Look left but attend right: an ERP investigation of the effects of covert attention and saccadic eye movement on visual processing

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Close coupling between saccade preparation and shifts of visual attention are frequently demonstrated by more efficient processing of visual stimuli presented close to the target of an intended saccade than at other locations. However, recent evidence has individuated an 'independent' attentional component that can be directed away from the saccadic target (Montagnini & Castet, 2007). We tested the independence of this attentional component with event related potentials. Participants were cued to simultaneously direct covert spatial attention (Attention task) and prepare a saccadic eye movement (Saccade task) toward either the same target (Same side condition) or to targets located on opposite sides (Opposite sides condition). ERPs elicited by peripheral visual stimuli at cued and uncued locations showed that visuo-spatial attention initially shifted towards the cued target of the Attention task in both Same and Opposite side conditions as indexed by similar enhancement of the N1 component (150-190 ms post-stimulus). Crucially, attentional effects were drastically reduced in the Opposite sides condition beyond 250 ms post-stimulus. This observed reduction suggests spatial attention was first allocated to the Attention task target, and following initial processing of the visual stimulus, attentional resources were at least partially shifted towards the saccade target. Thus, in Opposite sides condition, visuo-spatial attention is not directed simultaneously and in parallel towards opposite target locations but is serially allocated to the Attention task target first, then subsequently re-directed towards the Saccade task target closer to movement onset. These findings support the idea of shared mechanisms between covert attention and saccade preparation.

- Montagnini, A., & Castet, E. (2007). Spatiotemporal dynamics of visual attention during saccade preparation: Independence and coupling between attention and movement planning. *Journal of Vision, 7*(14), 1–16.