Exploring gender expression and identity in virtual reality
The interplay of avatars, role-adoption, and social interaction in VRChat

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Abstract

This study examines the complex relationship between gender, virtual reality (VR), and social interaction within the context of full-body tracking (FBT) technology in social VR platforms. As VR technology advances and becomes increasingly integrated into users’ lives, understanding the implications of gender expression and perception in these immersive environments is crucial. Utilizing unobtrusive observations and interviews within the VRChat platform, this research explores avatar choices, interactions, and FBT technology utilization as they relate to users’ expressions and perceptions of gender. The findings reveal that cultural background plays a significant role in shaping users’ gender expressions and perceptions in social VR. The study also demonstrates the fluidity of gender expression in virtual environments, highlighting how users can challenge and subvert traditional gender norms, and the potential of virtual reality as a tool for experiential learning, fostering cross-cultural understanding, and promoting inclusive and diverse gender expressions. This study contributes to the emerging body of literature on virtual reality and gender, providing insights that can inform future research and technology development in the field.

Keywords: full-body tracking, gender performativity, social interaction, social VR platforms, virtual reality
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Exploring gender expression and identity in virtual reality: The interplay of avatars, role-adoption, and social interaction in VRChat

Virtual reality (VR) technology and associated hardware have experienced substantial growth in recent years, leading to widespread application across various domains, such as medicine, aviation, and engineering (Cipresso et al., 2018). As a training platform, VR allows novices to learn high-risk and complex procedures (Bric et al., 2016). In parallel with the development of professional-grade VR devices, consumer-level VR apparatuses have also witnessed rapid progress, significantly contributing to users’ entertainment experiences. Users can visit virtual museums, take virtual concerts, watch films, and chat from a distance (Nalluri et al., 2021). Consequently, this advancement has created opportunities for social VR software to become an increasingly important platform for expressing oneself, meeting new people and having effective remote communication (Gunkel et al., 2018).

Owing to the highly interactive nature of social VR and its capacity to facilitate the construction of personalised spaces, an increasing number of individuals are demonstrating a keen interest in immersing themselves within these virtual environments. Social VR, which allows multiple users to interact with each other in a shared virtual environment, enables users to explore multifaceted aspects of their identities, forge connections with like-minded individuals, and unwind in comfortable, customizable settings. This experience underscores the significance of examining the intricate interplay between identity formation and social interaction in virtual environments.

1.1 Avatars and identity in VR

In traditional 3D virtual worlds and online games, such as those found on PC or console platforms, players primarily control characters on screen as a medium for interaction. But in VR, particularly VR powered by full-body tracking (FBT), which requires users to wear trackers on elbows, feet, hips, head, and hands to fully rig the avatar, users can interact with others through avatars in a different kind of immersive experience, than in traditional virtual worlds (Maloney &
Freeman, 2020). FBT is alternatively referred to as 6 point+ tracking, constitutes an optional feature for VRChat users. Standard VR incorporates three or four-point tracking, enabling users to manipulate the movements of their avatar’s hands and head. By contrast, FBT expands on this functionality by deploying additional trackers on the user’s hips and feet, allowing for control over lower body movements. In VRChat, users can keep standing or remain seated or reclined during their play session, as FBT technology ensures that their avatars accurately reflect their behaviours. Users can interact with others through voice, gestures, proxemics, gaze, and facial expressions, and apply memories from VR to influence real-life behaviour (Freeman et al., 2020; Blascovich et al., 2002).

As movements in VR mainly rely on full-body mirroring activities, and individuals have chances to experience different avatars or create avatars that best represent them, they have a connection to their avatars that allows them to express themselves more uniquely. For example, the perceived masculinity or femininity of avatars, along with their anthropomorphism, can significantly influence users’ perceptions and interactions in virtual spaces. This, in turn, may affect the ways in which individuals’ own behaviours in virtual reality (such as trying out a variety of avatars) an embodied method to discover themselves (Nowak & Rauh, 2005).

Social VR environments have been found to be effective tools for enhancing certain embodied experiences, such as communication. For example, in children with autism, VR has been shown to enhance communication skills through both verbal and non-verbal interactions (Halabi et al., 2017). Virtual reality perspective-taking exercises have been shown to increase prosocial behaviour by fostering empathy, with the degree of immersion or presence in the virtual environment playing a crucial role (Van Loon et al., 2018). Moreover, individuals’ experiences in social VR can have significant implications for their understanding of themselves and their relationships, both online and offline, which includes aspects such as gender identity, psychological well-being, and social skill development (Freeman & Acena, 2021). For instance, the intimate and secure social environment provided by VR can help individuals better conduct
interactive activities, such as improved communication, developing relationships, and dancing. As dancing in VRChat is more than just a recreational activity, it serves as a social event where users can connect with like-minded friends and build meaningful relationships. This practice in various social skills makes it easier for individuals to learn how to be outgoing and expressive of their emotions (Acena & Freeman, 2021; Maloney & Freeman, 2020).

Rather than submissively accepting the traits imposed by the binary gender stereotype, individuals can explore the possibilities of their own identity (Nowak & Rauh, 2005). Engaging in social VR activities geared at non-cisgender individuals can give them a valuable chance to connect with other non-cisgender individuals from all over the world (Freeman et al., 2022), transcend geographical boundaries, and gain encouragement and confidence from doing so. Many non-cisgender users may experience a different body for the first time in a vivid way. As a result, this embodied experience inspires individuals to perform their gender and gain emancipatory bleed experiences, which refers to the feeling of liberation that arises when overcoming or confronting systematic oppression, as well as recognizing factors that have impeded personal progress (Kemper, 2016). These experiences, stemming from an unintentional transfer between players’ in-game activities and real-life behaviour, emotions, and experiences, foster a deep sense of self-understanding (Ahn et al., 2013; Bowman, 2015). In the process, individuals gain motivation to learn, receive emotional support and recognition, and experience a social boost.

Avatar FBT technology is an advanced feature used in VR that facilitates the mapping of users’ real-life bodily movements onto their virtual avatars within a three-dimensional virtual environment. Utilizing sophisticated hardware, including motion tracking sensors and trackers, this technology effectively translates users’ physical movements into corresponding actions for their avatars, thereby enhancing realism and user engagement on social VR platforms such as VRChat (2014), which empowers users to express themselves with greater convenience and efficacy.
Non-verbal communication, facilitated through FBT technology, has been identified as a positive aspect of social VR experiences by a majority of participants in various studies (Maloney et al., 2020). This unique feature of VR allows users to embody and experience drastically different physical forms, offering a valuable means to explore the malleability of body representation (Piryankova et al., 2014).

Notwithstanding its escalating popularity and wide use, research exploring the impact of FBT on gender expression and perception is limited. By investigating the relationship among avatars, FBT and gender, game designers and researchers may gain invaluable insights into the manifestation and interpretation of gender within social VR environments, thereby guiding future design for inclusive and complex social spaces that cater to the diverse requirements and predilections of the user base.

Queer theory, as a subversive framework that challenges the heteronormative and binary gender systems prevalent in society, posits that gender should be seen as a fluid concept, allowing individuals to reimagine and reshape their gender identity (Jagose, 1996). Gender performativity suggests that gender identity is acquired and shaped throughout one’s life through social constructs and interactions. Drawing from queer theory, gender performativity theory, unobtrusive observations and interviews across various countries and cultures, I explore the following research questions:

RQ1: Under what circumstances are users more willing to express themselves (both verbally and non-verbally)?

RQ2: How do users perceive others’ gender in social VR?

RQ3: How do users perform their gender using full-body tracking technology in social VR?

1.2 Current study

Queer theory was used to understand the circumstances under which users are more willing to express themselves (both verbally and non-verbally) in social VR (RQ1). Queer Theory provides insights into how users perceive others’ gender in social VR (RQ2).
This study examined how users express and perceive gender within VRChat. Gender is performative constructs shaped by societal norms, influencing how users perform their gender identities within social VR environments, which challenges the traditional belief that individuals are born with a fixed gender identity (Butler, 2011). Gender performativity theory was applied to examine how users’ performances of their gender identities are influenced and shaped within social VR environments, as it relates to the performance of gender using FBT technology in social VR (RQ3).

In this research, the methodology is comprised of two main components: interviews and unobtrusive observations (Babbie, 2020). To explore the complex relationship between gender, virtual reality, and social interaction, I conducted semi-structured interviews within the VRChat world named “SuRroom”. This context was chosen due to its participant familiarity, encrypted rooms, available writing tools, in-world text input functionality, and encrypted voice chat channels. The interview questions covered a range of topics, including participants’ backgrounds, gender identities, VRChat experiences, avatar preferences, gender perceptions, and the use of FBT technology.

To complement the interviews, I also conducted unobtrusive observations in VRChat’s random worlds, friends+ worlds, and public worlds. Random worlds were chosen through VRChat’s random world selection option, while friends+ and public worlds were selected based on an event schedule to ensure a diverse range of activities and interactions was observed.

Additionally, my research methodology involves participant observation ethnography, a method rooted in being an active member of the community I am studying to generate knowledge and challenge preconceived theoretical assumptions (Shah, 2017). As an Asian woman with a Chinese cultural background, I have been actively participating in VRChat for two years. My interactions span across diverse player groups, including those from China, Japan, Southeast Asia, Europe, and the United States. Notably, my experiences include portraying an ancient Eastern elven man character within the game. Such a diverse and immersive
perspective allows me to effectively explore gender identity and expression, acknowledging the ways in which my understandings are uniquely shaped by my engagement within the community. But I also recognize that I have limitations for my position, as an active member of the *VRChat* community with my own experiences and cultural background, it is possible that my personal bias might influence my interpretation of data and interactions with participants. Acknowledging and mitigating these biases through reflexivity is crucial for producing objective research findings.

1.3 Summary

This research project explores the complex relationship between gender, virtual reality, and social interaction, which examines the significance of avatar FBT technology in VR for identity practices and the role of virtual reality in exploring diverse non-cisgender identities. The results of this investigation contribute to a more transparent comprehension of the ways individuals convey and perceive gender in social VR environments, thereby providing valuable insights for future avatar development and enriching social interactions within VR. Owing to the anonymity, users might be more inclined to express themselves within VR contexts, and choose avatars that correspond to their gender identity, experiment with diverse gender representations, or choose non-human or androgynous avatars as a means of contesting conventional gender paradigms (Nowak & Rauh, 2005).

The findings of this study will enable game designers, artists and users to better understand the factors that influence users’ willingness to express themselves in social VR environments. This can facilitate a deeper understanding of how others perceive gender in VR environments, providing insights for personal gender exploration as well as more inclusive and diverse avatar design and social interactions.

2 Background

Investigating social interaction and gender perception in VR requires knowledge in an interdisciplinary research domain that merges computer science, human-computer interaction,
and psychology (Spiel et al., 2019). In this section, I examined the foundational literature related to gender and social interaction within VR settings, emphasizing the significance of avatar FBT technology in these virtual spaces. The chapter begins with an exploration of the existing literature concerning diverse aspects of VR and social interaction, such as avatar choices, gender expression and perception, and the utilization of FBT technology. Following this, I investigated the suitability of VRChat as a research platform and pinpoint gaps in the existing body of knowledge. Lastly, I examined the connection between my research questions and the available literature, underlining the importance of my study in developing a comprehensive understanding of gender expression in VR.

2.1 VR and social interaction

VR constitutes a complex technology enabling users to immerse themselves in computer-simulated environments, emulating real-world experiences or generating novel ones (Boellstorff et al., 2012). By providing a sense of presence and interactivity, VR facilitates shared experiences and connections among users, unlocking new avenues for comprehending human behaviour and social interaction (Freeman & Acena, 2021). The recent advancements in VR technology have been characterized by notable enhancements in screen refresh rates, resolution, latency, and device computational capabilities, resulting in a more fluid and engaging user experience (Koulieris et al., 2019; Sauer et al., 2022). Moreover, VR content, encompassing gaming, films, live streaming, and educational software, has become more and more diverse (Lin et al., 2020). The escalating availability of high-quality content is anticipated to bolster adoption and engagement rates for VR devices, thereby amplifying opportunities for delving into the intricacies of human behaviour within these immersive spaces.

The evolution of social VR platforms has been driven by the enhanced accessibility and affordability of VR technology. As the hardware and software become increasingly attainable for a broader audience, social VR platforms have emerged as a popular medium for users seeking new avenues of interaction and communication (Gunkel et al., 2017). These platforms facilitate
users in engaging with one another within shared virtual environments, fostering innovative forms of social experiences that transcend geographical barriers and traditional communication methods.

As social VR platforms advance and incorporate more intricate features, they present a valuable opportunity for both researchers and users to investigate the subtleties of social interaction and its influence on an array of human behaviours. In social VR environments, users have the capacity to experiment with their self-representation and traverse the virtual world with varying levels of anonymity (Tupper, 2021). This enables individuals to examine their gender identity, contest established societal norms, and convey themselves in a more genuine manner.

