



Selective attention to threat in the dot probe paradigm: differentiating vigilance and difficulty to disengage

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Abstract

The dot probe task [J *Abnorm Psychol* 95 (1986) 15] is an often-used paradigm to investigate selective attention to threat. A facilitated response to probes that appear at the same location of threat information in comparison with responses to probes at the opposite location of threat information is interpreted as vigilance for threat. We argue that the findings in the dot probe paradigm are ambiguous evidence for the vigilance to threat hypothesis. Results can also be interpreted as a difficulty to disengage from threat. In this study, 44 undergraduates performed a pictorial version of the probe detection task. Taking into account the reaction times on neutral trials, we found no evidence for a facilitated detection of threatening information. It was found that the dot probe effects are at least partially due to disengagement effects. The implications of these results for the understanding of attentional bias in normal and anxious individuals are discussed.

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1. Introduction

There is strong evidence that clinically anxious and high anxious individuals selectively attend to threatening information (for a review, see Williams, Watts, MacLeod, & Mathews, 1997). In many theories of clinical anxiety, these attentional biases have been regarded as initiating and maintaining clinical anxiety. In particular, the importance of early detection of threat has been emphasized (e.g. Eysenck, 1992; Williams et al., 1997). According to these models, clinically

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anxious and high anxious individuals are oversensitive in detecting threat. In these individuals, attention to threatening information is strongly prioritized over neutral or positive information. This phenomenon has been labeled *vigilance*.¹ Vigilance for threatening information might have several pathogenic effects. It may lead to a heightened sensitivity for negative information, resulting in frequent anxious states. Furthermore, if attention is continuously captured by threat-related stimuli, this process interferes with ongoing goal-directed behavior (Eysenck, 1992).

Empirical support for the idea that anxious individuals are vigilant to threat largely stems from research using the dot probe task (MacLeod, Mathews, & Tata, 1986; for a review, see Mogg & Bradley, 1998). In a visual probe detection task, participants are shown a pair of stimuli for a short time at two different spatial locations on a screen. One of the stimuli is threatening, the other stimulus is neutral. After the offset of these stimuli, a dot probe emerges at the location of the threatening stimulus (*congruent* presentation) or at the location of the neutral stimulus (*incongruent* presentation). The allocation of attention is measured by the time needed to respond to the dot probe. It is reasoned that responding to the probe will be faster when attention is already allocated to the spatial location where the probe appears. Most probe detection studies found indeed that anxious individuals respond faster to congruent trials than to incongruent trials (*congruency effect*). This finding is interpreted as vigilance for threat.

Other findings raise doubt about this interpretation of dot probe effects. Posner, Inhoff, Friedrich and Cohen (1987) have decomposed spatial attention into three operative components: disengaging from the current location, moving to a new location, and engaging the new location. Derryberry and Reed (2002) have already pointed out that the facilitated response to probes at the threat location may also arise from a difficulty to disengage from the threat location rather than vigilance to threat. In line with this reasoning, studies using an emotional variant of the exogenous cueing task, have revealed that anxious individuals are not characterized by a vigilance to threat (facilitated engagement), but by a difficulty to disengage attention from threat (e.g. Fox, Russo, Bowles, & Dutton, 2001; Yiend & Mathews, 2001). Thus, the disengagement component might also be of importance in the congruency effect in the dot probe task.

Differentiating between vigilance and difficulty to disengage attention in the dot probe task is of importance for a number of reasons. It allows to refine the present conceptualization of attention to threat. In this context, it is important to note that several influential theories on attention to threat partially rely on data obtained through dot probe methodology (Mathews & Mackintosh, 1998; Mogg & Bradley, 1998). Furthermore, vigilance to threat has been used to explain some of the core features of anxiety syndromes. Should anxiety, however, be characterized by a difficulty to disengage attention from threat this would lead to a different set of problems, specifically at breaking away from negative material and engaging in adequate coping behavior (Derryberry & Reed, 1994). Therefore, in the present study, we empirically investigated which components of visual attention are measured by the probe detection task.

¹ In the context of attention to threat, the term vigilance is also used to refer to a general state of alertness for threat. In this paper, however, the term vigilance is used strictly in the sense of facilitated detection of threatening compared to neutral information.

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