

TECHNOLOGY

Virtual Reality Gets Real

The promises—and pitfalls—of the emerging technology

MARIA KONNIKOVA OCTOBER 2015 ISSUE



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IN 1965, IVAN SUTHERLAND, a computer-graphics pioneer, addressed an international meeting of techies on the subject of virtual reality. The ultimate virtual-reality display, he told the audience, would be “a room within which the computer can control the existence of matter. A chair displayed in such a room would be good enough to sit in. Handcuffs displayed in such a room would be confining, and a bullet displayed in such a room would be fatal. With appropriate programming, such a display could literally be the Wonderland into which Alice walked.”

Virtual reality has advanced rapidly in the past couple of years—the much-anticipated Oculus Rift headset is expected to



Oculus Rift Headset (Oculus VR)

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arrive in stores in early 2016, followed closely by several other devices. Yet the technology is still very new, and Sutherland's vision seems little closer to, well, actual reality. "Right now, it's like when you first had cellphones," Richard Marks, one of the lead engineers working on Project Morpheus, Sony's virtual-reality headset, told me. "A lot of focus is still on the most-basic things."

I recently spoke with scientists, psychologists, engineers, and developers about the possibilities for this emerging field. Where might it eventually take us—and will that be somewhere we want to go?

Being Virtually Anywhere

During a recent demonstration of Google Cardboard—a DIY headset that's made of cardboard and uses a smartphone for the display—I found myself by turns atop a rocky peak, in a barn next to a snorting horse, and on a gondola making my way up a mountain. The gondola ride gave me vertigo.

We react like that, experts say, because our brains are easily fooled when what we see on a display tracks our head movements. “We have a reptilian instinct that responds as if it’s real: Don’t step off that cliff; this battle is scary,” Jeremy Bailenson, the founding director of Stanford’s Virtual Human Interaction Lab, told me. “The brain hasn’t evolved to tell you it’s not real.”

Much of the excitement about virtual reality has come from the gaming community. Who wouldn’t want to experience a game so completely? But gaming is just the start. At Sony, Marks has worked with NASA to conjure the experience of standing on Mars—a view that could help scientists better understand the planet. David Laidlaw, the head of the Visualization Research Lab at Brown University, told me that his team has re-created a temple site in Petra, Jordan, enabling researchers to see previously unclear relationships between objects found there.

Google is testing Expeditions, a way of sending students to places like the Great Barrier Reef, where they can virtually scuba dive as part of a lesson on marine biology and ocean acidification. Similar approaches may enhance professional training. By donning a pair of goggles, a neurosurgeon could navigate brain structures before surgery; a chemist could step inside a drug to understand it on the cellular level; an architect could walk through a building she’s designing.

Another possibility: Imagine that you’re unable to attend a family gathering. With a pair of glasses, you’re in the middle of the action. And everyone there wears glasses that make it appear as though you’re present. The whole thing is recorded, so you can replay the experience whenever you’d like. Ten years from now, such a scenario might be common.

And consider the potential for telecommuting. Henry Fuchs, a professor at the University of North Carolina at Chapel Hill and a leader in the field, envisions virtual offices. You could use the physical space of your house—a real desk, a real computer—but interact with your colleagues as if they were in the same room as you.

Seeing Through Others’ Eyes

In his lab at Stanford, Bailenson studies how virtual reality changes behavior. He’s found that if your avatar is taller than you are in real life, you become more confident. If you have a particularly attractive avatar, you become friendlier. If you’re young and you have an avatar that is a senior citizen, you save more money. These changes last even after you leave the virtual realm.

And avatars could soon become more convincing. Most commercial virtual-reality systems capture only the movement of your head and hands. In 2013, though, Apple acquired PrimeSense, an Israeli company developing technology to track the movements of your whole body with infrared sensors and special microchips. And a company called Faceshift is working to capture facial expressions, so that if you smile or roll your eyes, your avatar will too.

Virtual reality has already proved useful in treating phobias and PTSD. It can help people overcome a fear of heights, for example, through simulations of standing on a balcony or walking across a bridge. Bailenson and others think it could also be used to build empathy. What if you could step inside a documentary, rather than just watching it on a screen—almost literally walking in someone else's shoes? That was the goal of *Clouds Over Sidra*, a virtual-reality film—created through a partnership between the United Nations and Samsung—that followed a 12-year-old girl in a Syrian-refugee camp in Jordan.