Gender, as a social construct, is intricately linked to the interactions and relationships individuals establish within their social milieu (Butler, 2004). Social interaction plays a pivotal role in shaping gender perceptions and expressions, and this becomes especially salient in VR environments, where individuals engage in social exchanges and form connections with other users (Gunkel et al., 2017). A social relationship represents a valenced connection between two individuals, wherein each party influences the other through self-differentiation (Harvey & Pauwels, 2009; Reis et al., 2013). The immersive quality of VR, along with the sense of presence it affords, can heighten the influence of social interactions on individuals’ comprehension and the manifestation of gender (Bailenson et al., 2003). Gender identities are constructed under the dual influence of personal choices and societal pressures, as I navigate and adapt to the prevailing cultural ideas and norms (Butler, 2011). Within this framework, investigating gender in VR environments presents a singular opportunity to delve into the intricacies of gender construction and the interplay between individual choices and societal expectations.

Within virtual environments, users possess the capability to explore various facets of their identity, including gender, by selecting and personalizing their avatars and movements (Nowak & Rauh, 2005). This flexibility enables individuals to investigate a multitude of gender
expressions and question conventional gender norms, thereby promoting a more profound comprehension of the fluidity and intricacy of gender as a social construct. Users can participate in a wide range of social interactions, spanning from casual conversations to thematic experiences, such as joining support groups or attending dance events (Gunkel et al., 2017). These engagements provide invaluable insights into the negotiation, reinforcement, or contestation of gender within the framework of virtual social exchanges.

In this context, social interaction and gender become inherently intertwined, as social VR environments afford users the opportunity to represent themselves in innovative ways and ignore social norms about gender. As users engage with one another in virtual spaces, they might question traditional conceptions of gender or embrace alternative gender expressions that diverge from their real-world identities (Freeman & Acena, 2022). This dynamic interplay between social interaction and gender in VR environments presents a novel perspective through which we can examine the intricate relationship between these two facets of human experience. Through this lens, individuals can gain valuable insights into the fluidity of gender and focus more on others’ personalities instead of social roles, further deepening the understanding of the multifaceted nature of gender as a social construct.

2.2 Gender expression and perception in virtual environments

Social VR presents a distinctive space for individuals to express themselves; they have the opportunity to express themselves through a wide array of channels, such as avatars, verbal communication, facial expressions, gestures, body language, and movements. Virtual spaces offer more possibilities for individuals to express their identity, which can differ significantly from real-life experiences (Freeman & Acena, 2021). As VR can be a powerful tool for fostering empathy and understanding between individuals, VR-based exposure therapy has been shown to reduce symptoms of behavioural phobias (Schutte & Stilinović, 2017; Morina et al., 2015). Compelling evidence supports the effectiveness of VR exposure therapy for treating specific phobias (such as acrophobia, fear of driving, claustrophobia, aviophobia, small animal phobia,
and arachnophobia), agoraphobia, and social phobia (Wechsler et al., 2019; Suso-Ribera et al., 2019; García-Palacios et al., 2002; Morina et al., 2015; Parsons & Rizzo, 2008; Krijn et al., 2004). This broad range of study-specific effect sizes, particularly in the context of social phobia, demonstrates the significant potential of VR as a therapeutic tool (Krzystanek et al., 2021).

Avatars act as virtual representations of users in social VR environments. Users can choose or create avatars that correspond with their gender identity or explore various gender expressions through their avatar’s appearance. Customization options, such as clothing, hairstyles, and body shapes, enable users to express their gender in diverse ways. The level of humanization and gendering of avatars significantly impacts their perception (Nowak & Rauh, 2005). In online spaces and mediated interactions, appearance and gender remain crucial for perception and credibility. VR provides a unique opportunity to experience a body that differs from one’s own, offering valuable insights into the plasticity of bodily representations (Piryankova et al., 2014). This potential for “body illusions” allows users to explore alternate body representations, such as feeling thinner or heavier than their actual selves (Serino et al., 2018). This capability can be particularly relevant for users who want to explore different aspects of their gender identity or expression.

Users often view their relationship with their avatars in different ways, depending on the context, purpose, and level of immersion in the virtual environment. While some players might perceive their avatar as a mere tool to navigate and achieve goals in the gaming environment, others may develop a deeper emotional connection and identify more closely with their virtual representations (Bowman & Banks, 2021). A range of factors, such as personal preferences, gameplay styles, and virtual world contexts, can impact users’ connection with their avatars, influencing the position they take within the sociality continuum. Users might focus on optimizing their avatar as a play tool, which can lead to increased play intensity but decreased emotional intimacy with the character (Banks, 2015). The functionality of the avatar can be likened to viewing avatars as “pieces on a gameboard.” Some users establish a more profound and
emotional connection with their avatars, treating them as “people in a world,” while other users identify avatars as real themselves (Bowman & Banks, 2021).

Moreover, VR can present three-dimensional representations of users’ bodies, helping them become aware of any distortions in their body image and offering opportunities to confront and correct these distortions (Wiederhold et al., 2016). This can lead to a more accurate and satisfying body image, potentially impacting users’ experience of gender within the virtual space, which can positively impact users’ emotional states (Baylor, 2009).

With strong links between voice pitch, masculinity, and dominance, voices have a more substantial effect on final judgments than appearance (Rezlescu et al., 2015). Users may be more likely to perceive and evaluate others’ gender identities based on the congruence between their avatars and vocal cues in social VR environments. Research has shown that there is a face-voice gender consistency preference in gender categorization, which can be a significant factor for users in social VR environments to express and perceive others’ gender (Rezlescu et al., 2015). Verbal communication in social VR environments is facilitated by real-time voice chat features, allowing users to engage with others in a manner similar to face-to-face settings. This enables users to express themselves through tone, pitch, and pace, enriching the overall social interaction experience. This mode of communication creates opportunities for users to experiment with or express different gender identities verbally.

In social VR platforms, players often express their emotions by triggering facial animations using gestures, making emotion management an important aspect of social interaction in VR. Some social VR platforms also allow users to capture and reproduce facial expressions in real-time for better engagement with others (Tupper, 2021). Since facial expressions help convey emotions and personality, the ability to control and manipulate these expressions in social VR environments may provide users with unique opportunities to explore and express their gender identity.
Nonverbal communication, including gestures, body language, movement patterns, and facial expressions, which occurs through FBT of virtual characters, is a positive aspect of users’ social VR experiences (Maloney et al., 2020). Users can convey emotions and intentions through gestures and postures, and they can demonstrate expressions associated with specific gender norms in various cultures or societies through certain gestures or body language. Users can also express their gender identity through their movement styles, such as walking patterns or seated postures.

2.3 Full-body tracking technology and gender performativity

FBT technology has the potential to increase users’ willingness to express themselves and enhance social interactions by breaking free from normative social constructions. This allows individuals to focus more on their personal interests and individuality, which can lead to a richer exploration of gender and personal identity. Butler (2011) argues that gender is an effect of reiterated acting, which produces static or normative gender identities while obscuring the contradictions and instabilities present in every individual’s gender performance. This idea suggests that what individuals consider to be a true gender is actually a product of repeated performances.

Butler (2011) uses the term “performativity” rather than “performance” to emphasize that gender has a continuous nature rather than being an isolated or discrete event. Performativity highlights the cultural and temporal continuity involved in constructing gender through a series of ongoing actions. According to Butler (2011), the illusion of an inner essence that individuals attribute to gender is actually produced through a set of continuous behaviours and a gendered stylization of the body.

FBT technology allows users to deconstruct the performative aspect of gender and challenge the notion that there is a true, original gender (Serino et al., 2018). By providing a virtual environment where individuals can experiment with different gender expressions and
performances, FBT technology offers a space for users to explore their own identities without the constraints of societal expectations.

The concept of bleed further enhances this exploration by allowing users to bring their virtual experiences into reality (Bowman, 2015). This process enables individuals to experience different gender expressions that may be difficult or impossible to achieve in their everyday lives due to fear or societal norms (Bowman, 2015). By integrating virtual and real-life experiences, users can not only explore their own identities but also gain a deeper understanding and acceptance of various gender expressions.

Emancipatory bleed further extends this exploration by empowering individuals to experience liberation from oppressive constraints and recognize factors that have hindered their personal growth, enables individuals marginalized due to their double consciousness or fractured identity to overcome negative aspects and experiment with different selves (Kemper, 2017). By seeking out emancipatory bleed, steering towards liberation, and investigating themselves through the lens of play, individuals can actively shape their identities, trying on and taking off various roles and characteristics they have longed to exhibit but have been discouraged from embodying (Kemper, 2020).

FBT technology accurately captures users’ movements and gestures and serves a dual purpose in VR. FBT technology facilitates not only a more immersive and interactive experience but also helps users express themselves within the virtual environment in a more authentic way. FBT bridges the divide between the virtual and real worlds, enhancing users’ sense of presence and connection with their virtual avatars (Slater et al., 2010). The sense of presence in VR is heavily influenced by the perception of input through visual, auditory, and kinaesthetic senses. A more enhanced sense of presence can be achieved when users are incorporated as part of the environment, with head movements producing motion parallax, and locomotion resulting in spatial translation, and the stimulation of vestibular responses. In numerous existing VR experiences, users are confronted with contradictory motion cues, leading to motion sickness,
which undermines the immersive experience (Slater et al., 2010). FBT technology tackles these issues by offering a more precise and immersive experience, integrating proprioceptive cues from actual walking, and augmenting the overall sense of presence in the virtual environment (Peck et al., 2013).

In multiplayer VR games, achieving a deeper sense of immersion necessitates real-time synchronization of whole-body movements (Jiang et al., 2016). FBT technology plays a pivotal role in synchronizing user and avatar movements, leading to enhanced cognitive abilities and feelings of agency over users' virtual representations. This synchronization establishes a robust connection between the user and their avatar, significantly contributing to the immersive experience (Desai et al., 2014; Collingwoode-Williams et al., 2017; Peck et al., 2013).

As capturing body language is significant in letting users to better understand and respond to each other within the virtual environment, users can perceive and express nonverbal cues in real-time for more effective communication and collaboration (Gravano & Hirschberg, 2011). The role of nonverbal communication in social interactions is well documented (Gravano & Hirschberg, 2011). Mimicry, imitation, and backchanneling are essential components of effective communication that contribute to feelings of liking and belonging (Leander et al., 2012; Kampf et al., 2018). FBT technology breaks down barriers between users, lets users develop more authentic connections and promotes empathy within the virtual space. Users can relate to one another on a deeper level, allowing for more meaningful social interactions and experiences. This increased level of connection and understanding has the potential to extend beyond the virtual world, impacting users' real-life interactions and relationships as well.

FBT technology in social VR platforms facilitates user interaction through natural body movements, leading to a more authentic and immersive experience during various activities, such as gaming, movie watching, concert attending, and party participation (Lala et al., 2017). The employment of FBT technology in social VR platforms cultivates a more inclusive atmosphere for individuals who do not conform to conventional gender roles or stereotypes.
FBT technology enables users to experiment with behaviours traditionally perceived as feminine, masculine, or non-binary within societal norms, allowing them to explore diverse aspects of their gender identity and expression without judgment or discrimination that are frequently experienced in real-world situations, which contributes to an enhanced understanding and acceptance of diverse gender identities and expressions, ultimately fostering a more inclusive and empathetic environment both within the virtual realm and in the broader context (Caserman et al., 2020; Correia et al., 2019).

2.4 VRChat and social support for non-binary users

Among social VR platforms that allow users to use FBT, VRChat stands out as a unique and increasingly popular medium for social interaction and self-expression, which has the largest and most active user base, representing a diverse range of cultural, social, and demographic backgrounds, making it a suitable platform for studying the complex relationship between gender, VR, and social interaction across different contexts (Poetker, 2019).

The key differences between VRChat and other social VR platforms are its emphasis on user-generated content instead of just offering official content to users, and allowing PC users and VR users to communicate at the same place (Poetker, 2019). The platform enables users to create and share their own virtual worlds, allowing them to construct unique environments that cater to specific interests, themes, or communities, where users can interact with one another using highly customizable avatars (Poetker, 2019). This user-generated content has led to the development of extensive development of virtual spaces, ranging from relaxing environments for casual conversation to highly immersive gaming experiences, providing opportunities for users with different needs and backgrounds. The high acceptance for both PC users and VR users encourages more individuals to express themselves and use their experience in VRChat to have a better understanding of gender identities in real life.

Roleplay in VRChat incorporates elements from various forms of roleplay and acting, such as Live-Action Role Playing (LARP), improvisational theatre, and tabletop roleplaying
games. The uniqueness of roleplay in VRChat primarily stems from the medium of virtual reality, which is harnessed to deliver an immersive experience for participants. Within VRChat, users organize a range of roleplay activities, and several large role-play communities exist, including the Dimensional Postal Service and the Loli Police Department etc.

The Dimensional Postal Service is a casual, lighthearted roleplay group that integrates improvisational theatre and comedic aspects, with themes loosely centred around postal work. This group engages in various activities, including delivering packages, processing passports, managing offices, and more. The Loli Police Department, or LPD for short, is another group of VRChat users who don police officer models and enforce the law within VRChat's virtual world.

