

Body RemiXer: Extending Bodies to Stimulate Social Connection in an Immersive Installation

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John Desnoyers-Stewart

Artist/Researcher, Simon Fraser University, Vancouver, BC, Canada, desnoyer@sfu.ca

Ekaterina R. Stepanova

Cognitive Scientist, Simon Fraser University, Vancouver, BC, Canada,
katerina_stepanova@sfu.ca

Bernhard E. Riecke

Virtual Experience Researcher, Simon Fraser University, Vancouver, BC, Canada, b_r@sfu.ca

Patrick Pennefather

Experience Designer/Researcher, University of British Columbia, Vancouver, BC, Canada,
patrick.pennefather@ubc.ca

Abstract

Body RemiXer is a mixed reality installation that connects immersants across the virtual/actual divide through emergent tactility and abstract embodiment. Using a virtual reality headset, Kinect, and projections, it explores the potential of immersive technology to create co-present experiences that foster intercorporeal relationships between immersants wearing a headset and those using the projections. Immersants' bodies are at the center of the installation, activated as a site for social exchange. *Body RemiXer* has been exhibited at an art festival and several smaller events. Observations during these exhibits revealed *Body RemiXer*'s capacity to disrupt social norms and stimulate new connections.

<1> Introduction

Body RemiXer (2019) is an immersive installation (Figure 1) that connects immersants by transforming and expanding upon their bodies and movement. This Mixed Reality (MR) experience uses body tracking, projections, and a Virtual Reality (VR) headset (Figure 2), to create a multi-layered experience that transcends the virtual/actual divide. The projections act as mirrors, providing access to the virtual space while the experience is grounded in the actual co-presence of immersants' bodies. It has been shown at the *Carnival of Mixed Realities*, and several smaller events in Vancouver, Canada. There, it revealed the capacity of co-located experiences to stimulate intercorporeality by mediating social spaces through embodied interaction.

