Digital Mind Molding: Is Virtual Reality Technology Pulling Our Strings?

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Abstract

Virtual reality technology is widely known to be used in pop culture, especially in video games and internet social settings, particularly due to the increasing online presence of our generation. However, there are many other uses for virtual reality, such as in therapy to treat phobias and traumas. Through repeated stimulation of the same trauma or phobia over and over again, patients have shown progress and improvement, suggesting virtual reality can be a great tool in the medical practices, particularly in psychiatric and psychological treatment. This technology also enhances social interactions, and has shown to fulfill social needs. Virtual reality can mold minds in more ways than one. For example, people's psychology can be changed through VR therapy when treating disorders or mental illnesses, or memories altered by simulating hyper-realistic situations and environments. The question is, what is it about virtual reality that can have such a large impact on our psychology? Does it have something to do with the uncanny valley concept or is there more to it than that? We explore the benefits and advantages of virtual reality technology, and later discuss the possible negative, ethical implications that this technology is currently used for and the future of it.

Virtual Reality technology is used to simulate a realistic and immersive environment for the viewer. Currently, there are still many improvements to be made before VR can accurately convey the same sort of experiences that reality can. Despite this, can present-day VR have dramatic effects on humans emotionally, psychologically, and physically? When people think of virtual reality, they usually immediately think of gaming. While virtual reality can make a video game more immersive and exciting, outside of gaming, there are many other creative uses for VR as well. Although virtual reality technology has been widely celebrated because of its diverse use and benefits in not only video games, but in other practices such as therapy, there are a few consequences that come with this technology as well. Virtual Reality has the potential to alter

memory and use strong representation of concepts and ideas to stir feelings of "deja vu" within their users to retrain behaviors. First, we will discuss the concept of the "uncanny valley", then the benefits, and lastly, the negative implications of the future of VR technology.

Most individuals do not find even the most carefully crafted Virtual Reality or virtual avatars realistic at the standards of modeling available today. Despite the seemingly realistic elements, something registers as "wrong," to the viewer. However, in a 2000 experiment from Ehrlich, Schiano, & Sheridan, researchers found that realism was most naturally conveyed with motion realism vs. image realism[1]. This motion realism is becoming more and more of a possibility with technologies such as the Kinect sensor which is able to gather and use data from real physical movement. Additionally, depending on the intended impact of a virtual reality experience, an environment designed for complete realism may be unnecessary or even detrimental to achieving the end goal.

In a study by Himanshu Chaturvedi at Clemson University, 35 individuals—20 males and 15 females—were given images to study a patient named Bob. One depiction of Bob was very realistic with details fleshed out in Unity, another was in flesh tone but more cartoonish and the third was based on a charcoal sketch. There was a landslide in results in which Bob conveyed more empathy in his more realistic state. His eye contact and irritability mixed with this realism helped to convey a human condition of someone with pain getting worse by the minute[2]. With cruder art styles, our expectations of these avatars are thus lowered, we feel a disconnect.

In Japan, a study was done by Jun'ichiro Seyama and Ruth Nagayama to try to figure out where exactly the uncanny valley begins and ends by manipulating and morphing parts of dolls' faces into human faces. In each experiment, specific parts of the face such as the eyes, mouth, nose, and other parts were manipulated to see how each observer reacts. The pleasantness or unpleasantness was measured on a 5 point scale: -2 was the most unpleasant, and +2 being the most pleasant[3]. While this was a mainly visual experience, another experiment was conducted where scientists asked the participants about the images' attractiveness by asking them to

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[1]Himanshu Chaturvedi, "Virtual humans and Photorealism: The effect of photorealism of interactive virtual humans in clinical virtual environment on affective responses." TigerPrints (2015): 5.

[2] Himanshu,35.

[3] Seyama, Jun'ichiro, and Ruth S. Nagayama. "The Uncanny Valley: Effect of Realism on the Impression of Artificial Human Faces." *Presence: Teleoperators & Virtual Environments* 16, no. 4 (August 2007): 340.

consider ages, symmetry, hairstyle, etc[4]. It is suggested that there might be different criteria for realistic faces and unrealistic faces, that they are completely separate from each other and the fusion between them is what creates the uncanny valley. It was determined that both visual culture and exposure, youthfulness—physical attractiveness—and the dichotomy of realism versus unrealism are what determine the uncanny valley[5]. However, it is still unclear exactly to what degrees and variations in these aspects determine the uncanny valley.