In addition to well-established roleplay communities, many individual roleplayers are present in VRChat. These users enact specific characters different from themselves, creating personalized experiences. For example, in the Japanese VRChat community, numerous idol groups exist, where users design catchphrases, styles, and appearances for their characters according to their preferences. They pay close attention to maintaining their idol personas and even organize idol-themed events and activities.

These roleplay experiences in VRChat allow users to explore various aspects of their personalities, step into the shoes of different characters, and build social connections with like-minded individuals. The virtual environment enables participants to experiment with new identities and personas in an engaging and realistic setting.

Moreover, the user-driven creativity and interactivity of roleplay in VRChat contribute to building empathy and understanding among community members. These experiences foster an environment that encourages open-mindedness, self-expression, and a sense of camaraderie, promoting positive social interactions in the virtual world.

VRChat also provides a level of anonymity to its users, which is another distinguishing feature. Unlike other social VR platforms that require users to link their accounts to their real-world social platform or require their real-life information, VRChat allows users to remain
relatively anonymous (VRChat, 2014). This anonymity can encourage users to experiment with different avatars, identities, and gender expressions that they may not try in specific social roles. On the other hand, owing to deindividuation, anonymity tends to promote antisocial behaviour in poor actors. There are five types of emerging virtual risks unique to social VR settings, including virtual violence (physical contact with avatars), virtual crashing (using tactics to ruin the experience), and virtual scaring (frightening others with scary avatars). Additionally, virtual abuse (verbal insults and hate speech) and virtual sexual harassment (sexually provocative gestures and sexual assaults) pose significant threats. Other risks include virtual voice trolling (using a mismatched or contrasting voice) and virtual trash actions, which serve to spoil others’ experiences but do not fit into previous categories (Zheng et al., 2023).

VRChat presents a unique opportunity for transgender and/or non-binary users to foster social support and safe spaces for exploring and expressing their identities. Non-binary individuals, along with others who embrace an anti-normative stance towards gender, have often witnessed the decline of safe offline spaces and the rise of online communities catering to their needs. Online social spaces have become integral to queer social lives, serving as vital platforms for learning about gender and sexual identities, connecting with like-minded individuals, and increasing visibility.

VRChat provides social support, to let individuals feel that they are supported, cared for, and valued by others, which is crucial in the formation of gender identities. As VRChat provides a trust and safety system and encourage users to customize their experiences by blocking or limiting content from potentially malicious or disruptive users. Additionally, users can join the same world with different instance types, such as invite only, invite+, friends only, friends+, public, and group instances. VRChat provides safer, controlled spaces for LGBTQ+ users to engage in identity exploration and expression, potentially helping to reconcile discrepancies between their gender and sex assigned at birth and alleviate gender dysphoria. Individuals who have these thoughts and feelings about gender dysphoria are able to sort of work through that
in VRChat. Those who have mutism or voice dysphoria in VR can also find a solution by attending voice practices in the communities. Communities in VRChat like Trans Academy hold social academy classes events every few days from karaoke to classes for those looking for resources relating to common trans issues.

2.5 Gaps in the literature

Despite the growing body of research on gender and VR, several gaps remain that warrant further exploration. One of these gaps pertains to the limited literature on FBT technology and gender performance. While previous research has touched upon the relationship between avatar choices, and the expression of identity in social VR environments, there remains much to uncover about how users perceive others’ gender based on avatar selection and how individuals navigate and negotiate their gender identity in virtual spaces. More research is needed to understand the complex interplay between technology, identity, and social interaction in platforms like VRChat. Investigating the ways in which FBT technology influences users’ experiences and behaviours can shed light on the nuances of gender performance in social VR environments.

I aim to deepen the understanding of the complex dynamics at play in social VR environments and enhance the ability to design more inclusive, and engaging virtual experiences for users by addressing these gaps in the literature and acknowledging the study’s limitations.

2.6 Summary

In conclusion, this background chapter has provided a comprehensive review of the existing literature related to gender, VR, and social interaction, with a specific focus on the role of avatar FBT technology in identity practices within VRChat. Through this literature review, I have identified gaps in the existing research that my study aims to address and inspire further exploration of the transformative potential of VR as a medium for renegotiating and reimagining gender and sexual identities. By illuminating the ways in which users navigate and experiment
with their identities in virtual spaces with FBT technology, this study can contribute to a growing body of knowledge on the social implications of emerging technologies and the potential for VR to foster more inclusive, diverse, and empowering experiences for users across the gender spectrum seeking ways that users express and perceive gender, to inform the design of future social VR platforms.

In the current study, I applied methodology that employed unobtrusive observations and interviews to investigate the factors that encourage individuals to express themselves, perceive others, and perform their gender in **VRChat**. The results were analyzed in relation to their implications for our understanding of gender, identity, and social interaction in VR.

### 3 Methods

#### 3.1 Unobtrusive Observations

I conducted unobtrusive observations, which is a method of observing without the knowledge of the observed (Given, 2008), by participating in activities and observing others interacting in **VRChat**’s random worlds, friends+ worlds, and public worlds. I carried out online observations inconspicuously, adopting the role of passive or nonreactive observers (Babbie, 2020). I did not interact or speak with the participants but focused on observing and recording their interactions. I used a transparent avatar to minimise other players interacting with me and to keep myself more inconspicuous. As most events started around 4 p.m. on weekdays, I kept all my observations at a similar time during weekdays to control the variables. Each observation session typically ranged from 5 minutes to 2 hours, depending on the duration of the event and the activity of the observed, and I remained present throughout the events. Observation events were digitally recorded. All records and data have been anonymised. While the passive and non-reactive nature of the observation method minimizes disruptions, it can raise concerns about participants’ awareness and consent. I recognized the potential discomfort, or violation of trust that participants may experience if they discover they are being studied without their informed consent, so I maintain anonymity and confidentiality throughout the study by
anonymizing data, removing any potentially identifying information, and ensuring responsible data handling.

3.1.1 Participants

In this study, I observed 95 participants, the details of which can be found in Table 1. The table presents participant information for unobtrusive observations, including observation world type, activity type, and the number of participants with different devices. Participants in the unobtrusive observations were users of VRChat who were encountered during observation sessions in random worlds and friends+ worlds. Their demographics, such as age, gender, and nationality, were unknown due to the nature of the unobtrusive observation method. The participants represented diverse users, as VRChat attracts individuals from various backgrounds and geographical locations.

I did not recruit participants, as recruitment was not applicable in this case for the observation sessions relied on naturally occurring interactions within VRChat’s virtual environment. I used a sample of convenience to join ongoing activities in random worlds, friends+ worlds, and public worlds and observed users who happened to be present at the time. This sampling technique allows me to explore user interactions in authentic and uncontrolled environments, aligning with the research questions on understanding avatar-based gender expression in VRChat.

Due to the passive and non-reactive nature of the unobtrusive observation method, obtaining explicit consent from the users being observed was unnecessary. To protect the participants’ privacy, however, all data gathered during observation sessions was anonymised, and potentially identifying information was removed.

Table 1

Participant Information for Unobtrusive Observations
<table>
<thead>
<tr>
<th>Observation ID</th>
<th>Observation world type</th>
<th>Activity type</th>
<th>Main language used</th>
<th>Participants</th>
<th>PC players</th>
<th>Three or four point tracking</th>
<th>Six point+ tracking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Random World</td>
<td>Chatting</td>
<td>English</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Random World</td>
<td>Chatting</td>
<td>English</td>
<td>4</td>
<td>3</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Random World</td>
<td>Chatting</td>
<td>English</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Friends+</td>
<td>Gaming</td>
<td>Chinese</td>
<td>8</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Friends+</td>
<td>Dancing</td>
<td>Japanese/ body language</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>6</td>
<td>Friends+</td>
<td>Chatting</td>
<td>Chinese/ Japanese</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Public</td>
<td>Music</td>
<td>Japanese</td>
<td>15</td>
<td>12</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Public</td>
<td>Dancing</td>
<td>Body language</td>
<td>28</td>
<td>6</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>9</td>
<td>Public</td>
<td>Chatting</td>
<td>English</td>
<td>15</td>
<td>12</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

### 3.1.2 Materials

**Equipment.** The materials used for unobtrusive observations included a laptop with VRChat installed, a notebook, and a recording software called OBS for recording observations and insights.

**VRChat.** VRChat is a social virtual reality platform that allows users to interact with others in various virtual environments using custom avatars. Users can play VRChat on various devices, including PCs and VR headsets like the Oculus Quest and HTC Vive, in which users communicate with others through voice chat, text chat, and body language, facilitated by FBT technology.

In VRChat, users can interact in five different instances, instances from the most private
to the most open are invite, invite+, friends, friends+, and public. The difference between invite and friends is that in invite world, only the host that created that instance could invite other people, while in friends world, any user in the current instance can invite their friends, but it should be noted that if the instance is friends, users who are not friends with the host cannot join.

In this study, I chose random worlds, friends+ worlds, and public worlds for this study. Random worlds are the worlds that VRChat promotes randomly to the users, in which users can explore and interact with others and encounter different avatars and experiences. As these worlds are always not the most popular worlds with a lot of users, they are seen as a more suitable place for introverted users to meet new people. Friends+ worlds are most used as event places, such as dancing and spaces for hanging out with friends, these worlds provide a more intimate and controlled environment. Public worlds are open-access worlds that welcome any user to join and participate in various activities, such as gaming, dancing, and chatting, which often feature more significant numbers of participants. As public events usually gathered a large number of people, if users use VR headsets to join the world, the requirement for their computer is very high. For this reason, users tend to use PC to take participants in public events with more than 40 users.

Although the game is called VRChat, the number of PC users still takes a large proportion. When PC players communicate and interact with VR players, the limitations of PC games can usually be clearly seen, such as the inability to swing arms freely, the inability to make body movements, etc. But through adding some avatar functions or using some software, PC players can break through these limitations and make their actions closer to VR players to express more of their emotions and ideas. Within VR users of VRChat, they use two main types of tracking technologies, three or four-point tracking and six-point+ tracking. Three or four-point tracking captures the position and orientation of a user’s head and hands by VR headsets and controllers, which allow users to perform basic gestures, such as waving and pointing but limits
the movement of their lower body. While six-point+ tracking extends beyond the head and hands to track additional points on a user’s body, such as hips, knees, and feet, which enables users to express all kinds of body language and gestures in VRChat. The six-point+ tracking requires additional hardware or software to capture a user’s movements.

By conducting unobtrusive observations in VRChat, this study sought to explore user interactions in various types of worlds by identifying users’ tracking technologies, analysing the meaning behind their interactions, and determining the influence of different tracking technologies on expressions of gender and identity.

3.1.3 Procedure

The unobtrusive observations were conducted following a systematic procedure to ensure consistency and accuracy in data collection.

I chose random worlds using VRChat’s random world selection option. Friends+ and public worlds were selected based on an event schedule and in-world population to ensure I could observe diverse activities and interactions. I used a transparent avatar to blend in with the virtual environment. When approached by other users for verbal interaction, I responded with emojis to maintain a passive role. Otherwise, I positioned myself at a comfortable distance from the group to observe without disrupting the natural flow of interactions.

During the observation period, I determined the tracking type of users (PC, three or four-point tracking, or six-point+ tracking) based on their movements and gestures during the observations, which allowed me to better understand how tracking technology influenced users’ expressions of gender and identity. I conducted observations for varying durations, ranging from 5 minutes to 2 hours, depending on the event and the natural interactions within the virtual environment. I remained present for the entire duration of the event. I recorded the date, time, the name of the world, the number of participants, and a detailed description of the observed interactions. I also noted my insights and took representative screenshots when appropriate.

When I analyse the data, I combined and anonymize the data, classifying the observations
based on factors and detailed accounts of the interactions.

3.2 Interviews

3.2.1 Participants

I conducted interviews with six participants, the details of which can be found in Table 2. The table presents participant information for interviews, including their gender identity, geographical location, most using tracking technology, and their total VRChat playtime in Steam. The participants for this study were six users of VRChat, comprising one Asian cisgender man using PC, one Asian cisgender woman using three-point tracking, one Asian cisgender man using seven-point tracking, one Caucasian cisgender man using PC, one Caucasian cisgender man using three-point tracking, and one Caucasian cisgender man using six-point tracking. Their total VRChat playtime on Steam was 2471h, 1257h, 2653h, 4400h, 184h, and 1353h, respectively.

Despite all six participants identifying as cisgender, the exploration of gender experiences within the virtual environment remains valuable in understanding gender expression more broadly. One reason for this is that many participants have friends who are not cisgender, giving them insights and exposure to diverse gender experiences within VRChat. Additionally, the VRChat community is generally more open to non-binary and/or transgender and alternative gender expressions, with some participants exploring the potentialities of their own gender identities. This inclusivity and openness to varied gender expressions enable a broader understanding of gender exploration in social VR platforms, even when focusing on cisgender participants.

The participants were recruited through my personal network, making this a sample of convenience. All participants were friends of mine. The primary reason for choosing friends as participants were to ensure a comfortable and open interview environment. As an insider, participants were likelier to share honest and in-depth insights into their experiences with someone they know and trust (Douglas & Carless, 2012). Due to this factor, I got more valuable
and even unique insights. This sampling technique facilitated diverse VRChat user recruitment with various tracking technologies and experiences.

