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"Exploring Virtual Reality's Influence on Communication: Introverts and Extroverts in VRChat"

Psychological approach to VRChat

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Description

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Abstract

In recent years, virtual reality has become more relevant in various aspects of people's lives, such as professional, research, and casual usage. With the normalization of VR, its pros and cons need to be researched so that VR can be utilized to its best. There is good amount of research on how “normal” videogames can affect people in various aspects but not enough about virtual reality and its effects. This research focuses on social aspect of virtual reality and how it can affect people’s way of communicating inside and outside of virtual reality.

The research uses mixed-method approach for collecting the necessary data and information, combining qualitative literature review of medical articles, online articles, and videos. For direct user-based information, a questionnaire was utilized to have best change of acquiring sufficient amount of data for research. Most of the information in this research is based on “normal” video games and not VR but can be linked to VR. Information can be utilized in theoretical research for difference between real and virtual reality.

The research revealed that people have used video games to alleviate social anxiety, challenge prejudice, and address body dysmorphia regardless of gender or sexuality. Additionally, VR proves to be helpful in promoting self-discovery and broadening perspectives. The research highlights the pivotal role of virtual reality avatars in shaping effective communication, emphasizing their capacity to either enhance or obscure the clarity and meaning of conversations in comparison to written or vocal based communication.

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Description

Tommi Tiippana

“Virtuaalitodellisuuden vaikutus kommunikatioon: Introvertit and Extrovertit VRChatissä"

Jyväskylä: Jyväskylän ammattikorkeakoulu JAMK, Kesäkuu 2024, 30 sivua.

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Abstrakti

Lähi vuosina virtuaalitodellisuudesta on tullut entistä merkityksellisempi ihmisten elämän eri osa-alueilla, kuten ammatillisessa-, tutkimus- ja arkikäyttössä. VR:n normalisoitumisen myötä, sen hyvät ja huonot puolet on tutkittava, jotta VR:ää voidaan hyödyntää parhaalla mahdollisella tavalla. On olemassa runsaasti tutkimusta siitä, kuinka ”tavalliset" videopelit voivat vaikuttaa ihmisiin eri näkökulmista, mutta ei ole tarpeeksi virtuaalitodellisuudesta ja sen vaikutuksista. Tämä tutkimus keskittyy virtuaalitodellisuuden sosiaaliseen puoleen ja siihen, miten se voi vaikuttaa ihmisten tapaan kommunikoida virtuaalitodellisuuden sisällä ja ulkopuolella.

Tutkimuksessa käytetään monimuotomenetelmää tarvittavan datan ja tiedon keräämiseen yhdistäen laadullista lääketieteellisten artikkelien kirjallisuuskatsauksia, verkkoartikkeleita ja videoita. Suoraan käyttäjäkohtaiseen tietoon käytettiin kyselylomaketta, jolla oli paras mahdollisuus saada riittävä määrä tietoa tutkimusta varten. Suurin osa tämän tutkimuksen tiedosta perustuu "tavallisiin" videopeleihin eikä VR:ään, mutta tieto voidaan yhdistää VR:ään. Tietoa voidaan hyödyntää teoreettisessa tutkimuksessa todellisen ja virtuaalisen todellisuuden erojen selvittämiseksi.

Tutkimus paljasti, että ihmiset ovat käyttäneet videopelejä lievittääkseen sosiaalista ahdistusta, haastaakseen ennakkoluuloja ja hoitaakseen kehon dysmorfiaa sukupuolesta tai seksuaalisuudesta riippumatta. Lisäksi VR osoittautuu hyödylliseksi, edistämään itsensä löytämistä ja avartamaan näkökulmia. Tutkimuksessa korostetaan virtuaalitodellisuuden avatarien keskeistä roolia tehokkaan viestinnän muokkaamisessa ja korostetaan niiden kykyä joko parantaa tai häiritä keskustelun selkeyttä ja merkitystä verrattuna kirjoitettuun tai ääneen perustuvaan viestintään.

Avainsanat (asiasanat)

Virtuaalitodellisuus, Sosiaalinen kanssakäynti, VRChat, Introversio, Extroversio, Ambiversio, Kommunikaatio mallit,

Muut (luottamukselliset tiedot)

Ei muuta tietoa

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1 Introduction

Virtual reality as we know today has just begun its growth to become the next generation way of playing games and connecting people all-around the world into one collective community. Since VR is just taking its first steps, it needs to be addressed that virtual reality can affect people in a positive and negative way. Ever since the invention of videogames there has been an underlying stigma that videogames can affect people, specifically the younger demographic in harmful way. This is something that has not been looked into nearly enough regarding virtual reality since it's only been around for fifteen years (for consumer use) and been in mainstream technology less than ten years. (Barnard, 2023)

In this thesis I wanted to get more insight of how virtual reality can affect people's way of communication in and outside the virtual reality. It goes through the fundamental information revolving virtual reality and psychological needs in communication. Motivation for this research comes from my own experiences in virtual reality and how it changed my own way of communication, confidence and perception of myself and others. Since there is so little research done on virtual reality and how it affects people in the long term, it could be beneficial for game and vr tech industry, and psychological care.

Since the psychology of people is so grand it made it difficult to determine the direction of the research. Research started with how virtual reality can affect people's psyche, but it became apparent that addressing this topic comprehensively would be impractical given the constraints of limited time and resources at this stage. As a result, an alternative approach, which provided easier accessibility and opportunities for participation, was pursued. Insights from experienced individuals in virtual reality were gathered by accessing various internet forums and servers during the research process.

Research of the virtual reality's effects on people is still in its early stages and should be looked at and research more as the technologies improve and get more relevant in everyday life. There is information and research ever since the 1980's about how "normal" video games affect people, in good or bad (Cooper & Mackie, 1986) ways, but not nearly enough about how virtual reality as a platform, whatever games, work or social since it's such a young concept still.

