
The Desert of the Unreal: Inequality in Virtual and Augmented Reality

Mary Anne Franks*

The world we live in is structured by inequality: of gender, race, class, sexual orientation, disability, and more. Virtual and augmented reality technologies hold out the promise of a more perfect world, one that offers us more stimulation, more connection, more freedom, more equality than the “real” world. But for such technologies to be truly innovative, they must move us beyond our current limitations and prejudices. When existing inequalities are unacknowledged and unaddressed in the “real” world, they tend to be replicated and augmented in virtual realities. We make new worlds based on who we are and what we do in old ones. All of our worlds, virtual and physical, are the product of human choice and human creation. The developers of virtual and augmented reality make choices about which aspects of our lived history they want to replicate, enhance, or change. The design — and design flaws — of new virtual and augmented reality technologies should be critically evaluated to assess their likely impact on inequality and their consequences for legal and social policy.

TABLE OF CONTENTS

INTRODUCTION	501
I. VIRTUAL AND AUGMENTED REALITY: DEFINITIONS, TAXONOMY, AND EQUALITY FACTORS.....	504
II. VR/AR AS A FORCE FOR EQUALITY.....	507
III. VR/AR AS HAZARDOUS TO EQUALITY	514
A. <i>The Limits of Empathy</i>	515
B. <i>The Expansion of Surveillance</i>	519
C. <i>Virtual Violence</i>	526

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D. <i>Unequal Accessibility</i>	530
E. <i>Withdrawal</i>	533
F. <i>Whose Game Is It?</i>	535
CONCLUSION.....	537

INTRODUCTION

In October 2016, a female gamer who uses the pseudonym Jordan Belamire wrote an article about her first experience playing the virtual reality game QuiVR.¹ In her account, Belamire describes how the game captivated her: “Never had I experienced virtual reality that felt so real. I was smitten. I never wanted to leave this world.”² Belamire marvels at the feeling of shooting an arrow in the snow and walking off the ledge of the highest tower in the game. “I didn’t fall,” she writes, “and I was walking on air. I was a god.”³ When Belamire begins a new game in multiplayer mode a few minutes later, however, the experience takes a turn. In multiplayer mode, other real-time players appear in the simulation, represented by a helmet, one hand clasping a bow, and a second, free-floating hand. The gender of the players is not apparent except through the sound of their voices, which other players can hear. After hearing Belamire’s voice, a player using the handle BigBro442 began to grope Belamire’s avatar with his free-floating hand. Embarrassed, she asked him to stop. “This goaded him on, and even when I turned away from him, he chased me around, making grabbing and pinching motions near my chest. Emboldened, he even shoved his hand toward my virtual crotch and began rubbing.”⁴

Belamire asks the reader to recall how she had described how real the drop from the high tower looked. “Guess what. The virtual groping feels just as real. Of course, you’re not physically being touched, just like you’re not actually one hundred feet off the ground, but it’s still scary as hell.”⁵ Belamire continues, “My high from earlier plummeted. I went from the god who couldn’t fall off a ledge to a powerless woman being chased by an avatar named BigBro442.”⁶ Belamire finds the incident disturbing, leading her to reflect on how male players like her brother-in-law had “played multiplayer mode a hundred times without incident, but my female voice elicited lewd behavior within minutes.”⁷ At the end of her article, Belamire wonders

¹ See Jordan Belamire, *My First Virtual Reality Groping*, MEDIUM (Oct. 20, 2016), <https://medium.com/athena-talks/my-first-virtual-reality-sexual-assault-2330410b62ee>.

² *Id.*

³ *Id.*

⁴ *Id.*

⁵ *Id.*

⁶ *Id.*

⁷ *Id.*

if virtual reality will be “yet another space that women do not venture into.”⁸

While QuiVR’s developers wrote an article expressing regret for Belamire’s experience and promising to modify the game to prevent similar incidents in the future,⁹ many of the comments posted in response to Belamire’s story, as well as to the developers’ reply, expressed irritation and even rage at Belamire.¹⁰ As sociologist Katherine Cross observed, “the overriding theme of the angry comments is that they accused Belamire of making a mountain out of a molehill because it was an online experience. These were ‘floating hands’ in a ‘virtual world’ that she could easily turn off, or just ‘take off her headset’ to escape from.”¹¹

This response exposes a fundamental contradiction at the heart of much common rhetoric about technology, in particular virtual and augmented reality technology. On the one hand, the appeal of virtual and augmented reality rests entirely on the promise of “realness,” an authenticity that rivals, or even surpasses, reality itself. On the other hand, the negative effects produced by these technologies are often dismissed as “unreal.” Accordingly, a player’s experience of the realistic effects of battle in a virtual reality combat game will be taken as evidence of the game’s merits, while the same player’s experience of being sexually harassed by another player will be dismissed as a hysterical overreaction to an illusory phenomenon. This is of course an illogical position: if the benefits of virtual and augmented reality are real, then the harms must also be real.

It is tempting to view this contradictory perception of virtual and augmented reality as a mere tic of the adolescent idealism that pervades tech culture — the naive belief in innovation that produces benefits but no costs. But there is something more worrisome at work in these selective assessments of virtual and augmented reality. What is often really meant by the claim that virtual and augmented reality harms are not *real* is that they are not *important*, at least as compared to the benefits of such reality. This, in turn, is a coded statement about whose experiences matter in virtual and augmented reality. The experiences of some groups are clearly weighted more heavily than others.

⁸ *Id.*

⁹ Henry Jackson & Jonathan Schenker, *Dealing with Harassment in VR*, UPLOAD (Oct. 25, 2016), <https://uploadvr.com/dealing-with-harassment-in-vr>.

¹⁰ See Belamire, *supra* note 1; Jackson & Schenker, *supra* note 9.

¹¹ Katherine Cross, *Sexual Assault Enters Virtual Reality*, CONVERSATION (Nov. 9, 2016, 8:19 PM), <https://theconversation.com/sexual-assault-enters-virtual-reality-67971>.

In this sense, virtual and augmented reality reflect, well, reality: in the non-virtual, non-augmented world too, the benefits experienced by some groups are celebrated while the harms experienced by other groups are dismissed as illusory. The world we live in is structured by inequality: of gender, race, class, sexual orientation, disability, and more. Virtual and augmented reality technologies hold out the promise of a more perfect world,¹² one that offers us more stimulation, more connection, more freedom, more equality than the “real” world. But for such technologies to be truly innovative, they must move us beyond our current limitations and prejudices. When existing inequalities are unacknowledged and unaddressed in the “real” world, they tend to be replicated and augmented in virtual realities. We make new worlds based on who we are and what we do in old ones. All of our worlds, virtual and physical, are the product of human choice and human creation. The developers of virtual and augmented reality make choices about which aspects of our lived history they want to replicate, enhance, or change. The design — and design flaws — of new virtual and augmented reality technologies should be critically evaluated to assess their likely impact on inequality and their consequences for legal and social policy.

There are three primary approaches that technology developers can take towards equality. The first and most ideal approach, at least from the perspective of equality outcomes, is when developers consider questions of equality at the design stage, making mindful attempts to build equality into the structure of the product itself.¹³ The second, less ideal approach is when developers intentionally or unintentionally ignore equality considerations at the design stage, but respond thoughtfully to equality issues as they arise. The third and least ideal approach from an equality perspective is when developers ignore questions of equality at the design stage, and dismiss equality issues as “unreal” or insignificant when they arise.

Unfortunately, when it comes to virtual and augmented reality, it seems that many developers have taken the third approach. What is more, critical evaluations of technological innovations tend to ignore questions of inequality in favor of focusing on values such as entertainment, verisimilitude, and communicative potential. The argument of this Article is that the real test of innovation of any virtual or augmented reality system is its impact on equality. Technological

¹² See Mary Anne Franks, *Unwilling Avatars: Idealism and Discrimination in Cyberspace*, 20 COLUM. J. GENDER & L. 224, 231-32 (2011).

¹³ For an example of building values into the design of technology, see Woodrow Hartzog & Frederic Stutzman, *Obscurity by Design*, 88 WASH. L. REV. 385, 402 (2013).

innovations such as virtual and augmented reality should be subjected to a kind of equality product testing that asks whether, on balance, the product advances or undermines equality, especially of gender, race, and class. This evaluation should include an examination of the product's purported and actual goals, the kinds of practices and mindsets it encourages, which groups of people it tends to benefit and which ones it tends to harm, its conditions of access, and what impact it has on general welfare. Specific questions should include: Does the product encourage or discourage respect for the autonomy of others? Does it emphasize the importance of consent or embolden aggression? Does it foster empathy or entitlement? Who is able to use the product? Who designed the product? Whose interests are enriched by the product? Whose interests are minimized?

Part I of this Article provides definitions, categorizations, and examples of virtual and augmented reality and identify relevant factors for equality evaluation. Part II considers positive uses and effects of these technologies, while Part III addresses negative uses and effects. Part IV concludes.

I. VIRTUAL AND AUGMENTED REALITY: DEFINITIONS, TAXONOMY, AND EQUALITY FACTORS

Virtual reality (“VR”) “refers to an immersive three-dimensional computer-generated environment.”¹⁴ In a virtual environment, “a user’s movements are tracked and his or her surroundings rendered, or digitally composed and displayed to the senses, in accordance with those movements.”¹⁵ Virtual reality headsets immerse users in an imaginary environment — or a real environment that is physically remote to the user — by generating realistic sights and sounds. In virtual reality “haptic” systems, game controllers or other devices also transmit tactile sensations to users. Fictional examples of virtual reality include the Metaverse, from Neal Stephenson’s novel *Snow Crash*, and the Holodeck, from the television show *Star Trek*. Real-life examples include Facebook’s Oculus Rift headset and NASA space simulators.¹⁶

¹⁴ Crystal Nwaneri, Note, *Ready Lawyer One: Legal Issues in the Innovation of Virtual Reality*, 30 HARV. J.L. & TECH. 601, 604 (2017).

¹⁵ Jesse Fox, Dylan Arena & Jeremy N. Bailenson, *Virtual Reality: A Survival Guide for the Social Scientist*, 21 J. MEDIA PSYCHOL. 95, 135 (2009).

¹⁶ See *Dream Chaser Simulator*, NASA (May 5, 2014), <https://www.nasa.gov/center/armstrong/multimedia/imagegallery/Simulator/ED14-0009-03.html>; *Oculus Rift*, OCULUS, <https://www.oculus.com/rift> (last visited Oct. 17, 2017).

Rather than immersing the user in an imaginary or distant world, augmented reality (“AR”) enhances the physical world surrounding a user, usually in real time. AR “allows digital content to be superimposed in the real world through special glasses or, more typically, the screen of a smartphone. AR adds digital content to a user’s perception of the real world.”¹⁷ The augmentation of reality is made possible by virtual components such as GPS data, graphics, and sound. Among the most well-known augmented reality products are Google Glass,¹⁸ Magic Leap, and Pokémon Go, the wildly popular cellphone-based game that uses GPS functionality to allow players to find, fight, and train virtual creatures that appear on phone screens as though they were present at players’ locations.¹⁹

Virtual and augmented reality overlap in many ways, as they present some of the same benefits and risks. For both, there are practical concerns about the physically distracting nature of the technology. Physical injuries such as walking into walls, tripping over stairs, and wandering into unsafe areas are common with both virtual and augmented reality.²⁰ The two technologies also diverge in many respects. One of the key differences between VR and AR is that while virtual reality tends to encourage retreat from one’s physical environment, augmented reality often encourages increased interaction with one’s physical environment. A useful illustration is the contrast between putting on a headset to shoot imaginary demons in QuiVR and hopping on the subway to try to “catch ‘em all” in Pokémon Go.²¹

The primary goal of most virtual reality technology is the achievement of “presence,” the sense of “being there”:²² “An increased sense of presence is often thought to magnify user effects (e.g., the extent to which user responses to virtual stimuli and virtual interactions resemble parallel responses to real-world counterparts)

¹⁷ Roderick O’Dorisio, *Torts in the Virtual World*, 94 DENV. L. REV. ONLINE 1, 1 (2017).