Although participants were told to answer questions honestly, any answer was welcome, my presence as both a researcher and community member might inadvertently influence participants’ behaviour during the study, as they may try to present themselves in a certain way or modify their responses based on their relationship with me or understanding of the research goals. To address the limitation, I continually engaged in reflexivity, actively questioning my preconceptions and assumptions while analyzing and interpreting data.

I considered ethical issues during the recruitment process. All participants were informed about the purpose of the study, the nature of their involvement, and their right to withdraw from the study at any time without consequences. The anonymity and confidentiality of the participants were assured, and the participants provided informed consent before the interviews commenced. All participants approved me to record the whole interview for the use of note-taking and data analysis.

**Table 2**

*Participant Information for Interviews*

<table>
<thead>
<tr>
<th>Participant ID</th>
<th>Gender identity</th>
<th>Ethnicity</th>
<th>Cultural background</th>
<th>Most using tracking technology</th>
<th>Total VRChat playtime (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Cisgender man</td>
<td>Asian</td>
<td>Chinese, American</td>
<td>PC</td>
<td>2471</td>
</tr>
<tr>
<td>P2</td>
<td>Cisgender woman</td>
<td>Asian</td>
<td>Chinese</td>
<td>Three-point tracking</td>
<td>1257</td>
</tr>
<tr>
<td>P3</td>
<td>Cisgender man</td>
<td>Asian</td>
<td>Chinese, Japanese</td>
<td>Seven-point tracking</td>
<td>2653</td>
</tr>
<tr>
<td>P4</td>
<td>Cisgender man</td>
<td>Caucasian</td>
<td>French</td>
<td>PC</td>
<td>4400</td>
</tr>
<tr>
<td>P5</td>
<td>Cisgender man</td>
<td>Caucasian</td>
<td>American</td>
<td>Three-point tracking</td>
<td>184</td>
</tr>
</tbody>
</table>
3.2.2 Materials

**Equipment.** The materials used for the interviews included a laptop with VRChat installed, a Vive Pro Eye VR headset, a Vive facial tracker, two Index controllers, three Tundra trackers, OVR Toolkit software, and a recording software called OBS. Since these are the devices that I usually use for VRChat, the participants would feel the interview more like a talk between friends, and be less reserved, which can also let me avoid being no real emotion in the conversation.

To take notes during the interviews, I utilised the OVR Toolkit software, which allowed access to computer-based documents while remaining immersed in the VR environment. This setup ensured a seamless and efficient note-taking process throughout the interviews.

**VRChat.** I conducted the interviews within the VRChat world named “SuRroom”. I chose SuRroom as the interview location due to participant familiarity, encrypted rooms, available writing tools, in-world text input functionality, and encrypted voice chat channels. These features provided a secure and comfortable environment for conducting the interviews. In the prior communication, participants said that they often chat with friends in this VRChat world, so they can be interviewed more relaxed in this world.

With this comprehensive setup, I conducted interviews in a familiar and secure virtual space, facilitating open and honest conversations with the participants. The advanced tracking technology allowed for more nuanced interactions, enhancing the overall interview experience for both the participants and me.

3.2.3 Interview questions

**Table 3**

*Questions for Interviews*
<table>
<thead>
<tr>
<th>ID</th>
<th>Theme</th>
<th>Questions</th>
</tr>
</thead>
</table>
| A  | Demographic                               | What is your ethnicity?  
How do you prefer to identify your gender?  
How long is your total *VRChat* playtime on *Steam*?  
When did you start to use a VR headset? How many hours per week do you typically spend using your VR headset?  
Have you experienced full-body tracking? (When did you start to use full-body tracking?)                                                                                                                                          |
| B  | Avatar preference in *VRChat*             | Which is your favourite avatar in *VRChat*, ignoring the cost?  
What is the reason that you tend to use human/non-human/a mix of avatars?  
How do you perceive the avatars you use? (Do they represent a specific aspect of your personality or identity, or do you see them more as tools for interaction?)  
How do you perceive non-human avatars? Do you think they are more unique or express more identity compared to human avatars?                                                                                                           |
| C  | Interactions in *VRChat*                  | How do you interact with users who use non-human avatars?  
If it is in a public world, and someone using a non-human avatar tries to interact with you, will you treat them differently than someone using a human avatar? (Will it be different in the private world?)  
What do you focus on more when you are hanging out with your friends? Friends themselves or avatars?                                                                                                                                   |
| D  | Circumstances in *VRChat*                 | Are there any specific situations that let you feel more comfortable expressing yourself in *VRChat*, both verbally and non-verbally? (Why do you think they are comfortable?)  
Do you think there are any differences between friends worlds and friends+ worlds? (What’s the difference?)  
Are there particular environments, or activities encouraging you to express yourself more openly? Like in some narrow space or some themed events? (What elements encourage you to express yourself?)                                      |
| E  | Gender perception in *VRChat*             | What do you think of making assumptions about other users’ gender in *VRChat*?  
Have you made assumptions about other users’ gender in *VRChat*? (What factors contribute to these assumptions? How accurate do you think your assumptions are?)                                                                                                      |
| F  | FBT’s influences                          | Have you noticed any influence of your in-game expression habits on real-life interactions? (Could you provide examples of how your *VRChat* experiences have affected real-life communication?)  
What impacts do you think full-body tracking can have on others who perceive your gender and identity in *VRChat*?  
How do you use full-body tracking technology in *VRChat* to express or perform your gender?                                                                                                                                   |
One limitation of the original questionnaire design lies in the transition from vague to highly specific questions, which might inadvertently prime the respondents and influence their responses. The follow-up questions may lead participants to focus on specific aspects rather than providing a comprehensive view of their experiences and thoughts.

To address this limitation, amending the third question in Section B Avatar Preference in VRChat to “What is the relationship between your avatar and your sense of self, if any?” allows participants to reflect on their avatar choices in relation to their identities more broadly. Similarly, modifying the fourth question to “What is your opinion of non-human avatars with regard to identity, whether yours or others?” opens up the possibility for participants to discuss their perspectives on avatar choices and their implications for identity expression without constraining their responses to specific assumptions or preconceptions.

3.2.4 Procedure

The interview procedure was carried out in a systematic and structured manner to ensure consistency and gather comprehensive insights from the participants. I conducted interviews with the six VRChat users, and they were invited to SuRroom individually at the agreed time. The instance of the world was set to invite only. After the participants joined, I changed my status to red, which means hide the world I was in and didn’t accept requests and invitations. I introduced the study’s objective and confirmation of participants’ informed consent preceded each interview. Then, I asked the primary interview questions and follow-up questions to facilitate a coherent and in-depth discussion of the topics. During the interviews, I ensured a comfortable and open atmosphere for the participants to share their honest thoughts and experiences. I carefully listened and took notes using the OVR Toolkit software while prompting follow-up questions and clarifications when necessary.

After I completed the interviews, I transcribed the notes and provided the participants with a copy of the transcription to review. I allowed the participants to confirm that the transcriptions accurately represented their thoughts and experiences and to make any
necessary corrections or clarifications. This process ensured that I faithfully captured the participants’ perspectives and that the data used for analysis accurately reflected their intended meaning.

Upon completing the interviews and the subsequent review of transcriptions, I offered participants a month of VRC+ (VRChat’s premium subscription service) as a token of appreciation for their time and contributions to the study. This incentive helped to express gratitude for their participation and encouraged honest and open sharing of their experiences in VRChat.

3.2.5 Data analysis

First, I transcribed all recorded interviews, noting any non-verbal cues, such as pauses or emphasis, which could provide additional context or insights into the participants’ responses. I then proofread and let the participants double-check their transcriptions for accuracy, making any necessary corrections to ensure that the data accurately reflected the participants’ statements.

Once the transcriptions were completed, I conducted a thematic analysis to identify common themes and patterns in the participants’ responses (Braun & Clarke, 2006). This process began with a thorough rereading of the transcripts to generate initial ideas about potential themes. I then utilized a bottom-up, inductive approach to coding, allowing the data to guide the identification of themes rather than imposing any preconceived notions or theoretical assumptions to ensure that the results accurately represented the participants’ experiences and perspectives.

After coding the entire dataset, I reviewed and refined the identified codes, grouping them into broader themes based on their similarities and differences. I then reviewed these themes, checking their relevance and coherence, and ensuring that they accurately captured the essence of the coded data. I also considered any potential relationships or hierarchies
among the themes, which could provide a deeper understanding of the participants’ experiences and perceptions of avatar-based self-expression and gender performance in social VR environments.

Lastly, I conducted a final analysis of the themes, drawing on the relevant literature to contextualize and interpret the findings, and to establish their significance within the broader field of study. This qualitative analysis provided valuable insights into the participants’ experiences and perceptions of avatar-based self-expression and gender performance in social VR environments (Strauss, 1987).

4 Results

4.1 Factors contributing to user comfort and safety in Social VR

I explore the various aspects that contribute to users feeling at ease and secure when engaging in social VR platforms in this section. These factors play a crucial role in facilitating positive user experiences, fostering a sense of belonging, and promoting healthy interactions within virtual communities.

Selecting communities with shared interests and trust is important in various observations made in VRChat. Users tend to gravitate towards others with similar interests and tracking types, the shared experiences and interactions create an atmosphere where users can feel safe and comfortable, creating a sense of belonging and trust within the community.

In various random worlds (Observations 1, 2, and 3), users engaged in diverse activities such as chatting, sharing personal stories, and listening to the design story of a virtual world. In Observation 4, users in a friends+ game world engaged in various activities such as playfully interacting with each other, playing games like mahjong, and looking in the mirror. Users with different tracking types communicated about the games, their experiences, and their avatars’ features, such as phantom sense in FBT users. Observation 5 took place in a friends+ dancing world where users participated in a kawaii (cute) dance event. Participants gradually muted their microphones as more people joined and started to use body language to interact with one
another, they hugged each other, gave a thumbs-up after a song ended, and used gestures like patting each other’s heads, making cute movements, and taking selfies with their fellow dancers. FBT users seemed to prefer interacting with other dancing users. In Observation 6, users in a friends+ chatting world formed smaller groups to chat and interact. PC users used the chatbox and verbal communication, while FBT users exhibited more relaxed and comfortable body language, indicating attentiveness to their friends’ conversations. In public worlds (Observations 7, 8, and 9), users participated in activities like singing, dancing, and chatting about their avatars. The interactions were mostly verbal and focused on specific activities or experiences, with limited physical interaction. Users gather in groups based on shared interests, tracking types, or avatar preferences, emphasizing the significance of selecting communities where users can connect and interact with like-minded individuals in a comfortable and trusting environment.

In chat-centric worlds, the level of verbal communication varied between users with different tracking types. PC players primarily used chatboxes and speech for interaction, while 3-point tracking users could move their hands, make adorable poses, and engage in touch-based interactions. FBT users were observed lying on the ground or sitting while chatting, changing their sitting positions from time to time. Their body orientation and facial expressions indicated that they were attentively listening to their friends.

In Observation 3, users listened to a FBT user’s story about their emotional experiences in VRChat, in which non-verbal communication played a significant role. Users expressed empathy, support, and understanding through their avatars’ movements and gestures, which created a sense of camaraderie among users and allowed them to connect on a deeper level, providing users with meaningful social interactions in VR environments without relying solely on verbal.

In Observation 4, two FBT users were playing with each other, both using avatars with animal ears. They discussed their “phantom sense” experiences and how they felt when their
avatar’s ears were touched, despite the difference in position from their real ears. This exchange facilitated bonding and shared understanding among participants.

In other observations, users expressed their appreciation for various aspects of social VR environments, such as world designs (Observation 1) and avatars (Observation 9). Real-time feedback from users serves as a valuable resource for designers, helping them understand how their creations impact user experiences.

In Observation 5, I witnessed an instance of virtual trash actions during a dance event. The scenario unfolded as follows: A PC user approached an FBT user who was in the middle of dancing. The PC user walked straight up to the FBT user and jumped three times, seemingly as a greeting. However, the FBT user, absorbed in their dancing, ignored the PC user's gesture. Undeterred, the PC user continued to advance toward the FBT user until their avatars were almost touching.

Reacting to the intrusion, the FBT user performed an evasive manoeuvre, stepping two steps back and to the right, then tilting their head to continue watching the dance on the screen. The PC user remained standing in place, motionless, until the break time arrived. At that point, the FBT user reached out and patted the PC user’s head, prompting the PC user to finally retreat to an area behind the mirror where their presence would not interfere with the dancing. This observation highlights the nuances of social interactions and personal boundaries within VRChat. Users may encounter different degrees of social awareness and etiquette, necessitating the negotiation of personal space and acceptable behaviour within the scope of the virtual world, underlining the importance of understanding and respecting the boundaries and expectations of others.

By conducting unobtrusive observations, I found by selecting communities with shared interests and trust, users can find like-minded individuals and develop meaningful connections. They can choose and interact with relaxing environments and activities, which contribute to a sense of calm and enjoyment. Without any compulsory verbal communication in the virtual
environment, users have the flexibility to interact using their preferred communication methods and receive real-time feedback from other users, allowing for responsive and dynamic interactions. While in some worlds with more people, users prefer to mute themselves and use body language to interact with others, which may be caused by the safety consideration.