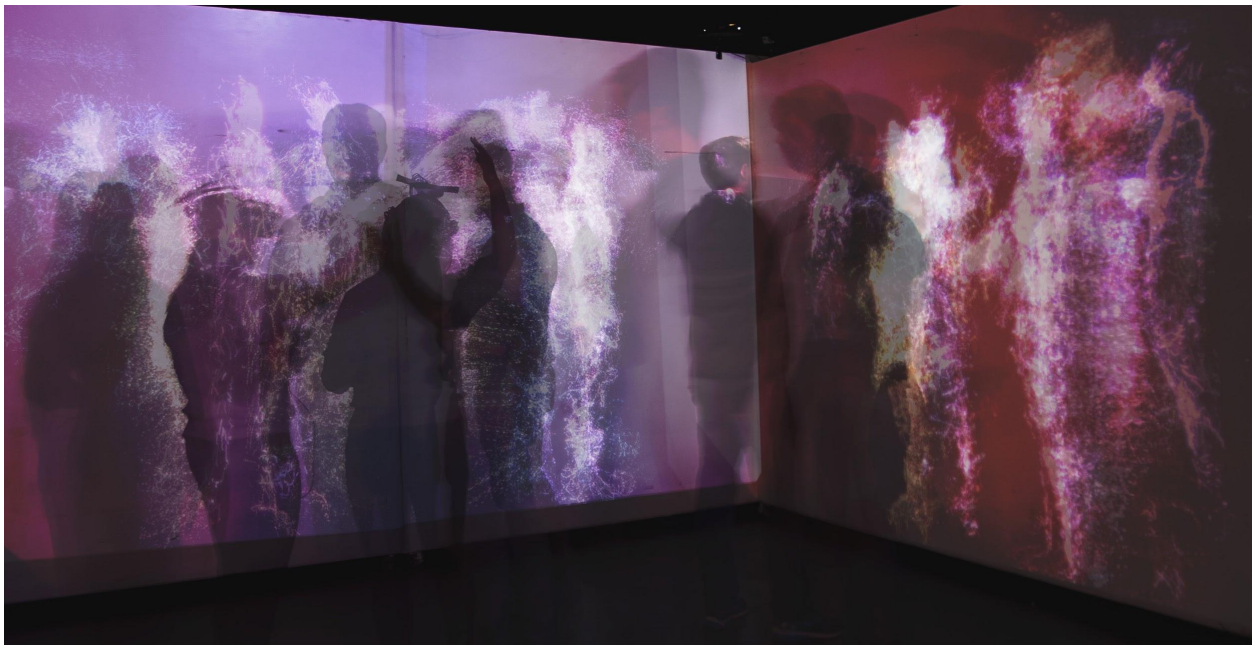


Figure 1. Composite image of interaction with *Body RemiXer*. Photography courtesy of Andreas Psaltis.

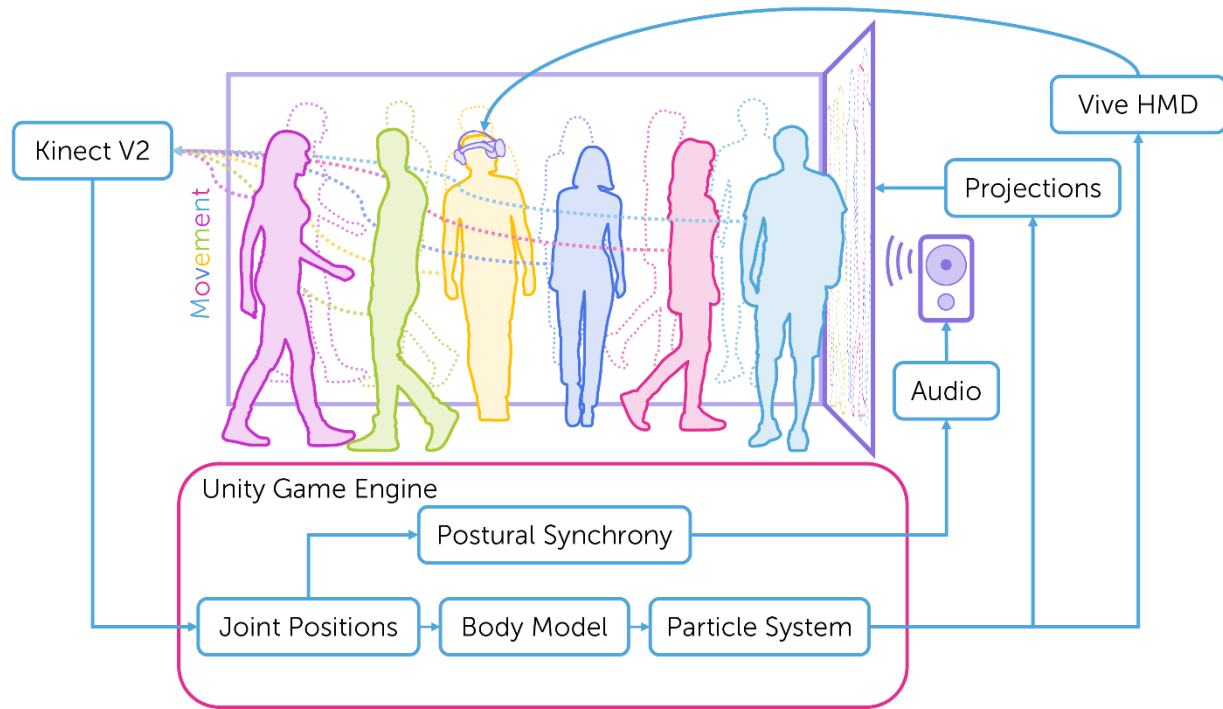


Figure 2. *Body RemiXer* System Diagram.

As immersants enter the installation, they are tracked by a Kinect which transforms their bodies into clouds of particles, forming a three-dimensional silhouette that follows their movement. *Body RemiXer* invites immersants to engage in expressive movements and tactile interactions with each other that are made socially acceptable through the context of the installation.

One immersant can put on the VR headset, finding themselves among ethereal auras that take on the physicality of the other immersants' bodies through touch. By touching hands with another participant, immersants connect their virtual auras through a steady exchange of particles, blurring the boundary between them. This newly established connection manifests as a drum beat that gets louder when they move together.

