Abstract

Virtual environments of social VR platforms offer a unique space for social interaction. They can be seen as socio-technological assemblages that foster immersion, embodiment, and presence, which come together as a framework that allows VR users to make space meaningful – thus creating places. This research aimed to understand how using social VR mediates social practices and the spatial practices of being social, investigating the spatial dynamics and place-making processes within Social VR environments. We conducted participant observation and 15 virtual in-depth interviews in VRChat. Our thematic analysis reveals that mobility and escape mechanisms are critical affordances shaping social spatiality. Additionally, social presence and co-presence are pivotal in establishing a feeling of 'being there' and cultivating attachment to virtual locales. Users actively contribute to the emergence of place through their spatial understandings and normative social behaviours. These findings underscore the significance of social interaction in shaping the spatial experience within Social VR. Further research is warranted to explore diverse user experiences and platforms, advancing our understanding of Social VR as a medium for meaningful interaction and place-making.

Keywords: virtual reality, social media, space and place, spatiality, social interaction

VR has been described as a medium that can allow people to become less isolated from one another through technology while avoiding the traps of contemporary social media, replete with spying algorithms that optimize people for the benefit of giant server businesses (Lanier 2017: 113). Social VR acts as a shared, open space for interaction between people (Gaggioli, 2018). During the COVID-19 pandemic, this aspect of the VR experience would become more salient than ever as physical distancing measures meant the opportunity for socializing physically were reduced. Purchases of VR headsets boomed and the number of users on social VR platforms increased dramatically in this period (Lang, 2022). People used social VR in lieu of safe social interaction in real life as a new paradigm during the pandemic to alleviate physical distancing. However, this was not social interaction as a facsimile of 'real-world' socialisation, reliant on physical proximity. The affordances of networked VR spaces offer embodied sociality with other users regardless of physical or temporal proximity. At the same time, social practice is reshaped by the use of avatars for embodied socializing and being able to teleport to new spaces. Social interaction is mediated by the platforms used and by the medium of VR itself, and this mediation affects the manner of social interaction accordingly. Social VR creates a space for interaction but the spatiality of social VR (how the space affects actions and interactions) affects social behaviour. Virtual environment of social VR can be seen as a socio-technological

assemblages that foster immersion, embodiment and presence in its various forms that come together as a framework that allows VR users to make space meaningful – thus creating places. This research aimed to understand how using social VR mediates social practices and the spatial practices of being social.

Spatiality and place in social VR

Social VR can be described as a set of platforms and social practices that allows people to interact with one another through virtual reality technology. Although social VR is often identified with head-mounted displays (HMD) (McVeigh-Schulz et al., 2019; Maloney & Freeman, 2020) it is often the case that users can join VR world using desktop applications – such as on VRChat. It is even possible, as some of our respondents mentioned in the interviews, that the access through desktop application is in some cases preferable. Therefore, we propose here to define social VR through the virtual reality affordances like verbal and non-verbal communication capabilities provided by avatar use and spatial metaphors like virtual worlds and the unique modes of transportation, rather than a specific technology that is being used. While there are many theoretical stands on the notion of affordances in the context of augmented and virtual reality (Heemsbergen et al. 2021; Steffen et al. 2019), we use the terms of VR affordances and platform affordances throughout the paper to denote the perceived capabilities of technology. We argue that imagined affordances (Nay & Neff, 2015) most closely apply to the social VR environment and can be used to describe the relations that VRChat users have and perceive to have within virtual environments. Also, while we argue that specific-to-VR affordances are something that defines social VR and allows its users to develop a distinctive phenomenology of

virtuality, we see that a set of more normal affordances, like interactions in VR that mimic the material world, also contribute to the virtual experience. The unique selling point of social interaction in VR is the possibility of introducing modes of interpersonal communication with geographically distant people, that resemble face-to-face interactions and alleviate some of the problems and deficiencies of online communication through video- or text-based platforms (Maloney et al., 2020; Moustafa & Steed, 2018). This is a kind of illusion that, while contingent on the willingness of the user to be immersed ([anonymized]), can result in spatial interactions and relations to the virtual environment that mimic the relations that can be observed in material world such as place attachment ([anonymized]).

