Social VR Beyond the Corporeal Standard: Reflections on Access for Disabled Persons

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ABSTRACT

Social VR holds the promise of engaging users in meaningful social interaction without leaving one's physical environment. Particularly for disabled people, this could reduce barriers to social participation in the context of leisure, work, and education. However, the current shape of VR technology and research efforts exploring social VR largely overlook disabled perspectives. In this extended abstract, we outline key research challenges that need to be addressed to ensure that social VR is accessible and engaging for all users by moving beyond idealized and non-disabled human bodies, i.e., the *corporeal standard*.

KEYWORDS

Corporeal Standard, Neurodivergence, Social VR

1 INTRODUCTION AND BACKGROUND

Social VR offers the enticing promise of engaging in social interaction without leaving one's current physical environment. For disabled people[1] in particular, social VR could contribute to improved access to leisure, education and work. However, the accessibility of social VR in the context of disability is currently underexplored. Recent research into the general accessibility of VR suggests that the current design of hardware and software poses significant barriers for disabled users [10, 21]. One of the challenges of social VR is that it brings the user's body into the virtual world by means of an avatar, drawing on embodied interaction and approximating the non-disabled experience of socializing in the real world as a given norm. Indeed, recent work indicates that non-disabled users view full body tracking as a primary mode of expression [18]; however, sensing systems which mediate these interactions are problematic for disabled users [15], with many not even trained to recognise disabled bodies [25].

Thus, access to such embodied social experiences in VR is not equally available to everyone, and benefits in terms of user experience are predominantly accessible to non-disabled users. Indeed, many systems align with what Critical Disability Studies refers to as the *corporeal standard*, a narrowly defined 'ideal' human body which does not accurately reflect human diversity [5], a concept which we have previously applied to assess the general accessibility of VR [10]. When discussing social VR, the corporeal standard is a helpful concept to understand how user avatars are shaped, which interaction paradigms support communication, making visible the assumptions that underlie the way that communication is designed, and allowing us to explore the extent to which they are tailored to non-disabled bodies.

In this paper, we draw from previous and emerging work to identify key challenges, and support discussion of future research into accessible social VR to better understand how to achieve fair and equal access to the benefits and experiences it promises.

2 SOCIAL VR AND THE CORPOREAL STANDARD

Here, we highlight how reflections on the corporeal standard and the design of and for bodies in social VR can be helpful to identify access barriers. To illustrate our approach, we draw on examples of popular commercially available social VR solutions, exploring user representation through avatars and interaction paradigms that are leveraged to facilitate communication.

Avatars in social VR apps often comprise semi-customisable representations of the upper body, such as those used in RecRoom and AltspaceVR, shown Figure 1 (running on Oculus Quest). Customisation options exist in these examples, but do not include representations of bodies outside of the corporeal standard. Thus, although this representation conveys some ambiguity as to whether the avatar is upright or seated, it removes the opportunity for wheelchair users to select representations which correspond to their bodies. The popular social VR app VRChat employs a full body representation, and supports seated play. Provided avatars (on Oculus Quest) are similarly upright; however, there is a facility to uploading user-created avatars in the PC version of the app, which could support representation of disability. The avatar creation process requires the use of development tools, though, presenting a barrier for many users. Recently, the tool *Ready Player Me* [26] has enabled users to design VR avatars for use in social VR applications, but, similarly, at the time of writing, it does not support representations of disabled bodies.

Interactions in social VR typically attempt to recreate spatial and physical aspects of real-world social interactions (for example, voice volume attenuates with distance). Thus, users interact with each other much as they would in real life, moving their avatars in close proximity, facing each other to talk, and using hand gestures

[1] Our paper identity-first language, but we appreciate that different groups of people and different cultures appreciate different terminology. For a detailed discussion of language in the context of disability, please see [1].

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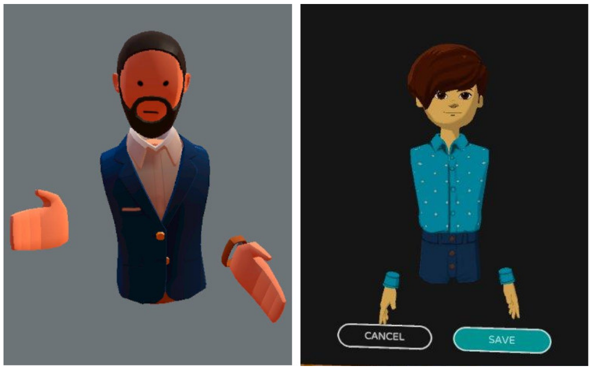

Figure 1: Avatar Creation in RecRoom and AltSpaceVR

while talking. In some apps, such as AltspaceVR, avatars mimic facial expressions, such as eye contact, to reinforce social connections, and research has demonstrated the effort made by commercial platforms to include rudimentary non-verbal cues [24]. We note that, since tracking data is mapped onto an assumed upright pose, seated adult players may simply appear as shorter standing avatars, leading to inadequate bodily representation. While locomotion is often achieved using joystick input or teleportation (as is typical in VR), engaging with other users requires body rotation, which has been identified as sometimes difficult for disabled users [19]. While such apps do not usually include specific options for accessibility, they do provide alternate methods for rotating using the controllers. However, controller rotation methods are unnatural, can be disorientating, and may disproportionately affect users beyond the corporeal standard, as is the case for simulator sickness [17]. Some games or activities in social VR apps also involve picking up and sharing objects, which may be difficult for disabled players.

