

Virtual reality's promise, risk loom large for health researchers



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Researchers are eagerly exploring how VR can help with everything from treating phobias to overcoming addiction, but others caution that there's still much unknown about how the brain reacts to prolonged exposure to the new medium. USA TODAY



(Photo: University of Houston)

SAN FRANCISCO – The increasingly vivid virtual world has the power to help overcome post-traumatic stress syndrome and heroin users kick their habits. But risks loom — namely, that overexposure to virtual reality may generate its own

That's the upshot of conversations with a variety of researchers working in VR across the country, where excitement mingles with concerns over the complex clinical implications of this big global tech phenomenon.

"The question seems to be, if VR is so real it can be used for treatment, then what are traumatic?" says Mayank Mehta, a neurophysicist with the University of California-Los Angeles' Center for [Neurophysiology](#). He reveals that VR causes the brain to react differently than it would to real-world stimuli.

Those unknowns, however, stand in contrast to virtual reality's ability to take patients safely into worlds that otherwise would be too painful. [Bordnick of the University of Houston](#) is using VR to generate the craving response that a familiar setting can trigger — in a virtual shooting gallery in a rundown house — and gradually coach the patient to resist that physical response.

"If you're exposed to stimuli without giving your body reinforcement (in the form of drugs), you kill the link, which in psychology is called extinction," says Bordnick, associate dean of research at the university's Graduate College of Social Work.



Immy's augmented reality glasses allow users to experience VR while not shutting out the real world, which researchers say should allow for longer spells. (Photo: Immy)

At the [University of Southern California](#), pioneering VR researcher Albert “Skip” Rizzo has developed Virtual Iraq and Virtual Vietnam software that is being used at dozens of VA facilities to help veterans plagued by PTSD.

Instead of avoiding any association with their traumatic war experiences, patients are gently guided back into realistic Iraq and Vietnam, “re-experiencing the association between the stimuli and its consequences,” says Rizzo, director of medical virtual reality at USC’s [Institute for Creative Technologies](#), where [Oculus Rift](#) founder [Palmer Luckey](#) once interned.

“We try to address the trauma and activate a memory, and it’s hard medicine for a hard problem,” says Rizzo. “But the pain can’t hurt you. For anyone saying that we’re re-traumatizing people, we say this is better than having them see Middle East war footage and freaking out.”

OCULUS RIFT, GOOGLE CARDBOARD

For more than a decade, such university VR research relied on five-figure headsets typically reserved for military applications. At [Bordnick's Houston lab](#) can even walk into a sophisticated VR "cave" that consists of huge screens whose images jump

But as with most technology, VR gear is getting better and cheaper. Labs are now doing much of their work on products that are more affordable. Researchers suggest that soon patients will be able to access trauma-reducing programs through smartphone-based VR [Cardboard](#) device.

Helping patients overcome difficult experiences is far from the only new use of VR. The technology's powerful impact on mental health can generate realistic levels of empathy, tangible reductions in pain and cure phobias, say researchers at [Stanford University](#).

In a demonstration of a diversity training simulation, the user at first appears in a virtual mirror as a white male, and then female. Moments later, an animated white male is screaming obscenities. When you raise your hands in self-defense, you become a woman. The idea is to truly feel the impact of racism, even if temporarily and virtually.

“There’s tremendous potential for VR to do good,” says Jeremy Bailenson, founding director of Stanford’s lab, who is paid for pain studies. He describes one such application, where a burn victim is placed into a snowy VR landscape, which reduces the need for bandages. “[Mind over matter](#),” he says.

RISKS AND LAB RATS

With VR technology in its early days, so too is any research into its negative affect on the brain.

“The truth is we don’t know what VR does to the brain yet, in part because the best brain studies require MRIs where that’s not happening with VR,” says Bailenson.

“But I can tell you that after working in VR for 20 years, I never spend more than 20 minutes (with a headset on) at a time because I tend to feel somewhat ill after being deprived of real-world stimuli for long periods of time.



Jeremy Bailenson is the founding director of Stanford University's Human Interaction Lab, which is doing deep research into the ways in which virtual reality gear can be used to help overcome trauma and phobias. (Photo: Martin E. Klimek, USA TODAY)

At UCLA, neurophysicist Mehta's lab rat studies indicate that when the animals are in VR, they fire fewer neurons than when the rats walk the same hall in reality.

“Is this good or is this bad? It’s not clear yet,” he says. “But these are very surprising results. I’ve really seen the brain behave this way. I’d be happier if more studies were done.”

Mehta says he has reached out to a variety of headset manufacturers with his research. He has interest in the results, but he has yet to get any to help fund more in-depth research. Oculus Rift, Sony and HTC declined to comment for this story.

In fact, with the coming onslaught of commercial products such as Oculus Rift, the current wave of gaming-focused users may prove to be the technology's inaugural lab rats. When VR came out, there were similar concerns about its negative psychological impact. The sheer power of video games to help some conditions such as teen-age depression suggests that even more powerful psychological counseling tools are possible.

In fact, if there is one big strike against VR it is found in the occluded nature of the technology. You can't see out of the headset and the real world beyond is also changing fast as they develop augmented reality goggles. Unlike VR, in which the viewer is fully immersed in a virtual world, AR glasses allow a virtual world to be overlaid over a reality the user can still see.

Companies such as ODG and Microsoft, which may roll out its [HoloLens](#) this year, have made significant strides in AR, and its founder [Tony Fadell](#) with re-imagining the company's pioneering if unsuccessful AR-focused Glass product. Industry analysts predict AR ultimately will make up \$90 billion of a \$120 billion VR/AR market by 2020. The thought is that virtual reality will truly transform heavy, fully enclosed and somewhat cumbersome VR goggles into lightweight AR glasses.

“Never in history have we been able to captive the eyes and ears with such realism, and in being able to trick the brain by making it feel vulnerable,” says Doug Magyari, CEO of Immy, a company that has long made AR and VR gear for military applications.

consumer space as well.

Easily escapable VR – such as handheld Cardboard devices – lessens the potential health risk, says Magyari. In short, the impact of virtual reality on the brain and psyche, it may be prudent to proceed with caution.

"I don't know if you've read all the (warning) labels that come with a lot of VR gear, urging users to take frequent breaks by children under 12," he says. "Those labels aren't there as a joke."

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