2 Research methods and ethics

For this thesis, a quantitative research method was used for the research, for its ability to provide a structured approach to data collection and analysis and helping to maintain objectivity throughout the study. This can help reduce bias and ensure the credibility of the findings. Research was started with a wide literature review. (Koppa, 2021) Before research theorical framework was made by a thorough reading of scholarly articles, books, and academic sources to get a solid foundation of existing knowledge and theories that are relevant to the topic in hand. Simultaneously, various medical articles on psychology were examined during the course of this research. Peer-reviewed journals, clinical studies, and research papers were thoroughly reviewed to obtain appropriate data, concrete evidence, and expert opinions on the psychology of virtual reality. A few of the main sources used for this thesis are by Domina Petric (2022) and Kai Baldvin (2018).

To get more practical insight and adopt a less scientific perspective, an exploration of blogs, online articles, and YouTube was conducted for relevant information. This provided good understandings of real-world implementations and user experiences relevant for the research.

By using these different researching methods, literature review, multimedia content analysis, and examination of medical articles, the aim was to gain a comprehensive understanding of the research topic. This approach did not only use theoretical information but also opened the research with practical insights and modern perspectives from both academic and user-oriented sources.

The participants for this research were recruited from various VRChat community Discord servers, as Discord is one of the most common applications for gaming and computer tech communities to gather and form connections and communities on. (Benet, 2021) Participants' involvement in the study was initiated through the distribution of a questionnaire.

The questionnaire was made with Google forms as after trying out other online questionnaire applications, it was the most fitting for the purpose of the study as it was very straightforward and easy for the participants as it could be filled without having to register or logging in in any way. Form had 31 mostly multiple-choice questions that participants filled out. (appendix.1)

Research questions

Based on the preliminary research and during the research process the following questions came up as prominent research questions for the thesis:

- How does virtual reality affect people's way to communicate?
- Do the effects reach over to real life?

Ethics

Artificial intelligence (AI) was used as one of the tools to edit and correct the grammatical errors made in the text to ensure the best possible result, regarding the flow and cohesivity of the text. It was also used to help with getting the correct types of citations and references from various sources. AI is getting more relevant nowadays and should be accepted as a tool to ease workload, especially when the end result would be the same if used or not, the only difference being the way to achieve it. (Zawacki-Richter,2019)

The participants were informed that the questionnaire was going to be for a bachelor's degree thesis and the answers completely anonymous. Any personal information was not collected during the research.

Critical thinking was applied to all the sources while examining, and for non-academic sources, the authors' backgrounds were assessed to verify their credibility. Primary sources were prioritized, with secondary sources used carefully.

As the author is an avid user of virtual reality, there can be personal biases in this research. Thus, it is acknowledged that more sources, especially sources with opposing opinions could have been included in the research.

3 Virtual Reality

Extended Reality (XR) is an umbrella term incorporating various immersive technologies that blend the physical and digital worlds. It includes Virtual Reality (VR), augmenting real-world experiences with computer-generated elements; Augmented Reality (AR), overlaying digital content onto the real world; and Mixed Reality (MR), integrating digital and physical elements seamlessly to create interactive environments. XR technologies are designed to enhance human perception and interaction, offering many applications for gaming, education, art, and more. (Tremosa, 2023)

Augmented Reality and Mixed Reality

Augmented Reality and Mixed Reality are closely related technologies, yet they show distinct differences in how they seamlessly integrate digital content with our physical world.

Augmented Reality is a technology that enhances our perception of reality by adding digital information or computer-generated elements to our view of the physical world. This augmentation can include images, videos, or 3D objects that coexist with our real environment. AR experiences are typically accessible through various devices, such as smartphones, tablets, AR glasses, or headsets. When engaged with AR, individuals can see and interact with both tangible objects in their near surroundings and the virtual elements are seamlessly integrated into their field of vision. The applications of AR include gaming, entertainment, education, healthcare, and numerous others. (Tremosa, 2023) At present, Pokémon Go stands as one of the leading applications that brought Augmented Reality into mainstream media. (Wingfield et al., 2016)

Mixed Reality represents a technology that exceeds the boundaries of AR by merging the physical world with digital, computer-generated components in a manner that blurs the distinction between the two. Unlike AR, where digital content only overlays the real world, MR advances this integration by allowing users to interact with and manipulate virtual objects as though they coexist with physical reality. MR is characterized by a high level of immersion and spatial awareness, offering experiences that seem to seamlessly blend the real and the digital. (Tremosa, 2023)

In summary, while both AR and MR harness the potential of digital augmentation, MR pushes the envelope by seamlessly connecting virtual and physical elements.

VR

Virtual Reality is a technology that creates immersive, computer-generated environments or simulations that can be experienced as if they were real. It typically involves the use of a VR headset, which covers your eyes completely, creating immersive visuals accompanied by motion sensor controls. In VR, your movements and actions in the physical world are tracked and translated into the virtual environment. This allows you to interact with and explore the digital world in a highly immersive way. For example, you can turn your head to look around, walk around virtual spaces, and even use handheld controllers to manipulate objects or perform actions within the virtual world. VR is used for a variety of purposes, including gaming, training, education, and simulations. It can provide an incredibly realistic and immersive experience, making you feel like you've been transported to a different place. (Tremosa, 2023)

3.1 Hardware

Virtual reality hardware has come a long way in recent years, with significant advancements in both the technology and accessibility of VR devices. Today, there are several types of VR hardware available on the market, each with its own unique features and capabilities.

