

# Enhancement of the Rubber Hand Illusion (RHI) by the touch-proprioceptive coupling: a self-initiated procedure of the RHI.

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## Introduction

The body is the entity that allows human beings to act in their environment. Thus, it is essential for them to be able to be in control of their body and movements. The sense of being in control of one's own body and actions is named the sense of agency. This notion is coupled with the sense of ownership: our body is really ours and that we own it. Together, the sense of ownership and the sense of agency constitute body awareness (Gallagher, 2000). However, it is possible to experimentally manipulate body awareness, notably with the well-known Rubber Hand Illusion (Botvinick & Cohen, 1998) where the participants are under the impression that a false plastic hand has become a part of their body and that they own it.

The RHI induction is classically explained as the resolution of a multisensory discrepancy between the proprioceptive and tactile sensations from the participant's real hand and visual perception from the rubber hand stroking (Ehrsson, 2012). The resolution of this conflict induces the RHI and a sense of ownership towards the fake hand. However, in Gapenne's opinion (2014) in order for body awareness to emerge, a moto-proprioceptive coupling is required. For him, the moto-proprioceptive coupling is deeply linked to our capacity to distinguish signals from the body activity than those from the outside world. According to his proposal, it seems that something is missing in the RHI for the fake hand to be really considered as our own hand since the subjects are in a passive state during the RHI.

Thus, it is hypothesized that in an auto-initiated RHI (i.e., participants stroking the fake hand with their free hand) the coupling between self-initiated actions and felt sensation would enhance both sense of ownership and agency in comparison with a passive RHI.

## Method

In order to test this hypothesis, an experimental design has been created where participants experienced a passive condition of the RHI and an active one. Proprioceptive drifts before and after the induction of the illusion were measured for each condition in order to implicitly investigate whether or not the illusion has been induced in the participant. Participants filled in a questionnaire after the illusion in each condition in order to investigate the sense of ownership and agency.

## Results

Results are currently being acquired but we expect a greater proprioceptive drift and stronger senses of ownership and agency towards the rubber hand in the active condition than in the passive one.

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## Discussion

In line with Gapenne, the expected results seem to indicate that self-initiated action towards one's own body increases the sense of ownership and agency toward the fake hand. This touch-proprioceptive coupling seems to underlie one's differentiation from the outside environment. More generally this experiment led us to think that moto-proprioceptive coupling is a crucial factor for the "enaction" of body awareness.

## References

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