Virtual Reality and its Implications

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Abstract

Virtual reality (VR) is a new interface for interacting with virtual environments. For the first time ever, humanity is not limited by screens to interact with virtual worlds. VR is revolutionary not only as a new interface, but also in its ability to deliver true presence immersion using depth perception and body tracking. With presence immersion in virtual worlds, almost all limitations of telecommunication methods fall away and take on the advantages of face-to-face full-body communication. With these advents, Humans' relationships to each other, their workplaces, their organizations, and themselves will be changed. World economies will be affected and virtual economies will be started, allowing for new industries and lifestyles. VR's positive effects will be met by negative ones as well, with the power of its immersion being its greatest problem and strength. User overwhelm and the ability for abuse is very possible, as well as its ability to bring people closer together and deliver high quality social interactions unbound to the physical world. Despite the variable effects of technological progress, VR will overall improve the world, with its greatest effects being yet unknown.

Keywords: virtual reality, virtual worlds

Virtual Reality and its Implications

Virtual reality (VR) is a game changer. It is a paradigm shifting evolution of technology that will change how humans interact with, and what they seek from, technology, each other, and the world around them. It's the next big technological revolution, like the Internet was before, because of its ability to add full body immersion to telecommunication and virtual worlds. Like virtual worlds, VR will shift the economy, how people interact with their work, each other, and their own lives. It will question notions about existence and who one wishes to be in the world. Humans are extremely social beings. They are hard wired to need to communicate with each other and all of society is built around that (Lee, Leung, Lo, Xiong, & Wu, 2011). Technology has allowed telecommunication to transcend physical distance. Soon, VR will allow for the transcendence of physical space and existence. Information can be taken in now at a volume that has never been this high (Understanding Media, 2016). Internet communication is taking a toll on users with its surface depth. Opinions that believe the Internet has been overall positive to humanity is on the decline (Smith, 2018). VR has its drawbacks, some from its simpler communication medium counterparts, others that itself creates. Like other technologies, it increases responsibility because of its ability to cause change. The negative and positive effects it will create are somewhat balanced. Although like other technologies, VR will give us more freedom and understanding of each other and the world around us. Because of this, virtual Reality will improve the world as humanity knows it.

Virtual worlds have been around much longer than virtual reality. This is because virtual reality can be considered an offshoot of a virtual world. Virtual worlds are any environments that exist digitally, and virtual reality is a new way to interface with those virtual worlds. A virtual world can be video game world, a simulation, or a digital space of any type. Usually they have

some form of dimensionality and space to them, usually 2 or 3 dimensions in which to exist. VR, of course, requires 3 dimensions to feel seamless with physical reality. One of the most notable virtual worlds created is the world of Second Life which was released in 2003. Virtual worlds, especially intractable ones like Second Life, have become large and vibrant enough through their users that they can be used as research groups for real-life scientific studies in fields such as phenomenological research (Houliez & Gamble, 2013). Researchers can use, and have used, virtual worlds as sources for their studies in human behavior.

Virtual reality will revolutionize, and virtual worlds are already, how people interact with their work and the economy. Telecommuting is already very common for many workers, using telecommunication technologies such as email and video chat to interact with their colleagues instead of physically meeting. Virtual worlds expand on the possibilities of telecommuting and telecommunication by allowing full reproduction of a real-world environment or activity in virtualized 3D space. These revolutions allow for companies and organizations to use virtual worlds for whatever needs they require. Already large companies have used virtual worlds as the next step over web, telephone, and email communication, drastically cutting costs and increasing productivity (Congress, 2008). Companies can utilize virtual worlds as areas of operation, making real-life offices and event centers obsolete. Virtual worlds already have had, companies, organizations, universities, and even congressional hearings use them as areas of operation (Congress, 2008). Virtual worlds utilize the merits of more simple forms of communication such as email and video chat while also introducing ones that didn't exist before, like being able to work in the same room with a group of people. This was something that could only be done in the same physical location before virtual worlds. This streamlining of communication mediums into one as well as the new possibilities virtual worlds introduce will save organizations time,

money, and energy. Virtual world technology's ability to streamline productivity makes many groups expect it to radically shift how organizations do work in the near future and represents an important subject in America's future (Congress, 2008).

