



Figure 1: Participant wearing headset among the projections in *Transcending Perception*. Photo by Munz Media courtesy of Nuit Blanche Regina 2018.

Transcending Projection: Progressive Engagement with Virtual Reality in Public Spaces

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ABSTRACT

Transcending Perception is a virtual reality (VR) installation which encourages play, expression, and creativity in social spaces. Over one thousand participants have engaged with this installation in public spaces including an art gallery and a disused storefront. It provides an excellent opportunity to explore the problems and possibilities of shared experiences in shared spaces using VR. By retaining social context in the virtual experience, encouraging interaction between participants, and providing an opportunity for progressive engagement, *Transcending Perception* is able to engage a large audience, many of whom might not have otherwise entered VR.

KEYWORDS

virtual reality, mixed reality, social spaces, interactive art, collaborative instruments

INTRODUCTION

Virtual Reality (VR) Head Mounted Displays (HMDs) provide access to virtual environments with fantastical elements which can go beyond the limits of ordinary physical reality. To accomplish this they block out reality with opaque headsets, allowing as much immersion in the virtual experience as possible; however, this obfuscation creates a rift between the reality presented by the HMD, and that which continues to surround the user.

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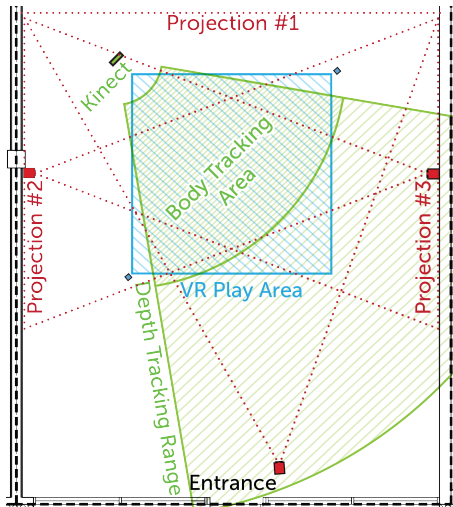


Figure 2: Layout of the interactive space of *Transcending Perception* at Nuit Blanche Regina 2018.

¹Video: <https://vimeo.com/278407417>

When used in private, controlled environments, this opacity is of little concern beyond ensuring a play area clear of unseen real obstacles. In the public use, the presence of onlookers, or even their potential presence, changes the experience into a social one. With this social context, come conventions that shape the behaviour of those on both sides of the HMD. The user is asked to blindfold themselves and become a spectacle for an unfamiliar audience in exchange for an experience that they cannot share. The shift from reality to the virtual experience requires a commitment to a sudden leap, one which will prevent many from trying the experience.

These social aspects of public VR should not be seen as a problem, but rather as an opportunity. An opportunity to engage with the technology and with each other, to understand both in a new light. My Master of Fine Arts was an exploration of VR technology which sought to find ways to acknowledge and reduce the physical and social discrepancies between the real and virtual experience [2]. The culmination of this research was *Transcending Perception*, a VR installation that attempts to alter the use of VR HMDs in social spaces by addressing the tension between the real and virtual experience—In some cases resolving it, and in other cases playing upon it. This installation provides a number of lessons on how the use of VR in public spaces can better reflect their social nature.

TRANSCENDING PERCEPTION

*Transcending Perception*¹, seen in Figure 1, is an interactive VR installation that allows participants to collaborate in the creative, improvisational production of multi-sensory experiences. The system tracks the bodies of participants using a Microsoft Kinect, and gives them an abstract visual and sonic instrument. Upon entering the space, each individual is assigned an instrument and can discover its response through movement. The sounds produced by their movement are spatialized through a 7.1 channel surround system, pervading the entire space. Three projections form a VR cave of virtual mirrors, allowing participants an opportunity to step partway into the virtual experience while an HTC Vive VR HMD provides full immersion into the altered reality of the experience.

Transcending Perception was designed to allow varied levels of engagement, to connect the HMD user to an altered representation of their real surroundings, and to encourage interaction and collaboration between all participants. This installation was shown for two weeks in April 2018 at the Fifth Parallel Gallery in Regina, Saskatchewan, Canada, and again, at a festival, Nuit Blanche Regina 2018. In both exhibitions, it transformed empty space into a collaborative social event thanks to three carefully considered elements: progressive engagement, transparency, and cultural context.

Progressive Engagement

According to designer, Mary Flanagan, “play occurs only when players feel comfortable” [3, p. 261] suggesting that making participants of a public VR exhibit comfortable is important to allowing them to engage. However, as performance theorist, Richard Schener states, “security is needed at the outset

STAGES OF ENGAGEMENT WITH *TRANSCENDING PERCEPTION*

- (1) **Awareness:** Prospective participants see the projection and other participants from far away and are drawn towards the installation.
- (2) **Curiosity:** Participants investigate, and upon entering the space, their body becomes subtly included in the artwork through depth tracking.
- (3) **Play:** Realizing their effect on the installation, participants play with the mirrored projection, noticing the visual and sonic results of their movement.
- (4) **Immersion:** Placing the HMD onto their head, they become completely immersed in a virtual environment informed by their real context. The people around them become transformed into light and sound.