¹⁸ See discussion *infra* Part III.B.

¹⁹ See John Davison, *WTF Is ‘Pokémon Go,’ Explained*, ROLLING STONE (July 11, 2016), <https://www.rollingstone.com/culture/features/wtf-is-pokemon-go-explained-20160711>.

²⁰ See, e.g., Roya Bagheri, *Virtual Reality: The Real Life Consequences*, 17 UC DAVIS BUS. L.J. 101, 115 (2016); Samuel Mallick, Note, *Augmenting Property Law: Applying the Right to Exclude in the Augmented Reality Universe*, 19 VAND. J. ENT. & TECH. L. 1057, 1065 (2017).

²¹ See Davison, *supra* note 19.

²² James J. Cummings & Jeremy N. Bailenson, *How Immersive Is Enough? A Meta-Analysis of the Effect of Immersive Technology on User Presence*, 19 MEDIA PSYCHOL. 272, 273 (2015).

and, in turn, to increase the effectiveness of mediated environment applications.”²³ The “realness” of virtual reality is important not just for the entertainment value of games and the verisimilitude of training programs, but also for applications dealing with pain management, empathy, and education.

There is a potential downside to this sense of immersive presence, however. Recent developments in virtual reality have become so immersive, say experts, that “people often confuse virtual reality with *actual* reality.”²⁴ While the precise reasons that VR has such an effect on people’s perception of reality is not yet known, experts hypothesize that the brain is effectively tricked into believing that virtual events are actually happening. According to Howard Rose, CEO of Deep Stream VR, “The human brain encodes VR as a place we’ve *been* rather than a thing we’ve *seen*.”²⁵ According to virtual reality scholars, “the benefits of learning via virtual experience may come with costs: the ease of generating vivid mental images may create later confusion regarding whether a retrieved mental image was perceived or imagined, thereby leading to more false memories.”²⁶

Augmented reality’s “enhancement” of the real world can provide new ways to shop, play, and research. By providing real-time information on the world around us, augmented reality systems offer the possibility of innovative engagement with our environment and instantaneous interactions with other people. The same qualities that make augmented reality appealing, however, also create risks, particularly privacy risks to those around the user.²⁷ Products such as Google Glass makes it very easy to unobtrusively and continuously record people without their knowledge or consent. Augmented reality has the potential to allow users to instantaneously summon up vast amounts of data about other people, from facial recognition profiles to criminal records to shopping habits.²⁸ Games such as Pokémon Go

²³ *Id.*

²⁴ *Will Virtual Reality Be Just Another Way to Objectify Women?*, ELLE (June 22, 2016), <http://www.elle.com/culture/a37146/will-virtual-reality-just-be-another-way-to-objectify-women>.

²⁵ *Id.*

²⁶ Ann E. Schlosser, *Learning Through Virtual Product Experience: The Role of Imagery on True Versus False Memories*, 33 J. CONSUMER RES. 377, 377 (2006).

²⁷ See generally Andrew Kotsios, *Privacy in an Augmented Reality*, 23 INT’L J.L. & INFO. TECH. 157 (2015) (exploring examples of modern technology that create privacy concerns); Michael S. Wagner, Note, *Google Glass: A Preemptive Look at Privacy Concerns*, 11 J. TELECOMM. & HIGH TECH. L. 477, 478 (2013) (assessing the privacy concerns that come with Google Glass).

²⁸ See Sharon Nakar & Dov Greenbaum, *Now You See Me. Now You Still Do: Facial*

have already been blamed for disrupting businesses and encouraging trespasses onto private property.²⁹

In order to effectively evaluate the equality impact of VR/AR, some categorization of these varied technologies will be useful. This Article will make two primary distinctions: between “perception-expanding” and “perception-limiting” features, and between primarily “self-oriented” and primarily “other-oriented” features. “Perception-expanding” will refer to features of VR/AR systems that present the user with sensations and information not available in the real world, whereas “perception-limiting” will refer to features that screen out information in a way not possible or not easily achievable in the real world. “Self-oriented” features are those that primarily focus on the user herself; “other-oriented” features are those that primarily focus on other people. A single system can of course include both perception-expanding and perception-limiting features, as well as both self-oriented and other-oriented features. In addition to offering substantive analysis of features internal to VR/AR technologies, this Article will also consider factors external to the technologies, especially their conditions of access and use, their intended demographics, and the identities and motivations of their creators.

For better or worse, VR/AR technology is a part of our shared world, and will only increase in sophistication, popularity, and ubiquity over time. As with all technological innovations, VR/AR can serve good and bad purposes. The more clear-eyed and direct we are about the potential of this technology to do harm, the more likely it is that this technology will be designed in a way that enhances, rather than degrades, equality.

II. VR/AR AS A FORCE FOR EQUALITY

Developers and enthusiasts of virtual and augmented reality technologies often claim that these innovations are capable of providing more than mere entertainment or recreational value — that they can transform the lives of individuals in dramatic and ethically significant ways.³⁰ To the extent that they do so, especially to the

Recognition Technology and the Growing Lack of Privacy, 23 B.U. J. SCI. & TECH. L. 88, 93-97 (2017).

²⁹ See Mallick, *supra* note 20, at 1066.

³⁰ See, e.g., Wagner James Au, *VR Will Make Life Better — Or Just Be an Opiate for the Masses*, WIRED (Feb. 25, 2016, 6:30 AM), <https://www.wired.com/2016/02/vr-moral-imperative-or-opiate-of-masses> (“Virtual reality will dramatically transform movies and gaming, but some see an even loftier goal for the burgeoning technology: Providing the world’s poor and underprivileged with a better life. Palmer Luckey, the

extent that they heighten or bring attention to the experiences of marginalized social groups, such technologies can be considered forces for equality.

Much VR/AR technology focuses on expanding users' perceptions to allow them to see, hear, and touch things they would not otherwise be able to. Perception-expanding technologies, whether self-oriented or other-oriented, can address inequalities in physical and mental ability, class, race, and gender in positive and innovative ways.³¹ Perception-limiting technologies, which strip out certain details and information about the environment and the people surrounding the user, can also address inequality by eliminating the identifying factors that often underpin racial, gender, and other biases, especially when these technologies are other-oriented.³²

One particularly fruitful perception-expanding and self-oriented category of VR/AR application relates to health and disability. A handful of studies have found encouraging signs that virtual reality can be used to assist patients suffering from chronic pain.³³ Patients who participated in virtual reality sessions involving peaceful settings or engaging activities have reported significant reductions in their pain — up to sixty to seventy-five percent during the sessions and thirty to fifty percent following the sessions, according to one study.³⁴ As concerns rise over Americans' increasing dependence on painkillers, these results are particularly welcome.³⁵ Experts are hopeful that virtual reality, in addition to providing a pain management alternative, “might help people who are on opioids to minimize their dose, giving them something active they can do instead of popping extra pills.”³⁶ Other uses of VR and AR perception-expanding technologies include

founder of Oculus Rift, and his chief technology officer, John Carmack, even speak of a ‘moral imperative’ to bring virtual reality to the masses.”).

³¹ See Ben Kuchera, *Being Someone Else: How Virtual Reality Is Allowing Men and Women to Swap Bodies*, POLYGON (Mar. 4, 2014, 12:00 PM), <https://www.polygon.com/2014/3/4/5423330/oculus-rift-vr-gender-swap-girl-mirror-look>.

³² See Donna J. Haraway, *A Cyborg Manifesto: Science, Technology and Socialist-Feminism in the Late Twentieth Century*, in SIMIANS, CYBORGS AND WOMEN: THE REINVENTION OF NATURE 149, 161 (1991).

³³ Angela Li et al., *Virtual Reality and Pain Management: Current Trends and Future Directions*, 1 PAIN MGMT. 147, 147 (2011).

³⁴ Jo Marchant, *Virtual-Reality Worlds Filled with Penguins and Otters Are a Promising Alternative to Painkillers*, QUARTZ (May 2, 2017), <https://qz.com/973605/the-opioid-epidemic-could-be-cured-with-virtual-reality-worlds-that-let-patients-escape-their-pain> (noting that by comparison, the maximum percentage of pain reduction patients report with morphine is thirty percent).

³⁵ See *id.*

³⁶ *Id.*

providing bedridden or terminally ill patients with realistic simulations of adventures they cannot undertake in real life³⁷ and treating mental disorders such as post-traumatic stress disorder, phantom limb syndrome, and phobias.³⁸

Perception-expanding, other-oriented VR/AR technologies have been hailed as revolutionary with regard to encouraging compassion and empathy for the suffering of others.³⁹ One of the pioneers in this venture is the immersive media company Ryot, which has been producing 360 degree videos for nonprofits, advertisers, and media organizations since 2015.⁴⁰ Many of their projects focus on humanitarian crises, such as the 2015 earthquake in Nepal and the plight of Syrian refugees.⁴¹ The company's screening of the Nepal footage at a film festival in Colorado left audience members in tears.⁴² It was later viewed more than 100,000 times on various platforms and helped raise \$150,000 in aid.⁴³ Ryot, which was bought by AOL in 2016, has produced virtual reality news videos for the Huffington Post, National Public Radio, and the New York Times.⁴⁴ According to co-founder David Darg, "VR can create empathy like never before It's the ultimate fund-raising tool."⁴⁵ Similarly, the immersive journalism team Emblematic Group produces content that puts viewers in the position of vulnerable individuals: "'Project Syria' focuses on the plight of child refugees, using real life audio and visuals

³⁷ See Lindsey Hoshaw, *Affordable Virtual Reality Opens New Worlds for People with Disabilities*, NPR (Oct. 22, 2015, 12:15 PM), <http://www.npr.org/sections/health-shots/2015/10/22/450573400/affordable-virtual-reality-opens-new-worlds-for-people-with-disabilities>.

³⁸ Emily Matchar, *Instead of Painkillers, Some Doctors Are Prescribing Virtual Reality*, SMITHSONIAN (July 21, 2016), <http://www.smithsonianmag.com/innovation/instead-painkillers-some-doctors-are-prescribing-virtual-reality-180959866>.

³⁹ See, e.g., Jason Ganz, *Virtual Reality Is the Global Empathy Machine*, MEDIUM (Mar. 23, 2017), <https://medium.com/singularityu/virtual-reality-is-the-global-empathy-machine-283b1ee4192c> (highlighting virtual reality projects such as the film Project Syria, that "can induce real policy and behavioral change by appealing to the emotions of people around the world").

⁴⁰ Abe Strep, *Crisis and Opportunity: How One VR Startup Is Capturing the 360-Degree Reality of the World's Most Vulnerable People*, WIRED (July 15, 2016), <https://www.wired.com/2016/07/ryot-darg-mooser-disaster-vr>.

⁴¹ Todd Spangler, *AOL Buys Digital Studio RYOT to Bring Virtual-Reality Content to HuffPost*, VARIETY (Apr. 20, 2016, 6:52 AM), <http://variety.com/2016/digital/news/aol-ryot-virtual-reality-huffpost-1201757403>.

⁴² See Strep, *supra* note 40.