And what if you could do something similar in real time? “Combine this sort of immersive storytelling, as it evolves, with technologies like Periscope and Meerkat”—apps that let users stream live video—“and you can in essence see the world through anyone's eyes,” Clay Bavor, the head of Google's virtual-reality initiatives, told me. A protester in Cairo or Athens or Baltimore, for example, could use a special camera to give people around the world a 360-degree view of what it's like to be there.

Engaging All Your Senses

Google recently acquired Thrive Audio, a company that specializes in spatial audio—sounds that your ear registers as emanating from a particular place. A virtual waterfall grows louder as you move toward it. Something catches your ear from behind. You turn, and see a deer approaching. The audio becomes three-dimensional, truly surrounding you.

Smell could become part of the virtual experience as well. A company called Feelreal has developed a mask that releases scents, such as the smell of fire or the ocean, to enhance what you see in a headset. (The project is hampered by the need to preload the scents you're likely to encounter, among other problems.) Closely related is the ability to taste what you see. Researchers in Singapore are developing electrodes that, when placed on your tongue, mimic basic tastes, such as sweet, salty, bitter, and sour.

What about touch? Could we one day find that when we dip our fingers in virtual water, it actually feels wet? David Laidlaw considers resolving this challenge, known as the haptics problem, to be the holy grail of virtual reality. But that doesn't mean it's insurmountable. “I'm confident we'll do it within our lifetimes,” Palmer Luckey, the founder of Oculus, told me. “There are no fundamental physical laws that prevent us from building something that's almost perfect.” Laidlaw is less optimistic—he thinks that creating lifelike haptics will take 100 years—but he agrees that a virtual world may one day be a nearly perfect simulacrum of the real one.

Of course, there could be unintended consequences. Already people are developing vision problems and vitamin-D deficiencies—not to mention obesity and diabetes—because they spend too much time in front of screens. (See [“The Nature Cure”](#).) What might a flawlessly rendered virtual world mean for our health?

A *Neuromancer* Future?

Jeremy Bailenson was inspired to work in virtual reality in part by *Neuromancer*, a 1984 novel that depicts a future in which people can “jack in” their brains directly to a virtual world. Perhaps, Bailenson speculates, that’s where virtual reality is headed. He imagines that in 50 or 100 years we might develop a brain-machine interface that taps directly into the nervous system.

Perhaps then we’ll find that rather than jacking in for a while and calling it quits, we can, like Alice, move wholly into a Wonderland where the laws of the prosaic world (gravity, aging) no longer apply. Virtual reality could then become akin to the Singularity, a concept described by Ray Kurzweil, a futurist and Google engineer, among others: a way for our minds to separate from our bodies and, uploaded into a digital realm, live on even as our physical selves grow old and die. Just like Wonderland, it’s a vision equal parts entrancing and frightening.

A Brief Chronicle of Virtual Reality

1930: The first mechanical flight simulator is patented.

1942–45: The U.S. military uses View-Masters for training during World War II. The device later becomes a popular children’s toy.

1962: Morton Heilig patents the Sensorama, an “experience theater” featuring 3-D video, a vibrating chair, fans, and artificial smells.

1968: MIT develops the first virtual-reality headset, a device so heavy, it must be suspended from the ceiling. Its nickname: “the Sword of Damocles.”

1996: Virtual Boy, Nintendo’s 3-D video-game console, is discontinued because it causes nausea.

2014: Facebook buys Oculus, a virtual-reality company, for \$2 billion.

2115: Virtual reality incorporates haptic sensations, enabling users to “touch” what they see.

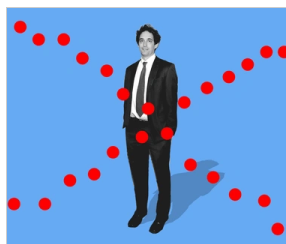
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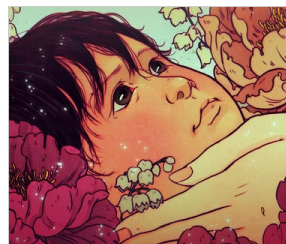
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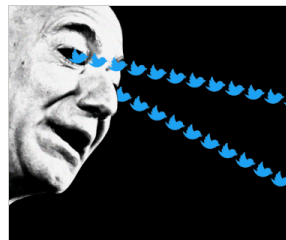
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