Poster | Motor System

[1P]Sensori-Motor Integration

Wed. Jul 29, 2020 1:30 PM - 3:30 PM Poster Session

*Videos are available throughout the meeting period.

[1P-110]Forearm-weight changes influence the height of reach-to-grasp movements

*Runa Ando, Yoshihiro Itaguchi (Faculty of Informatics, Shizuoka University, Shizuoka, Japan)

While functions and usability of prostheses have been improved, many people still give up using them. Since prostheses' weight is added to users' body during using them, it is possible that the weight causes difficulty in daily actions such as reach-to-grasp movements, in which they reach for an object and grasp it. A previous work showed that the height of a hand position in a reaching movement was lower immediately after the weight attached to the hand changed heavier, suggesting that participants predict weight load based on the previous trial and modulate motor planning for the next trial. In this study, we aimed to examine how the forearm-weight changes influence the kinematics of reach-to-grasp movement, which is a common and important action in daily life. In the experiment, participants performed reach-to-grasp movements under three experimental conditions; No-weight, Light-weight, and Heavy-weight conditions. In No-weight condition, the participant performed the movements without any weight. In Light-weight and Heavy-weight conditions, they performed the movements with a 100g or 200g weight attached to their forearm. Both left hand and right hands were tested in turn to confirm the possible effects of differences in muscle strength and dexterity. Three types of objects with different sizes were used, and the participants performed 18 blocks that consisted of 10 trials for the same object (2 hands, 3 objects, and 3 weights). We investigated the effect of weight changes on the maximum height, and the results showed that the maximum height decreased after the first trial in the blocks that the weight changed to lighter ones compared to those of the previous block, whereas it remained higher in the blocks where the weight changed to heavier. This result indicated that participants kept overcompensation of the weight and could not adapt it when the weight changed to heavier ones and suggested that they might have to continue to perform reach-to-grasp movements with excessive force or effort after adding weight at least in the time period we tested. This excessive effort for overcompensation could be one of the reasons for giving up using prostheses. In addition, we also found that kinematic measures for grasp components were not affected by forearm-weight changes, which supports the idea that modulation of reach and grasp components were independent of each other.