



Enhanced anger superiority effect in generalized anxiety disorder and panic disorder

Chris Ashwin^{a,*}, Pawel Holas^b, Shanna Broadhurst^a, Andrzej Kokoszka^b, George A. Georgiou^c, Elaine Fox^{a,**}

^a Department of Psychology, University of Essex, Wivenhoe Park, Colchester, UK

^b II Department of Psychiatry, Medical University of Warsaw, Warsaw, Poland

^c Dept. of Psychology, Roehampton University, London, UK

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ABSTRACT

People are typically faster and more accurate to detect angry compared to happy faces, which is known as the anger superiority effect. Many cognitive models of anxiety suggest anxiety disorders involve attentional biases towards threat, although the nature of these biases remains unclear. The present study used a Face-in-the-Crowd task to investigate the anger superiority effect in a control group and patients diagnosed with either generalized anxiety disorder (GAD) or panic disorder (PD). The main finding was that both anxiety groups showed an enhanced anger superiority effect compared to controls, which is consistent with key theories of anxiety. Furthermore, both anxiety groups showed a differential pattern of enhanced bias towards threat depending on the crowd in the displays. The different attentional bias patterns between the GAD and PD groups may be related to the diverse symptoms in these disorders. These findings have implications for the diagnosis and treatment of anxiety.

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1. Introduction

Humans sense more information in their environment than they can effectively process, so attention is necessary to filter out unnecessary information and to focus on relevant items. Many cognitive theories of anxiety propose that biases in attention play an important role in the causation and maintenance of anxiety disorders (Beck, 1976; Eysenck, 1992; Mathews, 1990; Williams, Watts, MacLeod, & Mathews, 1988, 1997). There is now much evidence showing that high-trait anxious people and patients with clinical diagnoses of anxiety display attentional biases towards threatening information (for reviews see: Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van Ijzendoorn, 2007; Mathews & MacLeod, 2005; Mogg & Bradley, 2004).

Much of the evidence for attentional biases in high anxiety has emerged from a small number of experimental paradigms, including the Stroop task, dot probe and Face-in-the-Crowd tests. In the

modified Stroop task people have to name the colours of words printed in different fonts, either in a list or presented one at a time. Findings have revealed that anxious individuals show greater interference when colour-naming threatening words compared to neutral words (Williams, Mathews, & MacLeod, 1996). This is proposed to reflect that attention to the negative content in distracter words interferes with performance on the central task of naming the ink colour. This effect has also been shown when words are masked to restrict awareness (MacLeod & Rutherford, 1992; Mogg, Bradley, Williams, & Mathews, 1993), and there is evidence that the Stroop effect in these modified designs also predicts the amount of later distress experienced from a disturbing life event (MacLeod & Hagan, 1992). However, it has been argued the mechanisms underlying this effect may actually reflect disruption caused by the emotional valence, rather than attentional effects (Mathews & MacLeod, 2005). In addition, some propose that word stimuli may be limited in anxiety research for a number of reasons (Bradley, Mogg, White, Groom, & de Bono, 1999; Mogg & Bradley, 2004). For example, words could represent a weaker stimulus or might have a more indirect relationship with 'real-world' dangers, compared to pictorial representations of threat. There is also a possible confound that anxious people may be more familiar and experienced with threat-related words compared to controls. Facial expressions of emotion might represent a more potent and ecologically valid

* Corresponding author at: Dept. of Psychology, University of Bath, Bath BA2 7AY, UK. Tel.: +44 01225 383502; fax: +44 01225 386752.

** Corresponding author. Tel.: +44 01225 383502; fax: +44 01225 386752.

E-mail address: c.ashwin@bath.ac.uk (C. Ashwin).

type of stimuli for investigating biases towards threat in anxiety research.

Other experimental methods, including the dot probe and Face-in-the-Crowd paradigms, have utilised images of facial expressions to investigate attentional biases in anxiety. Dot-probe paradigms typically involve two pictures appearing briefly in a display, followed by a target probe appearing behind the location of one of the pictures. Faster responses to a target are inferred to show that attention was preferentially allocated to the picture that appeared in its location. A number of dot-probe studies have reported that people with high trait anxiety and those diagnosed with clinical anxiety show an attentional bias for threatening information, including facial expressions of emotion (Bradley et al., 1999; Mogg & Bradley, 1999, 2002; Roy et al., 2008; Waters, Mogg, Bradley, & Pine, 2008). For example, using a dot probe paradigm, Mogg and Bradley (1998) showed that people with high trait anxiety attended more to threatening faces presented at 500 ms or 1250 ms compared to a control group and people with dysphoria.