While the individual platforms that form the social VR ecosystem differ, they all offer social activities that are spatial; that is, located *somewhere*. In most social VR applications, there are numerous virtual worlds[1] that can be explored that allow users the feeling of 'being-there'. This feeling is an aspect of *presence* - a sense of being in one environment while being physically located in another (Minsky, 1980). It is among the essential qualities of VR mentioned by Milgram et al. (1994) together with reproduction fidelity and extent of world knowledge, and we argue here that is also crucial for social interaction.

The term presence, while undoubtedly helpful in describing the spatiality of VR experience, has accrued an extensive array of meanings and interpretations across a variety of disciplines (Hruby et al., 2020; Nilsson et al., 2016). In the seminal work by Lombard and Ditton (1997), presence can be defined as 'the perceptual illusion of non-mediation'. The withdrawal from circumspection of technology can lead to *spatial presence*, which refers to the illusion of being physically located in a mediated environment (Hartmann et al., 2015), which in turn can result in automated responses, including spatial behaviour, like the ones exhibited in response to

equivalent unmediated stimuli (Sanchez-Vives & Slater, 2005). These include, for example, brain mechanisms responsible for spatial navigation (Brotons-Mas et al., 2006).

The exact feeling of 'being-there' has also been called *place illusion* by Slater (2009) to distinguish it from the other meanings of presence (Slater & Sanchez-Vives, 2016). In this proposition, presence is formed by place and plausibility illusions (Slater, 2009). Presence in this conceptualization can transform spatial experience, especially when combined with *immersion* and *embodiment*. While often conflated in meaning with presence (Shin 2019), immersion can be understood separately as an objective measure of system capability to replace the physical environment with a virtual counterpart and for which the term 'system immersion' is commonly used (Slater, 1999). Immersion is often described as the main selling point of VR ([anonymized]) and is perceived as a goal in creating virtual environments (Konecny, 2011). Embodiment, on the other hand, while frequently also considered to be a form of presence (self-presence) (Lee, 2004; Biocca, 1997)) can also be separately treated as a sense of embodiment describing the ensemble of sensations associated with having and controlling a body (Kilteni et al., 2012), connected to the feeling of self-location. Embodiment, therefore, is vital for that part of human spatiality that governs relations between self and body (Kilteni et al., 2012). As social VR tracks head and hand movement to generate the motions of avatars, the applications produce embodied social interactions that mimic face-to-face interactions in the real world (Maloney & Freeman, 2020).

Social VR, as a conduit for social interaction, will need to engender presence, embodiment and immersion to be effective, as they make it a more compelling social experience in general, with regards to the comfort of interactions (Maloney et al., 2020) and perception of self (Freeman & Maloney, 2021). The user must feel ‘in’ the place, must be embodied (that is,

identify with and use their avatar in an expressive manner) and must feel present. Presence in this sense can be further divided to social presence, co-presence and self-presence. Social presence occurs when we feel present in an environment with access to intelligence, intentions, and sensory impressions of others (Lee, 2004; Biocca, 1997). Through the existence of other intelligent beings, we are assured that the world we are in exists, whether it is virtual or not (Schultze, 2010). Co-presence is defined as being in the same shared virtual setting as others (Ijsselsteijn et al.,2001) and being able to jointly manipulate shared space (Durlach & Slater, 2000). Social presence and co-presence are strengthened in social VR through affordances brought using avatars (Blascovich, 2002). Latoschik et al. (2017) argue that realistic avatars create a stronger sense of virtual bodily ownership, increasing self-presence. This can affect social interactions in social VR, as the sense of identification with our avatar changes how we interact with others (Yee et al. 2007: 272). The logical progression of this is the more satisfied we are with self-presentation, the more likely we are to feel social presence and co-presence. Avatar-based interaction, that is the most common way of representing a user in social VR, can lead to a strong illusion of virtual body ownership and embodiment (Fribourg et al., 2018; Kilteni et al., 2012) and induce the feeling of presence (Slater, 2018).