In VRChat, the safety and trust system offer a user ranking hierarchy, ranging from visitor to new user, user, known user, trusted user, and friend. In Observations 1239, I noticed that the majority of users were ranked between visitor and user. Simultaneously, these users predominantly used public avatars, which were mostly non-human characters. In contrast, Observations 45678 revealed that the majority of users were ranked as trusted users and employed personalized, anime girl avatars. This distinction may be due to the larger number of Asian users in Observations 45678, who are more heavily influenced by Japanese culture.

It is also worth noting that in Observations 1239, only eight users were observed using male avatars, significantly fewer than those using non-human or female avatars. This disparity may be due to a lack of well-crafted male avatars available for new users to find and customize according to their preferences. Furthermore, a search on Booth, a website selling 3D models and character attachments, reveals that the number of accessories and clothing items for male avatars is significantly fewer when compared to those for female avatars created by the same authors.

Cultural influence, availability, and ease of customization might be significant factors contributing to the choice of avatars and user ranking in VRChat. Users’ preferences and options might be impacted by the prevailing cultural trends and the digital market’s offerings. User behaviour patterns and preferences within virtual environments could potentially inform the development of more inclusive avatar selections and representational options that cater to a broader range of users.
4.2 Determining and Expressing Gender in Social VR

I delve into the multifaceted nature of gender perception and expression in virtual spaces and examine the role of different factors in shaping these experiences, beginning by discussing behaviour-based gender perception and expression, highlighting the ways in which users interpret and showcase gender through their actions and interactions. Next, I turn to avatar-based gender perception and expression, exploring the significance of avatar choices, FBT technology’s impact, and the customization process in determining and displaying gender. Subsequently, I consider voice-based gender perception and expression, examining the role of vocal cues in shaping users’ understanding and performance of gender. Finally, I discuss experience-based gender perception and expression, investigating how users’ prior experiences and assumptions about gender distribution in social VR spaces can influence their perception of others.

4.2.1 Behavior-based gender perception and expression

In social VR, users rely on a variety of cues to perceive and express gender. One key aspect that influences these judgments is behaviour, as indicated by the participants’ responses in this study. Some certain behaviours can impact users’ perceptions of gender in VRChat and users intentionally modify their behaviours to convey or hide specific gender identities.

P1 highlights the role of fidgeting and purposeless behaviours in shaping assumptions about one’s gender, stating, “You can see others doing some fidgeting, some purposeless behaviours with conscious decisions, which may influence the assumptions of the gender others made of them.” This observation suggests that individuals might attribute specific gender identities to others based on these subtle actions. The fact that these behaviours are made with conscious decisions indicates that users may be aware of the impact of their actions on gender perception and choose to employ them to create a specific impression.

P3 further expands on the impact of specific postures and mannerisms on gender perception:
The position of my knees when sitting and the position of my hands when standing will become factors for others to judge my gender, so I am more careful and cautious in VRChat, even though I may not care about these behaviours in real life. And I always ensure that my avatar is wearing a pair of safety knickers.

Safety knickers, similar to longer boxer-style underwear, are made from a different material than regular underwear. They are worn outside the underwear as a precaution to prevent accidental exposure of one's underwear when wearing skirts. This statement reveals that users might be more aware of their body language and gestures in the virtual environment, recognizing the importance of these non-verbal cues in shaping others’ perceptions of their gender. The contrast between P3’s behaviour in VRChat and real life suggests that virtual environments might encourage users to pay more attention to their own self-presentation and to engage in self-monitoring or self-regulation to create a particular impression.

P4 emphasizes the significance of gender-specific body language in social VR, stating, “When they act in a certain way, you would expect someone of a certain gender, like dancing, walking, sitting in a certain way. For a guy, people don’t sit the same way.” This response illustrates that users tend to associate specific actions or postures with particular gender identities, reinforcing the idea that behaviour plays a crucial role in shaping gender perception. The emphasis on different sitting positions for men and women highlights how seemingly mundane actions can carry significant symbolic weight in terms of gender expression.

P6’s comment further supports the importance of posture in gender perception: “Sitting pose can influence the assumption. When someone sitting with their knees goes down, it is more feminine.” This observation demonstrates that certain postures are commonly associated with specific genders and that users might rely on these cues to make judgments about others’ identities. The identification of a particular sitting position as “more feminine” reinforces the notion that users in VRChat may internalize and reproduce traditional gender norms and expectations through their behaviour.
In some cases, users adopt behaviours from external sources, such as anime, to enhance their gender performance. P3 explains,

In VRChat, as I act as a girl, it is stipulated that I cannot sit with my legs split when wearing a skirt, and I will also shake my hands when I am waiting for others, and I will dangle when I am standing, so as to increase my own girlish. These behaviours are basically the impressions given to me by the images of girls in anime.

This suggests that users draw inspiration from various media representations to inform their gender expressions in VRChat. By emulating these behaviours, users can reinforce or challenge the expectations associated with a particular gender, which in turn can have an impact on how gender is perceived and experienced within the virtual environment. P3 also mentions the popularity of “kawaii moves” in the platform: “I practice kawaii moves, everyone does that in VRChat because it’s cute.” This statement suggests that some users might adopt specific gestures or mannerisms to fit in with the dominant culture of VRChat or to create a more appealing online persona. The widespread use of “kawaii moves” also indicates that these behaviours might have become a shared cultural practice within the community, contributing to the establishment of certain norms or expectations regarding gender expression.

P2 adds that some male users intentionally adopt stereotypically feminine behaviours in VRChat, noting, “In VRChat, boys learn to do those purposeless behaviours that girls usually do to misleading gender assumptions.” This statement implies that users might deliberately challenge or subvert traditional gender norms by engaging in behaviours typically associated with another gender. However, P2 also acknowledges that these behaviours are part of gender stereotypes and do not necessarily represent the actions of all women: “But those behaviours are just part of the stereotype I think, girls don’t always behave like those.” This recognition of the limitations of stereotypes suggests that users might be critical of the assumptions they make about gender based on behaviour, recognizing the diversity of gender expression.
Users may also consciously adjust their behaviours to conceal their actual gender, as P2 explains, "I prefer to do fewer movements and avoid doing those fidgeting stuff to hide my real gender." This illustrates the strategic use of behaviour in VRChat as a means of controlling one’s perceived gender identity, users are able to use FBT technology to undo gender, which is harder to achieve in real life because of the social norm. P2’s desire to hide her real gender highlights the potential for virtual environments to provide spaces for users to experiment with different aspects of their identity or to escape the expectations and constraints they may face in their offline lives.

In summary, users in VRChat rely on various behavioural cues, including fidgeting, posture, gesture, and body language, to express and perceive gender. These behaviours can be strategically employed to create specific impressions, challenge or reinforce stereotypes, and experiment with different aspects of one’s identity. The participants’ responses demonstrate the complexities of gender expression and perception in social VR and highlight the importance of further research to understand the nuances of these dynamics.

4.2.2 Avatar-based gender perception and expression

Participants shared their experiences and insights on their personal preferences for avatars, the impact of FBT technology on avatars, the challenges they faced in customizing their avatars, and how they perceive and express gender through the avatars.

In social VR environments, users have diverse reasons for selecting specific types of avatars. The connection between a player and their avatar can be seen as a psychologically merged entity, where a strong bond results in enhanced agency in gameplay. This connection encompasses four dimensions: (a) identification, where players see themselves as similar to or the same as the game character, (b) control, which involves a powerful sense of governance over the avatar’s actions, (c) suspension of disbelief, where players accept the virtual world as real, and (d) responsibility, which entails feeling obligated to ensure the avatar’s well-being (Bowman et al., 2012). P1, for instance, explained their preference for human avatars: “Because
I want to socialize as a human in the game, I always use human avatars in VRChat.” This choice reflects a desire to maintain a human identity while engaging with others in the virtual world. P2 mentioned that she prefers human avatars because she feels more natural when moving: “I prefer human avatars because their proportions are closer to mine, making movement feel more natural.” P2 also mentioned that her avatar is more like a character she borrows in the game, stating, “My avatar is just a character in the game like I’m borrowing this appearance. It doesn’t represent my personality and doesn’t resemble my real-life appearance. I treat my avatar like a virtual daughter that I can nurture.” This demonstrates that avatars can also be seen as distinct characters or extensions of the user’s personality, rather than direct representations of their real-life selves.

When meeting new people in virtual environments, users may place greater emphasis on avatars due to the absence of real-life interactions. P4 shared that his avatars often have non-human features, such as cat ears and tails because he finds it fun:

I don’t use a lot of fully human avatars like usually, they have cat ears, tails and stuff like that, it’s fun, why not? You can be whatever you want in this game, so why not be something that you cannot be in real life?

P4 also mentioned that his avatars represent some part of their taste: “My avatars can represent some part of my taste for sure because of course you only wear avatars you like.” P5 also expressed a connection with his avatar, stating, “I am related to my avatar. It’s not me, but my friends can recognize it as me, it is like my virtual agency.” P6 shared how his avatar preference influences his perception and interactions with others: “For me, an avatar is a tool for finding other furries because of their hobbies and identities. It is also half me, it represents some part of me.” This highlights the importance of avatars as visual representations of users in social VR settings.
Users’ preferences for specific avatars may impact their willingness to engage with others. P3 mentioned that he was more likely to interact with users whose avatars he found particularly appealing:

Most of the time, I interact with people I know and don’t pay much attention to avatars. But if someone uses an avatar that I really like and has customized it to look impressive, I might initiate interaction with them and try to get to know them.

P2 explained that she would avoid interacting with certain users based on the avatars they chose:

If someone is not using a microphone, playing on a PC, and using a non-human avatar, I won’t interact with them. From the avatar, I can sense that our preferences are different, and it’s hard to find common ground for conversation.

This illustrates how avatars can influence users’ perceptions of others and shape their social interactions in virtual environments, and the importance of high mobility in social VR.

P1 highlighted the impact of FBT on avatar perception, stating that different users with the same avatar model could evoke different feelings: “Even though it’s the same model when different people use it, the feeling they give is different, especially when using FBT. From their gestures, you can feel their distinct personalities and the unique atmosphere they create.” P3 also mentioned that he started to strongly identify with his avatar after using FBT: “I started to have a strong sense of immersion and felt that the avatar was me or me on the internet after using FBT, and it fully inherits my personality.”

Many participants shared their experiences and challenges with customizing their avatars. P2 explained that she dedicates a significant amount of time to avatar customization:

I spend 1/3 of my free time modifying my avatar, adding new clothes, hair, and accessories, changing gestures and expressions, and enhancing avatar functions. Another 1/3 of my free time is spent in VRChat testing new content and making
adjustments based on the results, and only the remaining 1/3 of my free time is spent
genuinely enjoying VRChat.
P3 talked about the effort and resources required to customize avatars, stating:
I spent a lot of time learning to modify avatars in Unity and Blender. I basically buy new
clothes or accessories for my avatar every week, just like someone dressing up in real
life. I use Unity to dress myself.
P3 also mentioned the difficulties and expenses involved in avatar customization,
particularly for newcomers:
It takes a lot of time to learn, which can be difficult for new users. Additionally, you need
to invest a lot of money in buying models and accessories. Many VRChat newcomers
simply copy models from model worlds, but many of those models actually violate
copyright laws. Without purchasing the original files, you can't customize your avatar's
appearance.
P1 shared their appreciation for both realistic avatars and those with fantasy and cute
themes, stating:
Some models have clothes similar to those sold in real life, and I think those avatars are
very realistic. But I also like the fantasy and cute-themed models, as they can represent
different aspects of a person. People are complex and can be both cute and cool.
Having unlimited avatar choices allows users to better express their multifaceted selves.
P6 noted that customization options for non-human avatars were just as diverse as
those for human avatars, if not more so: “When it comes to customization, everything a human
avatar can do, a non-human avatar can do, and even more.” P6 shared how their avatar
preferences affect their openness towards others: “If they have a good-looking avatar, I am
more open towards them and want to be friends with them.” P4 noted that he would perceive
one’s gender based on their avatar’s appearance: “Based on their avatar if that is a female
avatar and doesn’t talk, I think it’s her.” P1 added that: “I saw some people wrote in their bio,
saying the avatar’s gender is their gender. I think it’s pretty cool. Why bother caring about someone’s gender in reality?”

Avatar-based gender perception and expression in social VR environments is a multifaceted phenomenon. Users’ avatar preferences and customizations reflect their personalities and tastes, and FBT technology can enhance their experiences and interactions. From avatars, other users can know do they have similar tastes, and choose which user they would like to interact with.

4.2.3 Voice-based gender perception and expression

In the context of voice-based gender perception and expression, participants provided insights into their experiences with voice communication in social VR environments. They discussed how voice influences their perception of others’ gender and how it affects their interactions.