Hence, social VR is associated with access barriers for disabled people that span multiple aspects of these environments. This ranges from basic access to VR hardware and standard interaction paradigms that is not a given for disabled people [10, 21], the representation of disability through user avatars [9, 21], and can also be expected to extend to the implementation of features relevant for social VR.

3 RESEARCH CHALLENGES

Here, we discuss main research challenges associated with the creation of accessible social VR systems, spanning basic aspects of VR along with issues that are relevant in social settings. This allows us to further highlight which assumptions are currently made about users' bodies, and the implications thereof for future research.

3.1 Basic Access to Embodied VR Experiences

The appeal of social VR predominantly draws on its embodied nature and ability to replicate real-world experiences by means of VR hardware and interaction paradigms that are perceived as 'natural'. while 'natural' interaction can lead to accessibility barriers for disabled users as many sensor-based systems do not account for disabled bodies [15]. Previous work on VR demonstrates that neither currently available hardware nor interaction paradigms are broadly accessible for disabled people, particularly in the case of limited mobility [9, 22] and sensory disability; issues where anecdotal evidence has also suggested negative implications for engagement with social VR [18]. This has lead to the development of dedicated systems such as SeeingVR [27], or specialized hardware; for example, mounts that transpose mechanical wheelchair movement into the virtual world [12]. Other avenues of work include the development of middleware that replaces embodied interaction with more accessible controller inputs, such as WalkinVR (https://www.walkinvrdriver.com/), and dedicated explorations of suitable interaction paradigms (e.g. [3] examined locomotion methods for autistic users). However, most of these efforts remain exploratory, and further research is required to address access for disabled people at scale.

This suggests a **fundamental first research challenge** that needs to be addressed before the specifics of social interaction in VR can be explored together with disabled people, and one that to some extent contradicts the push of 'extending beyond the senses' in the design of social VR for non-disabled users: before optimizing the experience for the corporeal standard, we would like to encourage the research community to **reflect on who is currently not included in social VR**, and develop strategies to improve accessibility on a basic level.

3.2 Representation and Disclosure of Disability in Social Settings

Generally, work on social VR avatars for non-disabled users has shown the important role that the avatar plays as a bodily extension [7], highlighting the importance of offering customization options that reflect bodily diversity, and allow users to create virtual representations that align with their bodies [6]. Due to the embodied nature of VR, representation of disability is closely linked with disclosure of disability, i.e., sharing information on one's disability with other users when made visible through a personalized avatar or adapted interaction paradigms. Previous work on online communities has demonstrated that disclosure of disability is a personal and complex topic [2, 8], and research on VR avatars, gender and harassment suggests that VR is likely to be a problematic space for disabled people [23]. In our own work on VR gaming for wheelchair users [9], we found that representation of disability in multiplayer (i.e., social) settings is a sensitive topic particularly because of its close link with disclosure and, by extension, stigma. Participants suggested that representation of disability should be an optional feature. Likewise, Mott et al. [21] theorized that general VR applications should not enforce certain representations, but leave the choice with users. Likewise, initial research on social VR suggests that marginalized user groups revert to interaction strategies that help conceal their identities [19].

In the context of social VR, **key research challenges** that need to be addressed include how to design avatars that reflect disability, the structured exploration of the perception of representation of disability by disabled users, questions around safety, and how representation can be designed and integrated to support meaningful user experiences (rather than introducing vulnerability).

3.3 Design of Communication in Social VR

The design of communication in social VR is largely focused on the replication and augmentation of non-disabled forms of communication in this new setting (e.g., see [16]), and in cases where novel ways of supplementing communication are explored (e.g., [20]), disabled perspectives are not explicitly considered.

More recently, the technical development of VR systems, such as finger tracking on the Valve Index controllers, has also enabled the development of communities using and learning sign language in VRChat [11], supporting access for deaf users. However, other groups of disabled people remain largely excluded. For example, recent research by Maloney et al. [19] underscores that people with limited mobility will find it difficult to carry out certain gestures. Likewise, they may experience barriers when moving around as required by the environment, and details that typically contribute to user immersion may not be designed appropriately (e.g., the point of view of an individual may be inappropriate to support communication if seated). In the context of social VR for visually impaired users, Ji et al. [14] examined how to substitute peripheral vision to increase awareness of other users, highlighting the need to translate subtle visual cues into more accessible formats. Additionally, the impact of neurodivergence on engagement with social VR remains underexplored; while there is some research that leverages VR as a means of teaching neurodivergent people how to conform with neurotypically presenting forms of communication [4, 13], how to effectively capture and support neurodivergent forms of communication in VR has not been addressed.

Hence, **key challenges for future work** include investigations into how to design communication in social VR that prioritizes disabled experiences through bottom-up research approaches [10], focusing on how to support access to meaningful social interaction. Here, we see opportunities for work that addresses fundamental accessibility of communication (e.g., alternative modes of communication, adaptive gestures) and work that examines the impact of detailed implementations on the experience of disabled users with social VR.

4 CONCLUSION

Social VR offers intriguing opportunities for communication for disabled and non-disabled users alike. However, disabled users are expected to cross a number of access barriers that impact their ability to experience or fully benefit from current implementations. In our work, we identified and discussed three main research challenges that address the design of social VR for disabled users, and we hope that it will serve as starting point for conversations on how to ensure that social VR will become accessible and engaging for all users, by moving beyond designs that solely focus on the narrow and exclusionary scope of the corporeal standard.

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