⁴³ *Id.*

⁴⁴ *Id.*

⁴⁵ *Id.*

to transport you to a scene you'd otherwise only catch a glimpse of on the news" while "Project Hunger' puts you in the body of a starving indigent in a busy LA food bank queue."⁴⁶

"Feeling prejudice by walking a mile in someone else's shoes is what VR was made for," according to Jeremy Bailenson, the director of Stanford University's Virtual Human Interaction Lab.⁴⁷ The lab uses virtual reality scenarios to study people's responses to adopting the perspectives of people different from them, including demonstrations that are viewed from the vantage points of a black woman, a homeless person, and a child.⁴⁸ The lab has attracted the interest of the National Football League ("NFL"), whose commissioner Roger Goodell and executive vice president of football operations Troy Vincent visited the lab in 2016.⁴⁹ The league is exploring the possibility of using virtual reality "to train league staffers and players on understanding bias."⁵⁰ The NFL, which has few women or minorities in the upper levels of its employment ranks, has stated that it plans to use virtual reality in its diversity training programs, though how exactly it will do so has not yet been made clear.⁵¹ Other virtual reality labs have developed projects on sexual consent that allow users to swap genders.⁵²

In a series of studies, psychology professor Manos Tsakiris measured white adults' racial biases before and after experiencing virtual reality environments that created the illusion of being black. Using the associational Implicit Association Test ("IAT"), which tests for unconscious bias using the strength of associations between negative and positive concepts with various groups of people,⁵³ Tsakiris found

⁴⁶ Tabi Jackson Gee, *Men Are Unlocking the Virtual Reality of Being a Woman*. *Get Ready*, TELEGRAPH (Feb. 25, 2016, 1:27 PM), <http://www.telegraph.co.uk/women/life/men-are-unlocking-the-virtual-reality-of-being-a-woman-get-ready>.

⁴⁷ Marco della Cava, *Virtual Reality Tested by NFL as Tool to Confront Racism, Sexism*, USA TODAY (Apr. 8, 2016, 5:07 PM), <https://www.usatoday.com/story/tech/news/2016/04/08/virtual-reality-tested-tool-confront-racism-sexism/82674406>.

⁴⁸ See *Projects*, VIRTUAL HUM. INTERACTION LAB, <https://vhil.stanford.edu/projects> (last visited July 16, 2017).

⁴⁹ della Cava, *supra* note 47.

⁵⁰ *Id.*

⁵¹ See *id.*

⁵² See Tom Woodley, *Gender Swapping VR Project Educates Youth on Sex and Consent*, TECH THIS OUT NEWS (Feb. 9, 2017), <http://www.techthisoutnews.com/gender-swapping-vr-project-educates-youth-sex-consent-2>.

⁵³ See Reshma M. Saujani, "The Implicit Association Test": A Measure of Unconscious Racism in Legislative Decision-Making, 8 MICH. J. RACE & L. 395, 406 (2003).

that the white participants' negative biases against black people diminished after undergoing the simulation.⁵⁴ As Tsakiris writes:

By changing how people represent themselves internally, we probably allowed them to experience others as being more similar to them. This in turn resulted in a reduction in their negative implicit biases. In other words, the integration of different sensory signals can allow the brain to update its model of the body and cause people to change their attitudes about others.⁵⁵

Some police departments are taking the de-biasing potential of virtual reality very seriously. As the use of force by law enforcement, especially against minorities, has come under increasing scrutiny, several police departments are exploring training methods designed to reduce bias and encourage de-escalation strategies.⁵⁶ Companies like the Arizona-based VirTra provide "cave automatic virtual environments" that simulate high-stress law enforcement scenarios.⁵⁷ VirTra's system "consists of five large screens that surround a stage and five overhead projectors that cast lifesize videos onto the screens, giving the users the feeling that they're standing in the center of a scene."⁵⁸ The user wears a real firearm loaded with carbon dioxide that makes the gun recoil when the trigger is pulled.⁵⁹ A camera is coordinated with a laser on the gun to determine the accuracy of a shot, and users wear a device that provides "a small electrical shock to simulate they've been shot."⁶⁰ The system also allows for the creation of scenarios that test officers' unconscious biases.⁶¹ While experts caution that the effect of any training technology, no matter how sophisticated, "only scratches the surface of the severely embedded prejudices we need to address in order to make substantive change,"⁶²

⁵⁴ Manos Tsakiris, *Virtual Bodyswapping Reduces Bias Against Other Races*, CONVERSATION (Jan. 29, 2015, 6:02 AM), <https://theconversation.com/virtual-bodyswapping-reduces-bias-against-other-races-35801>.

⁵⁵ *Id.*

⁵⁶ See Issie Lapowsky, *The Virtual Reality SIM That Helps Teach Cops When to Shoot*, WIRED (Mar. 30, 2015, 7:00 AM), <https://www.wired.com/2015/03/virttra>.

⁵⁷ *Id.*

⁵⁸ *Id.*

⁵⁹ *Id.*

⁶⁰ *Id.*

⁶¹ *Id.*

⁶² See Sidney Fussell, *Virtual Reality Can Help Reveal Prejudice in Cops*, SPLINTER (Sept. 16, 2016, 2:13 PM), <https://fusion.kinja.com/virtual-reality-can-help-reveal-prejudice-in-cops-1793861939>.

the technology offers considerable advantages over traditional anti-bias training methods: “bias training is often just a day-long workshop provided by a third party or worse, a questionnaire . . . VR could possibly be used to stop police brutality before it even happens.”⁶³

Virtual reality technologies can also be used to actively limit, rather than expand, perception with the goal of boosting equality outcomes. For example, Katharine Zaleski, the co-founder and chair of the employment-matching platform PowerToFly, has suggested that virtual reality could be used to address the bias against women in technology and other professional fields.⁶⁴ In a February 2016 article for Quartz, Zaleski recounts a study that found that code written by women was more likely to be accepted by developers than code written by men when the gender of the coder was not apparent. But when developers do know the gender of the coders, the acceptance of code written by women drops by almost ten percent.⁶⁵ In another experiment, Zaleski notes, scientists made more job offers and higher compensation to job applicants they believed were male, despite the fact that the resumes on which they made the basis for their decisions were identical in every way except for the masculine or feminine names at the top.⁶⁶ Zaleski proposes that virtual reality could help solve the problem of gender bias in tech by replicating a real-life screening strategy adopted by a handful of symphonies in the 1970s and 1980s to address the gender disparities in the hiring of musicians.⁶⁷ When these symphonies erected screens in front of the auditioning performers so that the gender of the performers would be obscured, the likelihood that a female performer would make it into another round of auditions increased by fifty percent.⁶⁸

Zaleski described her virtual reality adaptation of this technique for job interviews in this way:

I'd invite the candidates, in the form of avatars, to sit with me for an interview where we would view each other in the same virtual space through our headsets. A candidate could choose to project any avatar they chose. Some women might opt for women avatars; others might choose to appear as men or in

⁶³ *Id.*

⁶⁴ See Katharine Zaleski, *Virtual Reality Could Be a Solution to Sexism in Tech*, QUARTZ (Feb. 19, 2016), <https://qz.com/619859/virtual-reality-could-be-a-solution-to-sexism-in-tech>.

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ *Id.*

⁶⁸ *Id.*

other forms altogether. Some men might want to look like aliens. It wouldn't matter. The important thing would be that I could see the job candidates as they chose to be viewed. That's better than me projecting my own views on them . . . I wouldn't know the genders of the candidates until I decided I wanted to hire them.⁶⁹

Zaleski's proposition is intriguing, though it is not a precise analogue to the orchestra experiment. Having job applicants choose an avatar to represent them is not the same as preventing judges from seeing auditioning musicians. In the orchestra auditions, the physical identity of the performers was presumably entirely obscured, leaving their evaluators to focus only on what they could hear. Such an approach seems appropriate, as it foregrounds the primary attribute being evaluated — musical skill. An applicant's choice of avatar in Zaleski's virtual reality "screening," on the other hand, might prompt any number of inferences about the physical identity and other characteristics of the applicant — a feature that might better serve the purposes of evaluating candidates for particular jobs. Zaleski's proposal is more of an exercise in ambiguating, rather than obscuring, identity.

The orchestra experiment that Zaleski recounts, and to a lesser extent the virtual reality adaptation she describes, is reminiscent of the philosopher John Rawls' famous "original position" thought experiment. Rawls maintained that in order for society to establish principles that are truly just and fair, it should engage in an exercise of blindness. In the original position, behind what he calls "the veil of ignorance," "no one knows his place in society, his class position or social status, nor does anyone know his fortune in the distribution of natural assets and abilities, his intelligence, his strength, and the like. . . . [T]he parties do not know their conceptions of the good or their special psychological propensities."⁷⁰ According to Rawls, the veil of ignorance is necessary to ensure that people make decisions based on consistent principles that apply to all people equally instead of self-interest. One could imagine using virtual reality technology to create veils of ignorance not just in job interviews, but in college admissions, loan applications, jury selection, civil and criminal trials — any scenario in which bias tends to rear its ugly head.

Imagine a virtual reality criminal trial in which all the participants appear as the same generic avatar distinguished only by a number or

⁶⁹ *Id.*

⁷⁰ JOHN RAWLS, *A THEORY OF JUSTICE* 12 (1971).

letter. There would be no way for the jury to draw inferences based on physical attractiveness, facial expressions, or choice of clothing, and it would be more difficult, though not impossible, to determine the race or gender of the people involved. The testimony of witnesses, the oral arguments of the advocates, and the interventions of the judge would have to be assessed according only to the content of what is stated and the tone and inflection of participants' voices — or, in an extreme screening scenario, even voices could be manipulated so as to obscure any racial, gender, class, or geographical markers. Critics might argue that this would deprive juries and lawyers of important visual and auditory cues that are essential to the determination of truth, but copious studies have demonstrated that inferences based on physical appearance — especially those that tend to invoke unconscious biases regarding gender, race, class, and physical attractiveness — are more often than not detrimental instead of useful to the determination of truthfulness or accuracy.⁷¹

Perception-limiting, other-oriented VR/AR technology presents innovative ways to create “original positions” with great potential to enforce equality norms. Examples of perception-limiting, self-oriented VR/AR technology are harder to come by, but one could imagine games in which the users are asked to establish the rules of play before they find out what kind of player attributes they will have. Or we could imagine legislative or diplomacy training that forces users to address a crisis without the benefit of knowing which constituency they represent. While perception-expanding, other-regarding, immersive experiences can help encourage empathy, perception-limiting experiences, whether oriented towards the self or towards others, have the potential to encourage fairness and anti-exceptionalism.

III. VR/AR AS HAZARDOUS TO EQUALITY

As the previous section demonstrated, many VR/AR applications are consciously designed to improve the quality of life for individuals suffering from illness or disability, and many applications are explicitly designed to address bias and discrimination. While these applications are encouraging, and it is likely the case that many

⁷¹ See Chet K.W. Pagar, *Blind Justice, Colored Truths and the Veil of Ignorance*, 41 WILLAMETTE L. REV. 373, 380 (2005) (“It is a broadly held belief that everyday jurors are accurate in their assessments of witness credibility. That belief is also deeply wrong.”). See generally DAN SIMON, *IN DOUBT: THE PSYCHOLOGY OF THE CRIMINAL JUSTICE PROCESS* (2012).

exciting opportunities for virtual and augmented reality to enhance equality have yet to be explored, there are good reasons to be concerned about the capacity of VR/AR technology to exacerbate inequality. Upon closer examination, some of the equality-enhancing potential of the VR/AR technologies intentionally designed to improve quality of life and combat bias is less reassuring than it initially appears, while a large number of VR/AR technologies are either indifferent to or even actively hostile to equality goals.

From an equality perspective, perspective-expanding, self-oriented technologies present the least troubling implications. Virtual reality programs designed to improve the lives of the physically disabled, mentally distressed, elderly, terminally ill, or those suffering from chronic pain pose little risk of exaggerating existing social prejudices. In fact, such technologies can justifiably be said to enhance equality by easing the suffering or expanding the opportunities for the disabled, the elderly, and the sick, as well as by helping focus society's attention on these individuals. That being said, one potential pitfall is that such technology might create a state of complacency that could in turn lead to increased disregard for the welfare of these individuals.