One of the most well-known VR devices at this time is the Oculus Quest 3, which is a standalone VR headset developed by Metas Oculus division. The Quest 3 is an all-in-one device, meaning it does not require a separate computer or gaming console to operate. It has a high-resolution display, integrated speakers, and inside-out tracking, which allows users to move around in the virtual environment without the need for external sensors. Another popular VR device is the Valve Index, which is a PC-based headset developed by Valve Corporation. The Index features high-end displays, adjustable lenses, and a comfortable fit, making it one of the most popular choices among gamers and VR enthusiasts. It also has a variety of sensors, including base stations that track the user's movement in real-time, allowing for more immersive and interactive experiences. In addition to these two devices, there are also several other VR headsets available on the market, including the PlayStation VR, the HTC Vive, and the Varjo. Each of these devices has its own unique

features and capabilities, and the choice of device will depend on factors such as price, compatibility, and intended use. (Greenwald et al., 2023)

3.2 Metaverse

The concept of the Metaverse is not a new one and has been explored in various forms of media for a long time. However, recent advances in VR technology have brought us closer than ever before to realizing this vision of a fully immersive, interconnected digital space. At its core, the Metaverse is thought as a virtual world that allows users to interact with each other and digital objects in real-time, using their own avatars or representations of themselves within the virtual space. This space is not limited to a single application or platform, but rather is an interconnected network of virtual spaces and experiences, which can be accessed and shared across a variety of devices and applications. (Tucci, 2023)

However, the development of the Metaverse also raises several ethical and social issues. For example, who will have access to this space, and how will it be regulated? What will be the impact on real-world interactions and relationships? How will issues of identity, privacy, and security be addressed? It becomes clear that Vr has problems with filtering content for users when BBC journalist entered into virtual strip club pretending to be 13-year-old and there was no way of stopping or preventing these kinds of incidents. (BBC, 2022)

One key factor in the development of the Metaverse is the continued evolution of VR technology. As VR hardware becomes more advanced and accessible, it is likely that more people will be able to enter and explore these virtual spaces. This is already happening, as VR headsets such as the Meta Quest and the PlayStation VR become more popular and affordable. (Majkowska, 2023)

As the concept of the Metaverse continues to gain popularity and attention, several major companies have announced their plans to develop Metaverse-like platforms and ecosystems. (Milmo, 2021) Facebook's recent rebranding as Meta is a clear indication of the company's focus on this area, with CEO Mark Zuckerberg stating that he believes the Metaverse will be "the successor to the mobile internet". Other tech giants such as Microsoft and Nvidia are also investing heavily in the development of Metaverse technologies.

In conclusion, the Metaverse represents an intriguing vision of a fully immersive and interconnected virtual world, which has the potential to revolutionize the way we interact with each other and with digital technology. However, realizing this vision will require significant technical and social innovation, as well as careful consideration of the ethical and social implications of this new form of digital space.

4 Social VR

Social VR, short for Social Virtual Reality, refers to virtual reality experiences and platforms designed specifically for social interaction and communication among users in a shared virtual environment. It combines immersive VR technology with social networking and an atmosphere to create a space where people can interact with others as if they were physically present, regardless of their actual physical locations.

As of the current writing, prevalent Social Virtual Reality (Social VR) applications, according to Zyber VR (2023), include VRChat, NeosVR, Rec Room, and Bigscreen. Throughout the subsequent sections of this paper, references to Social VR will primarily refer to VRChat, unless specified otherwise.

4.1 VRChat

VRChat is a dynamic virtual reality platform that invites users to engage in immersive social experiences within a shared virtual world. It serves as a vibrant hub where individuals can interact, socialize, and connect with others. This unique platform is accessible through various devices, including VR headsets, desktop computers, and even some mobile devices, ensuring a broad user base. VRChat also accommodates cross-platform interactions. This means that users with different devices can seamlessly engage with each other in shared virtual spaces, promoting a sense of community and accessibility. (Laukkonen, 2023)

Social interaction takes center stage in VRChat, with users effortlessly communicating via voice chat, text chat, or gestures. This social dimension forms the solid foundation of the platform, motivating users to come together in virtual spaces for conversations, gaming, or casual gatherings. Additionally, some users take the initiative to organize a diverse range of events and activities,

spanning from lively dance parties and captivating art exhibitions to competitive gaming tournaments. These gatherings provide users with a broad spectrum of opportunities to engage and participate in various virtual experiences, fostering connections with diverse individuals. (Fagan, 2018)

VRChat revolves around the idea of customizable avatars, giving users the ability to shape and personalize their virtual identities. In interview by Kent Bye (2020), Graham Gaylor (CEO of VRChat) talks about how it started:

> "I mean, when Jesse came on and implemented the first iteration of the avatar system, we kind of stumbled into the magic of giving the community that flexibility. You know, I don't think that any of us ever imagined the level of creativity that they would bring or the things that they would add and build into these avatars and worlds eventually. So, I think that a little bit of luck and a little bit of awesomeness, but mostly it's the creativity of the community. If you can empower them to do that, you get some really awesome stuff."

The platform thrives on content created by its users, who are encouraged to contribute by designing their virtual realms, avatars, and interactive experiences. This collaborative atmosphere has created hundreds of diverse and lively communities within the platform. These social communities extend beyond the virtual world, contributing to the platform's appeal and vibrancy.

Within VRChat, users travel a variety of user-generated virtual worlds, each offering unique themes and activities. These aren't static rooms but dynamic environments where users can interact with objects, engage in activities, and explore imaginative worlds. (Butler, 2022)

4.2 Avatars

The use of virtual avatars in VR environments has significant implications for individuals' identities and psychological well-being. Virtual avatars serve as digital representations of users, allowing them to interact and engage with virtual worlds and other users within those environments. These avatars can have a profound impact on individuals' perceptions of self and their psychological experiences. (Baldvin, 2018)

The relationship between a person's physical self and their virtual avatar can be complex. Research has shown that individuals tend to psychologically identify with their avatars, experiencing a sense of ownership and attachment. This identification can be influenced by factors such as avatar customization, embodiment (feeling as if the avatar's body is their own), and the level of agency individuals have over their avatars' actions. As a result, the virtual avatar becomes an extension of self, influencing individuals' self-perception and behavior both within and outside the VR environment. (Baldvin, 2018)