Even more impactful than how organizations operate; virtual worlds have the power to shift how we interact with economies themselves. Virtual Worlds virtualize worlds, and entire economies can be included in them. These economies can create entirely new avenues for creativity, expression, and even lifestyle. Second Life was one of the largest and first virtual economies. Second Life's economy exchanged approximately 850,000 dollars per day in 2008 (Congress, 2008). Second Life's economy was large and dynamic enough that universities used it to teach economics to their students as an accurate model of the real-world economy (Congress, 2008). In the movie *Ready Player One*, directed by Steven Spielberg and based on the book by the same name, virtual worlds are shown to have economies even more prevalent than the physical world's. People work, earn credits, and buy commodities in those virtual worlds more than they do in the physical. Money is also transferable between the virtual and physical, further blurring the lines between the two. Like the fictitious economy in the movie, virtual economies can be just seamless with, and complex as, the real-world's economy. Just like the real world’s, these virtual economies allow for new possibilities in innovation, creativity, and entrepreneurship (Houliez & Gamble, 2013). New fields and industries could be created in virtual worlds that are easily accessible from around the world. People work, earn credits, and live in these economies and will most likely be able to transfer money out the real-world's economy to cover any real-world costs.

Virtual worlds by themselves introduce many possibilities, although virtual reality takes all of those possibilities and builds upon them. VR introduces a new way to interact with virtual

worlds, allowing full immersion into them. Up to VR, virtual worlds could only be interacted with using screens and input devices like keyboards and controllers. It didn't matter how simple or complex the virtual world was, people could only interact with it through flat screens while likely being sedentary. Long term interaction with virtual worlds required long term periods of low bodily activity, introducing health effects and easily making virtual worlds that are equitable to the real-world seem ridiculous. How could sitting and typing on a keyboard be as real as the real-world? VR addresses that issue by introducing a new digital interface. No longer do users require screens to interact with virtual worlds, they can use more naturally immersive and bodily engaging tools such as VR. VR also introduces things that are impossible with screens such as depth perception, allowing immersion on levels up to par with the real world.

The human mind is very interesting when it comes to how it understands the world around it. It is reliant on very limited information from a small set of senses provided by the human body. VR currently, even while being rather clunky, gives enough information to the senses that allow for full immersion into a virtual world. Current mainstream VR technology usually utilizes a headset of some kind that gives stereoscopic vision to the user. This means each eye receives a separate image, unlike traditional screens that give the same one. Since the eye receives two separate virtual viewpoints, true depth perception can be experienced by the user. When looking and moving around in a virtual environment, the viewer’s brain can judge distances just like in the real-world, making it very difficult for the brain to tell the difference between the two. As technology advances, especially past the point where headsets are no longer required, it will only get even more immersive. Controlling a body in VR will one day become as simple and natural as controlling one's real-world body (Blascovich & Bailenson, 2011).

The depth perception and body tracking that current VR provides allows for extreme levels of immersion. Current VR systems usually have sensors that track the position of the user's body in the real world and translate those positions to that of the user's avatar in the virtual world. Avatars are any form taken on by a user in the virtual environment. A user can look down while standing and see a virtual body that their viewpoint is connected to, with arms that move while their real-world arms do. When observing these kinds of motions, the human brain fires the same neurons it would while observing actions in the real world. VR environments can be so immersive that the brain can't tell the difference between what is taking place to its virtual body versus what is happening to its physical body (González - Franco, Pérez Marcos, Spanlang, & Slater, 2010). Of course, users have the memory of putting on the headset and entering the virtual environment and the sensation of wearing the headset, but that is the last piece of information the users have to root them in the real-world. The bodily immersion is strong enough that VR is being more and more commonly used to rehabilitate stroke victims when relearning how to control parts of their body (González - Franco et al., 2010). Dr. Chris Carlson, professor at Centralia College teaching computer science and mathematics, weighs in, "Virtual reality can be so powerful that amputees can feel phantom pains in lost limbs and it can help treat those symptoms." VR's powerful bodily immersion is by far its greatest strength as a medium and technology.

Phenomena and experiences that arise from VR's immersion, and even that of simple virtual worlds, are causing new discussions to be had over what philosophically can be considered real. VR's ability to allow the transcendence of one’s physical location, body, and even personality if so desired, is being discussed by philosophers around the world. These advancements drastically challenge definitions and notions of what it means to be 'present' in a

situation, some causing philosophers to redefine as what is 'self,' what is 'real,' and what it means for something to 'exist' (Houliez & Gamble, 2013). These discussions have become normal for users of virtual worlds, they themselves claiming that they've had to rethink their notions of existential subjects (Houliez & Gamble, 2013). VR and virtual worlds are giving people tools to see worldly and existential perception in new lights.

