The role of trait anxiety in the recognition of emotional facial expressions

Robbie M. Cooper *, Angela C. Rowe, Ian S. Penton-Voak

University of Bristol, Bristol, UK

Abstract

Previous work has suggested that elevated levels of trait anxiety are associated with an increased ability to accurately recognize the facial expression of fear. However, to date, recognition has only been assessed after viewing periods of 10 s, despite the fact that the process of emotion recognition from faces typically takes a fraction of this time. The current study required participants with either high or low levels of non-clinical trait anxiety to make speeded emotional classification judgments to a series of facial expressions drawn from seven emotional categories. Following previous work it was predicted that recognition of fearful facial expressions would be more accurate in the high-trait anxious group compared with the low-trait anxious group. However, contrary to this prediction, no anxiety-related differences in emotion perception were observed across all seven emotions. This suggests that anxiety does not influence the perception of fear as has been previously proposed.

© 2007 Elsevier Ltd. All rights reserved.

1. Introduction

The ability to interpret correctly the emotional facial expressions of others is a skill fundamental to successful human interaction. It has been suggested that emotional facial expressions evolved as an external representation of internal emotional states as a means for swift communication of these states between individuals (Blair, 2003). Darwin (1872) believed that facial expressions are an innate and universal component of non-verbal communication. In support of this view, Ekman (1972) has shown comparable patterns of production and recognition of emotional facial expressions across different cultures.

Atypical processing of emotional facial expressions is thought to be a feature of some neuropsychological and clinical disorders. For example, recognition of disgust is impaired in Huntington's disease (Gray, Young, Barker, Curtis, & Gibson, 1997). Furthermore, recognition of anger is thought to be impaired in patients with clinical depression (Mendlewicz, Linkowski, Bazelmans, & Philippot, 2005; although see Persad and Polivy (1993) who present evidence for a general processing deficit of emotional facial expressions in depression). In contrast to these processing deficits associated with some conditions, recent evidence has emerged suggesting that heightened (but non-clinical) levels of trait anxiety are associated with an ability to more accurately recognize fearful facial expressions (Surcinelli, Codispoti, Montebarocci, Rossi, & Baldaro, 2006) relative to lower levels of trait anxiety. The current paper explores the

* Corresponding author at: Department of Experimental Psychology, 12a Priory Road, University of Bristol, Bristol, BS8 1TU, UK. Tel.: +44 117 928 8547; fax: +44 117 928 8588.

E-mail address: robbie.cooper@bris.ac.uk (R.M. Cooper).

relationship between recognition of emotional facial expressions and individual differences in trait anxiety.

Early cognitive theories of emotional disorders (Beck, 1976; Bower, 1981) predict that anxiety should be associated with biases favoring the processing of emotional stimuli across all domains of information processing (e.g., attention, memory, etc.). However, despite attempts to find such an information processing bias in memory (e.g., Mogg, Mathews, & Weinman, 1987) there currently exists no consensus on the relationship between memory for emotional stimuli and anxiety (Richards et al., 2002). Some studies have shown that high levels of trait anxiety are associated with improved retrieval of threat-related information compared with neutral information (e.g., Claeys, 1989; Eysenck & Byrne, 1994), while others have found no effects (e.g., Foa, McNally, & Murdock, 1989; Lang & Craske, 1997). Contrary to this, there is a large body of evidence suggesting anxiety is associated with a bias in attentional processing; a bias that favors the processing of threat-related information (e.g., Eysenck, 1992; Mathews & Mackintosh, 1998; see Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van Ijzendoorn, 2007 for a recent meta-analysis). Furthermore, it has been argued that this bias in attentional processing towards threat stimuli is the most important cognitive factor in the etiology and maintenance of anxiety (Mogg & Bradley, 1998).

While such attentional bias is the most documented of information processing biases in anxiety (Mathews, Mackintosh, & Fulcher, 1997) it is not the only reported. Anxiety is also thought to influence the interpretation of ambiguous stimuli. For example, when presented with threat/neutral homophones and asked to make a classification judgment, high-anxious individuals are more likely than low-anxious individuals to interpret the word as threat-related rather than neutral (Mathews, Richards, & Eysenck, 1989).

Evidence for such anxiety-related biases in attention and interpretation are also displayed in relation to the processing of emotional facial expressions. In the dot-probe task for example,[1] individuals with high levels of

anxiety demonstrate attentional biases towards the location of both angry (e.g., Bradley, Mogg, Falla, & Hamilton, 1998) and fearful (Fox, 2002) expressions relative to expressions that are happy or neutral.[2] Furthermore, in an interpretation task, Richards et al. (2002) presented ambiguous emotional facial expressions that had been constructed by morphing together two different emotional expressions (e.g., fear and surprise). When these ambiguous expressions were presented, high-anxious participants were more likely than low-anxious participants to identify them as fearful. Taken together, these studies demonstrate that at least some aspects of the processing of threat-related emotional facial expressions (i.e., allocation of attention; interpretation of ambiguous stimuli) are susceptible to individual differences in anxiety.

However, even in the study of attention there have been mixed findings in terms of how anxiety influences the way attentional resources are allocated to emotional facial expressions. Rossignol, Phillippot, Douilliez, Crommelinck, and Campanella (2005) gave participants a visual oddball task where they had to detect a discrepant fearful or happy face amongst a series of neutral faces. Participants who rated highly on self-report measures of anxiety were quicker to identify discrepant faces than non-anxious participants. However, fearful faces were detected just as quickly as happy faces. Similarly, Fox et al. (2000) gave participants a visual search task in which they had to search for either a positive or negative schematic face amongst sets of distracter faces. They reported that negative faces were found more efficiently than positive faces but that this effect was not modulated by participants' level of self-reported anxiety. Thus, some tasks demonstrate anxiety-related differences in the way threat-related emotional facial expressions are processed while others do not, suggesting anxiety may only be influencing certain aspects of the way attention is allocated (Mathews & Mackintosh, 1998).

More recently, and importantly for purposes of the present study, research has examined how emotion recognition (i.e., the ability to classify different emotional facial expressions as belonging to different discrete categories) might be influenced by anxiety. Surcinelli et al. (2006) gave a non-clinical sample of

---

[1] In its typical form, the dot-probe task presents pairs of stimuli (e.g., an angry face and a neutral face) for a brief period of time (typically 500 ms). The allocation of spatial attention between the stimuli is determined by response times to either identify or localize the 'probe' which appears in the location previously occupied by one of the stimuli. An attentional bias towards a stimulus category is assumed to be present if response times to probes occurring in the location previously occupied by that stimulus type (e.g., angry faces) are faster than when the probes appear in the location of the other stimulus type (e.g., neutral faces).

[2] Biases towards threat-related facial expressions have also been demonstrated in individuals not selected on the basis of anxiety level (e.g., Cooper & Langton, 2006) but it is the hyper-vigilance to these stimuli that is thought to characterize anxiety (Mogg & Bradley, 1998).