While the uncanny valley cannot be specifically measured, people tend to immerse themselves in their personally created avatars. Why is this? Avatars that share the same sex as VR users stir empathy[6]. Researcher Noah Robinson experiments with creating 3D abstract environments for patients to navigate through. These patients are coming down from drug addictions can navigate a psychedelic trip and alongside the help of a therapist who looks like an avatar[7], suggesting avatars build truth and convey sympathy within users. Does being in the space with the person in the headset resonate more than speaking from the sidelines? Robinson wants the VR to be fully immersive and break the fog that depression and anxiety creates so that the patient can fully focus on their thoughts. Robinson created these programs based on the comfort he found in video games as an adolescent. Robinson later suggests that increases in dopamine are the leading source of prevention for relapse.

As suggested with Robinson's study, VR can be beneficial in all kinds of therapy as well. With Cognitive Behavior Therapy (CBT), patients are taught to detect repeated negative thought patterns and then use corrective behavior to overcome them. Virtual Reality therapy allows the user to combine their own reasoning with the control of a trained therapist who can adjust settings of the visuals to their clients needs. Marcus F. Kuntze of the Cura Bern Clinic in Switzerland claims that people in VR seem to know they are not in a completely real setting as no one had ever hit the panic button in the simulated situations he devised[8].

Virtual Reality has been used to make an impact on people with dozens of disorders from anorexia to sexual addiction. The fantasy of the VR creates an escape that dulls the patients pain

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[4] Seyama, 345.

[5] Seyama, 349.

[6] Himanshu, 7.

[7] Adam Tamburin, "A virtual escape from addiction: Vanderbilt grad student is developing therapy through virtual reality that he thinks can help addicts in recovery." The Tennessean, 2018.

[8] Nikolas, Westerhoff, "Fantasy Therapy." Scientific American Mind 18, no. 5 (2007): 77.

and can provide a new perspective that breaks them out of negative thought patterns. Some of these treatments once again take advantage of the power of the virtual avatar. For example one program for treating anorexia has the patient navigate through a virtual space with a visible avatar copy of their body created through a scan. After the patient explores the space through this avatar, they find themselves confronting their virtual duplicate in a mirror. This sudden new perspective shocks many patients into realizing that they are lot thinner than the warped body image they had previously internalized, prompting a more positive body image that will hopefully encourage healing and recovery.

VR also can help prepare prisoners for returning to real world situations that might be confusing or overwhelm a person being reintroduced to ordinary life for the first time in many years. Even relatively simple environments like a grocery store can be overwhelming for the newly released. The loss of the sense of community developed during a long prison term causes trauma that can end up with the recently released individual seeking out the same bad influences they had before prison, growing overwhelmed by the unstructured outside and committing crimes that land them back in prison once more. This phenomenon is a significant problem, as statistics from the state of Colorado show that 50% of all prisoners released will end up back in jail after one year[9]. VR has become vital in helping acclimate prisoners to returning to the challenges of freedom long before they have to face them[10].

In many ways, the virtual environment can be used to mold one's mind to change it, for better or worse via the use of memory manipulation. One of the many proposed benefits for using VR technology is for mental health treatment. Individuals who suffer from anxiety disorders can train and adapt their mind to its fears through safe exposure in a virtual environment. Exposure therapy is a common practice for those who suffer from a variety of fears and phobia. What's interesting about VR is that it eliminates the need to recreate the experience in real life, which is both safer and more convenient for the patient[11]. In a real environment, the events are unpredictable, whereas in a virtual environment, the situations are controlled and

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[9] Emily Reynolds, "Virtual Reality makes Avatars more Important than Ever." Motherboard, last modified December 11, 2016, https://motherboard.vice.com/en_us/article/pgkv9z/vr-makes-avatars-more-important-than-ever

[10] Taylor Dolven and Emma Fidel, "This prison is using VR to teach inmates how to live on the outside." Vice News, last modified December 27, 2017, https://news.vice.com/en_us/article/bjym3w/this-prison-is-using-vr-to-teach-inmates-how-to-live-on-the-outside

[11] Dexter Thomas, "Therapists Are Using VR Headsets to Cure Phobias," VICE News, 2018. news.vice.com/en_ca/article/zmqda5/therapists-are-using-vr-headsets-to-cure-phobias.

programmed. The fear of heights, insects, and thunderstorms and more can be treated within generated 3D spaces. Real limitations such as flying on a plane due to cost are negligible with VR exposure.

