist Stanley Milgram at Yale University. Milgram and colleagues directed subjects to deliver increasingly painful electric shocks to a stranger (really an actor pretending to be in pain) when he gave an incorrect response on a memory test. The subjects' compliance pointed to a disturbing tendency to obey authority.

In Slater's version, the stranger was a virtual woman viewed on a computer screen. Although subjects knew the woman was not real, their heart rates increased and they reported feeling bad about delivering the shocks. Yet they kept

shocking the stranger just as Milgram's subjects had, Slater and colleagues reported in the December 2006 issue of *PLoS ONE*. The experiment is an important proof of principle, Slater says, because it suggests that virtual environments can be used to predict how people will behave in real situations.

Slater now plans to investigate how crowds behave in emergencies. For example, social psychologists have struggled to explain the so-called bystander effect, whereby people are less likely to help someone who is being attacked when there are others present. "There are various hypotheses out there, but they can't be tested" in real life, Slater says. In a virtual environment, however, he can easily control the number and behavior of people in any given situation. He also plans to examine how the behavior of a crowd at a virtual movie theater influences how individuals respond when a fire

breaks out. "The beauty of virtual reality is that it allows you to study these quite complex issues while sidestepping the practical and ethical problems inherent to real-world versions of such experiments," Slater says.

Researchers such as Contractor and Slater hope their work will ultimately lead to practical applications, from better disaster management to increased collaboration and creativity within organizations. Indeed, some blue-chip companies are already taking note. In June, IBM released a study of online role-playing games that concluded that these virtual environments provide fertile ground for developing real-world leadership skills. In a not-so-far-fetched future, applicants for management positions may find themselves listing their World of Warcraft credentials on their résumés right under their university business degrees.

—GREG MILLER