A. *The Limits of Empathy*

Perspective-enhancing, other-oriented technology is often explicitly geared towards increasing empathy. But many experts are skeptical that such programs can prompt people to action they would not otherwise take or produce long-term, substantive changes in people's biases.⁷² Despite the effusive enthusiasm of Ryot's founders, at least one of the nonprofits for which Ryot produced a film saw no change in the amount of donations between the year they used VR and the year they did not.⁷³ There is a real question whether humanitarian-focused VR/AR experiences merely appeal to people who are already inclined to care about these issues and have little effect on their actual behavior. According to Joelle Emerson, the CEO of a company that advises firms on inclusiveness, "It's very different to have a few experiences through a simulation on a single day versus a series of experiences over the course of your whole life . . . I'm not sure what kind of impact we could expect (from VR)."⁷⁴ Sociology professor

⁷² See, e.g., Paul Bloom, *It's Ridiculous to Use Virtual Reality to Empathize with Refugees*, ATLANTIC (Feb. 3, 2017), <https://www.theatlantic.com/technology/archive/2017/02/virtual-reality-wont-make-you-more-empathetic/515511>.

⁷³ See Streep, *supra* note 40.

⁷⁴ della Cava, *supra* note 47.

Frank Dobbin, who has studied diversity programs for decades, says they are “largely ineffective and even counterproductive.” According to Dobbin, “All lab studies show that you can change people’s attitudes for about 30 minutes after training . . . [b]ut three to six months later there’s either no change or a negative reaction because you’ve actually activated their bias.”⁷⁵

Even if virtual and augmented reality technology does not actively promote bias, repeated exposure to bias or other unpleasant experiences may produce two other undesirable effects: secondary traumatization or “compassion fatigue.”

It has long been known that witnessing violence can cause lasting psychological harm, especially in children.⁷⁶ Viewing photographic or video evidence of violence can also produce “secondary traumatic stress,” a condition often experienced by law enforcement officials tasked with viewing footage of violence against children.⁷⁷ In December 2016, two Microsoft employees sued the company alleging that they developed post-traumatic stress disorder from their duties screening images and videos of murder, child pornography, and bestiality.⁷⁸ The plaintiffs claim that they “were not warned about the likely dangerous impact of reviewing the depictions nor were they warned they may become so concerned with the welfare of the children, they would not appreciate the harm the toxic images would cause them and their families.”⁷⁹ Sociologists have cautioned that intense media coverage of suicides and murders can produce “contagion effects” leading to copycat behavior.⁸⁰ Given how “real” virtual reality experiences feel to users, there is reason to be concerned

⁷⁵ *Id.*

⁷⁶ See Leigh Goodmark, *From Property to Personhood: What the Legal System Should Do for Children in Family Violence Cases*, 102 W. VA. L. REV. 237, 245 (1999) (observing that “[t]he effects of witnessing domestic violence are strikingly similar to the effects of being abused”).

⁷⁷ Michael L. Bourke & Sarah W. Craun, *Secondary Traumatic Stress Among Internet Crimes Against Children Task Force Personnel: Impact, Risk Factors, and Coping Strategies*, 26 SEXUAL ABUSE 586, 589 (2013).

⁷⁸ June Williams, *Workers on Porn Detail Sue Microsoft for Injuries*, COURTHOUSE NEWS SERV. (Jan. 10, 2017), <https://www.courthousenews.com/workers-on-porn-detail-sue-microsoft-for-injuries>.

⁷⁹ *Id.*

⁸⁰ Sherry Towers et al., *Contagion in Mass Killings and School Shootings*, PLOS ONE, July 2, 2015, at 10, <http://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0117259&type=printable>; see Winona Dimeo-Ediger, *Behind the Sudden, Disturbing Uptick of Suicides on Facebook Live*, DAILY DOT (Feb. 10, 2017, 6:30 AM), <https://www.dailydot.com/irl/suicide-facebook-live>.

that experiencing trauma or violence through immersive virtual reality might produce similar harmful effects.

On the other end of the spectrum, constant exposure to violence can lead to what the literary theorist Geoffrey Hartmann called “compassion fatigue.”⁸¹ Writing in 1996, Hartmann observed that constant media coverage of human suffering does not provide the hoped-for antidote to human indifference; rather, it entrenches it:

As the media make us bystanders of every act of violence and violation . . . we glimpse a terrible inertia in ourselves and can even find reasons for it [A] sort of antibody builds up in our response system and prevents total mental disturbance. Even while deploring and condemning the events, we experience what the poet John Keats called “the feel of not to feel it,” as we continue with everyday life.⁸²

Virtual reality not only provides society with the ability to view atrocities in realistic and compelling detail; it provides the opportunity to view such atrocity over and over, on an endless loop. There is little way to predict if the effect of this exposure will be desensitization instead of sensitization.

In addition to the question of what, if any, long-lasting impact VR/AR technology will have on altruistic actions or human prejudice, there is the question of what would motivate people who are not already concerned about the plight of other human beings to pursue these experiences in the first place. To the extent that immersive experiences like 360 videos about refugees or natural disasters are entirely volitional, there is no particular reason to think that they will result in substantial numbers of people caring about humanitarian issues if they did not do so before. While it is significant that virtual and augmented reality have created numerous, varied, and increasingly realistic possibilities of engaging with the experiences of people unlike ourselves, the technology itself cannot alone make people want to take advantage of them.

What is more, the idea that people will or in fact do “believe” the experiences of women or minorities only if they experience them in virtual reality has some troubling implications. Women and minorities have been articulating the effects of discrimination for as long as there has been discrimination; vast amounts of empirical research have

⁸¹ GEOFFREY HARTMAN, *THE LONGEST SHADOW: IN THE AFTERMATH OF THE HOLOCAUST* 72 (1996).

⁸² *Id.* at 100.

repeatedly verified the accuracy of these subjective accounts with regard to pay gaps, racial and sexual harassment, and negative effects on housing, educational, and professional outcomes. The fact that these first-person accounts and objective validations are often insufficient to convince people of the reality of inequality is, first, deeply insulting to those whose experiences are discounted, and second, casts doubt on the likelihood that virtual reality simulations will succeed where these methods have failed.

When companies embrace VR/AR as part of mandatory diversity or sexual harassment training, they solve the problem of volition, but it is an open question whether unwilling participants will show the same empathy gains as other participants. People tend to be strongly attached to their beliefs and often resist attempts to analyze or change those beliefs.⁸³ There are some indications that VR sexual harassment training is more successful than conventional sexual harassment training because participants feel less personally attacked or singled out,⁸⁴ which is an encouraging sign. But it is not yet clear whether VR/AR technology aimed at increasing empathy for women, racial minorities, and other marginalized groups will not backfire. After all, most people empathize most strongly with people who resemble them; it is possible that highly immersive VR programs might increase empathy for the putative bigot or harasser rather than for his target.

The choices companies make about the ends to which VR/AR is deployed are also worth examining. For example, it is telling that the NFL's planned use of VR is aimed at increasing diversity in hiring and coaching,⁸⁵ and not, for example, at some of the league's other highly visible and entrenched problems. The number of NFL players that have committed domestic violence is shockingly high,⁸⁶ a fact that received considerable media attention when a videotape of Baltimore Ravens running back Ray Rice punching his then-fiancée in an

⁸³ See Elizabeth Kolbert, *Why Facts Don't Change Our Minds*, NEW YORKER (Feb. 27, 2017), <http://www.newyorker.com/magazine/2017/02/27/why-facts-dont-change-our-minds>.

⁸⁴ See della Cava, *supra* note 47 (“[S]ome hope [VR] could create breakthroughs where past efforts at stemming discrimination have come up short. Harvard studies examining decades’ worth of corporate diversity training sessions conclude that in many cases, the training is ineffective or even counterproductive, as attendees feel singled out for implicit criticism.”).

⁸⁵ *Id.*

⁸⁶ See Mary Pilon, *Inside the NFL's Domestic Violence Punishment Problem*, BLEACHER REPORT (Jan. 31, 2017), <http://mag.bleacherreport.com/nfl-domestic-violence-policy-suspensions>.

elevator was made public.⁸⁷ Numerous NFL players have also been accused and convicted of sexual assault, including Ben Roethlisberger, who was twice accused of sexual assault,⁸⁸ and Darren Sharper, who was sentenced to 18 years in prison for drugging and raping as many as 16 women.⁸⁹ The NFL is notoriously indulgent with regard to these acts of physical and sexual assault, in stark contrast to its response to other infractions, such as drug use.⁹⁰

All of these issues underscore the point that if underlying social attitudes about inequality do not change, there is little that technology can or will do to enhance empathy. If society fails to credit or to care about the firsthand experiences and empirical evidence of inequality, then our technology, however innovative, will likely reflect that. Not only will virtual and augmented reality technology be greatly limited in its potential to combat inequality, but it will have the potential to aggravate inequality in serious ways.

B. *The Expansion of Surveillance*

Perception-expanding, other-oriented technology in particular has tremendous power to expand the reach of surveillance and to endanger privacy. Augmented reality technology makes it possible for users to access information about others immediately and surreptitiously.⁹¹ While Edward Snowden's 2013 revelations about government spying catapulted concerns about surveillance into the national spotlight, surveillance in America has a long and troubling history.⁹² From the privacy deprivations imposed by slavery and incarceration to the widespread stalking and harassment of women,

⁸⁷ See Melissa Jeltsen, *Horrific Footage of Ray Rice Punching Then-Fiancée Released*, HUFFPOST (Sept. 8, 2014, 9:07 AM), http://www.huffingtonpost.com/2014/09/08/ray-rice-punch-video_n_5783380.html.

⁸⁸ Ben Roethlisberger, *Quarterback, Twice Accused of Sexual Assault*, VICE: BROADLY (Dec. 8, 2015, 8:00 AM), https://broadly.vice.com/en_us/article/bmwe8w/ben-roethlisberger-quarterback-twice-accused-of-sexual-assault.

⁸⁹ See Travis M. Andrews, *'Twisted': The Crimes of Former NFL Hero and Serial Rapist Darren Sharper*, WASH. POST (Aug. 19, 2016), https://www.washingtonpost.com/news/morning-mix/wp/2016/08/19/twisted-former-nfl-hero-and-serial-rapist-darren-sharper-sentenced-to-18-years/?utm_term=.13b1df1b29dd.

⁹⁰ See Kim Bellware, *NFL Punishing Players More Harshly for Drug Use than for Domestic Violence Arrests*, HUFFPOST (July 25, 2014, 9:29 AM), http://www.huffingtonpost.com/2014/07/25/nfl-punishments-drugs-domestic-violence_n_5618995.html.

⁹¹ See Kotsios, *supra* note 27, at 158.

⁹² See Mary Anne Franks, *Democratic Surveillance*, 30 HARV. J.L. & TECH. 425, 428-29 (2017).

marginalized groups in particular have suffered the chilling effects of private and public surveillance.⁹³ There is every reason to fear that the most destructive effects of increasingly sophisticated technologies of surveillance will be felt by racial minorities, women, and other marginalized groups the most, further entrenching social inequality.

The push to develop technology that makes surveillance easier, more detailed, and less detectable continues despite widespread privacy concerns. Numerous popular applications use geolocation tracking to pinpoint the precise location of individuals, often without those individuals' knowledge or consent.⁹⁴ Many of these products are directly marketed as surveillance tools, including those that openly encourage the surreptitious tracking of wives or girlfriends to ensure their fidelity.⁹⁵ Domestic violence experts have long warned that this kind of technology severely exacerbates stalking and harassment and actively endangers women in particular.⁹⁶ Other applications appear, on their face, to be innocuous: take, for example, the "Snap Map," a feature added to the popular social media platform Snapchat in 2017.⁹⁷ The opt-in feature allows users to share their location with their friends on the platform, an appealing option especially for the public posts users can make using the feature "Our Story."⁹⁸ But the application does not make it clear that the location information it shares is not only extremely precise — down to the street address — but also will be made available every time they open the Snapchat application, whether using "Our Story" or posting privately.⁹⁹ As one journalist observed,

⁹³ *Id.* at 440-50.

