Exploring Non-Human Embodied Perspectives through Gesture-Based Player Agency in Virtual Reality Games

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Keywords
virtual reality, exploration games, embodied perspective, non-human ontology, gestural interaction, player agency, player perception

Format of work
Game prototype

DESCRIPTION OF WORK
Liminal is a gesture-based exploratory VR game that invites players to embody beings beyond the human. It is made with Unity using XR Interaction Toolkit package. It can run natively on standalone headsets (Meta Quest 2/3 or similar) or via PC connection. This single-player VR experience positions the player in a fixed location, with interactions occasionally requiring expansive arm movements. The overall control scheme combines button input and gestural interactions.

In the first level, the player embodies a gigantic cosmic entity. They can grab and throw planets using the controller's grab button or open their arms wide to alter the movement of comets. In the second level, the player becomes the sky, controlling the weather, day, and night by squeezing rainclouds or dragging the sun and moon. As the game progresses, the player transforms into an insect and flies through a garden by flapping their arms. Later, they shrink even further into plankton, reaching out to interact with other plankton to light up the sea. In the final stage, the player teleports into their own consciousness, swimming through their mind with outward circular arm movements resembling breaststroke.

Playthrough Video: https://youtu.be/4wdYeQpQWrA

itch.io Link: https://kora-lee.itch.io/liminal

RESEARCH STATEMENT
This research studies how gesture-based player agency in exploratory virtual reality (VR) games facilitates embodied non-human perspectives. Current VR design emphasises visual immersion in human-centred, action-oriented experiences. This study explores VR's potential for non-anthropocentric game design through practice-based research. *Liminal*, a VR exploratory game, is developed to immerse players in roles with varying levels of agency and empowerment to highlight interconnectedness of all existence. Gestural interactions reflect players' physical form through body

Proceedings of DiGRA Australia 2026

expansiveness and effort. This research proposes a framework for non-human embodiment and dynamic perspective to diversify VR genres. Body control offers insights into natural human-computer interaction, immersive installation, and interactive design to enhance cognitive immersion. Ideologically, the emphasis on biocentrism fosters inclusivity, empathy, and companionship with the world.

Non-Human Embodiment

Liminal invites players to embody diverse non-human entities and challenges anthropocentric perspectives. Inspired by Daoist philosophy, which sees the world as a dynamic system of mutual inclusion (Chen et al. 2012), and Alan Watts' notion that humans cannot understand the world from a separate self perspective (Watts 1966), this research studies the fluidity of perspective by reflecting on identity and agency to deliver ideas about cosmic insignificance, biocentrism, and non-human ontology.

Perceived scale of virtual environment is influenced by avatar body size (van der Hoort, Guterstam, Ehrsson, 2011). Humans experience environments from a fixed size and with agency proportional to our bodies. Altering players' perceived scale and empowerment may foster non-human embodiment, allowing them to explore perspectives where human norms of dominance, vulnerability, and spatial orientation no longer apply, thereby encouraging empathetic connections to other life forms.

Practice-based research method is adopted to investigate how gesture-based player agency achieves non-human embodiment in *Liminal*. Embodied experiences involving physical movement and gesture facilitate deeper internalisation of ideas (Lin et al. 2024). Gestures are designed based on physical form and effort, with corresponding feedback to reinforce perceived power. Player begins as a vast cosmic entity in the universe and gradually shrinks, descending through the Earth as an insect and eventually becoming plankton in the sea. In the final consciousness world, power becomes relative as the intangible mind is not constrained by physical attributes. Unlike traditional design that increasingly empowers players (Pöhlmann, 2024, p. 336), *Liminal* reduces player's form to foster humility and challenge human supremacy.

Gesture Interaction Design and Player Agency

Gestures are designed based on power pose theory (Carney et al. 2010) and Labanotation developed by Rudolf Laban. Expansive, effortless postures signal high power, while closed, strenuous postures imply low power (Tiedens and Fragale 2003). Player agency and feedback further shape perception. The effort required to influence the world and the resulting impact reinforce embodiment and perceived power.

When embodying the cosmos in *Liminal*, player is empowered to simply open their arms to alter the comets' movement. In contrast, the garden stage interactions require higher physical effort to flap the arms to fly (Figure 1). Flapping intensity is calculated using controller velocity data to produce a responsive flying speed. Flight direction is determined by flattening and normalising the headset's forward vector, enabling players to fly naturally toward where they look. In the final stage, player swims through their consciousness (Figure 2). Swimming is detected by signed angles between sequential hand positions, resembling breaststroke for a relaxing and exploratory experience.