However, it must be also noted that the increased affordances of remote social interactions that are provided by VR can be also seen as potentially dangerous in terms of harassment (Blackwell et al., 2019), as the violations of personal space can be seen as equally disturbing as in material and virtual environments (Wilcox et al., 2006). Social VR designers have responded to this situation with the solution of a personal bubble where other users can be excluded, but this solution requires some technical competency and proficiency to use which may render it difficult to operationalise for the casual user. Personal space and the effect of

personal space on self- and co-presence are not only a function of the affordances of personal space bubbles, but also are affected by social appearance, cultural norms and individual difference such as social anxiety (Welsch et al., 2021).

The assemblage of a virtual environment, the technological mediation that fosters a sense of immersion, the psychological phenomena of embodiment and presence, and sociological effects of co-presence construct a framework that builds the spatiality of VR social experience. This socio-technical assemblage allows VR users to make sense of VR spaces as places, that is an experience of space which is meaningful, which the user feels a sense of attachment towards. If social VR facilitates social, co-, and self-presence and users feel comfortable, at home and able to socialise in social VR, then this characterises social VR as place rather than space. Place and the sense of place are the main concepts that frame our understanding of human spatial behaviour and gather a wide array of definitions within many disciplinary traditions (Creswell, 2014). Discussions on virtual place take place in the context of the already existing digitality of contemporary human spatialities, where space and place are constantly mediated through technology (Leszczynski, 2015) and being in a virtual environment is more commonplace than ever before (Coulson et al., 2019). While seemingly separating its users from the physical world, VR still participates in this digital assemblage. Saker and Frith (2020: 1429) put forward the notion of coextensive space to describe the 'symbiotic relationship between physical and digital that is increasingly proximate, extensive, and transformative'. The body movement is mirrored in VR and physical space through the use of the vast array of sensors in modern VR headsets results in an embodied parallelism between the physical and virtual (Bollmer & Suddarth,2022).

The perspective that we adopt here is a phenomenological one that stems from the work of Yi-Fu Tuan (1977) and that sees the place as a natural condition of human existence; a space

that ceases to be anonymous but is given a meaning and in which people can form an emotional bond to place such as place attachment (Lewicka, 2011).In a classic understanding of how meaning is associated with places (Gustafson 2001), the process involves self, environment, and others. In social VR, the self is provided by the avatar embodiment, the environment through computer-generated virtual worlds, and others through feelings of social and co-presence and social interaction with other VR users. Where VR lacks in the first two components of place-making, with avatars and virtual worlds being less than ideal counterparts of material settings, it is more than capable of providing meaning through social interaction. Strong meanings of place have been shown to originate from social networks (Kyle and Chick, 2007).

Virtual environments pose however an additional theoretical challenge in thinking about the place since they introduce location, authenticity, and realism ambiguities. It is not unfathomable to see how blurred the distinction between virtual or virtualized worlds (Janz, 2018) and the material world can become, changing what is perceived as real (Bakker and Bridge, 2006). Questions also arise about whether people can form meaningful relations to place and, if possible, what the prerequisites for technology are to achieve this understanding of place. Virtual places are also necessarily dynamic and ever-changing, even transcending, in a sense, what Massey called a global sense of place (Massey 2008) since the location itself ceases to be a stable anchor. Erik Champion (2021) proposed that the sense of place can be helpful in virtual environments in at least five aspects. Firstly, it can provide the uniqueness either through its distinctive features or, in the spirit of Doreen Massey's work (1994), through their relations and history. A place can also trigger evocative memories and associations with mental schemas of place (Relph, 1976). These can inspire awe by visualizing infinite scales, possibilities, and complexities or become a kind of storehouse for past users' meanings and identities. Finally, the

place provides a stage or social framework for communal and individual activities, 'placing' them, giving boundaries, and utilizing them in the dynamic creation of its own identity (Massey, 1994) and identity of human communities. As Champion highlights himself (2021), it is worth noting that this framework does not point out which of those aspects are necessary to create a place. Social VR can provide a unique opportunity in virtual place-making through the possibility of creating places that allow traditional legal and physical boundaries and limitations to be crossed and transcended (Kühne, 2021).

This research aimed to understand how social VR mediates social interaction through the spatial and technological affordances of social VR. Therefore, we looked to understand how users feel presence (self-, social and co-presence) in social VR; how this mediates social interaction; and what kinds of social and spatial interactions facilitate a sense of place in social VR. To do this, we asked the following questions:

1. What are the specific VR affordances that engender social spatiality in virtual worlds?
2. How does social presence and co-presence mediate a sense of ‘place’ in VR?