<1.1> The Case for Intercorporeal VR

VR is typically seen as a product for private consumption. Consequently, many public exhibitions neglect the site-specific requirements of the exhibition space. Often, a VR headset is placed in a gallery with limited consideration of the social context and no connection to the outside world. Such experiences rarely bring those outside the headset into the experience. *Body*

RemiXer is designed to activate bodies as what curator Nicolas Bourriaud calls a “site for social exchange.” [1] This focuses immersants towards their intercorporeal relationship with each other and mediates the social norms of the space. Intercorporeality is the relational connection between bodies as described by embodied mind philosopher Maurice Merleau-Ponty. Merleau-Ponty argues that our social interactions are fundamentally embodied, and we understand others through the possibility of mirroring their action through our own body [2].

Body RemiXer is a response to the emerging social future promised by making reality evermore virtual. It attempts to counter telepresent mediation that promises to facilitate social connections while simultaneously dividing us into isolated physical spaces. In 2002, Bourriaud observed that “communications are plunging human contacts into monitored areas that divide the social bond up into (quite) different products... before long, it will not be possible to maintain relationships between people outside these trading areas.” [3] This claim has become especially true with the emerging popularity of VR.

Instead, *Body RemiXer* is a social experiment that explores how VR could help connect people through their co-present bodies. We wanted to demonstrate the importance of this embodied aspect of the social experience and the capacity of VR to activate bodies and alter social norms to facilitate connection.

<1.2> Inspiration

There are some examples of VR for co-located social interaction. *CAVE* brings all immersants into the same co-located virtual space using avatars [4]. Despite being a passive experience, the presence of audience members acknowledges the social context and allows participants to share in the experience. *Invisible Walls* investigates co-presence between an immersant wearing a headset and spectators represented by abstract forms [5]. This interaction enables the immersant to feel co-present with the spectators and encourages interaction between them, allowing for a connection at a distance. *Body RemiXer* takes this co-located interaction further, bringing the headset-wearer into the same space as the spectators, enabling them to interact on the same level. Their bodies become activated as the central element of the installation, drawing immersants’ attention towards each other.

Body RemiXer was inspired by *The Machine to Be Another* [6], which allows immersants to see another's perspective through synchronized movement. While this experience can give immersants the sense of being in another body, it simultaneously draws attention to the similarities and differences between those bodies, dividing them through the same process it uses to connect them. *Body RemiXer* was designed to retain the focus on the physical body without reinforcing superficial appearances. We wanted immersants to freely move from the boundary of their body to connecting with another, and back again.

In *We Are All Made of Light* [7], Maja Petric captures bodies as simple “shadows” made of light that form evolving constellations to create a sense of unity and interconnectedness through abstraction. We were inspired by this concept and the aesthetic of *Notes on Blindness* [8], which demonstrated the capacity of abstract representations to represent the essence of human presence in VR. Similarly, we created an abstract neutral body which only revealed a silhouette or “aura” of the immersants and removed most visually identifying features. We hoped that this abstraction and neutral figure would focus immersants on the body and movement, encouraging a new form of connection that goes beyond the surface.

<2> The Experience

A critical aspect of *Body RemiXer* is creating an experience that suited a variety of levels of curiosity and openness to public expression. We want to encourage individual exploration that progresses towards tactile connections with other immersants. Immersants can interact with the system via either the mirror-like projections or the VR headset. Immersants can play with their particles movement individually; however, fully realizing the potential of the system requires interaction between immersants. Immersants can selectively move between three modes of interaction by touching their hands to a partner of their choosing (Figure 3). The particles respond differently in each mode, guiding immersants' attention to their engagement, connection and synchronization with others. In Solo mode, immersants' individual aura bodies are distinct and well-defined giving them an opportunity to embody the aura. In Exchange mode, the particles flow between immersants representing their connection. Finally, in Swap mode, each immersant's particle body is overlaid onto the other, focusing their attention onto the relationality between their body and their partner's.