⁹⁴ P. Kramer Rice, *You Are Here: Tracking Around the Fourth Amendment to Protect Smartphone Geolocation Information with the GPS Act*, 38 SETON HALL LEGIS. J. 17, 19 (2013).

⁹⁵ See Danielle Keats Citron, *Spying Inc.*, 72 WASH. & LEE L. REV. 1243, 1280 (2015) (warning that as "spyware proliferates, stalkers, domestic abusers, and identity thieves will have access to those intimate reservoirs of our personal data").

⁹⁶ See generally Cindy Southworth & Sarah Tucker, *Technology, Stalking and Domestic Violence Victims*, 76 MISS. L.J. 667, 675-76 (2007) (discussing how advances in technology empower "intimate partner stalkers" and recommending education of law enforcement about these methods).

⁹⁷ *Introducing Snap Map!*, SNAP INC. (June 21, 2017, 8:00 AM), <https://www.snap.com/en-US/news/post/introducing-the-snap-map>.

⁹⁸ Dani Deahl, *Snapchat's Newest Feature Is Also Its Biggest Privacy Threat*, VERGE (June 23, 2017, 4:18 PM), <https://www.theverge.com/2017/6/23/15864552/snapchat-snap-map-privacy-threat>.

⁹⁹ *Id.*

Because Snap Map shows exactly where you are every time you open the app, there are a number of dangerous scenarios that could take place without a user even posting a Snap publicly. What if you're at home alone, at night, and open the app to view Snaps posted by friends? What if you're walking by yourself and get a ping that a friend sent you a Snap message, so you read it? What if you're traveling and want to take a pic with a location-specific filter to post later on another platform? In all of these vulnerable situations, if you have Snap Map enabled, your location is immediately broadcast to some, or all of the people in your Snapchat friends list.¹⁰⁰

While users must at least nominally consent to being tracked by Snap Map, other applications make it possible to track people who have never consented to their information being made available for that purpose. The controversial "Girls Around Me" application is a case in point.¹⁰¹ The application uses a location-based mobile service called Foursquare to identify the user's location.

It then scans for women in the area who have recently checked-in on the service. Once you identify a woman you'd like to talk to, one that inevitably has no idea you're snooping on her, you can connect to her through Facebook, see her full name, profile photos and send her a message.¹⁰²

Foursquare eventually cut off the application's access to its service on the grounds that it violated the terms of their API (application programming interface) policy, and Girls Around Me was also removed from the iTunes App Store.¹⁰³ The application's developers have said that they will reintroduce Girls Around Me at a later date.¹⁰⁴

A number of other augmented reality technologies are destined to make surreptitious recording of others virtually undetectable. Google's first attempt at a hands-free headset with powerful computing powers, Google Glass, generated considerable controversy when it hit the

¹⁰⁰ *Id.*

¹⁰¹ See Nick Bilton, *Girls Around Me: An App Takes Creepy to a New Level*, N.Y. TIMES: BITS (Mar. 30, 2012, 4:43 PM), https://bits.blogs.nytimes.com/2012/03/30/girls-around-me-ios-app-takes-creepy-to-a-new-level/?_r=0.

¹⁰² *Id.*

¹⁰³ See Chris Jay Hoofnagle & Jan Whittington, *Free: Accounting for the Costs of the Internet's Most Popular Price*, 61 UCLA L. REV. 606, 629 (2014).

¹⁰⁴ Ian Paul, *Girls Around Me App Voluntarily Pulled After Privacy Backlash*, PCWORLD (Apr. 2, 2012, 5:25 AM), http://www.pcworld.com/article/252996/girls_around_me_app_voluntarily_pulled_after_privacy_backlash.html.

market in 2013.¹⁰⁵ Google Glass, which was shaped like a pair of eyeglasses, operated like a head-mounted smartphone.¹⁰⁶ The device had a touchpad located on one side that allowed users to swipe through an interface that displayed information such as current weather conditions and missed phone calls.¹⁰⁷ Google Glass also responded to user voice commands and included a camera with both photo and video capability. The criticism began even before Google Glass was available to the public.¹⁰⁸ The New York Times ran a story in May 2013 titled “Google Glass Picks Up Early Signal: Keep Out,” which detailed critiques of the device and noted that preemptive efforts to keep the device out of public spaces were already underway.¹⁰⁹ Critics took little comfort in the fact that the device’s creators had designed Google Glass to limit the invasiveness and surreptitiousness of its recording capabilities, forbidding facial recognition applications and requiring a tap on the temple or a voice command to trigger the camera, not least because hackers quickly discovered ways to avoid these safeguards.¹¹⁰ Within months of the device’s release, one programmer had figured out how to circumvent the facial recognition ban and another had developed a program allowing users to take a photo with Google Glass by merely winking.¹¹¹

Snap Inc., the company behind the wildly popular “disappearing” messaging application Snapchat and the Snap Map application discussed above, began selling its video-recording sunglasses Spectacles in 2016. The product is less sophisticated than Google Glass but similar in its ability to record others without consent. Retailing at \$130, Spectacles are also far more affordable than Google

¹⁰⁵ See Anisse Gross, *What’s the Problem with Google Glass?*, NEW YORKER (Mar. 4, 2014), <http://www.newyorker.com/business/currency/whats-the-problem-with-google-glass>.

¹⁰⁶ Jamie Lendino, *Google Glass: Everything You Need to Know*, PCMAG (Apr. 15, 2014, 4:30 PM), <http://www.pcmag.com/article2/0,2817,2416488,00.asp>.

¹⁰⁷ *Id.*

¹⁰⁸ Steve Henn, *Google Fights Glass Backlash Before It Even Hits the Street*, NPR (May 13, 2013, 3:06 AM), <http://www.npr.org/blogs/alltechconsidered/2013/05/13/183468218/google-fights-glass-backlash-before-it-even-hits-the-street>.

¹⁰⁹ David Streitfeld, *Google Glass Picks Up Early Signal: Keep Out*, N.Y. TIMES (May 6, 2013), http://www.nytimes.com/2013/05/07/technology/personaltech/google-glass-picks-up-early-signal-keep-out.html?_r=0.

¹¹⁰ Steve Henn, *Clever Hacks Give Google Glass Many Unintended Powers*, NPR (July 17, 2013, 2:51 PM), <http://www.npr.org/sections/alltechconsidered/2013/07/17/202725167/clever-hacks-give-google-glass-many-unintended-powers>.

¹¹¹ *Id.*

Glass, which sold for around \$1500.¹¹² Karen Monahan, a specialist in digital safety, warned that Spectacles pose privacy risks because of “geo-location tracking data and the high potential for people to be recorded without their knowledge.”¹¹³ According to Monahan, the fact that Spectacles are currently designed to make it obvious when they are recording does not answer the concern that those around the user do not get to choose whether they are recorded.¹¹⁴

While the initial introduction of Google Glass flopped partly due to privacy concerns, objections to Snapchat Spectacles have been more muted. In addition, a new version of Google Glass was introduced in 2017 to little public outcry over privacy.¹¹⁵ Major companies already have their eyes on far more subtle recording devices: Google, Samsung, and Sony have all filed patents for “smart” contact lenses that would provide users with virtually undetectable recording capability.¹¹⁶ Sony’s version of the product, which the user activates by blinking, “would be powered by piezoelectric sensors that convert eye movement into electrical power. It would involve extremely small versions of all the parts of a modern digital camera — an auto-focusing lens, a CPU, an antenna, and even on-lens storage.”¹¹⁷

The potential impact of these augmented reality technologies on marginalized groups, especially women and racial minorities, is frightening. Women and girls are already disproportionately targeted for intimate surveillance abuses, from stalking to surreptitious filming of private or sexual behavior.¹¹⁸ The very names of applications such as “Girls Around Me,” “WifeSpy,” and “Girlfriend Spy” make their

¹¹² Casey Newton, *Snapchat Unveils \$130 Connected Sunglasses and Rebrands as Snap, Inc.*, VERGE (Sept. 23, 2016, 10:55 PM), <https://www.theverge.com/2016/9/23/13039184/snapchat-spectacles-price-release-date-snap-inc>.

¹¹³ Sasha Lekach, *Privacy Panic? Snapchat Spectacles Raise Eyebrows*, MASHABLE (Nov. 16, 2016), <http://mashable.com/2016/11/16/snapchat-spectacles-privacy-safety/#fjmVIIACKkq8>.

¹¹⁴ *Id.*

¹¹⁵ See Steven Levy, *Google Glass 2.0 Is a Startling Second Act*, WIRED (July 18, 2017, 7:00 AM), https://www.wired.com/story/google-glass-2-is-here?mbid=synd_digg.

¹¹⁶ Todd Jaquith, *Sony Just Patented Contact Lenses That Can Secretly Record What You See*, BUS. INSIDER (May 3, 2016, 10:51 AM), <http://www.businessinsider.com/sony-contact-lenses-record-whatever-you-see-2016-5>.

¹¹⁷ Mike Elgan, *Why a Smart Contact Lens Is the Ultimate Wearable*, COMPUTER WORLD (May 9, 2016, 3:00 AM), <http://www.computerworld.com/article/3066870/wearables/why-a-smart-contact-lens-is-the-ultimate-wearable.html>.

¹¹⁸ See Karen E.C. Levy, *Intimate Surveillance*, 51 IDAHO L. REV. 679, 688 (2015) (“[I]t is striking how many technologies of intimate surveillance construct women, in particular, as monitored subjects.”).

intended targets clear.¹¹⁹ “Upskirt” and “downblouse” photography,¹²⁰ hidden cameras in bedrooms and bathrooms, and “revenge porn” also tend to primarily target women and girls.¹²¹ It is now possible for private, nude or sexually explicit material to be broadcast to the general public within seconds, endangering victims’ physical safety, career and educational opportunities, intimate relationships, and psychological wellbeing.¹²² A nationwide 2016 study revealed that one in eight adult social media users had been the victim of or threatened with unauthorized distribution of private, sexually explicit images or videos and that one in twenty adult social media users had engaged in such distribution.¹²³ The study also revealed that women were 1.7 times more likely to be victimized than men, and men were by far the primary perpetrators of the abuse.¹²⁴ These abuses will only increase as recording technology becomes both more sophisticated and harder to detect.

Increasingly pervasive private surveillance technologies will also have a disproportionate impact on communities of color, who have long been subjected to enhanced monitoring by the state.¹²⁵ As privacy expert Jeramie D. Scott writes, “The implications of social media monitoring are particularly dangerous for minorities and those who express unpopular views.”¹²⁶ In 2016, the American Civil Liberties Union (“ACLU”) revealed that Facebook, Twitter, and Instagram had

¹¹⁹ *Id.* at 686.

¹²⁰ Aimee Jodoi Lum, *Don’t Smile, Your Image Has Just Been Recorded on a Camera-Phone: The Need for Privacy in the Public Sphere*, 27 U. HAW. L. REV. 377, 379 (2005) (“The most common forms of voyeurism in the public arena are upskirting and downblousing. There are hundreds of websites dedicated specifically to upskirt and downblouse images.”).

¹²¹ Danielle Keats Citron & Mary Anne Franks, *Criminalizing Revenge Porn*, 49 WAKE FOREST L. REV. 345, 353 (2014).

¹²² See Franks, *supra* note 92, at 482.

¹²³ ASIA A. EATON ET AL., 2017 NATIONWIDE ONLINE STUDY OF NONCONSENSUAL PORN VICTIMIZATION AND PERPETRATION: A SUMMARY REPORT 11 (2017).