To answer those questions, we studied the use of the social VR application VRChat, that was chosen for this research since it is one of the oldest free-to-play social VR applications, with a large and diverse player base. One of the main affordances of VRChat that was important for our research is that VRChat allows its users to be creative and upload their avatars and worlds. This research was conducted during the COVID-19 pandemic in 2021, where physical distancing measures enacted across the planet meant that people were seeking new avenues for social contact. However, this investigation aims to understand the general characteristics of VR mediated social interaction rather than pandemic-specific phenomena. The boost in users at that time was a bonus for the research, but not the focus of the research.

Methods

Our methodology consisted of 15 virtual in-depth interviews (VIDI) and unstructured participant observations of virtual worlds inside the VRChat social VR platform. Exploration of VRChat through the participant observation method (Laurier, 2010) allowed us to understand the culture formed within the application by its users. The researchers spent more than 100 hours each in-game, exploring worlds and interacting with other people, assuming the role of new users exploring social VR. We have used participant observation to familiarize ourselves with the technical and social aspects of VRChat, especially regarding its unique culture. Insights from this method were further used to prepare interview scenarios and as background knowledge for interpreting interviews but were not used in formal analysis.

Interviewees were recruited through VRChat Discord groups, using an opportunity sampling method. We contacted server administrators and asked them to help us with the recruitment. They have agreed to send our invitations and study description to a group of the most active users. Willing users contacted us with friend invites, and they were able to ask questions about the purpose and nature of the research and review the information sheet and consent form during a private chat. No information about the project was withhold from the participants. The final step that was required for the recruitment process was to establish a 'friend' status with interviewer. In the end, 15 people agreed to be interviewed. We have not made any other selection of cases, and after empirical saturation was reached (Lincoln & Gruba, 1985) and no new insights were revealed during the analysis, we stopped the recruitment process. This number of interviews was small enough to perform an in-depth analysis by all the authors (Sandelowski,

1995) and is generally considered large enough for a typical phenomenological study (Creswell & Poth, 2019). Female users were under-represented (n=3), but the sample successfully included both experienced users with more than 1000 hours in game (n=11 including 2 female users) and relatively new users with less than 500 hours (n=4, including 1 female user). The distinction between those two groups was arbitrary but based on the participant observations.

Interviewing inside a VR world has, to our knowledge, no established methodology. Therefore, we have used traditional semi-structured interviews, adapting them for a VR environment. To avoid possible distractions from other users, we have created an instance of a private VR world into which we have invited participants. A simple world was chosen that offered essential functions like ambient nature sounds, natural lighting, and a mirror. During the meeting, the interviewer adopted a simple basic avatar that is given to every new VRChat user, while the interviewee was able to use any avatar. All participants were informed that they were able to leave at any moment. The interview was semi-structured with a list of topics that included: experience with VRChat and VR in general, reasons for using social VR, the COVID-19 pandemic and its influence on both the individual and whole VRChat community; technical aspects of VR; common ways of spending time in social VR; safety; world design and content creation; avatar design; social relations in VR. Interviews lasted 30-60 minutes.

All interviews were recorded, transcribed, and anonymized. Transcriptions of the interviews were analysed using CAQDAS software (NVivo) and an open coding technique. Both researchers coded the content separately and then grouped the resulting codes into categories and patterns according to the principles of grounded theory (Glaser & Strauss, 2017; Corbin & Strauss, 1990). VIDI posed some additional challenges when it came to both the technical organization of the meeting and the inter-personal interaction. Firstly, there is a technical issue in

making sure that the virtual world is accessible to participants using a wide array of devices (PCVR, Meta Quest, and a desktop PC) in terms of colour, available objects, and overall complexity. Secondly, it is much more challenging to provide a safe public place to meet and even more important to appear in a non-confrontational and welcoming manner in VR. Due to this, we chose basic avatars provided with any VRChat installation for ourselves. On the other hand, the choice of an avatar by the interviewee can be significant. Another unique feature of VIDI is the feeling of safety that VR-mediated contact can provide for the participant. If a participant feels any discomfort, it is straightforward to escape the uncomfortable situation through the safety features provided by default. Also, VIDI is methodologically flexible as it can be expanded beyond a static interview. For example, it is possible to introduce additional visual stimuli or travel between virtual worlds to illustrate points and provide examples of what is being discussed. Our study has shown that it is viable to adopt traditional qualitative methods for VR research, given the researcher is fully aware of the nature of the medium.

