

# Effect of Body Ownership in Virtual Reality on Skin Temperature

Thema:

Effect of Body Ownership in Virtual Reality on Skin Temperature

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BA

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## Hintergrund

When interacting in Virtual Reality (VR) the sense of body ownership can be disrupted in such a way, that users can experience an artificial body as their own physical body. This sensation is referred to as body ownership illusion. In the famous rubber hand illusion paradigm in non-virtual setups, a subject's hidden hand and a visible rubber hand are stroked synchronously with a brush. Researchers have observed that illusory ownership of an artificial body part as induced by the rubber hand illusion leads to a decrease in skin temperature in the actual, biological limb. They suggest that the illusion leads to a „functional disownership of that limb“, which causes a limb-specific disruption of thermoregulation. If VR embodiment is also accompanied by such responses, ethical concerns might be raised. Therefore, it should be investigated, if limb disownership and skin temperature drop also occur in a VR illusion.

## Zielsetzung der Arbeit

The thesis aims to investigate possible effects of a VR body ownership illusion on body temperature regulation. In a study both the classic rubber hand illusion and a virtual variant of the rubber hand illusion are evoked on participants. The latter takes place in a VR setup, where the rubber hand is replaced by an avatar hand. The skin temperature is measured continuously, both on the experimental limb and on the control limbs. Depending on the outcome of the experiment, subsequent studies may provide insight into the underlying effects. I.e. if a limb-specific decrease in skin temperature can be demonstrated in the VR condition, a further study could be conducted that focuses on visuo-motor stimuli instead of visuo-tactile stimuli.

## Konkrete Aufgaben

- Implement a VR environment
- Design and conduct study
- analyse results

## Erwartete Vorkenntnisse

- Unity programming / C#
- Experience with VR gear and applications
- Experience with avatar creation
- Knowledge in study design
- Knowledge in study analysis

## Weiterführende Quellen

- Botvinick, M., & Cohen, J. (1998). Rubber hands 'feel' touch that eyes see. *Nature*, 391(6669), 756. <https://doi.org/10.1038/35784>
- Maselli, A., & Slater, M. (2013). The building blocks of the full body ownership illusion. *Frontiers in Human Neuroscience*, 7, Article 83. <https://doi.org/10.3389/fnhum.2013.00083>
- Moseley, G. L., Olthof, N., Venema, A., Don, S., Wijers, M., Gallace, A., & Spence, C. (2008). Psychologically induced cooling of a specific body part caused by the illusory ownership of an artificial counterpart. *Proceedings of the National Academy of Sciences*, 105(35), 13169–13173. <https://doi.org/10.1073/pnas.0803768105>
- Human Interaction in Play (CHI PLAY '17). ACM, New York, NY, USA, 507-515. DOI: <https://doi.org/10.1145/3116595.3116596>
- Salomon, R., Lim, M., Pfeiffer, C., Gassert, R., & Blanke, O. (2013). Full body illusion is associated with widespread skin temperature reduction. *Frontiers in Behavioral Neuroscience*, 7, 65. <https://doi.org/10.3389/fnbeh.2013.00065>

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