博士学位論文内容の要旨

氏　　名	室井（ムロイ）　大佑（ダイスケ）
所　　属	人間健康科学研究科　人間健康科学専攻
学位の種類	博士（健康科学）
学位記番号	健博　第 153 号
学位授与の日付	平成 30 年 3 月 25 日
課程・論文の別	学位規則第 4 条第 2 項該当
学位論文題名	Walking through apertures and perceptual judgement in individuals with stroke （脳卒中者の隙間通過歩行と知覚判断）
論文審査委員	主査　教　授　樋口　貴広 委員　教　授　北　一郎 委員　准教授　山田　実(筑波大学)

【論文の内容の要旨】

Walking through a narrow aperture requires unique postural configurations, i.e., body rotation in the yaw dimension. Stroke individuals may have difficulty performing the body rotations due to motor paralysis on one side of their body. The present study was therefore designed to investigate how successfully such individuals walk through apertures and how they perform body rotation behavior. To achieve this purpose, I conducted six experiments to examine whether (a) individuals with stroke could walk through apertures safely and efficiently (Study 1: termed a walking task), and (b) they could estimate passable/impassable space correctly (Study 2: termed a perceptual judgment task). In the walking task, participants walked for 4 m and passed through apertures of various widths in an effort to make no contact with the frame. In the perceptual judgment task, participants observed apertures and reported whether they believed they would be able to pass though the aperture without body rotation.

A brief summary of Study 1 (Experiments 1–3) and Study 2 (Experiments 4–6) is as follows. The results of Experiment 1 showed that stroke fallers made frequent contact on their paretic side. Interestingly, however, the contacts were not frequent when participants penetrated the apertures from their paretic side. Clearer evidence was obtained from Experiment 2: the tendency among stroke fallers to make more contact on the paretic side disappeared when they penetrated an aperture from their paretic side. In Experiment 3, what I found was that the effectiveness of penetration from the paretic side was reduced from 50% to 25% when the walking task was performed under the dual task condition. These findings suggest that the involvement of spatial

attention toward the paretic side of the body is a plausible explanation for the effectiveness of penetration from the paretic side.

One may assume that frequent accidental contact with the frame could be the result of inaccurate perception of aperture passability. To address the validity of such an assumption, three experiments were conducted as Study 2. The results of Experiment 4 (standing condition) showed that, there was no significant difference between stroke participants and controls. The observation conditions were changed (Experiments 5: walking condition; Experiments 6: time constraint condition), but the evidence of inaccurate perception of aperture passability was not obtained. An important finding, however, was that, the stroke fallers underestimated their spatial requirements. Although our findings on perceptual judgment tasks were not constant in Experiments 4–6, I tentatively concluded that perceptual judgment of aperture passability in stroke fallers is likely to be inaccurate.

Based on these findings, I concluded that stroke participants who had history of falls had difficulty avoiding accidental contacts on their paretic side when they passed through apertures. One of the reasons for this difficulty was likely their inaccurate perceptual judgement. The most important finding was that stroke fallers showed a significant decrease in accidental contacts when they penetrated an aperture from the paretic side. These results suggest that measuring the behavior of walking through an aperture potentially provides new insight into the increased of instability during adaptive locomotion in stroke individuals.