



Assessing attention allocation toward threat-related stimuli: a comparison of the emotional Stroop task and the attentional probe task

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Abstract

This study examined the association of two widely used measures of attention allocation toward or away from threat-related stimuli: The emotional Stroop task and the attentional probe task. Fifty-three participants responded to computer versions of both tasks where stimuli were presented both subliminally and supraliminally. Thus, four indexes indicating attention allocation were computed for each participant. A correlation analysis showed that the attentional probe index and the emotional Stroop index were associated within each presentation mode while all other relations were nonsignificant. These results are discussed in terms of a distinction between preattentive and attentional processes operationalised by different stimulus presentation times.

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1. Introduction

Recent influential cognitive theories of anxiety have proposed that attentional biases for threatening information play an important role in the development and maintenance of anxiety disorders (Eysenck, 1992; MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002; Mogg & Bradley, 1998; Williams, Watts, MacLeod, & Mathews, 1997). There has also been considerable interest in examining processes of attention allocation toward threat within the non-clinical range of anxiety (i.e. anxiety as a personality disposition; Broadbent & Broadbent, 1988; Egloff & Hock, 2001; Egloff, Wilhelm, Neubauer, Mauss, & Gross, 2002). To study attention allocation,

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various research paradigms have been developed that are inspired by or adopted from cognitive experimental psychology. Two of these tasks have been used most frequently: the emotional (“modified”) Stroop task (Williams, Mathews, & MacLeod, 1996) and the attentional probe task (also called dot probe task, visual probe task or visual deployment task; MacLeod, Mathews, & Tata, 1986).

The basic idea of the modified Stroop task is that the emotional content of the stimulus words (as compared to neutral words) differentially interferes with colour naming by capturing attentional resources. These interference effects are typically interpreted as attentional bias for threatening information (Mathews & MacLeod, 1994). In the critical trials of the attentional probe task, a threat word and a neutral word are presented simultaneously on a computer screen. Directly after the display of the words, a visual probe (a small dot) occasionally appears in the location of one of the words. Participants are asked to press a button as soon as they detect the dot. Attention allocation to threat is measured indirectly by the reaction times to the dot: fast reactions to dots that appeared in the position of threat words and slow reactions to dots that appeared in the position of neutral words indicate attentional bias for threat (MacLeod et al., 1986). In contrast to clinically anxious patients, who usually show an attentional bias toward threat, individuals characterized by repressive coping tend to direct their attention away from threatening stimuli (Dawkins & Furnham, 1989; Krohne, 1996). Thus, attention allocation scores derived from both paradigms could show positive values (indicating attention allocation toward threat), zero values (indicating no preference concerning attention allocation toward or away from threat) or negative values (indicating attention allocation away from threat).

The present study examines whether the emotional Stroop task and the attentional probe task actually measure the same process (i.e. attention allocation toward or away from threat). Two recent studies yielded inconclusive results on this issue: Brosschot, de Ruiter, and Kindt (1999) reported a small positive inter-task association for social threat words. In contrast, Mogg et al. (2000) found no significant relationship between the attention allocation scores derived from both tasks. Both studies were similar in that they used a preselected group of participants as their main analysis focused on attention allocation in repressive and anxious participants. However, they differed in terms of procedural details: Brosschot et al. (1999) used the original version of the attentional probe task (MacLeod et al., 1986) that included a lot of filler trials, whereas Mogg et al. (2000) employed a variant where the probe appeared in each trial and a forced-choice decision to indicate the position of the probe (up or down) had to be made.

Our study aimed at further examining the association of attention allocation scores obtained with the Stroop and the attentional probe task. We used an unselected sample of participants because we were interested in attentional processes of non-clinical participants that cover the full range of trait anxiety as a personality disposition (rather than clinical anxious patients). In our study, participants responded to computer versions of the emotional Stroop task and a modified version of the attentional probe task (Mathews, Ridgeway, & Williamson, 1996). As a major improvement to previous studies, stimuli in both tasks were presented subliminally and supraliminally. Subliminal and supraliminal presentation modes tap different phases of attention regulation. Subliminal presentation yields indicators of early, pre-attentive processes that operate before a stimulus is consciously registered. These processes, which are assumed to reflect automatic mechanisms, serve to direct attentional focus toward significant parts of the perceptual field (e.g. stimuli associated with potential threat). In contrast, supraliminal presentation additionally

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