¹²⁴ *Id.* at 12.

¹²⁵ See Tom Lininger, *Sects, Lies, and Videotape: The Surveillance and Infiltration of Religious Groups*, 89 IOWA L. REV. 1201, 1210-11 (2004) (“In the 1960s, under the leadership of Director J. Edgar Hoover, the F.B.I. conducted a number of wide-ranging investigations with the ostensible purpose of ferreting out communists and other groups believed to be destabilizing influences in American society. One of these inquiries, entitled ‘Racial Matters,’ sought ‘all pertinent information’ about the ‘proposed or actual activities’ of individuals and organizations ‘in the racial field.’”); see also Franks, *supra* note 92, at 441-43.

¹²⁶ Jeramie D. Scott, *Social Media and Government Surveillance: The Case for Better Privacy Protections for Our Newest Public Space*, 12 J. BUS. & TECH. L. 151, 156 (2017).

provided user data to Geofeedia, a “social media monitoring company that partners with law enforcement and has marketed its services as a tool to track Black Lives Matter activists.”¹²⁷ The ACLU discovered that marketing materials for Geofeedia “referred to unions and activists as ‘overt threats’ and that the company told police its product can help track the ‘Ferguson situation,’ an apparent reference to the protest movement sparked by the police shooting of unarmed teenager Michael Brown in 2014.

Augmented reality’s erosion of the concept of “reasonable expectation of privacy” is also likely to impact racial minorities more severely than other members of the population. Since 1967, the concept has played a significant role in determining the constitutionality of government searches and seizures under the Fourth Amendment.¹²⁸ As racial minorities are disproportionately subjected to law enforcement monitoring and scrutiny,¹²⁹ reduced protections under the Fourth Amendment will have a greater impact on these populations.

In his opinion in the 1967 case *Katz v. United States*, Justice Stewart wrote that while a person cannot expect constitutional protection for what he “knowingly exposes to the public,” “what he seeks to preserve as private, even in an area accessible to the public, may be constitutionally protected.”¹³⁰ But it is not enough that a person has a subjective expectation of privacy; this expectation must “be one that society is prepared to recognize as ‘reasonable.’”¹³¹ While the reasonable expectation of privacy standard is both complex and contested,¹³² one factor in its determination has been the extent to which the information we wish to keep private is accessible to

¹²⁷ Sam Levin, *ACLU Finds Social Media Sites Gave Data to Company Tracking Black Protesters*, *GUARDIAN* (Oct. 11, 2016, 4:07 PM), <https://www.theguardian.com/technology/2016/oct/11/aclu-geofeedia-facebook-twitter-instagram-black-lives-matter>.

¹²⁸ See Andrew Guthrie Ferguson, *Personal Curtilage: Fourth Amendment Security in Public*, 55 *WM. & MARY L. REV.* 1283, 1303 (2014).

¹²⁹ Kia Makarechi, *What the Data Really Says About Police and Racial Bias*, *VANITY FAIR* (July 14, 2016, 3:09 PM), <http://www.vanityfair.com/news/2016/07/data-police-racial-bias>. See generally MICHELLE ALEXANDER, *THE NEW JIM CROW: MASS INCARCERATION IN THE AGE OF COLORBLINDNESS* (2010).

¹³⁰ *Katz v. United States*, 389 U.S. 347, 350-51 (1967).

¹³¹ *Id.* at 361 (Harlan, J., concurring).

¹³² See Richard G. Wilkins, *Defining the ‘Reasonable Expectation of Privacy’: An Emerging Tripartite Analysis*, 40 *VAND. L. REV.* 1077, 1128 (1987) (“The potentially limitless number of factors relevant to the determination whether a given expectation of privacy is ‘reasonable’ has resulted in confusion and uneven application of constitutional doctrine.”).

ordinary people using ordinary powers of observation.¹³³ While one cannot reasonably expect that public activities visible to the naked eye will be private, one might reasonably expect that activities that would only be visible through rare, sophisticated technology would be. In the 2001 case *Kyllo v. United States*, Justice Scalia indicated that whether a technology was “in general public use” was significant to the determination of whether a particular act by the state constituted a search.¹³⁴ Justice Stevens, in dissent, referred to the general public use standard as “perverse” because, as he put it, “it seems likely that the threat to privacy will grow, rather than recede, as the use of intrusive equipment becomes more readily available.”¹³⁵

Indeed, as augmented reality technology such as Google Glass or smart contact lenses become more affordable and more socially acceptable, it will be increasingly difficult for citizens to claim that they have a reasonable expectation of privacy anywhere.¹³⁶ As Professor Andrew Ferguson has observed, “[r]easonable expectations of privacy will be hard to claim in a society of ubiquitous surveillance.”¹³⁷ The already disproportionate subjection of racial minorities to the powers of the surveillance state, combined with the erosion of reasonable expectations of privacy, is likely to result in even greater racial disparities in the criminal justice system.

C. *Virtual Violence*

Most people will not encounter virtual reality technology in diversity training or 360 humanitarian videos. Most people will encounter virtual reality — in particular perception-expanding, other-

¹³³ Haley Plourde-Cole, *Back to Katz: Reasonable Expectation of Privacy in the Facebook Age*, 38 *FORDHAM URB. L.J.* 571, 586 (2010) (“[D]espite the arguably convoluted nature of the Katz test, the Court has generally considered several factors when approaching new technology, including the type of technology being employed, the quantity and quality of information being revealed, whether the technology is widely used by the public, and whether the action is otherwise legal.”).

¹³⁴ *Kyllo v. United States*, 533 U.S. 27, 28 (2001) (“[O]btaining by sense-enhancing technology any information regarding the home’s interior that could not otherwise have been obtained without physical ‘intrusion into a constitutionally protected area,’ constitutes a search — at least where . . . the technology in question is not in general public use.”) (citations omitted).

¹³⁵ *Id.* at 47.

¹³⁶ See Matt C. Pinsker, *Google Glass, Cybersecurity, and the Erosion of Privacy Through Emerging Technology*, 50 *No. 5 CRIM. L. BULL.* 1175 (2014) (“As a practical matter, if we live in an age where highly sophisticated technology is in general public use, then we cannot truly have any reasonable expectations of privacy.”).

¹³⁷ Ferguson, *supra* note 128, at 1312.

oriented technology — in video games and pornography.¹³⁸ These technologies present new possibilities to act out increasingly realistic fantasies of sex and violence, raising questions about these technologies' impact on users' "real-life" attitudes towards gender and racial equality, psychological wellbeing, behavior towards others, and privacy.

Jordan Belamire's experience of being groped in the virtual reality game QuiVR, described at the beginning of this article, highlights the problem of sexual harassment in virtual reality.¹³⁹ "Virtual" sexual assault has been around as long as virtual communities have existed. Journalist Julian Dibbell famously described one such assault in a virtual community in a 1993 article titled "A Rape in Cyberspace."¹⁴⁰ A user going by the name "Mr. Bungle" acquired the power to take over the voices and actions of other users in the community, and used that power to commit virtual rapes:

[Bungle] could take over the voices and actions of other characters and make them appear to do things they did not really do. . . . He invoked this power, in this public space, and took over the voices of these people. Once they were in his control, Bungle "raped" these women, violently and sadistically, and made it seem as if they enjoyed the rape.¹⁴¹

Such "avatar rapes" were profoundly disturbing to the real people behind the characters.¹⁴² The interactions that Dibbell described were completely text-based and, by today's standards, quite crude; nonetheless, the impact of sexual aggression in these interactions was profound. As virtual reality becomes increasingly realistic, is it unsurprising that research indicates "harassment in VR is far more traumatic than in other digital worlds"¹⁴³ and that "harassment feels 'way, way, way worse'" in virtual reality.¹⁴⁴

¹³⁸ Chris Morris, *Virtual Reality: Porn's Next Tech Breakthrough?*, CNBC (Jan. 20, 2016, 9:04 AM), <http://www.cnbc.com/2016/01/19/virtual-reality-porns-next-tech-breakthrough.html>.

¹³⁹ See discussion *supra* Introduction.

¹⁴⁰ Julian Dibbell, *A Rape in Cyberspace*, VILLAGE VOICE (Oct. 18, 2005), <http://www.villagevoice.com/2005/10/18/a-rape-in-cyberspace>.

¹⁴¹ LAWRENCE LESSIG, *CODE VERSION 2.0*, at 98 (2006).

¹⁴² See Franks, *supra* note 12, at 243-44.

¹⁴³ See *Will Virtual Reality*, *supra* note 24.

¹⁴⁴ Maddy Myers, *Harassment in Virtual Reality Feels "Way, Way, Way Worse," According to VR Developers*, MARY SUE (Mar. 16, 2016, 5:35 PM), <https://www.themarysue.com/harassment-in-vr-is-bad>.

The pernicious effects of sexual harassment have been extensively researched.¹⁴⁵ Catcalls, groping, quid pro quo harassment, unwanted sexual objectification, and undesired sexual contact restricts women's freedom of movement, expression, and activity; discourages women's participation in professional, public, and civic life; and conveys a message of female subordination.¹⁴⁶ Common, dismissive responses to virtual sexual harassment, including the assertion that such harassment is not "real" or the suggestion that women should simply avoid activities in which they encounter harassment, promote the pernicious idea that women lack the authority to characterize their own experiences and that the answer to abuse is for victims to exit certain spaces or forego certain opportunities. The prevalence of and lack of serious response to virtual sexual harassment reinforces the message that virtual spaces, like so many real spaces, are simply not "for" women.

Virtual reality experiences that fail to take sexual harassment seriously are one part of this problem; VR experiences that actively promote sexual harassment and assault are a potentially more serious one. Take, for example, *Dead or Alive Xtreme 3*, the game Sony used to launch its virtual reality headset Playstation VR in 2016.¹⁴⁷ The game's virtual reality update allows players to "continually touch a woman who is verbally protesting. . . . As the player pokes and prods [the female character's] body with the PlayStation 4's motion controller, she tells him 'I don't like it,' and uses a [Japanese] word that directly translates to 'bad' that is often used to flatly deny permission. The player persists, and the character naturally recoils."¹⁴⁸ Because the avatar on the receiving end of this activity does not belong to another player, this kind of sexual objectification is different from that experienced by Belamire in QuiVR. The primary concern with games like these is not the harm one user inflicts on another actual user in a virtual reality environment, but the harmful habits the technology encourages the user to indulge, which might encourage the same habits outside of the game.

¹⁴⁵ See, e.g., Deborah M. Thompson, "The Woman in the Street:" Reclaiming the Public Space from Sexual Harassment, 6 YALE J.L. & FEMINISM 313, 318-25 (1994).

¹⁴⁶ See Mary Anne Franks, *Men, Women, and Optimal Violence*, 2016 U. ILL. L. REV. 929, 931 (2016).

¹⁴⁷ See Sean Buckley, 'Dead or Alive' VR Is Basically Sexual Assault, the Game, ENGADGET (Aug. 29, 2016), <https://www.engadget.com/2016/08/29/dead-or-alive-vr-is-basically-sexual-assault-the-game>.

¹⁴⁸ *Id.*

At a minimum, both augmented and virtual reality have a tendency to normalize antisocial habits. Augmented reality tends to normalize surveillance; virtual reality to normalize objectification. Both encourage habitual indifference to the desires and boundaries of other people. If, as Aristotle believed, we are our habits,¹⁴⁹ then we must ask what spending hours in virtual or augmented reality, literally disconnected from those around us and fully centered on our own self-centered perspectives, is turning us into.