There were a couple studies and experiments conducted by Julia Diemer and her colleagues involving participants with phobias and a control group. Both groups were subjected to various simulations that induced anxiety and fear among the phobic participants. Heart rate (HR) and skin conductance levels (SCL) were recorded as psychophysiological responses to the VR[12]. Over a period of a couple weeks of this therapy and stimulation, HR and SCL were shown to reduce over time, meaning the therapy was working. This idea of multiple sessions of repeated stimulation was called "habituation". In both the control and phobic groups, anxiety was prevalent, but the biggest improvements shown were from the phobic participants.

Beyond fears and phobias, VR has been tested to treat PTSD in soldiers[13]. Like phobias, PTSD is treated with exposure therapy, but it's hard and almost impossible to recreate the experience one feels in a warzone. In an article published by NBC, Jimmy Castellanos, a war veteran from Iraq, was treated in VR for his PTSD. A majority of his dreams would be nightmares of his time in Iraq. Using virtual reality, Castellanos was able to enter a simulation of the war in Iraq. With a replica M16 in hand, Castellanos found himself on a helicopter flying above the warzone. "My heart was beating. I was sweating, and I almost freaked out." After his experience he was given a simple test to match colors and shapes with the correct labels. He was unable to go through with it. Over the course of thirteen weeks Castellanos continued with the sessions. By the last one, he reported that his nightmares had stopped.

Virtual reality has been used in various practices as a tool for therapy, but on the level of the average consumer, this technology can be used to enhance social interactions. The cyberspace and internet are places of high, positive potential for human engagement, improvement, discovery, and interaction[14]. The internet is particularly pertinent to college students because they grew up with this technology, and universities and educators emphasize

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[12] Diemer, Julia, Andreas Mühlberger, Paul Pauli, and Peter Zwanzger. "Virtual reality exposure in anxiety disorders: Impact on psychophysiological reactivity." World Journal Of Biological Psychiatry 15, no. 6 (Frebruary 2014): 428.

[13] Parkin Simmon, "How Virtual Reality Is Helping Heal Soldiers Suffering with PTSD," NBC, 2017. www.nbcnews.com/mach/innovation/how-virtual-reality-helping-heal-soldiers-ptsd-n733816

[14] Yu, Sen-Chi, and Chien Chou. "Does authentic happiness exist in cyberspace? Implications for understanding and guiding college students' Internet attitudes and behaviours." British Journal Of Educational Technology 40, no. 6 (2009): 1137.

the use for it. College is also the time for self-discovery and students try to find social interactions, intimacy, and explore sexuality through the use of the internet[15]. These are positive wants and needs that are pursued by students, but it is unclear how happy or satisfied they are in the cyberspace. Even so, virtual reality can enhance socialization and interactions.

In the words of Mark Zuckerberg himself, Virtual Reality can be a key tool of socialization[16]. It's thought that someday people will be able to use it for social activities such as travel, classes, concerts, etc with friends and family. In a world where it can be hard to schedule gatherings based on the availability of one another, this is quite an accomplishment.

Virtual Reality is even used to fulfill sexual needs. Due to creative use of a 360 camera, VR Pornography is becoming more and more believable. Technology known as telededonics is even being developed which can further deepen a connection between humans in a virtual space by allowing for enhanced verbal communication juxtaposed with mutual masturbation.

VR helps build empathy in its users creating scenarios that put them in the shoes of others by portraying sexual aggression, racial discrimination and more. VR can even put the user in a different country and social situation than they are accustomed too, providing simulation of first hand experience. Such programs create forethought in their users as well as build a dialogue. These programs help the user experience experiences in a new way and realize how they could help someone.

Although VR technology has many uses and benefits, there are consequences too. The head of Barcelona's Experimental Virtual Environment Lab Mel Slater, “Our work in VR has shown our minds body representation is a temporary construction that we continually rescontruct based on sensory input… we fairly quickly have the illusion body is different than what you expect[17].” While this seems strange in theory, it could be compared to our ease at picking up accents while we are on vacation for a week or two in a foreign area or familiar habits of a close friend whom you've been in close quarters with.

VR fills in details perhaps forgotten via trauma to create vivid imagery which takes soldiers back into the moment trauma was created and to walk through alongside a therapist. The

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[15] Yu, 1136-1137.

[16] Michael Greene, "Is VR a Game Changer?." Psychotherapy Networker, Washington 40, no. 6 (2016): 5.

[17] Michael, 5.

irony in creating an ultra realistic environment to desensitize patients to trauma they've experienced could cause patients to lose empathy. Even in a job simulation SIM, users claimed that while a more realistic avatar had more of a presence as an interviewee, they did not feel the same level of nervousness as when faced with a "real human[18]."