The impact of virtual avatars on individuals' psyches extends beyond self-perception. Avatars can affect social interactions and interpersonal dynamics within VR environments. Research suggests that individuals may project aspects of their real-world personalities onto their avatars, resulting in continuity between their offline and online behavior. Moreover, the social presence and interactions mediated through avatars can influence individuals' emotions, self-esteem, and social bonds. Positive social interactions and a sense of social belonging in VR can have beneficial effects on individuals' well-being, while negative experiences, such as avatar-based harassment or social exclusion, can lead to negative psychological outcomes. (Baldvin, 2018)

It is essential to recognize that virtual avatars are not detached from individuals' real-world identities and psyches. The psychological impact of avatars in VR can vary based on factors such as the degree of embodiment, the level of identification, the social context, and the individual's psychological characteristics. (Baldvin, 2018)

Understanding how virtual avatars reflect individuals' identities and influence their psyche is crucial for designing inclusive and psychologically safe VR experiences. By acknowledging the complex interplay between avatars and self-perception, researchers and practitioners can develop

strategies to promote positive experiences, foster psychological well-being, and mitigate potential negative effects associated with virtual avatar use in VR environments. (Baldvin, 2018)

4.3 Identity and gender

VRChat is more of a social platform than a game. There avatars become reflections of the players' identity rather than just a character you're playing as. When users spend time interacting with their avatars in virtual spaces, they often develop a sense of ownership and attachment to these digital representations (Straszfilms, 2021). This sense of psychological ownership can lead to a feeling that the avatar is an extension of oneself. Consequently, changes in the avatar's appearance or behavior can evoke corresponding emotional responses in the user, blurring the lines between the virtual and real self.

"For many users in VRChat, it can't be emphasized enough that they're not just piloting an avatar that they like the look of, they are the avatar that they like the look of. They are inhabiting a body." (Straszfilms, 2021)

Virtual environments offer a safe and experimental space for identity exploration. Users can use avatars to test different aspects of their personality, gender expression, or even cultural identity. This can facilitate self-discovery and the exploration of parts of one's identity that may not be readily explored in the physical world. (Freeman et al., 2022)

Virtual avatars present a unique opportunity for individuals to change and express their identities in ways that may not be feasible in the physical world. Users can customize their avatars to resemble their idealized selves, experiment with different appearances, or even adopt entirely different personas. Having an ability to create and control an avatar's appearance and behavior can influence how individuals perceive and present themselves, potentially leading to a sense of empowerment and self-exploration. (Freeman et al., 2022)

In research conducted by Baldwin (2018), various trends occurred from the interviews. The first thing that was observed, the longer a person had publicly acknowledged their transgender identity and initiated steps toward medical transition, the less likely they were to actively experiment with gender expression in video games. Some participants mentioned being extremely focused on

every aspect of their avatar's appearance before coming out or during the initial years after coming out. However, as time passed, the desire to customize every feature diminished, and most individuals became less concerned with avatar details if it aligned with their gender identity. This pattern matches the way many transgender individuals initially express their gender during the early stages of transitioning. They often emphasize stereotypical masculine or feminine traits through their actions and clothing choices but gradually adopt a more natural and realistic gender expression once they have had the opportunity to live as their true selves.

In Baldwins (2018) research became apparent that age also plays a role in how individuals use avatars to explore their gender expression. Younger participants can be more inclined to use avatars as a tool to visualize their gender transition goals. In contrast, older participants prioritize playing as their true gender but are less concerned about the intricate details of their avatar's appearance. This difference in approach can be attributed to generational disparities. Younger participants have grown up in a world where vast customization is expected in nearly every product, including video games. On the other hand, when older participants first began gaming, avatar customization was not yet a possibility. They simply selected a gender and played with characters that couldn't be altered beyond that. As a result, their use of avatars was primarily to extend their gender identity into the virtual realm, rather than visualizing specific bodily changes.

4.4 Prejudice

Virtual reality has the potential to impact a wide range of human experiences, including how people perceive and interact with others. One way in which VR can impact prejudice is by providing users with immersive and realistic simulations of experiences that are different from their own. For example, VR can simulate experiences of discrimination and prejudice that are commonly faced by individuals from marginalized groups, such as racism, sexism, and homophobia. These simulations can provide users with a more visceral and emotional understanding of the impact of prejudice, which can help to increase empathy and reduce bias. For example, “1000 cut journey” by Stanford University Virtual Human Interaction Lab has you take the role of a black male, Michael Sterling, experiencing racism as a child through disciplinary action in the classroom, as an adolescent encountering the police, and as a young adult experiencing workplace discrimination. (G4C, 2018)

Additionally, VR can be used to provide users with positive and affirming experiences of diversity and inclusion. For example, VR can simulate social situations where users interact with individuals from different backgrounds and learn about their experiences and perspectives. These simulations can help to reduce stereotypes and increase understanding and respect for diverse perspectives and identities. (Pan & Hamilton, 2018)

In a systematic review conducted by Tassinari et al. (2022) it was found that virtual reality is closely linked with real-life prejudice. As a result, virtual reality is becoming an increasingly useful tool for researching intergroup attitudes and how they can change through intergroup contact. To achieve more precise results in the future, further studies should focus on the potential of virtual reality. The unique features of virtual reality, such as its immersive nature, ability to simulate body ownership and embodiment, and ability to create highly realistic social environments, make it a promising tool for promoting perspective-taking, which has been shown to be a critical factor in reducing prejudice.

