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RESEARCH ART I C L E

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Age-related performance of human subjects on saccadic eye movement tasks

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Abstract We measured saccadic eye movements in 168 normal human subjects, ranging in age from 5 to 79 years, to determine age-related changes in saccadic task performance. Subjects were instructed to look either toward (pro-saccade task) or away from (anti-saccade task) an eccentric target under different conditions of fixation. We quantified the percentage of direction errors, the time to onset of the eye movement (saccadic reaction time: SRT), and the metrics and dynamics of the movement itself (amplitude, peak velocity, duration) for subjects in different age groups. Young children (5±8 years of age) had slow SRTs, great intra-subject variance in SRT, and the most direction errors in the anti-saccade task. Young adults (20±30 years of age) typically had the fastest SRTs and lowest intra-subject variance in SRT. Elderly subjects (60±79 years of age) had slower SRTs and longer duration saccades than other subject groups. These results demonstrate very strong age-related effects in subject performance, which may reflect different stages of normal development and degeneration in the nervous system. We attribute the dramatic improvement in performance in the anti-saccade task that occurs between the ages of 5± 15 years to delayed maturation of the frontal lobes.

Key words Saccade ´ Visual fixation ´ Anti-saccade ´ Reaction times ´ Express saccade ´ Frontal cortex ´ Aging ´ Senescence