Results

During the analysis, we coded several categories, which we have integrated into broader themes, guided by our research questions. Below we first develop a concept of social spatiality as being allowed by a set of affordances, both specific and non-specific to social VR. Then we proceed to discuss how the sense of place can manifest itself in VR, its relation to virtual physicality, and the importance of social presence and co-presence in maintaining the spatiality of VR.

Social spatiality and VR affordances

Using VRChat is an idiosyncratic social and spatial experience thanks to the unique affordances of VR. The quality of social interaction affects the spatial experience and its emotional dimension, and the spatial experience (including the software affordances) affects social interaction. Together they form what can be called a *social spatiality of VR*. The first and seemingly most important affordance is the mobility that VRChat provides. This includes both the ability to move between 'real' world and 'virtual' world and move between various environments inside VR. The former ability is often described as a convenience and an opportunity to escape materiality and return to it at any given moment:

> *It's certainly a convenience and also the very fact that you're sitting at home in a warm room and you're not going out when it's freezing, dark, wet, all those elements just disappear (...), and you can always escape if something happens. (P1)*

This ability to escape is crucial and the reason for escaping is often that the spatial experience of VR worlds can bring an instant reward in the form of pleasant experience. However, this escape can be treated and perceived quite literally. As the study took place during the COVID-19 pandemic it could be seen that for newer user VR have become a safe space, into which they could hide and perform everyday social rituals without endangering themselves or others:

> *(...) the pandemic has been one of the main reasons to be using it. (...) I've isolated from my peers and have been trying to find alternative avenues for socializing, fun(memorable) experiences and intimacy. (P8)*

The mobility affordances are even more important within VR. The uniqueness of virtual experience is tied to the software allowing people to move freely between worlds. In case of the

VRChat it can be described as 'nomadic' behaviour. People will meet in a certain place and then ‘jump’ together to different worlds. This can happen several times during a single session:

> *Sometimes, for example, we see something interesting and we have these, oh, some new world has been released by someone who just created a world that we used to really like, or currently really like, and just has cool ideas for these worlds. And it’s like, come on, let’s check it out. And sometimes we live in such a nomadic mode. (P7)*

This individual exploration happens mainly at the beginning of people’s use of VRChat, and it is rarely present in experienced users. All interviewed experienced users have memories of doing this, but after a while they search for friends and ‘jump’ together. It seems that in their case social presence is more important than ‘being-in-VR’ and experimenting with affordances. This would also suggest that this is a part of the process of a specific kind of place-making, where to transition from space and place VR users actively seek others to join them. It is a place that is socially constructed.

One important VR mechanic that is crucial to the way spatiality in social VR differs in comparison to the material world is that there are potentially endless (not considering hardware limitations) instances of the same world. Those instances can be created by any user and have wide range of privacy settings. This becomes important when, for example, a meeting or a game is interrupted by unwanted players a person or a group can jump to a private instance of a given world. The environment retains its visual and spatial features, but the social situation changes radically. This can also allow for uninterrupted explorations of environments. This control means that some spatial aspects of VRChat can be experienced without social interactions – an option that players exercise when the ‘noise’ of VRChat becomes too much. Connected to this is another spatial affordance unique to social VR - the ability to escape in an instant from a given

location, something that is not possible in material world. This is perhaps the strongest tool in users arsenal of tools designed to limit the impact of toxicity such as muting and blocking:

> *If you don't like something you click alt F4, or the button on the power strip, and off you go. (P3)*

VR mobility affordances create a unique social spatiality in which safe space is produced through the perception of always present ability to escape - from material world, from social interaction or from unwanted situation.