²<https://github.com/keijiro/Skinner>

of play more than later on. Once play is underway, risk, danger, and insecurity are part of playing's thrill." [4, p.386-387] This indicates that allowing the participant to control their engagement and comfort will lead to better results.

The physical layout of *Transcending Perception* shown in Figure 2 was arranged to encourage progressive engagement while giving participants agency over their level of interaction. Visible through the glass of a storefront window, onlookers were drawn in to investigate the activity seen from the street. The Kinect was placed so that as soon as participants entered the gallery space, they would be detected by depth tracking, showing up as a simple, monochromatic point cloud reflected on the screen. This semi-active space provided an area where participants could make the decision to actively engage or simply observe. As participants approached the screens they would see a progressively clearer representation emerge until they entered the active space of the body tracking area.

Upon entering the body tracking area, their low-fidelity point cloud suddenly burst into an abstract and highly active form. Their reflection became an emission source for a particle system based on their movement using Keijiro Takahashi's Skinner² particle system. Along with this vibrant display, the participant is given control over one of a variety of instruments based on their movement, encouraging collaboration in the production of a shared soundscape and further exploration of the virtual space through movement. The projections used a mirror metaphor to allow participants to identify with a specific virtual body, and using three of them established the depth of the virtual space.

Now readily engaged with the piece, participants are offered the opportunity to put on a VR HMD. Upon putting on the headset, they become completely immersed in the alternate view of reality presented by the system. By providing various levels of interaction, participants are allowed to progressively engage with the artwork up to the level of their comfort. They are encouraged to pass through the stages of engagement, presented in the sidebar, at their own pace, smoothly progressing from awareness to immersion. By the time they put on the headset, they are aware of what to expect, have had an opportunity to become comfortable with the interaction, and are ready to accept the alternate view of reality the HMD presents to them.

Transparency

Not only do the use of the Kinect and projections allow for progressive engagement, they also provide transparency between the virtual and real environments, allowing for social interaction between the HMD wearing participant and others sharing the experience. Seeing the projected imagery gives a sense of what is being experienced in VR while the HMD-wearer is made less exposed by the acknowledgement of the presence of others. In *Transcending Perception*, bodies are transformed into abstractions of light and sound. This shifts the spectacle of the HMD-wearer back onto the other participants, whose bodies have become the root of the virtual experience. Acknowledging their



Figure 3: *Transcending Perception*, Nuit Blanche Regina 2018.

PRELIMINARY GUIDELINES FOR VR IN SOCIAL SPACES

Even with an opaque HMD, public VR experiences should be designed with social interaction in mind. This can be accomplished by considering transparency, progression, and context:

- *Encourage progressive engagement:* Having multiple levels of engagement allows participants to engage at their level of comfort rather than demanding full and immediate commitment to an unfamiliar social paradigm.
- *Provide transparency between the virtual and real spaces:* Consider the participant's real environment as a constraint which can inform creative decisions and facilitate social interaction.
- *Consider the cultural context:* The cultural context of the exhibition space is important in establishing rules and boundaries that differ from the ordinary. The gallery or festival provide contexts for open exploration by allowing visitors to expect the unexpected.

presence while transforming their identity and removing their gaze redefines the social context of the virtual experience.

This transparency also leads to a safer experience. While an ordinary VR experience requires that the space be clear of obstacles, the system used in *Transcending Perception* can adapt to a dynamic social space by letting the HMD-wearer see other bodies and obstacles in the space. Participants inside and outside of the HMD are made constantly aware of the shared nature of the space, and the very possibility of others' presence might even make users more attentive.

Cultural Context

The presence of *Transcending Perception* within the larger cultural context of a gallery or art festival was also important to its successful implementation of VR in a public space. In these contexts, audiences expect to engage with an altered social space, with social norms distinct from those of ordinary life. As art theorist, Nicolas Bourriaud writes, "the contemporary art exhibition... creates free arenas, and time spans, whose rhythm contrasts with those structuring everyday life, and it encourages an inter-human commerce that differs from those 'communication zones' that are imposed on us." [1, p.16] The gallery provides a cultural context for open exploration and experimentation, where rules are allowed to differ from those outside that space.

Transcending Perception featured a schedule of performers who performed and improvised with participants, establishing varied contexts for their interaction. The musicians, word artists, and dancers each performed with the system in their own unique way. In some cases, the movement of dancers formed a more conventional audience/performer relationship where an impromptu stage appeared as others cleared the space. In other situations, performers encouraged participants to engage by positioning themselves and performing in ways that prevented this invisible stage from forming. This changing social context throughout the performance had clear effects on the participants and what they felt was socially acceptable, underlining the importance of establishing cultural context in the use of VR in social spaces.

CONCLUSION

Transcending Perception gives participants an opportunity to engage creatively with their friends and strangers. Instead of ignoring the social aspects of the public VR experience, it employs these features to develop a truly social VR experience. It allows participants to spend a moment separated from the anxiety of social pressures, instead engaged with each other as free and creative individuals. Stemming from the experience of developing and exhibiting this social VR installation, some preliminary guidelines are proposed for VR in social spaces in the sidebar. By further developing these guidelines we can begin to better design public VR experiences that acknowledge their social nature.

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