Taken together, these studies support the notion that, VR technology has the potential to impact how people perceive and interact with others, particularly in the context of prejudice and bias. By doing so, we can leverage the potential of VR to promote empathy and understanding while also addressing the complex and nuanced nature of prejudice and discrimination in our society. (NBC News, 2018)

5 Personality types

The OCEAN model, also known as the Big Five personality traits, is a widely recognized and well-established psychological framework utilized for the examination of human personality (Diener, 2019). This model encapsulates five fundamental dimensions, each offering valuable insights into various aspects of an individual's personality. According to the OCEAN theory of human personality, these major traits include Openness to Experience, Conscientiousness, Extroversion/Introversion, Agreeableness and Neuroticism. The OCEAN theory's measurement, represented by percentiles for each trait, is highly reliable, accurate, and beneficial for individual studies. However, its applicability in relationships, communication, and business is limited. It is most effective for individual personality assessments, population-level personality studies, and counseling or therapy purposes. (D’Agostino, n.d)

Introvert

Introversion refers to a state where individuals are primarily focused on their own thoughts and feelings. Introverts are often seen as reserved and contemplative. They tend to value alone time, prefer thinking to talking, and are more interested in deep, meaningful connections rather than being openly emotional. Introverts are selective about sharing personal information and usually confide in only a few trusted individuals. (Petric, 2022)

Introverts often find comfort in being by themselves, as it allows them to recharge their energy. They may choose writing over face-to-face conversation as their way of communicating. At times, introverts may experience a feeling known as "people exhaustion or running out of social battery," which pushes them to seek solitude to regain their mental energy. Introverts can also show brief moments of extroverted behavior, even if they generally possess introverted traits. (Petric, 2022)

In his medical journal, Petric (2022) suggests that introverted individuals tend to excel in certain professions like artists, writers, scientists, composers, and inventors. These careers value qualities such as introspection and the ability to work independently. However, introverts might face challenges when it comes to working effectively in teams or being highly social. They may not perform as well in professions that require extraversion, like politics, entertainment, teaching, or medicine.

Extrovert

According to Petric's (2022) medical journal, extroverts typically find enjoyment in social interactions and exhibit traits such as enthusiasm, talkativeness, assertiveness, and sociability. These people thrive in the company of others and gain energy from socializing. They often enjoy participating in events at large gatherings, such as parties, community activities, public demonstrations, or business and political gatherings. Additionally, extroverts tend to shine in group settings and collaborative environments.

Being primarily extroverted comes with certain advantages. Extroverts are good at socializing and thrive in team environments. They have a natural aptitude for presenting themselves confidently in public and are often perceived as likable. This social prowess makes them well-suited for

professions like show business, politics, medicine, teaching, and others that require strong teamwork and social skills. (Petric, 2022)

However, being extrovert may have some potential weaknesses. They might struggle with working alone and find it challenging to spend time in solitude for introspection. Compared to introverts, extroverts are more inclined to absorb the thoughts and emotions others have about them. They can also be more sensitive to insults and personal attacks. (Petric, 2022)

Ambivert

“Ambiversion is considered to be near the half-way mark of the introversion-extraversion continuous dimension of personality.” (Petric, 2022)

According to Petric (2022), an ambivert is someone who feels moderately comfortable both in group settings and when spending time alone. They can adapt easily to different social contexts. For instance, when facing authority or meeting a stranger, an ambivert may lean toward introversion but remain communicative and capable of socializing. However, when with family or friends, they may exhibit more extroverted traits without becoming overly excited or overconfident.

Ambiverts possess a valuable ability to adapt to various situations, making them well-suited for different scenarios. In terms of personality traits, ambiverts typically do not face significant obstacles in their professional lives. Ambiversion is often considered one of the most adaptable and stable personality traits within the spectrum of introversion and extroversion. (Petric, 2022)

6 Communication needs

Geoffrey Beattie and Andrew Ellis (2017) delve into human communication in their book, highlighting our unique ability to communicate through various means. From facial expressions, gestures, and eye contact to body posture, clothing, speech, and nonverbal sounds like laughter and sighs, humans have developed a rich selection of communication methods. When we nod our heads, it's like saying 'yes,' and a shrug often means 'I don't know.' The message is the same, regardless of how we express it. Sometimes we pick one way to communicate, and other times we

choose differently (not waving goodbye on the phone but using gestures and facial expressions when talking to someone from another culture/country). Another option is to play it safe and use both methods at once. For example, nodding and saying 'yes' together can be a good move if you're worried about your message getting across clearly.

Tone of voice

Albert Mehrabian explains extremely well how some information is gained or lost through the vocalization in speech. But as the Internet culture has grown, text-based conversation has increased, and people had to come up with way to indicated vocal based communication in text such as sarcasm. (Siever, 2017)

> “As I have pointed out, there is a distinction between verbal and vocal information (vocal information being what is lost when speech is written down— intonation, tone, stress, length, and frequency of pauses, and so on), and the two kinds of information do not always communicate the same feeling. This distinction, which has been recognized for some time, has shed new light on certain types of communications. Sarcasm, for example, can be denned as a message in which the information transmitted vocally contradicts the information transmitted verbally. Usually, the verbal information is positive, and the vocal is negative, as in "Isn't science grand."” (Originally written by Mehrabian, 1968/republished by Mortensen 2008, p. 195)

Within the large communities of diverse backgrounds in VRChat, there exists a subset of individuals who prefer not to vocalize their thoughts. This choice is influenced by various factors, ranging from personal dissatisfaction with one's voice to instances where the voice does not align with an individual's gender identity, and even cases of physical muteness.

One notable community addressing the needs of the deaf and mute player base is known as "Helping Hands" in VRChat. This community is dedicated to providing support and offers virtual reality sign language lessons to those interested in learning. (Twice, 2022) VRChat has recently introduced features facilitating communication for individuals facing challenges with vocal expression.

The inclusion of text boxes within the game has proven beneficial, serving as an effective means for those with communication difficulties to express themselves within the virtual space.

Body language and facial expressions

In virtual reality, body language and facial expressions can be very limited and up to avatar creators if they want to make simple or extremely complex avatar animations that simulate facial expressions and body language. This problem can be alleviated with different ways to track players' movements and expressions in different ways. Social vr games usually have automatic eye movement made to simulate eye contact inside vr. True eye contact can be achieved with headsets that support eye tracking. In a book by Mortensen (2008), Mehrabian writes how facial expressions alone contribute 55% to the message that is being conveyed.

