A Systematic Review and Meta-Analysis on The Use of Tactile Stimulation in Vection Research

Lars Kooijman*, Houshyar Asadi, Shady Mohamed and Saeid Nahavandi.

Institute for Intelligent Systems Research and Innovation, Deakin University, Australia.

* Corresponding author. E-mail address: kooijman.l@outlook.com.

Authors' affiliated emails: {L.Kooijman; Houshyar.Asadi; Shady.Mohamed; Saeid.Nahavandi}@deakin.edu.au

ABSTRACT

Vection is classically defined as the illusory perception of self-motion induced via visual stimuli. The utility of vection research lies in its potential to enhance simulation fidelity, as measured through presence, and reduce the probability that motion sickness symptoms occur. Studies have shown a multimodal interaction of various sensory systems in facilitating vection and the utility of co-stimulating some of these sensory systems along with the presentation of visual stimuli have been reviewed. However, a review on the use of tactile stimulation in vection research appears to be missing from literature. The purpose of this review is to evaluate the current methodologies, and outcomes, of tactile stimulation in vection research. We searched for articles through EBSCOHost, Scopus and Web of Science. Studies were included only if they detailed an experiment on the effect of tactile stimulation on vection. Twenty-four studies were obtained and distilled in tabular form. Eighteen studies contained sufficient information to be included in a meta-analysis. We identified that tactile stimulation has mostly been applied in the form of vibrational stimulation to the feet. Furthermore, tactile stimulation is most effective when it is presented in a temporally congruent manner to other sensory cues whereas tactile stimulation as a unisensory stimulus does not appear to be effective in eliciting vection. We discuss the need for more qualitative research to reduce methodological inhomogeneities and recommend future research in tactile-mediated vection to investigate stimulation to the torso and investigate the use of forces as a tactile stimulus.

Keywords and Phrases: Vection, Tactile Stimulation, Cue-integration, Systematic Review, Meta-analysis.

This version of the article has been accepted for publication in Attention, Perception & Psychophysics after peer review and is subject to Springer Nature's AM terms of use but is not the Version of Record and does not reflect post-acceptance **improvements** or any **corrections**. Please refer to the Version of Record, which is available online at: <https://doi.org/10.3758/s13414-021-02400-3>.