超短潜時サッカード誘発のための視覚刺激要因の検討

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An Investigation of Visual Stimulus Factors to Evoke Express Saccades

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Abstract

The purpose of this study was to investigate visual stimulus factors to evoke saccades with extremely short reaction times（express saccades）that would improve motor performance. Four male subjects each participated in five kinds of tasks consisting of seven blocks of 60 trials. First, they were instructed to keep their gaze at a fixation point on the right side of a computer monitor. When a target began to move horizontally from a starting point（near or same as the fixation point）to left at a constant velocity, the subjects made a saccadic eyemovement to pursuit it as quickly and as accurately as possible. First four visual stimulus conditions were determined in 2×2 combinations from the following two aspects:1）whether the target started from the fixation point or $5°$ left from it, 2）whether warning stimuli cuing target's start timing were presented or not at the fixation point. In the last condition, the fixation point suddenly disappeared after 1200 ms of gaze, and after further 200-300 ms, the target started from the starting point. Saccadic reaction times（SRTs）and the endpoint errors of primary saccadic eyemovements to the moving target were analyzed by repeated-measured two-way analysis of variance and t-test on each tasks in all the subjects. The results showed that the express saccades can be evoked by the following two strategies：1）to predict the onset timing of target movement correctly while detecting the initial target movement in peripheral vision rather than foveal vision. 2） to disengage spatial attention. These perceptual strategies would improve motor performance in ball games, boxing, karate and kendo.

Key words：express saccades, saccadic reaction times(SRTs), spatial attention, peripheral fixation, predictability of target's start timing, perceptual strategies