The experience begins from the moment onlookers notice the installation from afar. They can watch others play and interact with the piece, becoming spectators of an impromptu performance and enter whenever they desire.



Figure 3. Progression of interaction through *Body RemiXer*.

Discovering the Aura in the Mirror. Upon entering the active space, immersants see their ethereal reflection fade into existence in the projection as their bodies are detected by the Kinect. Particles swarm around their body, appearing as a kind of virtual aura. Each immersant's aura takes on a unique colour intended to allow them to retain a sense of identity that can later be mediated in the other modes. Immersants can play with the reflected aura, responding to the particles' motion and experimenting with different movements. This allows the immersant to transition into the active space of the installation, establishing the connection to their virtual body. The aura was designed to allow immersants to embody their virtual body by removing biasing features, such as sex or race, that might alienate immersants and to encourage playful interaction through visuals that respond to their movement energy.

Becoming More Immersed. We designed *Body RemiXer* to allow immersants to interact with or without the headset to make the installation more accessible. Those who put on the headset find themselves surrounded by the virtual space seen in the mirror projections. Their body and those around them are transformed into auras of energetic particles, each with their own color. The identities of friends, strangers, and oneself become blurred together as they are abstracted.

Connecting Through Touch. As an immersant seeks to understand this new reality they reach out towards these strange bodies. Another immersant reaches to them in response and as their hands make contact (Figure 4), they find their aura bodies suddenly connected as they progress

to exchange mode. Particles fly between their bodies, breaking the previously clear boundary and creating a sense of connection.



Figure 4. Physically touching their hands together allowed participants to connect their virtual auras and move between the installation's three modes. Photo by Stephen Crocker.

Moving Together. Connected, the immersants hear a faint drumbeat. Through their shared movement they discover that they can control the loudness of the drums. Moving together makes the drums louder, while moving differently makes them softer. This audio feedback was intended to encourage immersants to move in response to one another, further strengthening their connection.

Swapping Bodies. By touching both hands together, immersants can move from exchanging particles between their bodies to an abstract form of body swapping. They see their partner's aura superimposed onto their own and vice-versa. This allows them to see their body and their partner's simultaneously, reinforcing the similarities and discrepancies between them and encouraging attention to their partner and movement synchronization.

<3> A Carnival of Mixed Realities

In its first public exhibition *Body RemiXer* was experienced by 400 attendees at *The Carnival of Mixed Realities: Fun Palace Edition* (Figure 5). This one-night mixed reality event sought to reimagine Littlewood, Price, and Pask's concept of the Fun Palace, a reconfigurable and active space of inquiry designed to stimulate social change by prompting new possibilities [9]. The event was designed to facilitate unconventional social interventions like *Body RemiXer*. Attendees were primed to expect the unexpected and to engage with the installations as everything in the space was interactive. We observed them approach *Body RemiXer* with active curiosity, exploring the possibilities offered by the installation. Attendees could freely enter and leave the space without waiting in line and could interact through the projections until the headset became available.