> "Facial expression, touching, gestures, self-manipulation (such as scratching), changes in body position, and head movements— all these express a person's positive and negative attitudes, both at the moment and in general, and many reflect status relationships as well. Movements of the limbs and head, for example, not only indicate one's attitude toward a specific set of circumstances but relate to how dominant, and how anxious, one generally tends to be in social situations. Gross changes in body position, such as shifting in the chair, may show negative feelings toward the person one is talking to. They may also be cues: "It's your turn to talk," or "I'm about to get out of here, so finish what you're saying. "" ."" (Originally written by Mehrabian, 1968/republished by Mortensen 2008, p. 197)

Players in desktop mode (not playing with any VR headset) can only move their head freely and use predetermined animations. Desktop players are limited to a set amount movement, facial expressions and pose options decided by the avatar creator.

Players in "half body" (using only a VR headset) can move their head and hands freely. Facial expressions come from hand gestures made by the avatar creator. Legs and hips follow premade animation patterns made by the creator. It can look silly when the actual body and virtual avatar are in different positions, so the animations do not match the head and arm positions very well.

Players with full body tracking (VR headset and additional trackers on the legs and hip) have full control over the avatar's movement. This type of tracking has a significant barrier for mainstream use because of the cost and availability for different devices. It can be enhanced with more trackers and base stations to have even more precise movements.

More detailed information about how different types of tracking can be found from more technical manuals provided by VRChat developers for its users in VRChat Documentation (VRChat).

"Hence even the way people move their bodies may express something of their attitude and orientation to other participants in a face-to-face situation." (Mortensen, 2008, p.211) This quote can be understood in relation to virtual tracking, that by reducing the amount of tracked movements the message that is being conveyed can be easier to misinterpreted or have less of an impact to receiver of the message.

7 Research

For this thesis, a research questionnaire (appendix.1) was used to gain insight of the impact of virtual reality on communication styles, focusing on introverts and extroverts within VRChat. The questionnaire addressed the key research questions such as experiences related to avatar choice, judgments, prejudice, and challenges in virtual communication. It was distributed to various Discord servers that have diverse groups of VRChat users. Regarding ethical standards, the questionnaire ensured participant confidentiality and obtained informed consent.

The research was conducted during the autumn of 2023 and remained open for one week. The amount of the participation for the research was quite limited. Ten responses were received over the duration of the week during which the questionnaire was kept open. People are extremely skeptic about clicking links on Discord, especially from people that they do not know. This comes from discord having a problem with hackers using link-based hacking tools to get into people's personal information and profiles. (Sabin, 2024)

In terms of demographics, participants aged between 17 and 32 were considered. Most identified as male, while smaller percentages identified as female, transgender, or preferred not to disclose.

All participants utilized a PC-VR setup, and 40% had full-body tracking. The majority were experienced VR users with over 1000 hours of usage time.

Participants engage in various virtual reality activities, socializing, playing games, watching movies, playing gun and flight simulations, interacting with strangers in VRChat, and using the platform for learning new skills.

7.1 Results

Most of the participants are active in having interactions outside the game via social media or face-to-face, and they say that VR has impacted their socializing skills positively in some amount.

Most of the participants think that non-verbal cues are important in conversation, and more than half find that avatars can convey those kinds of cues somewhat effectively in virtual reality. All participants think that it is important to have some kind of ability to express themselves via non-verbal cues through avatars for effective communication. These results can be linked to the information that Mehrabian talks about how a large part of the conversations happen through non-verbal communication.

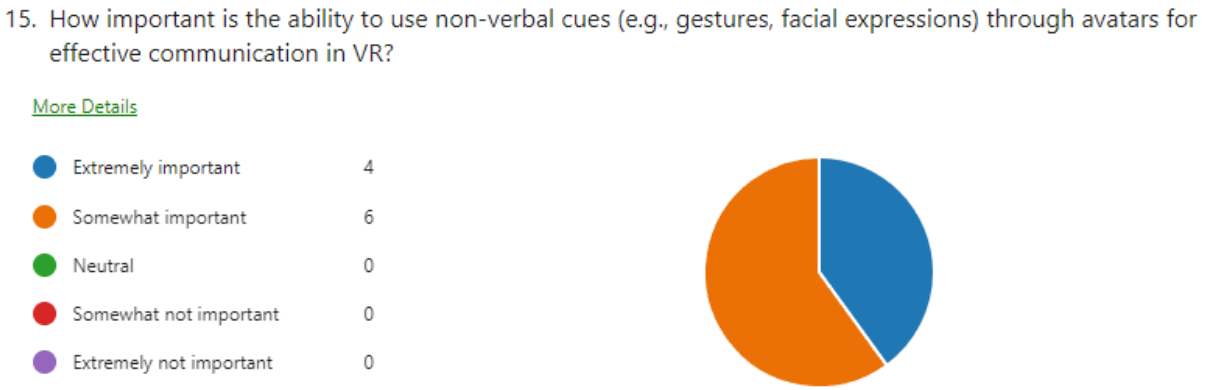

Figure 1. Question 15, Results

When asked about misinterpreting intentions or emotions in VR due to limitations in avatar non-verbal cues, respondents varied in their experiences, with some expressing certainty that they had not, others acknowledging instances where they had.

A significant portion of participants felt a strong sense of presence in VR, considering it crucial for meaningful conversations, especially when compared to text-based interactions. Avatars played a vital role in creating this immersive environment.

