Attention Capture by Sudden and Unexpected Changes: A Multisensory Perspective

Erik Marsja

Akademisk avhandling

som med vederbörligt tillstånd av Rektor vid Umeå universitet för
avläggande av filosofie doktorsexamen framläggs till offentligt
förvar i Hörsal B, Samhällsvetarhuset,
fredagen den 8 december, kl. 10:00.
Avhandlingen kommer att försvas på engelska.

Fakultetsopponent: Associate Professor, Francois Vachon,
School of Psychology, University of Laval, Quebec, Kanada
Abstract
The main focus for this thesis was cross-modal attention capture by sudden and unexpected sounds and vibrations, known as deviants, presented in a stream the same to-be-ignored stimulus. More specifically, the thesis takes a multisensory perspective and examines the possible similarities and differences in how deviant vibrations and sounds affect visual task performance (Study I), and whether the deviant and standard stimuli have to be presented within the same modality to capture attention away from visual tasks (Study II). Furthermore, by presenting spatial deviants (changing the source of the stimuli from one side of the body to the other) in audiotactile (bimodal), tactile, and auditory to-be-ignored, it explores whether bimodal stimuli are more salient compared to unimodal (Study III). In addition, Study III tested the claims that short-term memory is domain-specific.

In line with previous research, Study I found that both auditory and tactile deviants captured attention away from the visual task. However, the temporal dynamics between the two modalities seem to differ. That is, it seems like practice causes the effect of vibratory deviants to reduce, whereas this is not the case for auditory deviants. This suggests that there are central mechanisms (detection of the change) and sensory-specific mechanisms.

Study II found that the deviant and standard stimuli must be presented within the same modality. If attention capture by deviants is produced by a mismatch within a neural model predicting upcoming stimuli, the neural model is likely built on stimuli within each modality separately.

The results of Study III revealed that spatial and verbal short-term memory are negatively affected by a spatial change in to-be-ignored sequences, but only when the change is within a bimodal sequence. These results can be taken as evidence for a unitary account of short-term memory (verbal and spatial information stored in the same storage) and that bimodal stimuli may be integrated into a unitary percept that make any change in the stream more salient.

Keywords
Attention Capture, Distraction, Tactile, Auditory, Visual, Multisensory, Crossmodal, Bimodal