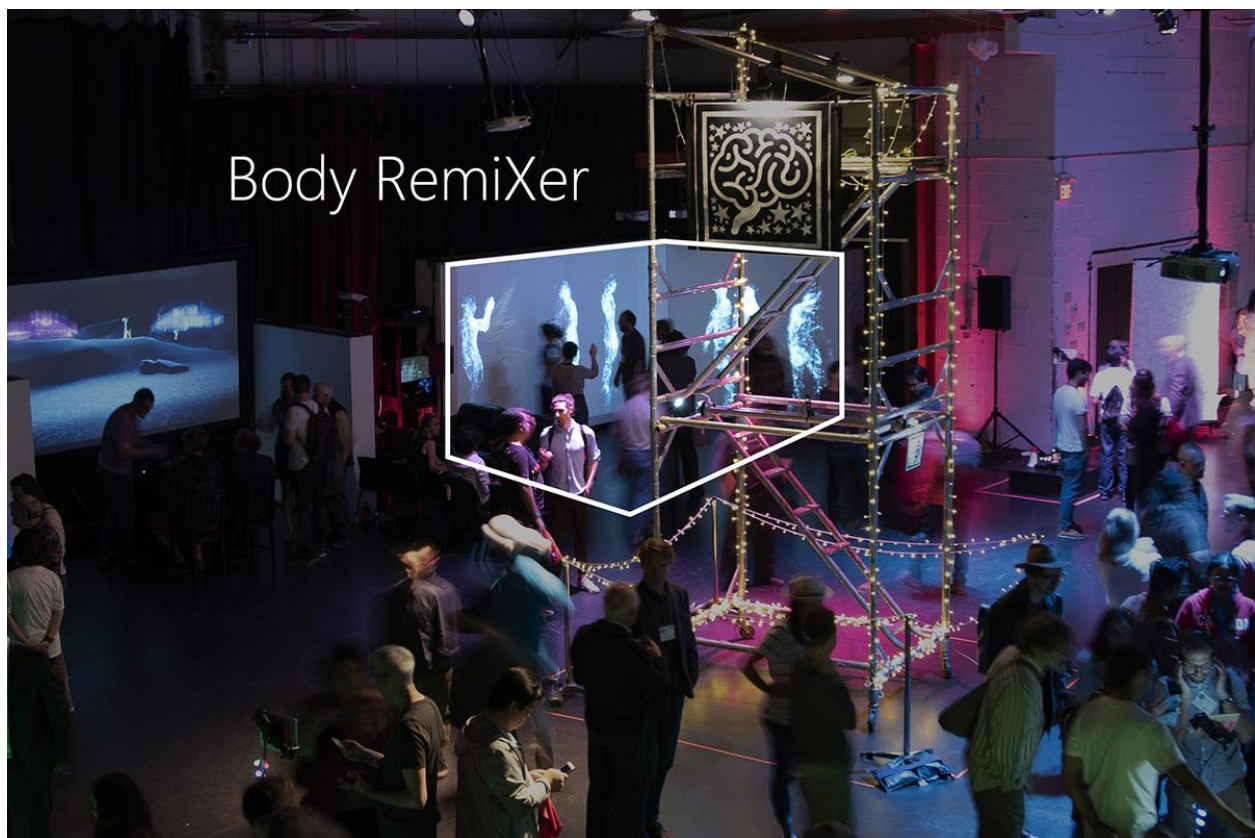


Figure 5. *Body RemiXer* at the *Carnival of Mixed Realities*. Photo courtesy of Andreas Psaltis.

<4> Activating Bodies as a Site for Social Exchange

Body RemiXer is what Bourriaud refers to as a relational artwork: a work which takes human relations as its subject and forms a “social interstice”—a state of encounter that runs counter to the norms of everyday life. It mediates immersants’ bodies virtually with material effects on their social relations. It is “an art form where the substrate is formed by intersubjectivity...” [10] Somaesthetic designer and interaction researcher, Kristina Höök, claims that this intersubjectivity is driven through an intercorporeal process that can be mediated through technology [11]. The subjective and affective experience of social interaction is thus experienced through the relationality between bodies as attuned by the medium of interaction.

Body RemiXer capitalizes on this intercorporeality to gain an alignment of immersants’ inner states by aligning their physical states and giving rise to an intersubjective experience. As Höök claims, “In social relations, the other’s body influences us in an immediate sense; we mirror and might feel what they feel.” [12] In *Body RemiXer*, immersants observe and respond to each other’s movements, establishing the body as a site of social exchange, through an intercorporeal relationship that extends into future connections.

As installation artist Nathaniel Stern claims, interactive artwork reframes the body’s movement, thoughts, and sensations: “Interaction is a limitation – But it is also an amplification. At its limits, interactive art disrupts our relational embodiment, and thus attunes us to its potentials.” [13] In *Body RemiXer*, certain social elements are hidden or subdued, amplifying others. The body’s appearance is altered, and the others’ gaze is hidden, removing visual indicators typically used to discriminate, and replacing them with a unifying aesthetic intended to transcend physical boundaries. Through its imagery, *Body RemiXer* restricts the forms of social interaction available to immersants to attune them to aspects which ordinarily go unnoticed and momentarily freeing them of their conventional social boundaries.

