

【Grant-in-Aid for Scientific Research (S)】

Broad Section J



Title of Project : Psychological foundations of body scheme transformation via co-embodiment in virtual reality and its application

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Keyword : Co-embodiment, Body scheme, Virtual Reality, We-mode, Skill transfer

【Purpose and Background of the Research】

The purpose of this research project is to reveal the mechanism for evoking the sense that the joint action with others is due to one's own contribution (sense of agency) and the mechanism for transforming the latent knowledge necessary for performing the physical action (body scheme) in the virtual environment where two person perform physical action as not only "I" but also "We" by using one embodied avatar (Co-embodiment). Based on them, this project also aims to realize efficient skill transfer methods using virtual reality settings.

【Research Methods】

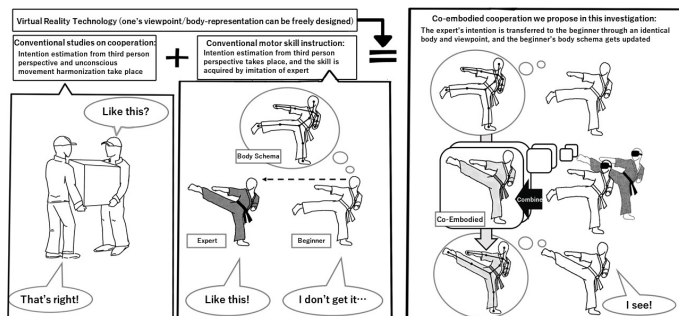


Figure 1 Understanding "We-mode" with Co-embodiment and its application in skill transfer

Interdisciplinary research for understanding "we-mode" and realizing its application in skill transfer will go on as following;

(A) Realize the basic co-embodiment technology which can establish we-mode during joint action from first person perspective.

(B) Clarify the conditions and mechanisms that cause sharing of intention in action and transferring body scheme between actors under unconscious level.

(C) Develop the method for physical skill transfer using co-embodiment technique, and reveal its performances and limitations.

【Expected Research Achievements and Scientific Significance】

This is a multidisciplinary research project. From the viewpoint of cognitive science, this project proposes a new experimental system by utilizing virtual reality which is able to make us use any kind of body to investigate the

mechanisms of we-mode and body scheme. From the viewpoint of engineering, this project aims to develop effective skill transfer systems based on the clarified mechanisms of we-mode and body scheme. Expected research Achievements are following;

- Elucidation of the mechanisms of sense of agency in joint action and we-mode with a new experimental method that allows others to intervene their own bodily actions by using virtual reality.

- Elucidation of the mechanisms of action intention sharing and body scheme transformation through experiments which investigate the effectiveness of the learning with the proposed method with controlling parameters of co-embodiment.

- Realizing the novel physical skill transfer system that fully utilizes the characteristics of we-mode by establishing we-mode in a situation where two people work on the same action with the same viewpoint and the same body

【Publications Relevant to the Project】

Ogawa, N., Ban, Y., Sakurai, S., Narumi, T., Tanikawa, T., & Hirose, M. (2016). Metamorphosis hand: dynamically transforming hands. In Proceedings of the 7th Augmented Human International Conference 2016, Article 51, ACM.

Kojima, T., Hiyama, A., Miura, T., & Hirose, M. (2014). Training archived physical skill through immersive virtual environment. In International Conference on Human Interface and the Management of Information, pp. 51-58, Springer, Cham.

【Term of Project】 FY2019-2023

【Budget Allocation】 154,200 Thousand Yen

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