Not only are existential perceptions being challenged by virtual reality, but also perceptions of one's self. The immersion of VR is powerful enough to make users feel that they truly are their virtual avatar. This allows for entirely new concepts to social science. For the first time in human history, people can effectively 'try on' different biological forms and experience what it feels like. That experience is profound enough that users feel like they are taking on the attributes of that form. This effect it referred to as the Proteus Effect (Blascovich & Bailenson, 2011). Its impact is strong enough that studies have found that the phenomenon can help mitigate biases by putting people in the shoes of other people, such as a white person in the body of a black person (Peck, Seinfeld, Aglioti, & Slater, 2013). Once again, VR's greatest strength is its ability to transcend physical limits and give new viewpoints on concepts.

Virtual Reality's ability for full body immersion allows for muscle memory, bodily rapport, and everything else being face-to-face delivers. These aspects and others allow VR to drastically improve the quality of interactions and communication. Physical presence during communication is a major factor when it comes to the quality of an interaction. Many times unconscious, the effects that being physically around someone, such as reading body language and eye contact, greatly improves the quality of the interaction of which basic online telecommunications lack (Li & Jing, 2018). VR remedies that lack in online communication by allowing for physical presence during interactions. This improves closeness and the overall

positivity of the interaction (Tarr, Slater, & Cohen, 2018). Human bodies significantly respond to cues from other human's bodies as they are hard wired for social interaction (Lee et al., 2011). Not only are the interactions themselves more positive and of higher quality, but attitudes and emotions towards avatars and their inhabitants are improved as well. Physical presence, and doing things together in VR, results in closer relationships, greater trust, and improves affiliations toward others and their avatars (Tarr et al., 2018). Non-VR telecommunications don't allow any physical presence at all, removing any ability to utilize these advantages.

Some of the most fundamental advantages of VR stem from more simple telecommunication mediums. Virtual worlds, and VR by extension, provide all of the advantages that simpler communication technologies provide (Congress, 2008). One of the most fundamental advantages of modern telecommunication is the ability to transcend distance, allowing for contact to be kept wherever one goes (Understanding Media, 2016) (Li & Jing, 2018). This transcendence allows people to avoid the loneliness and depression that would normally come from being physically separate (Li & Jing, 2018). People can meet new people and reconnect with people they already know despite any location limitation. Also, online communications can be very important to people who feel very uneasy about social situations but wish to develop their social skills. Online communication can benefit those people by allowing for a more relatively safe environment to interact in than the real world (Li & Jing, 2018). VR does this by removing bodily harm from the equation. Users can rest assured that they can simply leave the environment whenever they want by turning off the system since they aren’t physically there. They won't find themselves trapped in a social situation like they could be in the real-world. Quality relationships are usually found as well, with nearly half of the users of

online games considering their online friendships to be better or equal to their offline ones (Congress, 2008).

Why is it then that there doesn't seem to be any mainstream VR worlds with thriving economies and societies? The reason is simply time. VR has become what could be considered mainstream only around 2016 with the releases of headset such as the HTC Vive and Oculus Rift. When new hardware is introduced, it usually takes time for software development to be able to catch up. Companies and industries haven’t had time to keep up with the progress, and VR technology is already evolving past those headsets. With this progress, it's only a matter of time before photo-realistic quality is achieved (Congress, 2008). It’s only a matter of time before all of VR's implications become reality.

While simpler communication techniques have many advantages, they also have many issues. There are many discussions about if modern social networking technologies are making it more difficult to interact in the physical world face-to-face. Studies have shown that increasing the use of simple modern telecommunication tools decreases one’s ability to effectively interact face-to-face with others (Li & Jing 2018). This has been a concern about social media for a long time and it is caused by the dehumanization of the medium. Instead of interacting with people, interacting with text has become the norm.

The issues that arise by the overuse of text don't necessarily apply to VR. In fact, those issues are fixed by VR's attributes. Online interactions are of lower quality and are less socially supportive than face-to-face interactions because they lack the ability for nonverbal communication (Lee et al., 2011). Since VR allows for nonverbal communication with its introduced bodily presence, VR will allow for the same qualities that face-to-face interaction brings. Heavy use of telecommunications will no longer have those negative side-effects.

Virtual reality still has plenty of issues of its own. One of the most prevalent issues with any form of communication method is the ability for abuse of others. Online bulling is an issue that plagues current communication methods and will be an issue for future ones (Understanding Media, 2016). VR will be no different, allowing for much more visceral abuse to take place than other communication methods. Just as VR allows for unprecedented levels of immersion for positive subjects, so too are is the immersion of negative subjects.