This momentary alteration has the potential to persist beyond the installation, both in those relations established through the experience, and in the newly realized social potentials of the immersant. As an MR installation, *Body RemiXer* is designed to allow for connection to evolve across the virtual/actual divide, connecting the experiences within these realms together. Immersants are encouraged to adopt their virtual auras through MR mirrors (Figure 6). From here, interpersonal connection starts as physical touch between immersants and extends into the

virtual merger of their auras. This could then extend back to the connection between the actual participants leaving the exhibit and beyond into their subsequent relations.



Figure 6. Immersant reaching towards their reflection in VR. Photo courtesy of Melissa Dex Guzman.

<5> Observations on How Virtual Reality Can Mediate Social Interaction

Body RemiXer is a prototypical social structure that forms a template for what VR supporting intercorporeality could be like. By inverting many of the assumptions about what VR *is* we explore what *it could be* instead. To understand the social effects of *Body RemiXer* and the ways it mediates intercorporeal relations we discuss our observations of immersants' interaction with the system and each other below. We observed immersants' behaviour directly while facilitating the installation and through video footage of the Fun Palace event. Exemplary images from our video footage can be seen in Figure 7.



Figure 7. Clockwise from top left: several participants interact together; two immersants dancing together, one in VR; A headset wearer high-fives another immersant; immersants hold each other as the interact

<5.1> Impromptu Performers on the Mediated Stage

The open, progressive nature of *Body RemiXer* allowed people to interact in a variety of ways. Some observed from afar, carefully staying outside the tracked space, while others ran towards the projections with excitement. An audience/performer relationship emerged, with the headset-wearer at the center of the performance. Those who engaged, responded to the projections, dancing and playing around with each other. The installation became a stage for these impromptu performers surrounded by spectators taking pictures and watching the unfolding performance. Most spectators eventually did take part in the installation, having had the opportunity to safely observe the altered rules of the space.

<5.2> Divergent Social Norms

The altered relations between immersants showed that the context of the installation disrupted social conventions, establishing new ones in their place. Immersants' performances may have been normalized by the setting and established a space of heightened intersubjectivity that drew their attention towards each other. When wearing the VR headset, those norms were further altered, creating a space with two disparate social norms overlaid onto one another. Immersants were seen reaching out to touch the mirrors and the virtual bodies surrounding them, perhaps to reconnect with the physicality of the space and to test if it was "real."

Connecting by touching hands seemed to prompt immersants to playfully explore larger possibilities of tactile interaction: we observed hugging, trying to touch with their legs, touching a stranger's head, or inviting them to waltz. The neutral appearance of the virtual bodies around them appeared to remove social inhibition for headset-wearers. Subsequently, the interaction between a headset-wearer and others around them seemed to occur across the social norms of two distinct spaces as indicated by observations of touch that would not have ordinarily occurred between strangers. In most cases, the headset-wearer initiated contact and the other reciprocated, becoming more active as they could move more confidently. These unusual forms of social contact may have enabled interpersonal embodied interaction and formed what Bourriaud calls a *social interstice* where connections emerge in ways not otherwise possible outside of the installation.

<5.3> Transcending Social Boundaries Through a Unifying Aesthetic

The abstract auras were designed to provide immersants with a unifying aesthetic to encourage a sense of collective identity. While wearing the headset, the only way to identify others was through the sound of their voice, a strategy which some immersants subverted by playing a game of virtual hide-and-seek. On several occasions, we observed immersants using the fluidity of others' identities to hide, tricking the headset-wearer into confusing them for another person. Through this mechanism, immersants may have become more open to interact with every participant in the space, establishing a connection that transcended social boundaries including age and visible disability as described in section 5.5.