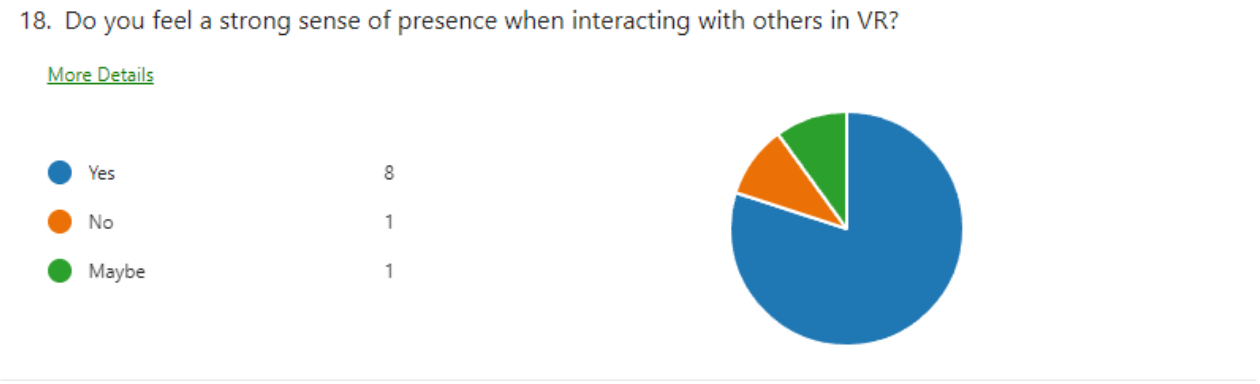

Figure 2. Question 18, Results

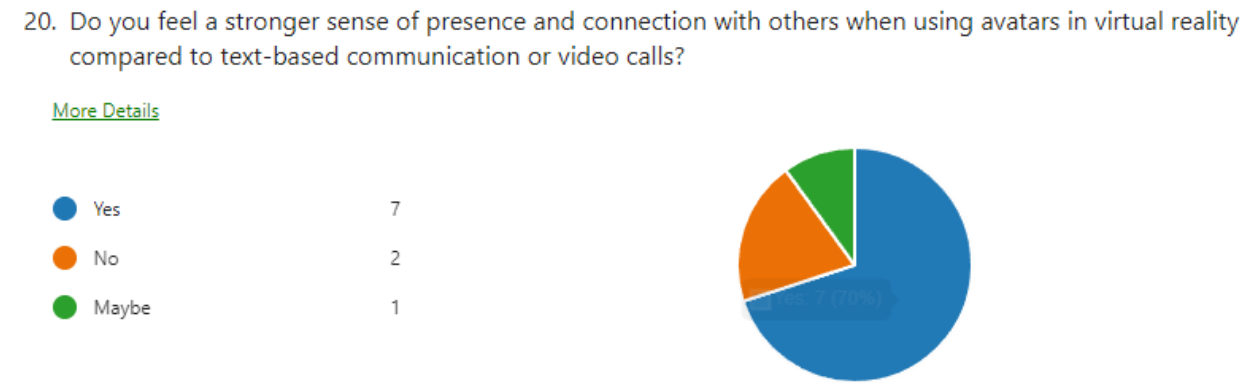

Figure 3. Question 20, Results

Concerning comfort in communication, opinions varied on whether participants felt more at ease in VR than in real life. Many believed that customizing their avatar enhanced their ability to express their identity in VR compared to real life. The impact of avatars on confidence levels varied,

with some stating a significant influence, others some influence, and some little to none. As Freeman (2022) says, virtual avatars can present a unique opportunity for players to change and express their identities in ways that may not be feasible in the physical world. This can have a direct impact on players' confidence in and out of the virtual reality.

Regarding having a main avatar representing their true self, many agreed, while others either disagreed or did not have a main avatar. Many participants acknowledged that their avatar choice affected their communication style, and for some, it influenced their confidence in VR. Differences were noticed in how others interacted with them based on their avatar choice, with many experimenting with various avatars, observing certain stereotypes associated with them and noting that users of similar avatars tended to gather in social spaces.

