The Effect of Varying Target Sizes and Spaces between Target and Non-target Elements on Goal-directed Hand Movement Times while Driving

Expressed by Fitts in 1954, there is an inverse relationship between movement time and target size and/or the distance between the participant and a target; smaller and further away targets require longer movement times than larger, closer targets. Here, the applicability of Fitts’ law to an in-vehicle, dual-task setting is under investigation. In the current experiment, different target sizes and spaces between target and non-target elements (target-element space), were investigated in simulated driving and non-driving scenarios in two age groups (18 -- 35 and 45 -- 65 years old). The aim of this experiment was to investigate whether target size and target-element space (i.e., the space between targets and non-targets) would have an effect on the mean movement times of younger and older participants for driving and non-driving conditions. Participants pointed to and touched targets on a smartphone touch screen in a vehicle mock-up. Movement times were recorded while concurrently performing a simulated driving task (dual-task condition) and while performing just the pointing task (single task condition). Errors were defined and are presented. Mean movement times in the dual-task condition were significantly faster than in the single task condition. Additionally, in line with Fitts’ law, in-vehicle movement time decreased as a function of target size. Elements that had the most target-element space were moved to most quickly, however, the medium and small spaces did not differ. Differences between the two age groups were not found.