Another method used to study the detection of threat using images of emotional expressions is the Face-in-the-Crowd paradigm. Hansen and Hansen (1988) carried out the original study involving groups of photographs showing emotional expressions arranged in displays. Participants had to search the displays and decide if a discrepant face was present or not. They reported that people detected angry faces faster and more accurately than happy faces, and interpreted this to illustrate a threat superiority advantage for angry faces compared to friendly faces. However, the study was limited after discovery one of the photographs had a shadow in it, which may have affected the results (Purcell, Stewart, & Skov, 1996). Further studies developed computer-drawn schematic faces instead of photographs, to avoid visual confounds between stimulus types. These versions of the Face-in-the-Crowd task have used schematized angry, happy and neutral expression faces arranged in displays on a computer screen. Participants decide if all the faces in the display are the same, or if there is one face that is different than the rest. A number of studies with control participants have used the Face-in-the-Crowd task with schematic faces and found that angry faces are detected faster and more accurately than friendly faces, termed the anger superiority effect (Ashwin, Wheelwright, & Baron-Cohen, 2006; Eastwood, Smilek, & Merikle, 2003; Fox, Lester, Russo, Bowles, Pichler, & Dutton, 2000; Öhman, Lundqvist, & Esteves, 2001). These findings support ideas of an evolutionarily developed threat detection module that preferentially detects stimuli in the environment that signal threat and allocates attentional resources towards them (Öhman, 1986; Öhman & Mineka, 2001; Öhman et al., 2001).

To date only a small number of studies have been reported using the Face-in-the-Crowd task with people who are high anxiety or diagnosed with anxiety disorders. Most of these studies have included people with non-clinical high anxiety or with diagnoses specific to social anxiety. Byrne and Eysenck (1995) used this paradigm with photographs of people expressing angry and happy expressions in displays and found that individuals high in subclinical trait anxiety were faster in detecting angry faces compared to low trait-anxiety. Gilboa-Schechtman, Foa, and Amir (1999) used a similar Face-in-the-Crowd design to Byrne and Eysenck with photographs and reported that people with social anxiety disorder showed greater attentional biases for angry versus happy faces compared to controls. A study by Juth, Lundqvist, Karlsson, and Öhman (2005) utilized the Face-in-the-Crowd paradigm with schematic faces, instead of photographs, and found that people with high social anxiety showed more effective detection of angry compared to happy faces. Another Face-in-the-Crowd study using schematic faces and different display sizes found that people with social anxiety disorder had shallower slopes for detecting angry faces compared to happy faces (Eastwood et al., 2005), illustrating

that angry faces capture attention more easily than happy faces in those with social anxiety. They further reported that people diagnosed with PD also had a greater attentional bias towards angry faces, comparable with the social anxiety group. A meta-analysis by Bar-Haim et al. (2007) looked at 172 different studies measuring bias towards threatening information in people with and without high anxiety using a variety of experimental paradigms. The authors reported a robust threat-related bias with a low to medium effect size was evident in people who are diagnosed with anxiety disorders or have high sub-clinical measures of trait anxiety.

Generalized anxiety disorder (GAD) and panic disorder (PD) are both clinically diagnosed anxiety disorders. GAD is characterized by heightened anxiety and tension alongside difficulty in relaxing. People with GAD have excessive and often irrational worry about aspects of everyday life (APA, 1994). Their worry is characterized by repeated negative thoughts about possible threat, which may emerge from attempts at avoidance or coping (Borkovec & Roemer, 1995). This pervasive worry is beyond that normally experienced in everyday life, and expresses as chronic and exaggerated anxiety. Therefore, individuals with GAD tend to always be anticipating disaster and worrying about issues such as health, money, family, friends, and work. In contrast to the chronic low-level anxiety found in GAD, panic disorder (PD) involves unexpected episodes of intense fear accompanied by physical symptoms, and persistent apprehension over their recurrence or consequences (APA, 1994). A strong component of PD is the fear of embarrassment or humiliation from others. In fact, individuals often report a desire to avoid or escape public places because they would feel embarrassed or humiliated if they had a panic attack there. Since social elements are an important factor, it is thought people with PD might be biased towards cues of social evaluation, such as emotional expressions (Eastwood et al., 2005).

While GAD and PD present with dissimilar behavioural profiles, the nature of any differences between PD and GAD in their attentional biases towards threat is currently unknown. One idea is there might be a common core threat-related attention bias shared by the various anxiety disorders, with attentional differences between disorders emerging from other factors (Bar-Haim et al., 2007). Alternatively, distinctive patterns of attentional biases related to behavioural symptoms might be evident across various anxiety disorders. While there is some initial evidence to suggest various anxiety disorders might show differences in how they process threatening information, there is a lack of experimental findings in this area (Amir et al., 1996; Vrana, Roodman, & Beckham, 1995). Research has shown differences between anxiety disorders in the timing of attentional biases, with some disorders showing early biases towards threat and later biases away from threat (Mogg & Bradley, 2004, 2006). However, Eastwood et al. (2005) reported that social phobics and those with PD had similarly enhanced attention towards threatening faces. There have been a number of mixed findings to date, so further research is needed to better understand the nature of cognitive biases in anxiety disorders.

1.1. Experimental aims

The main aim of the present study was to investigate attentional biases towards angry faces in control participants and clinical patients diagnosed with either GAD or PD using the Face-in-the-Crowd task with schematic faces. Schematic faces were used because they are highly matched on low-level visual characteristics, which minimizes potential visual confounds that can occur between expressions in real photographs (Fox et al., 2000; Öhman et al., 2001). We predicted that the GAD and PD would show enhanced anger superiority effects compared to controls. Since PD is associated with heightened concerns about socially observed anxiety, we hypothesised people with PD might show even greater

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