Another important affordance of social VR that is strongly related to the embodiment factor is the possibility of using various kinds of personal avatars. Presence and embodiment in VR depend on the intentionality of the user and the ability to shape the look and behaviour of avatars can motivate the user to engage in a more meaningful way. For example, it can be used to blend with the current environment and social context:

> *Yes, I have multiple avatars. I change them often. I usually use it this way depending on, for example, what world we're in, what situation, or maybe a game. I try to adapt somehow sometimes – whether it's to the mood or the climate. (P5)*

However, there was no connection found between physicality of a player and the look of the avatar. On VRChat, most of the avatars are female, and one of the reasons, according to our respondents, is that they are better made. Embodiment is not a factor of replicating the body or realistically appropriating it, but of having an avatar that functions and looks good in the VRChat environment. The spatiality of VRChat is affected by avatar choice, but self-presence is not necessarily related to representing the self accurately.

The final affordance that is specific to VRChat but also exists in other social VRs is the presence of mirrors. Almost all worlds have some mirror that helps people choose and admire

their avatars, see their surroundings, and see themselves with other people. They form a unique kind of spatial anchor toward which people gravitate. It is an example of an affordance based on something familiar from the material world, that is transformed into a factor that builds the phenomenology of virtuality (Chalmers, 2017). Arguably, looking at your own reflection in the mirrors is one of the most popular activities in VRChat:

> *Mostly it's social games, Spin the Bottle, Never Have I Ever, and just hanging out, and which is the most popular activity in the whole game, looking in the mirror. (P3)*

Affordances of VRChat are also affected by the difference between the computational demands of the application and the hardware capability of headsets and desktop computers. Low computing power means that the overall experience is limited. There is a tangible boundary between PCVR users and Quest HMD users as almost all worlds are accessible to the former and many are off limits for the latter due to hardware requirements.

> *I run it on the Quest2 and there is lots of stuttering and blocked content due to high fidelity - not to mention the PC Only worlds/avatars/experiences where I'm simply left out altogether. (P8)*

This means that there are situations where social group mobility is restricted by a member being unable to travel between all the worlds. This limitation translates into people having non-uniform spatial experience even when located within the same virtual world. It is entirely possible to be unaware that the world one is visiting is not presenting itself fully. In such situation there is a social spatiality that is unique to VR and unable to exist in material world, where people present in a single location are not only perceiving place differently but are also receiving different set of stimuli.

Social presence, co-presence and sense of 'place'

The mobility affordances open the possibility of exploration of different VR worlds. This process is often accompanied by emotional responses not unlike those that are associated with material places. New users spend a large amount of time visiting the vast array of existing environments that offer unique experiences of being 'somewhere else'. One of the participants (P6) mentioned that "In VR you don't move too much, you stand mostly in one place, but you feel like you're somewhere else entirely".

But individual exploration of being-in-VR happens mainly at the beginning of people's use of VRChat, and it is rarely present in long-time users. Experienced VRChat players mostly do not tend to have favourite worlds, only two of participants recalled having one. When asked, they do not perceive virtual environment as something especially important. However, they often recall places that were particularly interesting, visually stunning, or atmospheric which can indicate that virtual places, just like in the material world, can have emotions and feelings associated with them, forming a kind of place attachment (Lewicka, 2011) and ultimately developing a sense of place. It is unique to VR that those feeling may be attached to an instance of virtual world and not to a particular location. The process of forming an emotional attachment can be seen especially clearly in the feelings expressed for the *home* world - the place where every VRChat users start their experience and where they can always escape to be alone. Six of the long-time users and one less experienced user we interviewed have explicitly expressed some form of care toward their home environment, ranging from simply looking through possible environments to carefully setting it up. As one of the participants said:

My current house that I have set up for myself is such a world. It may not be a

> *demanding world, but I like it a lot because I have a cherry tree inside and a mirror nearby and it's such a simple world, but because I like cherry trees, nature, I like this world. (P4*)

The spatial dimension of the VR social experience is often invisible to VRChat users. In this aspect, the role of 'virtual physicality' (VRChat worlds) is the same as material public space - to provide a tangible background to and set a tone for social interactions. There are public worlds that serve as a meeting point for groups of friends and for newer players to wander around and learn the ropes of VR experience. Just as material world communities can form around a certain shared public space (Silk, 1999), so the same phenomenon occurs in social VR. This was apparent from responses concerning the 'Poland' virtual world and Polish speaking VRChat players who mentioned it frequently:

> *I've never kept the score of how many worlds I've been to in a single session, but let's just say that usually the first place I go to when I enter is Poland, if there's someone there to talk to or possibly some sort of mess, then I leave. (P3)*

But the spatiality of VR is only partly explained by the virtual physicality. For most of our participants (n=11), the ability to meet other people is the most crucial factor influencing their willingness to be inside VR and social presence and co-presence are both a major factors in providing the allure of social VR. The nature of social interactions and mechanics that are specific to the VR medium are not particularly important and people perceive social contacts in VR as similar to meeting people in material space, either for a specific event or just as a way of spending time. In the words of our interviewee (P1): "Mostly *I come to my friends, the most normal thing in the world".*

One important exception is that for a lot of users social VR present an easier opportunity

to socialize than material public space due the nature of the medium. It is perceived as safe space where social contacts are not as demanding and can be avoided if necessary. There is a strong conviction among more experienced VRChat users that there is relatively larger percentage of people with social anxieties present in social VR in comparison to the general population:

> *I find that on VRChat a lot of people usually come with some kind of social problems. They try to adapt to their surroundings, they try not to sit in the real world, but enter the virtual one, because they feel safer there, it is easier for them to adapt or even learn how to react to certain situations, be it conversations with someone or discussions. (P12)*

Social presence and co-presence importance for spatiality of social VR is predominantly visible in the emotional reaction to being able to co-exist with other avatars in the same space. People tend to perceive VRChat not as a game but rather a social communicator with the capability of inducing the feeling of presence. One of the interviewees (P14) expressed in in that way: “It's like it seems that you have more contact with people, that you don't only write with them, it's like they are avatars next to you, but you feel that you are somewhere else”. The fact that individually felt presence depends on other people is also evident in the intricate separation between public and private worlds. The more experienced users tend to navigate towards spending more time in private worlds populated with friends, using public spaces only as a meeting place when necessary. The simple exploration of VR is not enough. Even when the surroundings are not optimal or uninteresting, co-presence is crucial for social and spatial experience to come together. This mechanism causes the nomadic group behaviour mentioned before, where people tend to travel through VR as a close-knit group. On the individual level, the presence or absence of others can influence the spatiality of VR experience straightforwardly by adding or removing

the incentive to visit some category of worlds. People can avoid certain places because they are afraid of toxic behaviour or go to specific locations only because of their friends:

> *It depends, because if I'm somewhere with people I know, I'm sitting in the world where they are. If they move, I go to another world. If they stay in this world for a long time, I stay in this world. (P14)*

Conclusions and discussion

To return to the research questions, initially we were interested in knowing ***what are the specific VR affordances that engender social spatiality in virtual worlds*?** We have defined VR social spatiality, as the assemblage of social interaction and spatial experiences in VR, that is produced and influenced by a set of affordances. The most crucial affordances in this context are the ones that are connected to a change in user location - *mobility affordances*. This includes the ability of people to move between material and virtual space but also to explore virtual worlds. At first glance this ability can be portrayed as escapism, and it exists as such in the minds of our participants However, we conclude that when using VRChat, they do not experience escapism but rather an expansion (Johnson et al, 2016: 388) — 'a merging of self and other that allows for expansion of the possibilities of human experience while retaining the ontological sense of self.' Our argument stems from the observing that in the group of more experienced users the virtual aspects of the VRChat withdraw from circumspection. They no longer explore VRChat for the sake of the virtuality of the experience, but they seek instead a social interaction, which when successful mitigates against the perception of artificiality and not being ‘real’. The basic social mechanics of the application mean that spatial interaction becomes a default activity, and in that

interaction the virtual nature of both it and the environment withdraws from the experience of the user. This follows David Chalmers' (2022) argument that VR is not differentiated by users perceptually if the activities in VR are meaningful, and that VR acts as an extension of reality rather than an alternative to reality.