If virtual reality has the capacity to make us feel as though we are “really” engaging in a certain act, what does that mean for acts of sexual or other violence? The porn industry has been exploring the potential of virtual reality for years, and while some are optimistic that technology might subvert some of the more unsavory tendencies of that industry, there is considerable concern about its harmful consequences.¹⁵⁰ The increasing sophistication of virtual reality technology, combined with increasingly accessible, intimate personal data about those around us, raise questions both about the behavioral impact of VR porn on users as well as privacy concerns.¹⁵¹ Virtual game developers themselves have conceded that “first-person death in VR is often just too intense”¹⁵² and researchers warn that abuses such as “revenge porn”¹⁵³ “could be exacerbated through the potential for sharing 3D models, based on real people.”¹⁵⁴

Imagine a virtual reality program that allows a man to rape or beat an avatar constructed from highly detailed biometric data collected on his ex-girlfriend, so that the avatar realistically reflects the ex-girlfriend’s facial features, height, weight, and voice.¹⁵⁵ Or consider a

¹⁴⁹ ARISTOTLE, *NICOMACHEAN ETHICS* 21 (C.D.C. Reeve trans., 2014).

¹⁵⁰ See Matt Wood, *Virtual Reality Could Transform Pornography — but There Are Dangers*, CONVERSATION (May 22, 2017, 11:30 AM), <https://theconversation.com/virtual-reality-could-transform-pornography-but-there-are-dangers-78061>.

¹⁵¹ See Olivia Blair, *Virtual Reality Pornography Could Raise Issues About Consent, Researchers Warn*, INDEPENDENT (May 19, 2017, 11:10 AM), <https://www.independent.co.uk/life-style/love-sex/porn-virtual-reality-pornography-consent-issues-reality-fantasy-tech-a7744536.html>; Nwaneri, *supra* note 14, at 623.

¹⁵² Michael Rundle, *Death and Violence ‘Too Intense’ in VR, Developers Admit*, WIRED (Oct. 28, 2015), <https://www.wired.co.uk/article/virtual-reality-death-violence>.

¹⁵³ See generally Mary Anne Franks, *Revenge Porn Reform: A View from the Front Lines*, 69 FLA L. REV. (forthcoming 2018).

¹⁵⁴ MATTHEW WOOD ET AL., “THEY’RE JUST TIXEL PITS, MAN”: DISPUTING THE ‘REALITY’ OF VIRTUAL REALITY PORNOGRAPHY THROUGH THE STORY COMPLETION METHOD 5447 (2017). See generally Jaclyn Seelagy, *Virtual Violence*, 64 UCLA L. REV. DISCOURSE 412, 417 (2016).

¹⁵⁵ See Sarah Knapton, *Future of Revenge Porn Will See Spurned Exes Create 3D Sex Avatars of Ex-Lovers, Warn Experts*, TELEGRAPH (May 19, 2017, 12:01 AM),

virtual reality pedophile program that gives a user the ability to engage in extremely realistic sexual acts with extremely realistic avatars of what appear to be very young children — perhaps modeled to look like specific young children who live in the user’s neighborhood. In addition to sexual violence, consider highly realistic virtual reality experiences of other forms of violence: imagine a white supremacist virtual reality game that would allow a user to participate in an extremely graphic lynching of an African-American man, or a homeland security simulation that creates a realistic torture scenario, or a game that lets users engage in a vicious beating of a homeless person, or a vivid training and recruitment video created by a terrorist group.¹⁵⁶ We do not yet know the long-term effects of highly realistic, immersive virtual violence on either those engaging in it or those whose virtual selves may be receiving it.

D. Unequal Accessibility

In addition to the disparate impact VR/AR is likely to have on marginalized groups regarding empathy and violence, there is a separate question to be asked about accessibility. Will VR/AR be equally accessible to people regardless of gender, race, disability, and class? There is compelling evidence so far that this may not be the case.

In March 2014, social media scholar danah boyd posed a blunt question about virtual reality in Quartz: “Is the Oculus Rift sexist?”¹⁵⁷ In the piece, boyd relates that she vomited the very first time she put on a pair of virtual reality goggles. She noticed that severe nausea was a problem that many of her female colleagues shared in virtual reality, while her male colleagues did not seem to be affected. After researching the issue, boyd discovered a possible reason for the disparity. According to boyd, humans use “depth cues” to determine how far away objects are. One of these cues, “motion parallax,” tells our brains that if an object is getting larger, it is because it is getting closer. Another, “shape-from-shading,” helps the brain determine distance by the way light falls on an object. Because shape-from-shading is much harder to replicate than motion parallax, virtual reality systems primarily rely on motion parallax cues. boyd

<http://www.telegraph.co.uk/science/2017/05/18/future-revenge-porn-will-see-spurned-exes-create-3d-sex-avatars>.

¹⁵⁶ See Peter Csathy, *Virtual Reality — the Rewards, the Risks with Mike Rothenberg of River Accelerator*, VIDEOINK (Aug. 26, 2015), <https://thevideoink.com/virtual-reality-the-rewards-the-risks-with-mike-rothenberg-of-river-accelerator-888d2232148b>.

¹⁵⁷ danah boyd, *Is the Oculus Rift Sexist?*, QUARTZ (Mar. 28, 2014), <https://qz.com/192874/is-the-oculus-rift-designed-to-be-sexist>.

discovered that men tend to prioritize motion parallax cues while women rely more on shape-from-shading, meaning that “men are more likely to use the cues that 3D virtual reality systems relied on.”¹⁵⁸ Boyd ponders “whether or not biology plays a fundamental role in shaping people’s experience with immersive virtual reality.”¹⁵⁹ She closes her article with the question, “are systems like Oculus fundamentally (if inadvertently) sexist in their design?”¹⁶⁰

A similar question could be asked of augmented reality systems. In addition to the virtual reality sexual harassment issues discussed in the previous section, women’s use of augmented reality technology, particularly in public, often differs significantly from men. Augmented reality games such as *Pokémon Go* have drawn praise for encouraging users to engage with strangers and unfamiliar environments, but these opportunities carry particular risks for women. As journalist Laura Hudson writes,

Walking around unfamiliar places can also be a particularly dicey proposition for women, not only because of the potential for *Pokémon Go* to be used by sexual predators as well as thieves but also because harassment and abuse are endemic problems that women often face whenever they move through public spaces. While *Pokémon Go* has spurred social interaction and sparked unlikely friendships for many players, some women are understandably wary about being approached by strange men, particularly at night or while alone.¹⁶¹

Because of existing gender inequalities in the physical world, women’s access to games like *Pokémon Go* is limited in a way that men’s access is not.

Hudson notes how race also limits players’ experience of the game: “a 40-year-old white man shared a story . . . about finding an unexpected camaraderie with two young black men when they realized they were all out searching for *Pokémon* in the middle of the night. They started sharing tips about the game — only to be interrupted by a cop who suspected the black men were selling

¹⁵⁸ *Id.*

¹⁵⁹ *Id.*

¹⁶⁰ *Id.*

¹⁶¹ Laura Hudson, *Pokémon Go Is Pushing Gaming into the Outside World — and All the Dangers in It*, SLATE (July 12, 2016, 12:18 PM), http://www.slate.com/blogs/browbeat/2016/07/12/Pokémon_go_vs_the_racism_and_sexism_of_the_outside_world.html.

drugs.”¹⁶² Writing in Kotaku, Omari Akil, who is black, describes how his initial excitement about playing the game quickly dissipated as racial reality intervened:

I spent less than 20 minutes outside. Five of those minutes were spent enjoying the game. One of those minutes I spent trying to look as pleasant and nonthreatening as possible as I walked past a somewhat visibly disturbed white woman on her way to the bus stop. I spent the other 14 minutes being distracted from the game by thoughts of the countless Black Men who have had the police called on them because they looked “suspicious” or wondering what a second amendment exercising individual might do if I walked past their window a 3rd or 4th time in search of a Jigglypuff.¹⁶³

Akil’s account highlights how the intrusion of deadly, real-life prejudice into augmented reality makes the technology less accessible to racial minorities.

Access to VR/AR technology may also be limited by disability. While, as discussed above, VR/AR technology may provide a host of opportunities for people with disabilities, experts note that VR/AR may also present many challenges for people with disabilities. Researchers have observed that the complexity of some virtual environments may make it difficult or impossible for those with intellectual disabilities to use them, and that unequal access could lead to “people with disability [being] neglected or excluded by their peers.”¹⁶⁴ Researchers also note that VR/AR “may present potential harm for people with disability if programs fail to provide users the option to conceal disability” and that VR functionalities that reconstruct disability may render the technology inaccessible to disabled individuals.¹⁶⁵

Finally, there is the question of how cost affects access to VR/AR technology. VR-ready computers can cost up to \$1000, and even many of these computers do not yet have the tech specifications necessary to provide a high-quality virtual reality experience.¹⁶⁶ VR also requires

¹⁶² *Id.*

¹⁶³ Omari Akil, *Pokémon Go Could Be a Death Sentence for a Black Man*, KOTAKU (July 19, 2016, 12:30 PM), <https://kotaku.com/pokemon-go-could-be-a-death-sentence-for-a-black-man-1783388743>.

¹⁶⁴ Karen Stendal, *How Do People with Disability Use and Experience Virtual Worlds and ICT: A Literature Review*, 5 J. VIRTUAL WORLDS RES. 1, 8 (2012).

¹⁶⁵ *Id.*

¹⁶⁶ Chris Neiger, *Virtual Reality Is Too Expensive for Most People — but That’s About*

headsets, the high-end versions of which cost upwards of \$500.¹⁶⁷ Even as the cost of VR/AR products has been dropping and the number of low-end, affordable versions of headsets and wearables has increased,¹⁶⁸ it is important to bear in mind that even cheaper versions of VR/AR technology will be inaccessible for much of the world's population, especially outside of the United States. Though precise statistics about computer ownership worldwide are not available, Internet access serves as a rough proxy. The majority of the world's population — sixty percent — does not have access to the Internet.¹⁶⁹

E. Withdrawal

Extended withdrawal from real-time, physical, face-to-face interactions can make returning to those interactions difficult. Experts warn that “as virtual-reality platforms become mainstream and affordable, the pull of spending more time in virtual reality may prove hard to resist.”¹⁷⁰ Even before advances in virtual reality, studies indicated that male pornography use was associated with decreased interest in actual sexual activity and an increase in sexual dysfunction, including the inability to maintain an erection or experience orgasms.¹⁷¹ Addiction to video games has become pervasive enough to earn a classification in the latest edition of the Diagnostic and Statistical Manual of Mental Disorders.¹⁷² “Internet gaming disorder” involves “persistent and recurrent online activity” and “results in clinically significant impairment or distress.”¹⁷³ Experts have suggested that more than three million young Americans between the

to *Change*, BUS. INSIDER, (Sept. 8, 2016, 7:44 PM), <http://www.businessinsider.com/why-is-virtual-reality-so-expensive-2016-9>.

¹⁶⁷ See *id.*

¹⁶⁸ Alice Truong, *Virtual Reality Might Actually Be Accessible to the Masses*, QUARTZ (Sept. 25, 2015), <https://qz.com/510500/virtual-reality-might-actually-be-accessible-to-the-masses>.

¹⁶⁹ See *Internet Users*, INTERNET LIVE STATS, <http://www.internetlivestats.com/internet-users> (last visited Oct. 22, 2017).

¹⁷⁰ Monica Kim, *The Good and the Bad of Escaping to Virtual Reality*, ATLANTIC (Feb. 18, 2015), <https://www.theatlantic.com/health/archive/2015/02/the-good-and-the-bad-of-escaping-to-virtual-reality/385134>.

¹⁷¹ Robert Weiss, *Is Male Porn Use Ruining Sex?*, PSYCHOL. TODAY (Jan. 20, 2014), <https://www.psychologytoday.com/blog/love-and-sex-in-the-digital-age/201401/is-male-porn-use-ruining-sex>.

¹⁷² Cecilia D'Anastasio, *How Video Game Addiction Can Destroy Your Life*, VICE (Jan. 26, 2015, 9:06 AM), https://www.vice.com/en_us/article/vdpwga/video-game-addiction-is-destroying-american-lives-456.