P3 shared that he would speculate about others’ gender out of curiosity if he was interested in someone and had verbal communication with them. He also mentioned that his language would change based on his perception of the other person’s gender, stating, “After guessing their gender, I pay attention to my words. If I think they are female, I don’t use foul language in front of them”. This indicates that users might modify their behaviour and language depending on their gender perception of others in the virtual space. This self-regulation may arise from ingrained societal norms or expectations regarding how one should interact with different genders, reflecting how gender dynamics from the physical world may persist in virtual environments.

P3 also pointed out that he would try to determine if someone is using a voice changer when he is curious about a generally mute individual who starts speaking: “If I’m curious about someone who is usually mute, I try to judge if they are using a voice changer when they start talking”. The need to determine if someone is using a voice changer might indicate a desire for authenticity in interactions or scepticism towards those who choose to modify their voice. While
P2 mentioned that some people try to guess if others are using voice changers after hearing their voices, considering it’s a malicious behaviour. This suggests that some users may rely on preconceived notions about gender distribution in virtual spaces when interacting with others, which could influence the expectations of other users.

Moreover, P3 noted that some male users learn to produce feminine voices, but these voices often sound similar and can be differentiated: “Friends with a deep level of role play will open a voice changer to better perform their avatar. Some men learn to produce female voices, but they often sound similar and can be identified”. This could point to the limits of voice changers and the human ability to produce subtle differences in vocal patterns, revealing the challenges users may face in fully embodying a different gender identity through voice alone.

Finally, P4 simply stated that when they hear a feminine voice, they assume it belongs to a girl: “If you hear a feminine voice, you think there is a girl” (P4). This response reinforces the idea that voice plays a significant role in shaping users’ perceptions of others’ gender within social VR environments. The reliance on voice as a gender cue may demonstrate how deeply ingrained gendered vocal characteristics are in our understanding of identity and how these characteristics can influence our perception of others even in virtual spaces.

Participants’ experiences suggest that voice-based gender perception and expression are multifaceted aspects of social VR interactions. Users may rely on assumptions and stereotypes when they hear others’ voices, which can influence their behaviour and communication.

4.2.4 Experience-based gender perception and expression

Users sometimes rely on their personal experiences to perceive and express gender within VRChat. These experiences often shape users’ expectations and assumptions about the gender distribution within the platform, informing their default assumptions about others’ gender identities.
A notable phenomenon within VRChat is the babiniku (バ美肉) culture, in which users who identify as man in real life adopt woman avatars or personas. P3 explained:

I have many friends who are babiniku, which refers to male Vtubers or VRChaters who use female avatars. Some of them use male voices, some use falsetto, and some are otokonoko. Many people will write babiniku in their bio, so I think VRChat has the most babiniku users. Everyone likes to use anime girls.

The popularity of babiniku culture illustrates the fluidity of gender expression within VRChat, where users have the freedom to explore different gendered identities and appearances. The presence of babiniku users also influences how other users perceive and interact with their peers within VRChat. P3’s experience demonstrates that he has come to expect and accept the prevalence of babiniku users on the platform. This acknowledgement and understanding of babiniku culture may help reduce the likelihood of making incorrect assumptions about others’ gender identities based solely on their avatar’s appearance.

P2 also shared her belief that 80% of VRChat users are men, which influences her default assumption about others’ gender before hearing their voices: “Based on regular chats, social media screenshots, and various experiences, I think 80% of users in VRChat are male. So, before hearing their voice, I assume they are male”. This perspective highlights the prevalence of experience-based gender perception, where users draw on their previous encounters and observations to form expectations about the gender of others within the platform. However, it is important to recognize that relying on personal experiences and assumptions can also limit users’ understanding of the diverse range of gender expressions and identities present within VRChat. Defaulting to a particular gender based on personal experience may inadvertently perpetuate stereotypes and lead to misperceptions about others’ gender identities.
Experience-based gender perception and expression play a significant role in shaping users’ understanding and expectations of gender within VRChat. The popularity of babiniku culture illustrates the flexibility and fluidity of gender expression within VRChat, where users have the opportunity to explore different gendered identities and appearances. Users often draw on their past experiences and observations to make assumptions about others’ gender identities, as well as to inform their own expressions of gender. However, it is essential to recognize the limitations of relying on personal experiences and assumptions, as these may not fully capture the diverse range of gender expressions and identities present within the platform.

4.3 Impact of Social VR and FBT on Users

In this chapter, I explore the various impacts of social VR and FBT technology on users, delving into the ways these technologies shape interactions, self-expression, and experiences in virtual environments. I discuss selective socialization and enhanced self-expression in virtual worlds, examining how users navigate and engage with others in these spaces, then focus on the unique experiences users can have in VR that may not be possible in real life, as well as the potential transfer of these experiences to their offline lives. Finally, I investigate how social VR and FBT enable users to engage in mutual interactions and identity exploration beyond the limitations imposed by societal norms and expectations, aiming to provide a comprehensive understanding of the transformative potential of social VR and FBT on users’ experiences, interactions, and identities.

4.3.1 Selective socialization and enhanced self-expression in virtual worlds

Participants emphasized the value of being in familiar or controlled social environments, such as worlds where only friends are allowed, and the impact of avatar appearances on initiating interactions, some participants favoured worlds with fewer people or more private settings, as they found larger groups to be anxiety-inducing: “I usually go to rooms with fewer people. If there are too many people, I get a bit socially anxious unless my friends are there” (P1); “I feel more comfortable in friends’ worlds, not friends+ worlds, but the ones that only my
friends can join. That’s because people who are already my friends are familiar, so I can relax” (P2). In one-on-one settings, P4 reported feeling more at ease: “If I am one-on-one with someone, in some private world, vibing or listening to music, I feel very comfortable, like I am with my friends in real life”. VRChat allows users to choose the worlds and people they want to engage with, making self-expression easier, as P4 expressed:

Expressing my feelings or emotions is way more accessible in VRChat because you can choose the world and the people you want to stay with. You are with someone like face-to-face here, but face-to-face in real life could be very intimidating, and you may have social bias, like certain people from certain stuff.

P5 expressed preferences for worlds with familiar people or where he could have more control over their social interactions: “Sometimes friends’ friends may be annoying, so I prefer to go to friends’ worlds, but if I’m with my friends, I don’t mind going to some world with more people”. P6 also mentioned their preference for smaller, cosier worlds where they feel less observed: “If I am with a group of people, I feel being watched. Friends+ world is more like semi-public, I like staying in a place with fewer people, those cosy worlds”. This preference highlights the importance of offering diverse environments in VRChat to accommodate users with different social preferences and levels of comfort. By providing a range of worlds and settings, VRChat allows users to find spaces where they can be themselves and engage with others at their own pace, further enhancing the potential for self-expression and identity exploration.

Participants also emphasized the importance of being able to choose worlds and interact with like-minded individuals in VRChat. P4 said:

Expressing my feelings or emotions is way easier in VRChat because you can choose the world and the people you want to stay with. You are with someone face-to-face here, but face-to-face in real life could be very intimidating, you may have social biases, like certain people from certain backgrounds.
This freedom of choice allows users to build meaningful connections, develop deeper emotional bonds, and engage in more authentic self-expression, without the constraints of societal expectations and norms.

Participants highlighted the importance of engaging in activities and worlds that facilitate self-expression without the need for verbal communication and they thought worlds that didn’t require verbal interaction, more appealing and comfortable: “I also find dancing worlds, where I don’t need to use my mic, very comfortable. I guess I just don’t like talking to strangers that much” (P2); P3 stated:

When I go to dancing or kawaii move events, there isn’t much need for verbal communication. I can communicate through body language without using my mic. I mostly attend these events for my own enjoyment and don’t worry too much about what others are doing. So, I frequently participate in dancing events, kawaii move events, and DJ events. I get nervous at avatar gatherings, where the main activity is chatting, so I don’t go there as often.

P1 expressed that he could communicate more comfortably in gaming worlds, where he could engage in activities with people whom he may not know well without feeling awkward: “I usually express myself better in gaming worlds. When playing games with people I’m not familiar with, there is no awkward silence due to a lack of topics”. P2 felt more at ease in specific environments: “I feel more comfortable in spacious and bright settings, but that’s just me”, while P3 said: “I’ve always liked small spaces, but I can’t always experience that in real life. In VRChat, there are many small Japanese-style closet spaces. I find it very relaxing to sleep in those spaces”. In the physical world, falling asleep is typically regarded as an individual, private experience. Yet, in social VR environments, sleep activities can be reimagined as more interconnected experiences, allowing friends or even strangers to unwind and spend time together in a shared virtual space. Users wear their VR headsets, choose a comfortable world and a suitable instance, adjust settings and lie down, then they say good night to each other
and close their eyes. Once they are awake, they may take off their VR headset and continue sleeping or take photos with the messages their friends left beside them. These settings allow users to interact with others without the pressures of maintaining conversations or facing social anxiety. By providing various activities that cater to different preferences, VRChat enables users to feel more at ease and allows them to participate in activities that align with their interests.

Participants valued VRChat for offering them the freedom to choose the group they want to social and the social environments they want to stay in, which made them feel more comfortable and capable of expressing themselves.

**4.3.2 Experiencing the unattainable in VR and transferring it to real life**

The participants show the significant impact of their VRChat experiences and FBT on their real-life interactions, behaviours, and self-perception, which provides a unique platform for self-expression, experimentation, and skill development, which may ultimately contribute to users’ personal growth and well-being.

Firstly, the flexibility and anonymity of VRChat enable users to create and inhabit avatars that represent their ideal selves. P1 mentioned, “I like that my avatar embodies some of my ideal states, such as hairstyle, clothes I want to wear, and the impression I give to others.” P3 also expressed a desire to adopt the gender represented by his anime girl avatar in real life, stating that:

There might be a wish to become the gender displayed in the game in reality. It’s challenging and costly to change in real life, but being able to do something in virtual reality that I cannot do in real life is interesting. When I was playing VRChat, I didn’t just want to be a girl, but I thought that maybe I’m actually a girl.

The fact that participants can create and control their avatars allows them to explore their desired self-image in a safe and non-judgmental space, which can foster self-acceptance and self-discovery.
Moreover, the interactive nature of VRChat, as a game and a social VR platform, allows users to try to do the things they might not feel comfortable doing in real life, because of the social norms or the costs. P1 shared, “I would do some actions in VRChat that I wouldn’t do in real life, such as patting others on the head.” P4 also mentioned he can engage in activities like dancing in VRChat, which they wouldn’t do in real life. P1 and P4 noticed improvements in their real-life communication abilities. P1 observed, “I used to not pay much attention to others when talking in real life, but now after playing VRChat, I feel like I can focus more on people’s reactions when I speak.” P4 and P6 mentioned that their real-life social interactions have improved, with P6 stating, “I’m a lot more social now, I feel I’m easier to have a conversation in real life.” The immersive and interactive nature of VRChat can provide users with opportunities to practice their communication skills in a less intimidating and more controlled environment and help users develop new social skills, which can lead to greater self-confidence and improved social interactions in real life, which can be invaluable for users who experience social anxiety or other communication barriers in real life.

In addition, participants reported that their experiences in VRChat and the use of FBT carried over into their real-life interactions. P1, P2, P3, and P5 mentioned adopting new gestures and behaviours from their virtual experiences. For instance, P1 mentioned adopting new gestures in real life, “I often do some actions to show that I’m thinking, like putting my index finger on my chin and shaking my head. I found that I started doing this in real life too.” P5 shared, “I always do the peace sign after playing VRChat, and I also do that in real life. I feel I focus more on body language now.” P2 added, “I often do gestures corresponding to my avatar’s expressions when I walk in real life. I didn’t have many chances to sway my leg while waiting in real life, but now I often do that in VRChat.” P3 also stated, “After using FBT, many of my VRChat actions have carried over into real life, such as giving a thumbs up, showing helplessness with open hands, and making big movements like spinning and hopping around when I’m alone.” P5 also reported engaging in behaviours he wouldn’t do in real life: “In some
photogenic worlds, I do some behaviour that I wouldn’t do in real life, for a selfie”. The adoption of these new behaviours suggests that users are internalizing and integrating aspects of their virtual experiences, which can contribute to the formation of new habits and a more diverse behavioural repertoire.

**VRChat**, as a medium for renegotiating and reimagining gender identities, helped users to create experiences for self-exploration, skill development, and personal growth. The use of FBT has also influenced their real-life interactions and behaviours, letting them foster more inclusive, diverse, and empowering experiences for users across the gender spectrum.

### 4.3.3 Engaging in mutual interactions and identity exploration beyond societal constraints

Participants shared their experiences about the immersive nature of **VRChat** and its impact on their social interactions, which shows the use of FBT allows users a more authentic expression of themselves, and contributes to more engaging and immersive experiences in social VR environments.

P1 and P2 both highlighted the benefits of using a VR headset in **VRChat**, which allows users to gauge whether others are paying attention and receive immediate feedback. P1 expressed the difference between using VR and FBT in **VRChat** and playing on a PC:

> I feel that the difference between playing on a PC and using FBT in VR is enormous when interacting. Others can know if you’re listening to them, your thoughts on what they’re saying, and your mood. Verbal communication is still important during interactions, but body language has become much more pronounced.

