

## I AM WHERE I BELIEVE MY BODY IS

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**Background:** The relationship between childhood trauma and paranormal experience and belief has previously been interpreted as a need for emotional refuge and/or control over life events; Marks, 2021). An alternative explanation might be alteration in immunological and neurophysiological mechanisms involved in information processing.

**Aims:** This project aimed to test whether spatial prediction causally influences body ownership and disownership, and whether manipulating spatial expectations can alter embodiment experiences.

**Methods:** Three quantitative, within-participant studies were conducted using immersive virtual reality. Healthy subjects participated in the studies. Study 1 (N=80) investigated body ownership and localization during virtual Rubber Hand Illusion (vRHI) and first-person Full-Body Illusion (1pp-FBI) under aligned and misaligned conditions. Study 2 (N=81) investigated verbal conditioning's effect on spatial prediction and embodiment during vRHI. Study 3 (N=50) investigated the effects of verbal conditioning and visual feedback on implicit and explicit body localization. Measures included proprioceptive drift, skin conductance response, and embodiment questionnaires, and were analyzed in a Bayesian framework. The current project, including its hypotheses, design, sampling, and analysis plan, was preregistered prior to the research being conducted, and can be accessed at the following link: <https://doi.org/10.17605/OSF.IO/XQJPG>.

**Results:** In Study 1, embodiment increased across illusions, though disownership occurred only with explicit misalignment in 1pp-FBI. Proprioceptive drift indicated spatial recalibration toward virtual bodies in conditions of misalignment. The correlation between predicted body location and embodiment was observed only in 1pp-FBI when recalibration was necessary. In Study 2, verbal conditioning influenced hand position but not embodiment, whereas multisensory illusion affected both perceived position and embodiment, independently of prior verbal manipulations. In Study 3, verbal conditioning affected implicit body localization only when combined with visual feedback but influenced explicit body localization even in the absence of visual feedback. A possible limitation is related to participants' difficulty in consistently detecting the misaligned position of the virtual relative to the real hand in the virtual reality environment.

**Conclusions:** The predicted body's location may contribute to ownership and disownership when there is an explicit recognition of the incongruence between the real and virtual body positions (i.e, in the misaligned condition). Verbal and visual cues bias spatial perception, but multisensory congruence is necessary to elicit embodiment.

**Keywords:** Virtual RHI, Full-body illusion, Body ownership, Body's location, Verbal conditioning

### Publication:

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