Abstract

The study of attention aims to understand how the visual system focuses its resources on salient targets presented amongst competing distractors. In a continuously changing environment, temporal attention must pick out targets presented in between spatially coincident distractors that are offset in time. Cognitive theories have proposed that this task is mediated by a temporal 'spotlight' of attention. This thesis combines evidence from behaviour and electrophysiology (EEG) with theoretical insights from neural network modelling to investigate the interplay between this spotlight and conscious perception.

The experiments described in this thesis investigate the electrophysiology of temporal visual perception using the Rapid Serial Visual Presentation (RSVP) paradigm. Building upon behavioural research, we use EEG to investigate the influence of target discriminability, the Attentional Blink (AB) and feature integration on the temporal dynamics of visual perception. These findings characterise the influence of pre-attentional processes on attentional deployment, and the subsequent influence of this deployment on perception and behaviour. In addition, they provide the basis for a complementary computational elucidation.

The theoretical component of this thesis is based on the ST^2 neural network model. The notion of Transient Attentional Enhancement (TAE) embodied therein is the computational equivalent of the temporal spotlight. Its function is evaluated within the ST^2 model and in relation to other modelling approaches. In addition, human ERP (Event-Related Potential) data from the experiments are compared with the model's equivalent activation traces, termed *Virtual ERPs.* This combination of theory and experiment broadens our understanding of temporal visual perception, and in conjunction, highlights the role of neural modelling in informing EEG research.