P1 said:

> In **VRChat**, because you’re wearing a VR headset, you can tell if others are listening to you, just like in real life. I think being able to see others’ reactions makes my communication smoother. When using text-based communication in social apps, not
being able to see people’s reactions sometimes makes me wonder if I said something wrong.

P2 added, “In VRChat, when you do something, you always receive feedback from others, whether it’s verbal or through actions, and it’s very timely feedback.” This real-time feedback and the sense of presence in VRChat can lead to more effective communication and deeper connections, as users can better understand each other’s emotional states and intentions.

P1 and P3 emphasized the increased sense of presence and intimacy with others in VRChat. P1 stated:

Because the immersion is stronger in VR, any actions feel like they’re happening in real life, so I can become closer to others. And thanks to VRChat, cute avatars and voice changers, the gender inside is ambiguous, and I think it’s very comfortable and wonderful that the concept of gender is about to collapse. The feeling that it doesn’t matter if the inside is a man or a woman is the best.

P3 shared their experience of quickly building connections with others in VRChat through gestures and shared activities, which might be considered strange in real life:

In VRChat, when you touch each other’s ears, when you do gestures, or when you dance together, you can quickly develop a bond. In real life, doing these things would be strange. When playing MMORPGs, there isn’t such an immersive feeling, and you can’t freely control your actions, so there isn’t the same sense of quickly building relationships with others.

The physicality of these interactions can enhance the emotional bond between users, allowing them to establish closer connections and facilitate a sense of community within the virtual environment. P3 also states: “If I want to sugar with someone, apart from the appearance of the avatar, I will pay more attention to their personality and hobbies. Many of my friends, building relationships from games to reality, are all the same gender.” Sugar (お砂糖) refers to
the partner relationships in VRChat. The definition of sugar varies from person to person. There are romantic sugars limited to the VRChat, romantic sugars that develop into real-life relationships, friendship sugars that involve dating without a romantic relationship, and friendship sugars that simply involve playing together as friends. Many users do not care about others’ genders, as these are virtual relationships, and sugar merely signifies that a user has a sweet presence in VRChat.

Mutual interactions in VRChat, which are powered by the ability to communicate nonverbally through body language, enable users to explore identity and engage more intimately with others, meanwhile, they have an opportunity to experiment with their identities while bypassing societal constraints, social norms, and the limit of the cost.

5 Discussion

To better guide the future design of social VR platforms, I explore three research questions: (1) Under what circumstances are users more willing to express themselves (both verbally and non-verbally)? (2) How do users perceive others’ gender in social VR? (3) How do users perform their gender using full-body tracking technology in social VR? These questions help to understand the factors that influence users’ willingness to express themselves in social VR environments and facilitate a deeper understanding of how others perceive gender in VR environments. From the results of observations and interviews, I found cultural differences play an important role in gender performativity with FBT in social VR, so I use cultural perspectives to consider how it influences users’ experiences within social VR environments. First, users in social VR environments are more willing to express themselves (both verbally and non-verbally) when they feel comfortable and safe, which can be achieved through factors such as shared interests, smaller groups, trust systems, customised worlds, and supportive communities (RQ1). Secondly, users perceive others’ gender in social VR through a range of strategies including behaviour, avatar appearance, voice, and experience-based assumptions, however, these strategies are not without their limitations, such as restricted avatar design options, potential for
harassment, and normative expectations related to voice (RQ2). Lastly, users perform their gender using FBT technology by engaging in immersive embodied events, acting out their identity, and visualising their identity through avatar creation and design, which can influence their self-awareness, self-confidence, and community-building experiences both online and offline (RQ3).

In the first section of this chapter, I explore gender performativity through FBT in different cultural contexts, examine the creation of safe spaces, discuss the role of social VR in fostering relationships, and identify challenges and obstacles in navigating these virtual environments. Subsequently, I address design considerations for enhancing self-expression among FBT users, focusing on aspects such as avatar customization, voice features, non-verbal communication, FBT enhancements, experience optimization, cultural adaptation, and the integration of friend room synchronization with public events. By examining these topics in depth, this chapter aims to contribute to the ongoing discourse on the role of virtual reality in shaping our understanding of gender, identity, and social interaction.

5.1 Exploring gender performativity through FBT in different cultures

Users from various cultural backgrounds experience and navigate gender performativity in social VR environments in different ways. In VR environments that utilize FBT technology, people from different countries and cultural backgrounds converge, making it easier to break away from the stereotypes and social norms traditionally dictated by societal expectations (Aririguzoh, 2022). FBT enables users to express themselves more authentically and dynamically, further enhancing the potential for diverse interactions. For example, the origin of the concept of cuteness in Japanese culture may be closely related to the value placed on humility (Nittono et al., 2021). Traditionally, Japanese culture emphasizes humility and self-control, and people appreciate a reserved and elegant demeanour. Consequently, the Japanese notion of cuteness is associated with both an adorable appearance and the expression of gentleness and tenderness. By using FBT, users can perform to be tender or not through their
body language, with the choice of ignoring the requirement. They could also choose not to be a human, and develop exclusive rules and personalities.

Asian female users tend to conceal their gender and reduce their movements which can be perceived as a woman in unfamiliar environments to avoid drawing attention to themselves as women. This is primarily due to the male-dominated user base in VRChat and the potential for unwanted attention or malicious behaviour that might arise when revealing their gender in public spaces. As violence against women, including sexual harassment and cyberbullying, is a more prominent issue in the Asia-Pacific region that may contribute to women’s discomfort in being surrounded by male users in VR environments (Facts and Figures: Ending Violence Against Women and Girls, 2022). Given the prevalence of such incidents, women may feel particularly vulnerable and worry about their safety when placed in situations where they become the centre of attention. Furthermore, media representations in these societies often portray women as victims or perpetrators of violence, perpetuating the association between women and vulnerability (Dong & Xu, 2017). This negative portrayal may exacerbate the feeling of unease experienced by Asian women in social VR environments when they find themselves the focus of male users’ attention.

Confucian culture, which has a profound impact on mainstream societal values in East Asia, emphasizes the values of family and marriage, with women playing primary roles as wives and mothers (Slote & De Vos, 1998). This cultural context, particularly in collectivist cultures, may lead Asian women to feel additional pressure to uphold their modesty and adhere to traditional gender expectations in social interactions, as straying from the norm could be perceived as selfish (Kemper, 2017). But in virtual spaces, they can choose to not act as a women that catering the social norm, which may let them feel more comfortable in VR.

Asian male users’ perspectives on avatar representation and safety knickers in social VR environments offer insights into how cultural norms and conservative values influence gender performativity and interactions. These users pay close attention to the appearance of
their avatars, especially when using women avatars, ensuring that their actions, sitting postures, and other behaviours conform to the gender of their avatars. They also remind friends to add safety knickers to their avatars.

Safety knickers, a concept originating from conservative East Asian cultural norms and expectations for women, play a significant role in these users’ avatar customization. In East Asia, moral standards are often male-dominated, and women’s clothing is closely linked to their morality (Choi et al., 2022). As such, wearing safety knickers serves as a signal of chastity from women to men. The private nature of undergarments is intimately connected to women’s chastity and character within this cultural context, and the act of viewing them gives the viewer a strong sense of power. This power can lead to feelings of aggression, making women feel threatened by voyeuristic gazes.

Women internalize a sense of shame under this cultural influence, making them wear safety knickers out of fear of unintentional exposure or being caught in a compromising situation. Not wearing safety knickers is often seen as a symbol of sexual openness, which is frowned upon in East Asian contexts. Despite there is no substantial difference between safety knickers and underwear, the idea that seeing safety knickers equates to a failed peeping attempt has been successfully popularized in East Asia, nullifying the pleasure derived from voyeurism. Safety knickers act as a simple method to dismantle this concept.

A significant cultural divide exists between East and West in this regard. Currently, there is no specific term in English that refers to East Asian safety knickers, and one must search using “shorts underneath dress” to find an equivalent term. In Western online forums like Reddit, the question of whether to wear shorts under a short skirt is often met with responses advocating against it, or only wearing them to prevent thigh chafing and sweating.

The norms and social expectations imposed on women in Eastern cultures result in users unconsciously adding many requirements and new pressures when role-adopting as women in VR environments. As these pressures are pervasive in the lives of East Asian
women, non-female users playing as women in social VR can gain a more authentic understanding of the challenges women face in real life and use their experiences to improve women’s status. At the same time, users who want to transition to women can experience these cultural pressures in a safer environment, develop coping mechanisms, and apply their experiences to real-life gender transitions.

Caucasian male users report that they do not deliberately perform their gender in social VR environments. This attitude may be attributed to the growing emphasis on individualism and self-expression in many Western societies, as well as the progressive stance often taken towards gender and sexual behaviour. As Western societies increasingly prioritize promoting equality and inclusivity, Caucasian users may be less concerned with adhering to traditional gender norms and expectations within virtual spaces. This cultural context enables them to explore and experiment with their virtual identities more freely, focusing on self-expression without the constraints imposed by prescribed gender roles.

Cisgender males may also be less aware of their own gender performance, particularly concerning masculinity, as they often do not need to engage in the same level of introspection and reflection as those with non-cisgender experiences. This lack of self-awareness can be attributed to the fact that cis-men’s gender expressions typically align with societal expectations and norms, leading to a lower likelihood of experiencing challenges or scrutiny in their day-to-day lives. Without strong motivation to question or reevaluate their gender identities, cis-men may inadvertently perpetuate and uphold traditional gender roles and norms. However, virtual environments offer a unique opportunity for cis men to explore diverse gender expressions and performances, prompting a richer understanding of masculinity and increased empathy for the experiences of others outside their own gender identity.

The anonymity provided by platforms such as VRChat, combined with the immersive capabilities of FBT, enables users to release their emotions and even adopt personalities that are entirely different from their real-life personas. By allowing users to break free from the
constraints of their cultural background, FBT in *VRChat* creates opportunities for individuals to explore new ways of expressing themselves and interacting with others. This encourages a more open and diverse exchange of ideas and experiences, ultimately enriching the social dynamics within the virtual reality environment.

### 5.1.1 Creating safe spaces for FBT users to express and explore gender identity

*VR* offers a unique environment that merges voice, visual, and interactive experiences, similar to real-life interactions. This environment allows users to focus on personality and shared interests, fostering a sense of security. Users can remain anonymous and express themselves comfortably without the constraints of real-world identities, such as physical appearance, ethnicity, socioeconomic status, and location.

Social VR platforms differ from traditional MMORPGs by requiring real-life actions for in-game activities, enhancing the immersive experience and fostering deeper connections among users. Phenomena like phantom touch and the sense of presence can help develop relationships within virtual environments. These virtual experiences can serve as a guide for users, helping them navigate their gender identity and expression more authentically and confidently. By creating safe spaces, social VR platforms can play a vital role in exploring and expressing gender identity across diverse cultural contexts.

*VRChat* offers a unique opportunity for users to explore and affirm their gender identity in a more supportive and inclusive environment. The freedom to choose one’s environment and social circle, as well as the ability to customize avatars, enables users to experiment with different gender expressions and presentations at a lower emotional and social cost. This helps to accelerate the gender affirmation process, as users can take the confidence and self-understanding they have gained in the virtual world and apply it to their real lives.

Moreover, the blending of virtual and real-life experiences in *VRChat* can lead to stronger connections and friendships, which can provide valuable support for individuals undergoing gender affirmation. The ability to meet people with similar experiences and share
stories, advice, and encouragement can make the journey of self-discovery and affirmation less daunting and more empowering.

In the real world, individuals who identify as transgender, non-binary, or gender non-conforming often face different challenges when attempting to express themselves (Saltzburg & Davis, 2010). In many Asian countries, people may have no direct contact with transgender individuals in their daily lives, so their understanding of trans identities is often based on exaggerated or stigmatizing portrayals from sensationalized media, which tend to pathologize transgender experiences. This gap in understanding can lead to discrimination and exclusion, as transgender individuals are treated differently from cisgender individuals. Allowing users to choose the groups they would like to hang out with and perform certain gender in front of in social VR can avoid people who have a lack of understanding or acceptance of non-binary.

Language and terminology related to gender identity and expression may differ across cultures, creating challenges for those seeking to articulate their experiences and find community support. In some contexts, a rich vocabulary may be available for diverse gender identities, while in others, language may be limited or non-existent, making it difficult to communicate one’s gender identity or find acceptance (Dev et al., 2021). For example, Japanese users may opt for more gender-neutral and inclusive honorifics, such as “san,” to address others in the virtual environment. In English, people use “they/them” to express they are queer, but in written Chinese, there are no such gender-neutral words. As in Social VR platforms like VRChat, users can meet people speaking different cultures, they can learn other languages without any cost from other users, and use those words to challenge traditional gender norms and expectations at a linguistic level.