¹⁷³ *Id.*

ages of eight and eighteen might be suffering from this addiction.¹⁷⁴ There have been several cases of criminal charges brought against adults who neglected children in their care because they were playing video games, including a couple whose child died of malnutrition as the parents spent their days playing online games.¹⁷⁵

Virtual reality may promote withdrawal in another, larger, more political sense. As discussed above, while experts are skeptical about the ability of virtual and augmented reality technologies to increase concern for less fortunate individuals in any meaningful way, some virtual reality developers are driven not to increase empathy and real-world assistance for the less fortunate, but to replace the reality of the less fortunate with virtual reality.¹⁷⁶ According to Jaron Lanier, the computer scientist credited with bringing the term “virtual reality” into the mainstream, many in Silicon Valley “envision a time in which the rich become immortal while ‘everyone else will get a simulated reality.’¹⁷⁷ Their vision seems to involve providing disadvantaged populations with the simulation of experiences that wealthy individuals enjoy in reality. Virtual reality developers like Palmer Luckey, the founder of the virtual reality headset Oculus Rift, want to “provide billions of people with virtual versions of everything the wealthy take for granted: touring the Louvre, sailing the sun-dappled coast of California, or simply sitting in a meadow beneath a clear blue sky free of smog and pollution.”¹⁷⁸

It is a prospect that Lanier himself finds disturbing: “I’d prefer to see a world where everyone is a first-class citizen and we don’t have people living in the Matrix.”¹⁷⁹ Lanier’s concern is shared by the media scholar Ethan Zuckerman, who finds the suggestion “that we can make gross economic inequalities less relevant by giving Africans virtual bread and circuses”¹⁸⁰ both “diabolical and delusional.”¹⁸¹ Luckey’s own articulation of his vision inadvertently provides the clearest reason to share Lanier and Zuckerman’s alarm: “Once you’ve

¹⁷⁴ *Id.*

¹⁷⁵ See, e.g., Maya Kosoff, *A California Couple Is in Prison for Neglecting Children While Playing World of Warcraft*, BUS. INSIDER (Aug. 11, 2014, 10:38 AM), <http://www.businessinsider.com/california-couple-is-in-jail-for-neglecting-their-children-to-play-world-of-warcraft-2014-8>.

¹⁷⁶ See Au, *supra* note 30.

¹⁷⁷ *Id.*

¹⁷⁸ *Id.*

¹⁷⁹ *Id.*

¹⁸⁰ *Id.*

¹⁸¹ *Id.*

perfected VR, you can imagine a world where you don't need to perfect anything else."¹⁸² Using virtual reality to distract disadvantaged and exploited populations from the misery of their lived conditions may indeed provide them with relief, but it also diminishes the likelihood of their resistance to those conditions. At the same time, such technology would likely help relieve the conscience of wealthy Western nations and powerful corporations, removing incentives for them to change their policies or practices.¹⁸³

F. *Whose Game Is It?*

Of course, the views of major technology developers are colored by their bottom line: profit. Virtual and augmented reality technology is big business; investments in VR/AR totaled \$1.7 billion in 2016, and Goldman Sachs estimates that “by 2025, the VR industry could be worth \$80-\$182 billion.”¹⁸⁴ Revenue in VR/AR “is projected to increase from \$5.2 billion in 2016 to over \$162 billion in 2020.”¹⁸⁵ Three of the major players in the VR/AR market — Facebook (which owns Oculus Rift), Google (which owns Magic Leap), and Microsoft (which owns HoloLens) — are also among the five most valuable public companies in the world.¹⁸⁶ The other two on that list, Amazon

¹⁸² *Id.*

¹⁸³ Such a strategy is reminiscent of the cynical comfort that religious figures offer to deeply distressed populations. As Slovenian theorist Slavoj Žižek writes apropos of Mother Teresa's much-lauded ministrations to the people of Calcutta, “The ideological benefit of this operation is double: in so far as she suggests to the poor and terminally ill that they should seek salvation in their very suffering, Mother Teresa deters them from probing into the causes of their predicament — from *politicizing* their situation” SLAVOJ ŽIŽEK, *THE PLAGUE OF FANTASIES* 18 (1997). Similar concerns have been raised with the provision of animatronic pets to provide care and affection to elderly and other vulnerable individuals. Ethicist Shannon Vallor has asked, “[W]hat happens to our moral character and our virtues in a world where we increasingly have more and more opportunities to transfer our responsibilities for caring for others, to robots?” Angela Johnston, *Robotic Seals Comfort Dementia Patients but Raise Ethical Concerns*, KALW (Aug. 17, 2015), <http://kalw.org/post/robotic-seals-comfort-dementia-patients-raise-ethical-concerns#stream/0>.

¹⁸⁴ Arwa Mahdawi, *A Bug in the Matrix: Virtual Reality Will Change Our Lives. But Will It Also Harm Us?*, GUARDIAN (Nov. 2, 2016, 9:31 AM), <https://www.theguardian.com/technology/2016/nov/02/virtual-reality-oculus-palmer-luckey-harassment-diversity>.

¹⁸⁵ BI Intelligence, *The Virtual and Augmented Reality Market Will Reach \$162 Billion by 2020*, BUS. INSIDER (Aug. 22, 2016, 10:49 AM), <http://www.businessinsider.com/virtual-and-augmented-reality-markets-will-reach-162-billion-by-2020-2016-8>.

¹⁸⁶ See Will Oremus, *Tech Companies Are Dominating the Stock Market as Never Before*, SLATE (July 29, 2016, 4:38 PM), http://www.slate.com/blogs/moneybox/2016/07/29/the_world_s_5_most_valuable_companies_apple_google_microsoft_amazon_

and Apple, are reportedly also working on breaking into the VR/AR market.¹⁸⁷ The power and influence of these companies has been described as monopolistic and anti-democratic: “The tightening monopolization of US industry is rendering America an oligarchy, with profound ramifications for our political system,” leading experts to conclude that “the preferences of the very rich had a huge impact on policy decisions while the views of middle-income and poor Americans had almost none.”¹⁸⁸

The people who make up these major companies are also not representative of society at large, and there is evidence that the dominance of white men has affected the products and practices of many companies. Employees in the leading Silicon Valley tech firms are seventy percent male, forty-seven percent white, forty-one percent Asian, six percent Hispanic, and three percent black.¹⁸⁹ Women in the tech industry are paid significantly less than men. Among “certain types of computer programmers,” for example, “men mak[e] on average 28.3 percent more than their female counterparts.”¹⁹⁰ In 2017, the virtual reality startup UploadVR was sued for sexual harassment by its former director of digital and social media, Elizabeth Scott.¹⁹¹ According to Scott, the “boy’s club” atmosphere of the startup was saturated with explicit sex talk and routine degradation of female employees. One room, designated as the “kink room,” was allegedly frequently used by male employees to have sex and was often strewn with underwear and condom wrappers.¹⁹²

facebook.html.

¹⁸⁷ See Nat Levy, *Amazon Web Services Quietly Forms a Mixed Reality Team, but What Is It Building?*, GEEK WIRE (June 20, 2017, 10:57 AM), <https://www.geekwire.com/2017/amazon-web-services-quietly-forms-mixed-reality-team-building>.

¹⁸⁸ JONATHAN TAPLIN, *MOVE FAST AND BREAK THINGS: HOW FACEBOOK, GOOGLE, AND AMAZON HAVE CORNERED CULTURE AND UNDERMINED DEMOCRACY* 119 (2017).

¹⁸⁹ See Megan Rose Dickey, *Equal Employment Opportunity Commission Says Tech Industry Is Underutilizing Diverse Talent Pool*, TECHCRUNCH (May 18, 2016), <https://techcrunch.com/2016/05/18/equal-employment-opportunity-commission-says-tech-industry-is-underutilizing-diverse-talent-pool>.

¹⁹⁰ Tracey Lien, *Women in Tech Still Earn Far Less than Men, Study Finds*, L.A. TIMES (Mar. 23, 2016, 4:00 AM), <http://www.latimes.com/business/technology/la-fi-tn-0323-pay-gap-20160323-story.html>.

¹⁹¹ Lucas Matney, *UploadVR Sued over ‘Rampant’ Sexual Behavior in the Workplace and Wrongful Termination*, TECHCRUNCH (May 15, 2017), <https://techcrunch.com/2017/05/15/uploadvr-sued-over-rampant-sexual-behavior-in-the-workplace-and-wrongful-termination>.

¹⁹² *Id.*

Given the tremendous power of technology generally, and VR/AR technology in particular, to shape perceptions of reality, the political and social views of influential developers are also worthy of consideration. To take one example, Oculus founder Palmer Luckey provided thousands of dollars in funding to a group that produced pro-Donald Trump, anti-Hillary Clinton propaganda and secretly donated \$100,000 to fund Donald Trump's inaugural celebrations using a series of shell companies.¹⁹³ Luckey was also a tacit supporter of GamerGate, the campaign of threats and harassment directed against women critical of sexism in the gaming industry.¹⁹⁴ While funding propaganda efforts to further political interests and supporting vicious attacks on women is alarming behavior from any individual, it is particularly disturbing when the individual in question has overseen the development of an influential product whose purpose is to alter the perception of reality.

CONCLUSION

In their apologetic and thoughtful response to Jordan Belamire's virtual reality sexual harassment experience, the male creators of QuiVR asked, "How could we have overlooked something so obvious?"¹⁹⁵ One answer is that sexual harassment is often not, in fact, obvious to men. Technology is only as progressive, revolutionary, or democratic as the people who create it. Given that the technology industry is currently dominated by white men, it is hardly surprising that its products are primarily designed with the white male subject in mind. This is sometimes the result of deliberate choice, and sometimes the result of unconscious bias. Either way, the worlds created by VR/AR tend to replicate the unequal world we all already live in. If VR/AR developers want to change this, their theory and practice will need to undergo a dramatic shift.

To avoid entrenching status quo inequality, VR/AR developers should submit their products to equality stress testing before they ever

¹⁹³ Rosalind S. Helderma & John Wagner, *Sheldon Adelson, Corporate Interests Boost Trump Inaugural Fundraising to Record Levels*, WASH. POST (Apr. 10, 2017), https://www.washingtonpost.com/news/post-politics/wp/2017/04/19/sheldon-adelson-corporate-interests-boost-trump-inaugural-fundraising-to-record-levels/?utm_term=.b3496663daf9.

¹⁹⁴ Marco della Cava & Brett Molina, *Facebook Millionaire Luckey Aligns Himself with Alt-Right, but Only If You Squint*, USA TODAY (Sept. 26, 2016, 8:45 PM), <https://www.usatoday.com/story/tech/news/2016/09/26/facebook-millionaire-luckey-aligns-himself-alt-right-but-only-if-you-squint/91132042>.

¹⁹⁵ Jackson & Schenker, *supra* note 9.

bring them to market. They should make equality an explicit consideration at every stage of the design process. Instead of merely asking whether a particular product is entertaining or useful, they should ask other questions: Who is this product really designed for? Will women be able to use the product the same way as men? What will be the impact of this product on racial minorities? What kinds of obstacles might women or racial minorities face in attempting to use this product?

VR/AR technology developers should engage in equality analysis out of self-interest as well as concern for others. Equality considerations make products better. While women and racial minorities might suffer first and most from thoughtless design, the kinds of risks that VR/AR technology pose — to privacy, autonomy, physical and psychological wellbeing — will eventually affect everyone. According to Philip Rosedale, the founder of the virtual world Second Life, “There is no difference between a life lived in virtual reality versus ‘real reality.’”¹⁹⁶ Someday this statement is likely to be literally true, and we must work to ensure that this eventual reality will be more equal than our present one.

¹⁹⁶ See Au, *supra* note 30.