The *escape affordance* itself, however, is important to the spatiality of social VR. It encompasses a wide range of mechanisms ranging from muting, through changing virtual location, to disconnecting. It is perhaps the most important factor in social VR being experienced as a safe space in the perception of VRChat users. VRChat and other social VR applications are Face-Interface-Face (F-I-F) communications platforms, and as Oksman and Turtiainen (2004) argue this kind of mediated communication allows for a withdrawing from the stage (echoing Goffman) where the front stage of our interactions (the VR world) becomes withdrawn itself. Many studies on social VR (Maloney et al., 2020; McVeigh-Schultz et al., 2018; Moustafa & Steed, 2018) highlight its helpfulness in maintaining social interaction over distance, just like other social media. The virtual space and place become the background for the social activities, just like material space.

While VRChat offers various unique features for users, such as extensive mobility affordances and the ability to embody avatars, these features are not essential for experienced users. Although these aspects may initially attract users to VRChat, they become less significant when users transition from perceiving VRChat as merely a space for VR activities to appreciating it as a place for social interaction. When users become more experienced, avatars primarily serve a functional role by facilitating social interaction through embodiment, and mobility primarily ensures safety rather than enabling exploration. As social interaction becomes the primary focus of VRChat, the affordances of VR become more tailored and limited. This is

evident in the use of non-VR hardware to access VRChat; if the primary purpose is socialization, a VR headset may not be necessary, as a desktop PC can adequately facilitate social interaction. While some affordances of VRChat, particularly the ability to escape, are still highly valued, many features are not conducive to the experience of VRChat as a place for social interaction.

The second question we have asked was '***How does social presence and co-presence mediate a sense of 'place' in VR?'***. For these participants, social presence and co-presence are fundamental in the experience of and sense of place in VR. The social interaction within the application appears, to be critical in terms of place attachment and accepting the VR world. Through social interaction, the VR world becomes a world in a phenomenological sense, that is a meaningful existential locale ([anonymized]) for those using the application thanks to co-presence. Being with others orients the VRChat user in a manner that leads to an acceptance of this virtual space as a place – a meaningful location for interaction and somewhere that has meaning and importance beyond the interaction too. When events in VRChat conspire to break this orientation or attunement to place through social interaction, then the artificial nature of the application becomes apparent too.

This finding is critically important for both VRChat and the wider development of consumer VR. The key to enjoying VR to the extent that one feels a sense of place attachment is, for these participants, contingent on the quality of social experience. This is related both to the spatial affordance of the platform and the normative behaviours of users that facilitate social interaction. Place here is created; the practices of use and spatial understandings of users develop over time and facilitate the creation of place attachment and a feeling of place. Place, critically, is not created by the developers of the platform but is co-constructed through the spatial affordances given to users and the practices of use by those users. In developing social (or indeed

any) VR applications, place needs to emerge rather than be ‘enforced’ by design. The feeling of place is heavily contingent in this research on social and co-presence and breaking that breaks the feeling of place. It is not VR, but what you do and who you do it with in VR, that was critical in this research in creating a sense of place and sociality.

The most significant contribution of this research is the identification and exemplification of the nuanced interplay between spatial movement, social presence, co-presence and the transformation of space into place within virtual environments. Movement In VRChat, between and within the social worlds of the application, is deeply intertwined with social dynamics, where the act of moving to and within spaces filled with others becomes a performative and social endeavour. This performative nature of movement, coupled with the affordances of social and co-presence, underlines the pivotal role of social interactions in the metamorphosis of space into meaningful place in the virtual environment. Our findings illuminate the critical importance of these interactions and mobilities in shaping virtual environments, illustrating how digital spaces become significant through the social fabric that binds users together and creates place attachment. Our spatiality in virtual worlds is mediated by the essential affordances of social relations and interactions. The crafting of spaces that are not only navigable but also emotionally resonant affords the possibility of transforming them into places of significance and attachment.

When generalizing findings from this study's specific research sample, caution must be exercised. While we have provided some basic quantification to our results, our sample is still small in regard to the complexity of the research problems. The study also specifically focused on experienced users of VRChat, which only partially represent the spectrum of VRChat users and users of social VR in general. While the findings regarding social VR highlighted in this research are significant for understanding the broader impact of social VR as a medium, it is

crucial to acknowledge the necessity for additional research with much larger sets of participants to explore the experiences of new users and users from diverse demographic backgrounds. Users with little to no experience should be investigated, especially as we still need to learn how the observed socio-spatial behaviour forms during VR use.

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