As pointed out in a journal by therapist Michael Greene, data profiles can be created for individuals about their kinematics or physical movements that could be more identifying than previously conceived about one's identity. Individuals could also start to question the validity of the real world around them. Could they become immune or desensitized to fear?

The invention of smartphones drastically changed social interactions and created new anxieties, suggesting the same could become true for virtual reality—the need to become plugged in and escape. Currently, VR headsets are cheap and available to all at a relatively low price, increasing accessibility to this technology.

Over many years evidence of the human drive toward escapism has been observed through the rising number of people struggling with video game addictions. Young veterans are being encouraged to use Virtual Reality to deal with conflicts from fighting overseas in Afghanistan because they are more used to "video game situations than talking about their emotions." In virtual reality there are blurred lines between real and virtual worlds; the experiences in these two worlds can cause a dilemma on ethics. When people experience virtual reality, their memories will be manipulated, making it difficult to distinguish between reality and the virtual world, possibly encouraging more violent behaviors. VR systems can wire human brains differently and using immersive technology to desensitize their brains. In the article, "FaceBook Removes VR Shooting Demo," ethics can play a major role of ethics on how it can impact on people's behaviors and actions[19].

Virtual reality technology has the potential to alter memories, leading to various ethical implications. As we have seen with the data breaches on Facebook, many individuals do not even foresee or consider how companies are taking our information and potentially profiting from it. Companies that own virtual reality technology and gather user data can use it to create

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[18] Himanshu, 5.

[19] Price, Rob. "Business Insider." N/A. 28 Feb 2018. http://www.businessinsider.com/facebook-oculus-cpac-vr-shooting-demo-parkland-school-attack-2018-2 (accessed Apr 3, 2018).

individual profiles of users. Does this imply that decisions and personalities can be altered by suggestion through VR as well?

The article "The Ethics of Immersive Journalism: A rhetorical analysis of news storytelling with virtual reality"[20] discusses the ethical implications of the filming tactics used in the creation of 360 immersive news video documentary *Clouds Over Sidra*; particularly the manner in which the immersive nature of the video and the lack of evidence of the camera operator removes signals that this is not an entirely unbiased and unedited view of reality. The dangers of creating this illusion of reality are subtle but significant. While avatars with a somewhat exaggerated cartoon-like appearance have been shown to inspire more empathy in VR [21], in the case of particularly realistic environments, the human brain is more likely to interpret and store memories of such an experience as truth, much as a memory of a real event the person was an eyewitness to would be processed. This could easily be used to quietly influence perceptions of an event by presenting an altered or selectively recorded event and then presenting it through VR.[22] Virtual Reality can provide a false security blanket, our inhibitions lowered completely; our reaction times lowered and cause us to remember things in a problematic blurred manner. We can become confused, isolated, altered beyond the point of recognition.

The effects of virtual reality on the human experience can be very strong, therefore there is both a great deal of potential for the technology to be used in beneficial ways and in ways that might be potentially dangerous. A VR experience can be used to manipulate the mind into emotional responses and assumptions in ways that other media cannot. The every person can collect a background check on an individual and see someones entire internet history for less than ten dollars. With corporations showing no restrain in collecting our meta data and building profiles of their consumers; we are in danger of losing our anonymity. Virtual Reality could someday act as an amplified lie detector machine, recording our every unconscious response to real time simulation. Virtual Reality creates environments that appeal to our most fragile senses; our mental illness, our shortcomings, our dating interpersonal sexual lives. Information could

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[20] Hollis Kool "The Ethics of Immersive Journalism: A Rhetorical Analysis of News Storytelling with Virtual Reality Technology." *Intersect* 9 (November 03, 2016).

[21] Yong-Il Lee, Yeojeong Choi, and Jaeseung Jeong. "Character Drawing Style in Cartoons on Empathy Induction: An Eye-tracking and EEG Study." *PeerJ* 5 (2017).

[22] Aline W. Borst, and Beatrice De Gelder. "Is It the Real Deal? Perception of Virtual Characters versus Humans: An Affective Cognitive Neuroscience Perspective." *Frontiers in Psychology* 6 (2015).

someday be readily available to anyone that discusses what kind of a friend, lover, employee, student to the every person. Information that we cannot hide from or dismiss.

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15. Yu, 1136-1137.
16. Michael Greene, "Is VR a Game Changer?." Psychotherapy Networker, Washington 40, no. 6 (2016): 5.
17. Michael, 5.
18. Himanshu, 5.
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