人とインタラクションの未来
2018 年度採択研究者

2020 年度
年次報告書

高木 敦士

日本電信電話(株) 人間情報研究部
特別研究員

剛性フィードバックでの運動のトランスファーと向上

§１. 研究成果の概要

In FY2020, the methodology to estimate the arm's endpoint stiffness using measurements from the participant's grasp force was used to demonstrate similar changes in endpoint stiffness when learning to insert a tool into a narrow hole. Importantly, the learning rates of different motor learning factors (e.g. speed of insertion, endpoint stiffness, peak force) were compared with real tools versus a completely virtual environment with force feedback. A new human-computer interface was also developed. This interface used the cocontraction of two opposing muscles to add an additional degree of control. Cocontraction is invisible to the naked eye, but an interface was developed to enable participants to see their shoulder cocontraction in real-time, and control it like a computer mouse.

【代表的な原著論文情報】

1) Takagi, A., De Magistris, G., Xiong, G., Micaelli, A., Kambara, H., Koike, Y., ... & Burdet, E. (2020). Analogous adaptations in speed, impulse and endpoint stiffness when learning a real and virtual insertion task with haptic feedback. Scientific reports, 10(1), 1-9.

2) Takagi, A., Kambara, H., & Koike, Y. (2020). Independent control of cocontraction and reciprocal activity during goal-directed reaching in muscle space. Scientific Reports, 10(1), 1-9.

3) Takagi, A., Maxwell, S., Melendez-Calderon, A., & Burdet, E. (2020). The dominant limb preferentially stabilizes posture in a bimanual task with physical coupling. Journal of neurophysiology, 123(6), 2154-2160.

4) Takagi A., Furuta R., Saetia S., Yoshimura N., Koike Y., & Minati L. (2020). Behavioral and physiological correlates of kinetically tracking a chaotic target. PLoS ONE, 15(9), e0239471.