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Detection of emotional expressions in rapidly changing facial displays in high- and low-socially anxious women ☆

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Abstract

Facial information and attention to facial displays are distributed over spatial as well as temporal domains. Thus far, research on selective attention to (dis)approving faces in the context of social anxiety has concentrated primarily on the spatial domain. Using a rapid serial visual presentation (RSVP) paradigm, the present study examined the temporal characteristics of visual attention for happy and angry faces in high- ($n = 16$) and low-socially anxious individuals ($n = 17$), to test whether also in the temporal domain socially anxious individuals are characterized by threat-confirming attentional biases. Results indicated that presenting angry faces as the first target (T1) did not aggravate the detection of the emotional expression of the second target (T2). Yet, participants generally showed superior detection of the emotional expression of T2, if T2 was an angry face. Casting doubt on the role of such attenuated attentional blink for angry faces in social anxiety, no evidence emerged to indicate that this effect was relatively strong in high-socially anxious individuals. Finally, the presentation of an angry face as T2 resulted in a relatively hampered identification of a happy-T1. Again, this ''backward blink'' was not especially pronounced in high-socially anxious individuals. The present anger superiority effects are consistent with evolutionary models stressing the importance of being especially vigilant for signals of dominance. Since the effects were not especially pronounced in high-anxious individuals, the present study adds to previous findings indicating that socially anxious individuals are not characterized by a bias in the (explicit) detection of emotional expressions [Philippot, P., & Douilliez, C. (2005). Social phobics do not misinterpret facial expression of emotion. *Behaviour Research and Therapy, 43*, 639–652].
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Keywords: Attentional bias; Temporal attention; Social phobia; Facial expressions; Attentional blink; Emotional expressions

Information processing models of anxiety disorders generally assume that anxious individuals have a tendency to preferentially allocate attention to threatening information (e.g., Williams, Watts, MacLeod, & Mathews, 1997). Since fear of negative evaluation is the key feature of social phobia, cognitive models of

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☆Examples of how we modified the slides of the KDEF to remove irrelevant features that may unintentionally influence (facilitate) target detection independent of the emotional expression displayed on the target slides (e.g., prominent shoulders) can be obtained from the first author.

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social phobia propose that social phobic individuals are hypervigilant for social threat cues such as angry, disapproving facial expressions (e.g., Rapee & Heimberg, 1997). In line with this, studies using a dot probe methodology have found that subclinically as well as clinically socially anxious individuals are faster to respond to probes occurring in the spatial location of angry than of neutral or happy faces (Mogg & Bradley, 2002; Mogg, Bradley, & Philippot, 2004; Pishyar, Harris, & Menzies, 2004). Since studies manipulating the exposure duration of the face stimuli only revealed an attentional bias for social threat cues when presented for a relatively short duration (i.e., ⩽500 ms) (Mogg et al., 2004; Pishyar et al., 2004), this attentional bias seems to involve initial orienting rather than maintenance of attention.

Studies using the face-in-the-crowd paradigm provided further evidence for social phobics' selective attention to angry faces. That is, individuals with social phobia were faster in detecting an angry face in a crowd of 12 neutral distractor photographs than nonanxious controls (Gilboa-Schechtman, Foa, & Amir, 1999). A recent study that varied the number of neutral distractors showed that for socially phobic individuals, the detection of (schematic) angry faces was far less influenced by the number of distractors than the detection of (schematic) happy faces. This suggests that the relative efficacy of social phobic individuals to detect angry faces in the face-in-the-crowd paradigm reflects a bias to become aware of angry faces more readily than of positive faces (Eastwood et al., 2005). All in all, the available evidence is consistent with the idea that socially anxious individuals are constantly primed to monitor signals of disapproval. Such a (spatial) selective attention to disapproving facial expressions is likely to be reciprocally involved in the maintenance of social phobics' concerns, as it will logically act in a way to confirm their fear of negative evaluation.

Thus far, studies on attentional processes in social anxiety primarily focused on the selective allocation of attention during the concurrent presentation of static safe and threatening facial stimuli. Yet, facial expressions in the context of real-time social interactions are highly dynamic and may vary very rapidly from interested/approving to disapproving or even angry and vice versa (see e.g., Goffman, 1967). Germane to this, fundamental research on the temporal domain of visual attention has consistently shown that the ability to identify a particular target is deteriorated when another target is presented within a certain temporal window after the first (e.g., Broadbent & Broadbent, 1987; Raymond, Shapiro, & Arnell, 1992).

The deficit in the identification of the second target has been called the *attentional blink*, referring to the apparent refractory period following the presentation of the first target. Interestingly, this so-called attentional blink was found to be attenuated when a participant's own name was used as the second target (Shapiro, Caldwell, & Sorensen, 1997). Apparently, the interference effects of the first target are attenuated when the second target stimulus is of high personal relevance, presumably because highly salient stimuli have a low threshold for recognition (see also below).

This pattern of findings provides several interesting clues of how the detection of facial expressions in rapidly changing facial displays may inadvertently influence social phobics' perception of (dis)approval in a way to confirm their phobic concerns. First, it can be hypothesized that similar to the visual "cocktail party" effect described above, the threshold for detecting (salient) angry faces in a stream of facial stimuli may be relatively low resulting in an attenuated attentional blink. This effect may be especially pronounced in socially anxious individuals because of their preoccupation with disapproval and negative evaluation by others (cf. Fox, Russo, & Georgiou, 2005). If indeed high-socially anxious individuals would display an attenuated attentional blink for angry faces, this would result in a negatively biased representation of other's evaluations as compared to nonanxious individuals. Therefore, the first aim of the present study was to explore whether the attentional blink is indeed attenuated when disapproving, angry faces appear as the second target stimulus, and whether this effect is especially pronounced in high-anxious individuals.

Second, it might be that the appearance of an angry face (as a first stimulus) may result in a relatively strong deterioration of the detection of a subsequently appearing stimulus (i.e., enhanced attentional blink). In case the second target represents an approving expression, such angry-face-induced attentional blink would result in an underrepresentation of others' approval which, in turn, would logically act in a way to confirm socially anxious individuals' preoccupations with disapproval. Previous research, however, failed to find evidence for such a hampered identification of a second target (a noun) when it was preceded by a salient first target stimulus (own name) (Shapiro et al., 1997; exp. 3). To explain the finding that using a highly salient stimulus (own name) as the first target did not affect the identification of a subsequent target stimulus (a noun), Shapiro et al. (1997) proposed that any first stimulus demands a disproportionate amount of resources, irrespective of