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**Author**

Briggs, KE

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**Attention is Modulated by Motivational  
Relevance: A Behavioural and ERP Investigation  
of Affective Picture Processing**

**Kate Elizabeth Briggs**

**BA (Hons) University of Tasmania**

Submitted in fulfilment of the requirements for the degree of Doctor of

Philosophy

University of Tasmania

June 2007

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A handwritten signature in black ink, appearing to read 'K Briggs', with a stylized, cursive flourish at the end.

Kate Briggs  
June 2007

15.06.07

## ABSTRACT

ERP evidence of affective picture processing generally agrees with one of two dominant theories. The first is that enhanced ERP responses to pleasant and unpleasant stimuli relative to neutral reflects the processing of stimulus motivational relevance, referred to as the quadratic effect, and the second is that enhanced ERP responses to unpleasant stimuli compared to pleasant and neutral stimuli reflects a negativity bias. The overarching aims of the current series of empirical studies were to identify which of the two aforementioned theories can most definitively account for affective picture processing (Phase 1); and to investigate how processes of attentional engagement and disengagement are influenced by the presence of motivationally relevant stimuli (Phase 2). Pictorial affective stimuli (high and low arousing pleasant, unpleasant, sexual, and neutral stimuli) were presented in a modified oddball paradigm to 38 participants (19 male, 19 female) in Experiment 1 and 34 participants (17 male, 17 female) in Experiment 2. A negativity bias was demonstrated for P3b amplitude in Experiment 1; however significantly enhanced P3b amplitudes evoked in response to sexually explicit stimuli in Experiment 2 was not consistent with either dominant theory, and raised questions as to the separable effects of motivational relevance and sexual arousal on cognitive processes. Experiment 3 was aimed at investigating whether ERP responses are differentially modulated by the social content of affective picture stimuli. The same participants from Experiment 2 participated in Experiment 3 and the oddball task involved the presentation of low arousing social and non-social pleasant, unpleasant, and neutral stimuli. No significant differences in ERP component measures were shown between social and non-social pleasant, or between social and non-social unpleasant stimuli, however both P2 and

P3b component amplitudes were enhanced in response to neutral faces compared with neutral objects. Factors associated with facial recognition and difficulties extracting affective information from a somewhat ambiguous neutral expression were cited as possible explanations for the observed ERP component modulations.

The principal aim of Phase 2 was to investigate whether the presentation of appetitive and aversive cues influences the engagement and disengagement components of covert visual attention as inferred by responses to validly and invalidly cued targets respectively. Participants in Experiment 4 (N=19 female) and Experiment 5 (N=18 female) were presented with a modified peripheral cueing paradigm, where pictorial stimuli (sexual, mutilation, threatening, and neutral) served as peripheral cues. Target processing as indexed by P1 and P3b amplitude showed significant facilitation in both Experiments 4 and 5 when targets were cued by sexual and mutilation stimuli, regardless of whether cueing was valid or invalid. It was therefore concluded that the engagement and disengagement components of covert visual attention are not differentially affected by motivationally relevant cues; rather, normal participants demonstrate a global response bias when responding to targets that are cued by motivationally relevant appetitive and aversive cues. The same participants from Experiment 5 were presented with a peripheral cueing paradigm in Experiment 6, which aimed to investigate the effect of phylogenetically (biological) and ontogenetically (cultural) fear-relevant stimuli on processes of covert visual attention. Pictorial stimuli depicting dangerous animals, human threat, and neutral objects served as peripheral cues. In line with preparedness theory (Seligman 1970, 1971), target processing was facilitated by the presence of animal threat stimuli compared to human threat and neutral stimuli, and also the early level of visual

processing as indexed by cue-evoked P1 amplitude was enhanced in response to phylogenetically, fear-relevant animal stimuli. A global response bias was again demonstrated in Experiment 6, and it was concluded that the attentional system of normal participants is sensitive to stimuli that have been evolutionarily associated with threat and/or fear. The current dissertation therefore has theoretical implications for the systematic study of affective picture processing. Furthermore, the introduction of a peripheral cueing paradigm to the study of affective picture processing provides a new insight into the effect that both appetitive and aversive stimuli have on processes of attentional orienting and target processing.

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