Electrophysiological Markers of the probability cueing suppression: statistical learning of distractor locations and inter-trial modulation

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Visual search performance is facilitated when the singleton distractor occurs at a high probability location where the distractor occurred frequently in the past, compared to locations where it rarely occurred. Additionally, some studies found search becomes slower when the target appeared at the location of the preceding distractor (coincident condition). However, the underlying neural mechanisms have not been closely examined based on the statistical learning experience. Here, we used lateralized event-related electroencephalogram (EEG) potentials and lateralized alpha power (8-12 Hz) to shed further light on the temporal dynamics of the distractor suppression modulated by inter-trial and statistical learning of distractor locations. Adopting an additional singleton paradigm (N = 20), we observed a stronger suppression (shorter RTs) when the color-defined distractor appeared at a specific frequent location than other rare locations in search displays. We found slower RTs in the coincident versus the non-coincident condition mirrored by the larger amplitude of the SPCN component, suggesting the distractor-target inter-trial mechanism needs further access to visual working memory in a context scene. However, the lateralized alpha power (8-12 Hz) reflects no anticipatory suppression of spatial attention based on probability cueing of distractor locations. Our findings thus provide new neurophysiological evidence for individuals' attention modulation by the statistical learning of distractor locations and inter-trial effects.

Primary author: QIU, Nan

Co-authors: Dr ALLENMARK, Fredrik (General and Experimental Psychology, Department of Psychology, LMU Munich, 80802, Germany); Prof. MÜLLER, Hermann J. (General and Experimental Psychology, Department of Psychology, LMU Munich, 80802, Germany); Prof. SHI, Zhuanghua (General and Experimental Psychology, Department of Psychology, LMU Munich, 80802, Germany)

Presenter: QIU, Nan

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