Figure 1: Player is flapping their arms to fly.

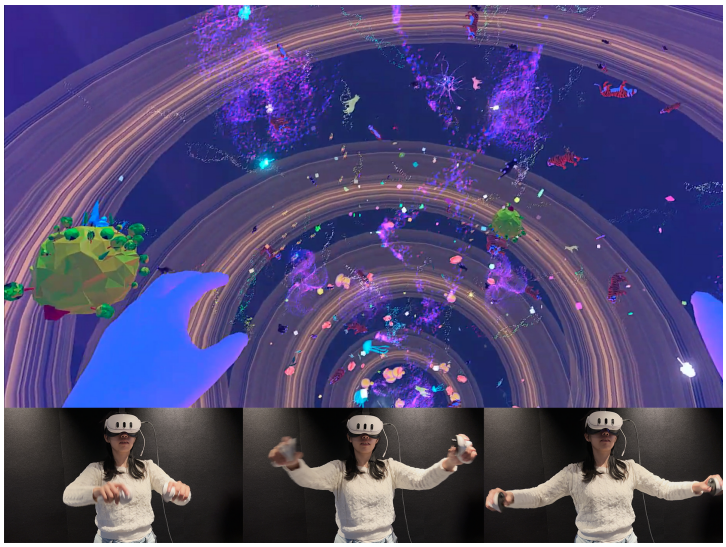

Figure 2: Player is pushing hands outward to swim.

Game Environmental Design and Awe

When confronting entities greater than oneself, awe arises and self-importance diminishes. Situating players beneath colossal beings or landscapes leads to the realisation of being part of a greater whole (Ke and Yoon 2020). Conversely, a higher spatial position is cognitively associated with social dominance (Meng et al. 2019). In *Liminal*, player's position and perspective are designed to provide a clear, elevated view of the environment when embodying large entities. As the player shrinks, their viewpoint lowers, and surrounding objects appear colossal. The distant background elements are scaled to emphasise the player's reduced size. Position and perspective can be used to manipulate perceptions of scale and power.

Conclusion

VR offers potential for immersive, embodied experiences, yet most game design focuses on human-centred paradigms with individualism ingrained (Pöhlmann 2024). Non-human perspectives remain underexplored. *Liminal* manipulates player agency, sense of scale and power for non-human embodiment. The presence of high-power entities induces awe. Gesture-based agency further shapes power and autonomy through body expansiveness and effort. The avatar roles, level of empowerment, and

player experience should be considered in gesture design. Although player's self-identity in *Liminal* is not fully defined and may involve embodying abstract existences without a physical body, identity emerges through interactions with the environment. Future studies can explore avatar body design to support non-human embodiment. *Liminal* seeks to foster environmental awareness and social understanding, broadening VR's scope by promoting empathetic engagement beyond conventional genres. The proposed framework offers interdisciplinary applications in human-computer interaction, immersive installation, and interactive design, particularly in creating experiences that transcend human-centric paradigms.

EXHIBITION

The setup consists of a standalone VR headset (Meta Quest 2/3 or similar), with the game prototype pre-installed and running natively on the device. As *Liminal* is a single-player game, an external monitor (preferably 43" or larger) is recommended to mirror the in-headset view in real time, allowing viewers to observe the player's interaction and perspective. The in-headset view will be cast wirelessly to a laptop via a standard Wi-Fi connection, with the laptop then connected to the monitor through HDMI. A table is preferred for placing the headset, printed materials, and miscellaneous items. During the gameplay, the player remains in a fixed position, but sometimes needs to open their arms wide or reach out with their hands during interactions. For safety, a play area of approximately 3 × 3 meters is recommended to minimise the risk of accidentally hitting nearby objects or furniture.

BIO

Ka Kei Lee (Kora) is a Hong Kong game designer, animator, and illustrator based in Melbourne. While completing her Master of Animation, Games and Interactivity at RMIT, she focuses on storytelling, creative mechanics, immersive experiences, and has a strong versatility across game and animation production. She is the producer and programmer of *Liminal*, a VR game where players embody non-human beings to explore cosmic insignificance through gesture-based interactions. Eager to push her boundaries, she enjoys collaborating across disciplines and exploring new technologies.

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