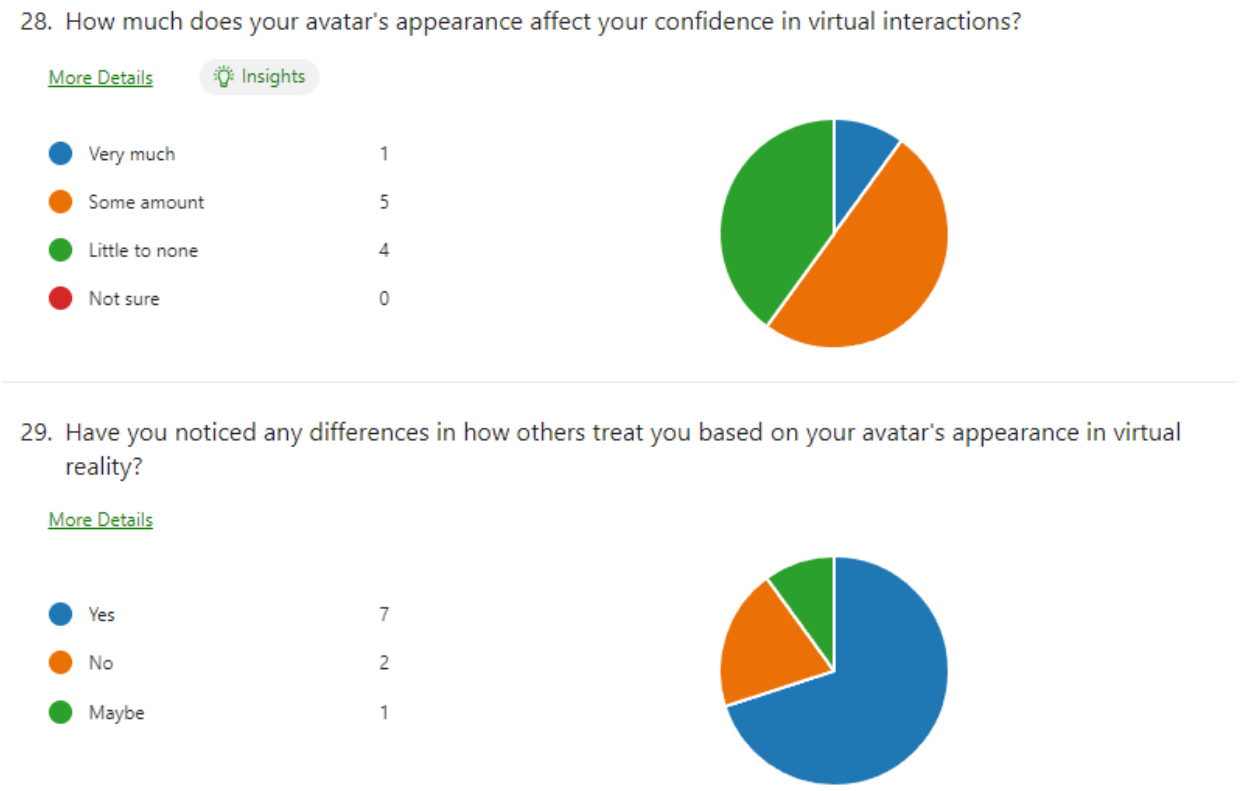

Figure 4. Questions 28, 29, Results

8 Discussion/Conclusion

In a book by Beattie and Ellis (2017), it is written about how humans have developed communication further than any other species with a number of different ways to communicate. This becomes clearly apparent in VR, where some of the ways to communicate are taken away or limited, such as facial expressions, gestures and body posture depending on what platform the player is playing on.

There is prejudice in the world, in virtual or real. In VR, the prejudice does not come from ethnicity or how someone looks like. Prejudice comes from an avatar's perspective. Only after people have gotten to know each other they start noticing things that the avatar does not show to outside, where they are from, their beliefs, their values in life or even their gender can be a complete mystery until months into friendship. (Pan & Hamilton, 2018) For some, these can be crucial cornerstones of trust in relationships or can be an opportunity to gain new knowledge from new viewpoints. Prejudice does not disappear; it changes its form. This is why players who use certain type of avatars, is it meme, E-boy/girl, furry or character from your favorite game, tend to find each other eventually and join or create communities around those interests. This has created a lot of diversity and opportunities to find a place to belong. (NBC News, 2018)

Straszfilms (2021) explains well in their video essay how players in VRChat do not play as their character but inhabit those characters, which brings deeper connection between the character and the player. For some, this can be a big leap in discovering themselves. Also, Baldvin (2018) speaks in his research that game avatars are a way to experiment with gender identity freely. In VRChat, becoming users' true self or ideal self is easier as VRChat is built around user-generated content and players can easily get an avatar that they can modify to their liking. This can be a confidence boost for anyone who plays VRChat, as you can be anything or anyone you want to be.

The growing popularity of virtual reality technology has encouraged research for understanding its impact on communication, especially as it is becoming more affordable and part of everyday life. (Majkowska, 2023) However, my research on this subject was limited by number of participants, leaving uncertainty in my conclusions. I went to the research hoping for mix of introverts and extroverts in participants to see if personality types play a heavy role in communication in virtual

reality. Most participants identify as ambiverts, and this leaves the question still open: how does virtual reality affect communication for introverts and extroverts?

Upon analyzing the responses from the research questionnaire with insights from the literature review, it shows a promising potential link between virtual reality and its ability to address social anxiety, combat prejudice on multiple fronts, and assist those dealing with body dysmorphia, regardless of gender or sexuality. (Baldwin, 2018) The research also highlights how virtual reality can be transformative, helping in self-discovery and broadening perspectives. (Freeman et al., 2022)

Avatars, as digital representations of users, play a crucial role in virtual reality communication. They not only impact the clarity of interactions with their movements and expressions but also contribute significantly to the depth of meaning in conversations. The importance of avatars extends beyond immediate interaction, influencing social dynamics and users' psychological well-being. (Straszfilms, 2021)

As the VR technology continues to advance, it is going to need more research on many aspects, including physical and psychological effects on people. A good understanding of the complexities of communication within virtual reality is crucial for unlocking its full potential in developing meaningful connections and addressing various social and psychological challenges. To achieve such understanding, more scientific research is suggested.

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Appendices

Appendix.1 Survey on Virtual Reality Communication: User Experiences and Preferences

1. How often do you use VR?
2. How long have you used VR?
3. On average, how long do you spend in virtual reality? (per session)
4. How do you spend your time in Virtual reality?
5. How often do you interact face-to-face with people IRL?
6. How often do you interact messaging or via other social media with people IRL?
7. How would you describe your communication skills IRL?
8. Has your use of VR for socializing impacted your social interaction skills IRL in any way?
9. If yes, how much do you feel that VR has changed your ability to communicate with others?
10. How important is the ability to use non-verbal cues (e.g., gestures, facial expressions) in conversation for you?
11. Do you find it different to express emotions and non-verbal cues in VR compared to text-based communication?
12. How important is the ability to use non-verbal cues (e.g., gestures, facial expressions) through avatars for effective communication in VR?
13. How effectively do you think avatars convey non-verbal cues compared to real-life interactions?
14. Have you ever misinterpreted someone's intentions or emotions in VR due to limitations in avatar non-verbal cues?
15. Do you feel a strong sense of presence when interacting with others in VR?
16. How important is a sense of presence for meaningful communication in VR?
17. Do you feel a stronger sense of presence and connection with others when using avatars in virtual reality compared to text-based communication or video calls?
18. Do you feel more at ease communicating with others in VR compared to real-life interactions?
19. Does virtual reality allow you to express yourself more comfortably compared to real-life interactions?
20. Do you feel that being able to personalize your avatar in VR helps you express your identity better?
21. How much does your avatar's appearance affect your confidence in virtual interactions?
22. How much do you feel that your (main) avatar represents your true self in virtual reality?
23. Does the choice of avatar representation affect your communication style in virtual reality?
24. Have you ever tried experimenting with different avatars to see how it changes the way people interact with you in virtual reality?
25. How much does your avatar's appearance affect your confidence in virtual interactions?
26. Have you noticed any differences in how others treat you based on your avatar's appearance in virtual reality?
27. If yes, give an example of situation where you were treated differently based on your avatar appearance.
28. Do you consider yourself as an introvert, ambivert or extrovert?
29. Your own thoughts about the questionnaire or the subject