Holograms are here, from Tupac to Marilyn Monroe. Will you be next?

By Jeremy Bailenson, Published: November 30

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In 2007, a television ad featured a delighted Orville Redenbacher plugged into a new digital music player and proclaiming his popcorn to be as light and fluffy as the miniature device in his hand. The only trouble: At the time of the ad, Redenbacher had been dead for a decade, long before the iPod's 2001 debut.

This past April, at the Coachella music festival in California, thousands cheered as a hologram of Tupac Shakur, who was shot dead in 1996, showed off dance moves and rap lyrics that created the impression of an entirely new performance. Virtual Tupac appeared side by side with a very live Snoop Dogg.

Then in May, the Hollywood Reporter revealed that a small L.A.-based media company had created a virtual Marilyn Monroe and was planning a global concert tour that would put her on stage with live musicians. Dollar signs seemed to be dancing in the heads of the computer-generating industry. The Reporter quoted Justin Wilkes, an executive with @radical, which has created holograms for clients such as Deutsche Telekom. "There is a genuine feeling that this is cool and this is the future," Wilkes gushed.

It's not just the future. It's the present, and we haven't begun to deal with the psychological, legal and financial implications of a hologrammed world. Tupac's mom and Redenbacher's grandson gave their blessings to the virtual resurrections, but Monroe's estate immediately threatened a lawsuit that, at least for now, has derailed a new singing career for the film star, who died of a drug overdose in 1962. (The company says, however, that it has delayed the concert tour not because of technical issues, not the legal threat.)

Seeing the deceased Redenbacher or Tupac speak or move in ways those icons never intended could be at best creepy and at worst an infringement of copyright law. But as trendy as resurrecting celebrities may be, a more pressing concern is understanding the implications of making virtual copies — we call them "doppelgangers" — of the living.

For the past decade at Stanford University's Virtual Human Interaction Lab, where I work, we have been building three-dimensional images of volunteers — thousands of them over the years — and studying the volunteers' reactions to seeing their virtual selves. As scientists and scholars, it's our mission to examine the powerful effects of doppelgangers and alert the public about possible abuse, even as we worry that our work also has possible commercial applications, particularly in advertising and marketing.

Humans have been looking at their reflections for as long as pools of water have existed. Since the 19th century and the invention of photography, we have gotten used to seeing ourselves as others might see us — or at least as the camera lens captured us. The rise of video technology in the past few decades has created "asynchronous" versions of ourselves; we
shake our heads ruefully as we watch our younger selves dancing at a wedding years ago.

But virtual doppelgangers allow for a new and mind-blowing experience. Imagine looking in a mirror and seeing your reflection behave in ways beyond your physical abilities. Hit a Mickey Mantle-esque home run. Dance on Broadway, or with the stars. Climb Everest, or the corporate ladder. Seeing your virtual self reach these great heights could be psychologically liberating or devastating, depending on the motives of those who control your avatar.

About once a week I get a visit at the lab, in the heart of Silicon Valley, from venture capitalists or start-up companies that are racing to leverage business applications that capitalize on the virtual self. Insurance companies want to encourage preventive medicine, market research firms want to test consumer behavior, fashion boutiques want to allow people to try on fancy outfits from their living rooms.

The inspiration for some of our research can be traced to science fiction, which first explored the idea of virtual doppelgangers. In his 1984 novel "Neuromancer," William Gibson describes the intense psychological reaction that a woman experiences upon seeing her doppelganger perform unseemly acts. While Gibson chooses to focus on the darker side of human nature, for the past decade my lab has used doppelgangers to build and test more positive applications.

Consider research by Jesse Fox, a graduate student from the lab who is now an assistant professor at Ohio State University. She wants to help solve the obesity epidemic. Despite the onslaught of public service campaigns lauding healthy eating and exercise, the United States remains one of the leading nations on the obesity chart.

Fox designed a virtual approach to promoting exercise for people reluctant to get off the couch. As her experimental subjects exercised, they watched their doppelgangers lose weight in front of their eyes — and then gain it all back when the subject’s activity level went toward couch potato. This powerful depiction of the consequence of failure inspired most subjects to increase their level of exercise. In fact, over the next 24 hours, the doppelganger experience caused the subjects to exercise 40 minutes longer than members of a control group who did not see the effect on their virtual selves.

In another study, researcher Kathryn Segovia wanted to find out whether doppelgangers create false memories. In her experiment, more than half of elementary school children who saw their virtual selves swimming with whales believed, five days later, that they had physically done so.

