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Understanding Individual Differences in Eye Movement Pattern During Scene Perception through Co-Clustering of Hidden Markov Models

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Abstract

Here we combined the Eye Movement analysis with Hidden Markov Models (EMHMM) method with the data mining technique co-clustering to discover participant groups with consistent eye movement patterns across stimuli during scene perception. We discovered explorative (switching between foreground and background information) and focused (mainly on foreground) eye movement strategy groups among Asian participants. In contrast to previous research suggesting a cultural difference where Asians adopted explorative and Caucasians used focused eye movement strategies, we found that explorative patterns were associated with better foreground object recognition performance whereas focused patterns were associated with better feature integration in the flanker task and higher preference rating of the scenes. In addition, images with a salient foreground object relative to the background induced larger individual differences in eye movements. Thus, eye movements in scene perception not only contribute to scene recognition performance, but also reflects individual differences in cognitive ability and scene preference.