Another major issue that VR will perpetuate is one that is already be criticized with Facebook and other social media. It's the ability for a group or individuals to easily, many times unaware that it is happening, isolate themselves to a certain way of thinking. Facebook has been criticized in the past for their algorithms that organize what information is seem by a user. By using their interests, Facebook prunes sources to match what users would like to see. Other times though, it's the user's decision to isolate themselves. The Internet can allow a person to meet new people and find like-minded individuals, almost to an extreme (Understanding Media, 2016). Dr. Carlson adds, "Much like current social tools, isolating one's self to their own ideology by surround themselves with like-minded people can hurt their ability to interact with others in a tolerant way." With VR, every aspect of one's social life could be controlled in a similar manner. "It's much easier to control who you are around with in VR, much like Facebook's feed. It can constrict your world instead of broaden it."

In addition to the possibility for abuse and isolation, VR's true problem may come from its greatest strength, its immersiveness. It simply will be too overpowering for some. "It's almost too real for some people, like when they think they're falling they feel that they actually are falling. It can be so immersive that they can have an overpowering emotional reaction to it compared to traditional [telecommunication methods] and games," Dr. Carlson remarks. Already

there is debate about violent video games and questionable themes in movies and other media. VR will take those issues up many more notches and the youth and the mentally unstable will be most vulnerable. Dr. Carlson adds, "[VR] will have a much more subconscious effects, such as showing up in dreams, and a much stronger effect on younger users compared to [simpler gaming and communication mediums]."

One concept that all technological revolutions can be criticized with is the concept of that they have no overall positive effects. Any revolution in technology introduces both positives and negatives, possibly canceling each other out. VR could be said that it won't improve anything, only change it. Dr. Carlson remarks, " VR will be a more intense version of [the social issues] we have now. There will be the same positives and drawbacks, only much more intense then it is now." "We're not far from things like Inception, where harm can be inflicted to one's mind and ideas. This balances out with the positives that VR brings, just like previous technologies which have their own drawbacks and positives. The technology will have a balanced impact."

VR and technology itself does have an overall effect though. Technology introduces negatives as well as positives, although many times the positives become so ingrained into everyday life that they are less perceivable. "Look at the automobile, it allows for people to connect. Yet many, when they enter a car, become the worst version of themselves. Yet it's now hard to imagine removing cars and other vehicles from our world. They are such an integral part of how we do things," Dr. Carlson remarks. A prime example is the discovery and harnessing of electricity. Without electricity, most aspects of the modern world could not exist. While humans use electricity, they exploit the natural environment for resources and damage the environment. Although with electricity, humanity can now protect themselves, and the planet, from dangers such as asteroids. Technology gives humanity greater ability to change the world around them,

and therefore more responsibility to it. Humanity may have much more things it has to deal with, but at least it now has the ability to deal with them. Those abilities would not be possible without taking on the responsibility of technology and knowledge. Bad things are enabled by electricity and other technologies but the choice to do those bad things are made by the people that do them. The root problem is the choice of the people, not the technology itself. It doesn't matter how technologically advanced humanity will get, humanity's issues arise from itself, not the world and technologies around it. Although VR and other technologies add more to what humanity must deal with, it also gives humanity the ability to further change and understand the world around it and itself. That knowledge and understanding makes the toils worth it. That is why VR will make the world a better place.

Overall, VR's true negatives, and positives, will be discovered in time. Its greatest strengths and costs are likely things humanity would never see coming. The unknown is always the most dangerous, and exciting, part of any human pursuit. "[VR] can have very different effects to different people and much more visceral than perhaps a reaction to an art piece or a sculpture or even a movie. VR will bring new ways of showing experience in a whole new medium," remarks Dr. Carlson. VR's true effect and meaning will be different for each person. VR will become seamless with humanity and its impacts will be as diverse as all of its individuals.

Conclusion

Virtual reality (VR) improves on what virtual worlds deliver. Virtual worlds allow for new mediums of communication that will improve and streamline corporate and personal telecommunications and activities. Like simpler mediums, virtual worlds transcend distance, allowing distant contacts to meet and converse. VR revolutionizes virtual worlds by adding the

ability for physical presence in them. Depth perception and body tracking, as well as how brains take in information, makes VR very immersive. This powerful immersion is VR's greatest strength as well as one of its problems. VR has many problems like other technologies, but they are balanced out by many positives as well. In the end, it is humanity's choice how to use these technologies. VR gives humanity's individuals tools they didn't' have before to interact with and understand each other and the world around them, therefore improving the world overall as humanity knows it. VR is a new medium of expression that humanity can utilize to change the world. "Through ... virtual worlds, the real world will become a better, more connected place" - Philip Rosedale, CEO of Linden Labs, makers of Second Life (Congress, 2008).

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