<5.4> Intercorporeal Mimicry

We observed indications of intercorporeality as immersants moved in response to one another. We saw them mimicking one another: some instantaneously synchronized their movement, while others watched and then repeated or responded to others' movement. This mimicry was seen in the apparition and repetition of certain movements. During the event, when a new movement was introduced, we observed it more frequently amongst other immersants until another movement appeared, became more popular, and took its place. This allowed the installation to be somewhat self-sustaining, reducing the need for an attendant. Interaction mechanisms were passed along from one immersant to the next without the need for our intervention. Immersants demonstrated their discoveries to one another and helped each other to put the VR headset on, creating subtle opportunities for connections to emerge. Even when immersants appeared to act alone, they were continuing the train of the intercorporeal interactions distributed over time.

<5.5> A Lingering Experience

Even after the experience ended, the effects of immersants' altered relationality appeared to linger. While many connected with people they knew, the tactile interaction encouraged interaction between individuals who appeared to be strangers prior to the interaction. In several cases, this newly formed relationship continued through conversation. Immersants often socialized after their interaction with *Body RemiXer*. Many remained within the tracked area, continuing to interact with the installation more casually while focusing on their conversation. In one instance, a headset-wearing immersant sought to find their virtual partner after taking off the headset but was unable to as they had no way to identify them. Their partner's disappearance could have led them to connect with others as they sought to reestablish their connection with an unknown other. While not directly measurable, these observations indicated that immersants' relations were indeed affected by their experience. For example, one headset-wearing immersant invited a visually impaired participant to interact together. Upon removing their headset, the participant was visibly surprised by the white cane held by the other participant, having interacted in the absence of their preconceptions of disability. Those who realized the independence between superficial appearances and their intercorporeal experience may have taken this awareness with them.

<6> Conclusion

Body RemiXer explores the potential of inviting intersubjective experiences in both actual and virtual realms by linking interpersonal tactile interaction with ethereal virtual representations. This presents new possibilities for MR to connect people by mediating co-present embodied intercorporeal interactions. We have proposed a way to encourage social connection by visually limiting the perception of the body's outward appearance while amplifying its movement and connection to others. We continue to build upon this knowledge, exploring the phenomenology of virtually transcending one's body to connect with others through in-lab studies and continued observations of installations in-the-wild.

References and Notes

1. Nicolas Bourriaud, *Relational Aesthetics* (Les Presses du Réel: Dijon, 2002).
2. Maurice Merleau-Ponty, "The philosopher and his shadow," in *Signs* (Northwestern University Press: Evanston, IL, 1964) 159–181.
3. See Bourriaud [1] 8–9.
4. Kris Layng, Ken Perlin, Sebastian Herscher, Corinne Brenner, and Thomas Meduri, "CAVE: Making Collective Virtual Narrative," *Leonardo* 52, No. 4, 349–356 (2019).
5. Michael Lankes, Jürgen Hagler, Georgi Kostov, and Jeremiah Diephuis, "Invisible Walls: Co-Presence in a Co-located Augmented Virtuality Installation," in *CHI PLAY '17* (ACM: Amsterdam, The Netherlands, 2017) 553–560.
6. Elen Collaço de Oliveira, P. Bertrand, M. E. R. Lesur, et al., "Virtual Body Swap: A New Feasible Tool to Be Explored in Health and Education," in 2016 XVIII Symposium on Virtual and Augmented Reality (SVR) (2016) 81–89.
7. Maja Petric, "We Are All Made of Light," 2018, <<https://www.majapetric.com/we-are-all-made-of-light>>.
8. "Notes on Blindness," 2016, <<http://www.notesonblindness.co.uk/vr/>>.

9. “Special Conference Event: An Evening at the Fun Palace – Acting Cybernetically,” American Society for Cybernetics, <<http://asc-cybernetics.org/2019/special-conference-event-an-evening-at-the-fun-palace/>>, accessed January 8, 2020.
10. See Bourriaud [1] p. 15.
11. Kristina Höök, *Designing with the Body: Somaesthetic Interaction Design* (The MIT Press: Cambridge, MA, 2018) p. 114.
12. See Höök [11] p. 115.
13. Nathaniel Stern, *Interactive Art and Embodiment: The Implicit Body as Performance* (Gylphi Limited: Canterbury, UK, 2013) p. 13.