

Investigating Visual Statistical Learning during Aging Using the Eye-Tracking Method

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Abstract : This study examines the effects of aging on visual statistical learning, using eye-tracking techniques to investigate this cognitive phenomenon. Visual statistical learning is a fundamental brain function that enables the automatic and implicit recognition, processing, and internalization of environmental patterns over time. Some previous research has suggested the robustness of this learning mechanism throughout the aging process, underscoring its importance in the context of education and rehabilitation for the elderly. The study included three distinct groups of participants, including 21 young adults (Mage: 19.73), 20 young-old adults (Mage: 67.22), and 17 old-old adults (Mage: 79.34). Participants were exposed to a series of 12 arbitrary black shapes organized into 6 pairs, each with different spatial configurations and orientations (horizontal, vertical, and oblique). These pairs were not explicitly revealed to the participants, who were instructed to passively observe 144 grids presented sequentially on the screen for a total duration of 7 min. In the subsequent test phase, participants performed a two-alternative forced-choice task in which they had to identify the most familiar pair from 48 trials, each consisting of a base pair and a non-base pair. Behavioral analysis using t-tests revealed notable findings. The mean score for the first group was significantly above chance, indicating the presence of visual statistical learning. Similarly, the second group also performed significantly above chance, confirming the persistence of visual statistical learning in young-old adults. Conversely, the third group, consisting of old-old adults, showed a mean score that was not significantly above chance. This lack of statistical learning in the old-old adult group suggests a decline in this cognitive ability with age. Preliminary eye-tracking results showed a decrease in the number and duration of fixations during the exposure phase for all groups. The main difference was that older participants focused more often on empty cases than younger participants, likely due to a decline in the ability to ignore irrelevant information, resulting in a decrease in statistical learning performance.

Keywords : aging, eye tracking, implicit learning, visual statistical learning

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