5.1.2 Fostering relationships in social VR

In VRChat, a concept called “sugar” has emerged, which represents a special bond that transcends gender and sometimes even nationality. This virtual environment provides a more inclusive space for users to form connections, enabling them to overlook factors that might be
more significant in real life, such as appearance, financial status, and nationality. The concept of sugar is a spontaneous creation by Japanese users, and it is not an official feature of VRChat. It is called sugar because the sweet, flirtatious interactions between users with cute avatars resemble sugar. Unlike games like Final Fantasy XIV (2013), which has an official marriage feature, sugar relationships in VRChat are more akin to the partner feature in Dragon Quest X (2012), with no gender rules or restrictions.

In VRChat, sugar relationships stand out from those in other games because they are not influenced by the users’ real-life genders. Many users who adopting role as women form close bonds with users who adopting role as men, regardless of their actual gender. The end of a sugar relationship is referred to as salt, named so because it is painful and bitter, the opposite of the sweetness of sugar.

The unique illusion of VR makes it possible for users to appear as cute girls with adorable avatars, regardless of their real-life gender. Even a man’s voice can seem like that of a cute girl in this virtual environment. VRChat provides a unique space where users can form connections regardless of gender, and the community embraces this value, making even same-sex couples feel comfortable.

However, in VRChat, a person’s personality and character are more important than their gender. Unlike in typical online games where players can only get to know each other through text chat, VRChat allows users to communicate through voice chat, gestures, and actions, making the experience feel more genuine. In this environment, anyone can be a beautiful girl, so their real-life gender and appearance become less important, but their personality becomes more significant than in other online relationships.

Japanese users of VRChat have established relationships that blend virtual and real life. The authenticity of voice and gestures in virtual reality, aided by FBT technology, makes users feel as though they are interacting with real people, despite the avatars’ artificial appearance. This form of interaction is similar to the way we engage with others in real life. By breaking down
barriers between the virtual and real worlds, users see offline meetups and gift-giving as natural aspects of their relationships. The culture of posting Amazon wish lists on VRChat stems from the idea that giving small gifts to friends is a good thing, beyond just influential celebrities. For long-distance couples, VR provides a new way to deepen emotional connections by allowing them to watch videos together, travel the world and take photos, and play various types of games in different virtual worlds. Users can enjoy romantic moments together while admiring beautiful scenery, and having fun in-game can bring them closer. In horror-themed worlds, the suspension bridge effect can further deepen their connection.

The ability to interact with objects in the virtual world provides users with more conversation topics, making it easier to make new friends and maintain relationships. This also adds to the sense of realism, allowing users to have experiences similar to real life and feel more at ease.

In general, the process of establishing oneself as a woman involves becoming a woman, being treated as a woman, and truly believing oneself to be a woman. However, uncontrollable factors in real life can make this process challenging. In VRChat, users can freely choose their environment and social circles, allowing them to practice at a lower cost in a more inclusive environment. This accelerates the gender affirmation process, and users can bring their virtual experiences into the real world, becoming more confident individuals.

5.1.3 Challenges and obstacles

The high learning curve for avatar design in Social VR platforms. Customizing and designing avatars to accurately represent one’s gender expression and personal identity can be a complex process. Users may need to acquire technical skills and knowledge to create the desired avatars, which can be discouraging for those without prior experience in 3D modelling or computer graphics.

Some social VR platforms lack a comprehensive account migration system. They do not offer a seamless account migration process, making it difficult for users to transfer their
customized avatars, progress, and achievements across different platforms and different accounts. This limitation can impede users’ ability to express their gender identity consistently and retain their anonymity.

Social VR platforms’ absence of built-in voice modulators limits users’ ability to experiment with their voice in a comfortable and accessible manner, while voice plays a crucial role in expressing and perceiving gender.

The high cost of VR equipment, including headsets and full-body tracking systems, can create a financial barrier for many potential users. This limitation may disproportionately affect individuals from lower-income backgrounds and those living in regions with limited access to affordable VR technology, restricting the diversity of perspectives and experiences within social VR environments.

In social VR environments, it is not uncommon to observe communities and circles formed by individuals who share the same cultural background. While these groups can offer a sense of familiarity and belonging to their members, they may inadvertently reinforce existing social norms within the virtual space. As a result, the influence of these norms could become more pronounced, potentially inhibiting cross-cultural interactions and exchanges. Such a dynamic may inadvertently create barriers for individuals seeking to explore and express their gender identity beyond the confines of their own culture, as they may feel constrained by the prevailing expectations within their virtual community.

5.2 Designs for enhanced self-expression of FBT users

5.2.1 Avatar Customization and Management

The desire to encourage more users to engage in avatar customisation requires the social VR platform to simplify the process by offering a diverse range of built-in avatar customisation features or plugins. This makes it easier for users with different skills and levels to create and modify their avatars to their liking, reducing the learning curve and investment of
money and time. Simplify the process of acquiring and customising avatars by creating an official platform for the sale, modification, and distribution of avatar models.

To protect the intellectual property of avatar creators and maintain a sense of trust within the community, it is vital to implement measures to combat model theft, such as the use of digital watermarks, strong identity verification systems and copyright laws.

Enabling one-time account creation and avatar transfer across platforms will also improve the user experience. By allowing users to seamlessly access and manage their custom avatars without having to go through the process of having to re-customise their avatars after changing accounts or platforms.

**5.2.2 Voice Features**

As users engage in social VR experiences, they may choose to alter their voices using voice changers or voice training to perform their gender or present their desired gender identity. In doing so, they may encounter malicious users or those who maintain traditional assumptions about gender and voice. Judgments and assumptions about gender based solely on voice can be limiting and may not fully capture the complexity of gender identity. Through interviews, it has been found that most users prefer to communicate with friends in private worlds and tend to remain muted in public or large group settings.

This phenomenon presents new challenges for the designers of social VR platforms, such as implementing options for muting non-friends or allowing users to make their voices audible only to specific individuals. By offering more flexible and private settings, enhancing blocking mechanisms, and fostering a more inclusive and diverse virtual experience, social VR platforms can better accommodate users’ needs for safety, privacy, and authentic self-expression.

Incorporating built-in voice modulators into social VR platforms can serve as a valuable feature for enhancing self-expression among users. Offering a built-in voice modulator can reduce the learning curve for users who wish to experiment with different vocal identities without
resorting to third-party applications or undergoing voice training. As some individuals may face difficulties using voice changers due to hardware limitations, such as incompatible graphics cards, adding in-game voice changers in social VR platforms can help mitigate these issues. Additionally, voice training, while a viable option for some, may alter one's original voice and might not be suitable for those who are still exploring their gender expression and have not yet reached a decision on their desired vocal identity. By providing an accessible and user-friendly built-in voice modulator, social VR platforms can empower users to experiment with a wider range of vocal expressions, fostering a more inclusive and customizable virtual experience.

Ultimately, the development of features that promote a sense of security and control over one's virtual presence is crucial for the continued growth and success of social VR platforms. By enabling users to navigate their gender expression and interactions with others in a more supportive and adaptable environment, these platforms can empower individuals to explore their identities, form meaningful connections, and break free from the constraints of societal expectations and cultural stereotypes.

5.2.3 Non-verbal Communication and Interaction

Developing training courses that focus on non-verbal communication in VR environments can help users better understand and use body language, gestures, and other non-verbal cues in social VR platforms to communicate emotions, intentions and information without relying solely on verbal communication.

By creating more diverse game worlds with interactive elements, designers can provide users with opportunities to engage in a wider range of activities and social interactions, and increase their desire to express themselves using body language, gestures and spatial positioning.

Creating virtual environments that facilitate safe and beneficial 'bleeding' between users' virtual and real-life experiences fosters a positive and supportive atmosphere in social VR environments, where users are more comfortable expressing themselves through non-verbal
communication and benefit from the increased empathy and understanding that emerges from these shared experiences. The potential negative effects of “bleeding" could be mitigated by having staff with relevant medical backgrounds on duty to answer questions, ensuring the health and safety of users.

5.2.4 FBT Enhancements

To maximise the potential of FBT, developers should consider incorporating more in-game lessons and activities that utilise the technology. These courses can teach users how to effectively use FBT to express themselves and interact with others, and demonstrate the many ways in which FBT can enhance the virtual experience.

A significant barrier to widespread adoption of FBT is the cost and size of currently available devices. By developing more affordable and lighter weight consumer grade FBT devices, more users will be able to use and benefit from the technology. This will allow for a greater diversity of gender expression and interaction in social VR.

The development of FBT technology that allows for the capture of finer details and more subtle movements could further enhance the ability of users to express themselves in virtual spaces. Improvements such as tracking finger movements, palm movements, muscle flexibility and other subtle aspects of body language allow users to communicate more effectively and realistically in social VR environments.

5.2.5 Cultural Adaptation and Integration

Reduced system requirements make the platform more accessible to a wider range of participants to facilitate cultural adaptation and integration. Absorb and adapt existing cultural practices within the virtual environment. For example, explaining sugar relationships to non-Japanese users.

Combining the world of friends with events held in the public world can facilitate cultural exchange and interaction. By allowing users to synchronise their private instances with public events, such as lectures or musical performances, users are able to participate in a variety of
cultural experiences from the comfort of their own social circles. This integration gives users the opportunity to explore new interests, learn from others and share their own cultural insights, ultimately enhancing self-expression and fostering a more inclusive and diverse social VR experience.

6 Conclusion

This research investigates the relationship between gender, virtual reality, and social interaction in the context of VRChat, a social VR platform. As VR technology advances, social VR platforms provide users with opportunities to explore their identities and connect with others in highly immersive and personalized environments. The use of avatars with FBT technology enhances user engagement and allows for greater self-expression.

This study examined how users expressed and perceived gender within social VR environments, drawing from Butler’s gender performativity theory and queer theory (Butler, 2011; Jagose, 1996). The research questions focused on users’ willingness to express themselves, their perception of others’ gender, and their performance of gender using FBT technology. The methodology consisted of semi-structured interviews conducted in VRChat and unobtrusive observations in various VRChat worlds.

The results provide insights into how users convey and perceive gender in social VR environments, potentially informing future avatar development and enriching social interactions within VR. The findings can also help game designers, artists, and users to better understand the factors influencing users’ willingness to express themselves in social VR environments, facilitating more inclusive and diverse avatar design and social interactions. This research also demonstrates that interactions within social VR can serve as a form of experiential learning, allowing users to acquire new cultural insights and apply them to their offline lives. Moreover, social VR provides a safe and controlled environment for users to experience emancipatory bleed and use their virtual experiences as guidance when facing challenges in real life.
The findings of this study emphasize the importance of social and cultural backgrounds in shaping users’ gender expressions within social VR platforms. Consistent with gender performativity theory, the distinct gender expression patterns exhibited by users from different cultural backgrounds support the notion that gender is not a fixed, static category, but rather a dynamic performance influenced by social norms and expectations. Gender can be formed or transformed through continuous, iterative practice influenced by individual experiences and broader cultural frameworks. Users can engage in persistent gender performances in VR environments and, through virtual experiences, question social norms in real life, thereby gaining the courage to express their gender more authentically and becoming more inclusive of non-binary identities.

In line with queer theory, this research reveals that users can challenge and subvert traditional gender norms by portraying avatars that do not conform to their real-life identities. By customizing avatars, altering their voices, learning gender-specific behaviours, or minimizing actions that convey masculine or feminine qualities, users demonstrate the fluidity of gender expression in virtual environments. This encourages a dialectical reconsideration of conventional notions of gender and identity.

The key findings suggest that users from different cultural backgrounds, specifically Eastern and Western cultures, exhibit distinct gender expression patterns through FBT due to their unique real-life experiences and social norms. Although VR environments offer users a space free from traditional social norms, Asian male users, perceiving women as being in a vulnerable position, tend to be more protective of themselves when using women avatars.

Through the use of social VR platforms, users can learn about and absorb elements of other cultures to fill gaps in their own cultural experiences. By employing FBT technology, users drive their avatars by making corresponding movements and gestures in real life, enabling highly flexible interactions with others. These immediate interactions provide users with an
experience similar to real life, allowing them to transfer these experiences into their everyday lives and receive guidance.

In social VR, users primarily rely on an avatar’s appearance, voice, behavioural patterns, and experiences to determine the gender of others. This requires social VR platforms to offer diverse embedded avatar customization options, built-in voice changers, a wider variety of worlds and courses, and increased anonymity settings. It also necessitates technology companies to develop more accurate, lighter, and affordable VR and FBT devices.

Despite the limitations of this study, such as the focus on a single platform (VRChat), and limited participants, the findings have important implications for the design of virtual reality platforms, avatar technology, and FBT systems. Future research could explore other virtual reality platforms, examine additional aspects of gender performance, or utilize different methodologies to further our understanding of the complex relationship between gender, virtual reality, and social interaction.

By exploring users’ gender expression patterns and perceptions, as well as the influence of cultural backgrounds on these aspects, the research not only contributes to a theoretical understanding of gender performativity theory, queer theory, and emancipatory bleed, but also has practical implications for the design and development of virtual reality platforms, avatar technology, and FBT systems. As virtual reality continues to evolve and become more integrated into our daily lives, it is crucial to recognize the significance of these virtual spaces in shaping our identities and social interactions. The way that builds the social VR platform should consider users’ safety, privacy, and anonymity, and have some designs that encourage individuals to express themselves more.
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### 7.1 Ludography