There’s a danger to false memories — but what if holograms helped us see the future? Hal Hershfield, an assistant business professor at New York University who was a graduate student at the Stanford Center on Longevity, wondered if doppelgangers could help solve an enduring economic conundrum: How to persuade 20-somethings to save for retirement earlier than most of them do now.

Some members of his study group watched their virtual selves age-morph into sexagenarians. Later, when asked a series of questions about retirement, they were more inclined to put money into savings than subjects who either looked at other people of retirement age or who merely imagined their future lives as retirees. Hershfield’s experiments inspired a change in fiscal behavior, and investment firms are now exploring how to integrate the technology into their portfolio-management software.

In Steven Spielberg’s sci-fi thriller "Minority Report," Tom Cruise’s character looks up at a billboard and encounters an advertisement that uses his own name, thanks to eye-recognition technology that instantly identified him. Sun Joo Ahn, now an assistant professor of advertising at the University of Georgia, wanted to take this fictional construct a step further: What if consumers looked at a billboard and saw themselves using a product they had never seen before?

Subjects in Ahn’s studies saw their doppelgangers enjoying novel soft drinks. Later on, those subjects said they preferred the "self-endorsed" brands to other brands. Doppelgangers, the study suggested, could be the ultimate sales tool.

Corporations are catching on. Maria Jabon, who worked in the lab at the time of Ahn’s study, soon afterward got a job at LinkedIn and presented her new colleagues with the advertising research. Fast-forward a year later, and the "Picture Yourself" campaign has become one of the most successful marketing campaigns in the company’s history. It grabs a picture of a LinkedIn user and shows her smiling next to the job of her dreams: “Picture yourself with this new job.”

But these are just still photographs. The power of a 3D virtual self is that it can be animated. Imagine if LinkedIn didn’t just simply put your picture next to a job description of a ballerina but showed you prancing around doing spins and jumps.
It cost almost half a million dollars to build the holographic Tupac that danced onstage last spring. But a Microsoft product called Kinect, heralded by Guinness World Records as the fastest-selling consumer electronic device ever, can build the virtual self for about $100, and in no time at all. During a recent visit to Microsoft Research, I watched a scientist twirl the Kinect sensor around my head, and a minute later, I saw a projection of my virtual doppelganger staring right back at me — visible from any angle, able to perform any action fathomable by an animator, capable of being copied a million times for free and never to degrade so long as electricity exists.

There are obvious downsides to these applications. For example, this technology allows for a visual version of libel: Instead of making up gossip about people, you could create video-quality images of their virtual selves doing unseemly things. In the hands of a disgruntled employee or an ex-lover, the possibilities are daunting.

What does the legal system have to say about all this? The picture is murky at best. On the one hand, existing laws may serve perfectly well as deterrents and remedies; for example, copyright precedents should apply equally to virtual images and real ones. If a hologram’s actions hurt someone’s reputation, presumably current libel and slander laws would offer protection.

On the other hand, the Supreme Court has already carved out exceptions for virtual humans. Perhaps the most notable example involves virtual child pornography. In 2002 the court ruled, 6 to 3, that Congress could not criminalize the creation of computer-generated images of children engaged in sexual acts because there was no harm to an actual child. More recently, in 2011, Justice Samuel Alito concurred with a ruling recognizing that the right to free speech protects violent video games, but he wrote a separate opinion to flag the unique nature of virtual media, arguing that users’ experiences “just might be very different from reading a book, listening to the radio, or watching a movie or a television show.”

If virtual media is different, and if doppelgangers are the future, then we can’t think of them as exceptions. Our doppelgangers are us, and they need protection, too.

To say technology is moving quickly is obviously an understatement. Technology is almost always moving quickly. That’s why it’s past time to confront the implications of a futuristic creation that’s already here.

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(Christopher Polk/ GETTY IMAGES NORTH AMERICA ) - Rapper Snoop Dogg, at left, performs with a hologram of deceased Tupac Shakur at the 2012 Coachella Valley Music & Arts Festival in Indio, Calif., on April 15.
(Stanford University's Virtual Human Interaction Lab) - Sam Schwartzstein, starting center for the Stanford football team, with his virtual self surfing a big wave.
(Michael Steele / Getty Images) - Formula 1 driver Lewis Hamilton of Britain next to a 3D hologram during Reebok's launch of their Smooth Fit technology on July 1, 2008, in Amsterdam.