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ATTENTIONAL BIAS FOR WORDS AND FACES IN SOCIAL ANXIETY

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Conflicting findings concerning the nature and presence of attentional bias in social anxiety and social phobia have been reported in the literature. This paper reports the findings of two studies comparing people with high and low social anxiety on dot probe tasks using words, faces photographed in front view, and faces photographed in profile as stimuli. In Study 1 those with high social anxiety displayed an attentional bias towards negative faces. The low social anxiety group showed an attentional bias towards positive faces. No significant effects were observed on the dot probe using words as stimuli. Study 2 used pairs of faces presented in profile as though looking at each other. One of the faces displayed either a positive, negative or neutral expression. The second face always had a neutral expression, and in half of the trials it was the subject’s own face. The findings of this more ecologically valid procedure replicated those of Study 1. Facilitated attention to dots following emotional faces was specific to threatening facial stimuli. From these studies it appears that the facial dot probe task is a more sensitive index of attentional bias than the word task in a non-clinical sample with social anxiety.

Keywords: Social anxiety; Attentional bias; Facial stimuli

Research concerning the mediation of anxiety has emphasized the relationship between attentional allocation and subjective anxiety following reports that anxious patients were biased towards early detection of verbal material relevant to their fears (e.g. MacLeod et al., 1986). MacLeod et al. (1986) found that anxious individuals directed their attention towards verbal threat stimuli and non-anxious subjects directed their attention away from threat-related words. It has been proposed that attentional bias may act to maintain and amplify anxiety reactions (Mathews et al., 1990). It has also been suggested that attentional biases may predispose individuals to develop anxiety (MacLeod and Rutherford, 1992).

Most of the work investigating whether anxiety is associated with an attentional bias towards threatening material has used words as stimuli. However, little clear evidence of an attentional bias has been found for socially anxious individuals using the dot probe task with word stimuli (e.g. Asmundson and Stein, 1994; Horenstein and Segui, 1997). Recently, a number of authors have examined attentional responses in social

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anxiety using faces as stimuli, arguing that facial expressions are particularly significant for those with social anxiety as they convey important information concerning personal acceptability and social value (e.g. Bradley et al., 1997; Gilboa-Schechtman et al., 1999).

The findings of studies examining attentional bias in social anxiety using facial stimuli have been somewhat contradictory. For example, Bradley et al. (1997) found no evidence of attentional bias towards threatening faces in a sample of socially anxious subjects. These authors also divided participants into groups based on median scores on the Beck Depression Inventory. When subjects high and low on emotional dysphoria were compared, control subjects displayed longer reaction times to probes following negative faces, suggesting that nondysphoric controls were selectively avoiding negative faces. Therefore, in Bradley et al.’s study, neither subjects elevated in social anxiety nor subjects elevated in depression scores showed attentional bias towards negative faces.

Yuen (1994) found that people with elevated scores on measures of social anxiety who believed that they would be asked to give a presentation after completing the task showed longer reaction times for detecting probes that followed a negative face as compared to a neutral face. Yuen also reported that there were no differences in response times to the two kinds of stimuli among non-anxious controls. These results suggest that socially anxious individuals may actually be avoiding negative faces, at least when subjected to social threat. Yuen presented the faces for a longer period of time than is customary with the dot probe procedure (1000 ms), perhaps accounting for this finding. However, Mansell et al. (1999) have replicated Yuen’s results using a more standard 500ms exposure duration, suggesting that the longer presentation time does not account for Yuen’s (1994) findings. Mansell et al. (1999) found that socially anxious individuals avoided both positive and negative faces under conditions of social-evaluative threat. Consistent with Bradley et al. (1997), Mansell et al. did not find an attentional bias under conditions where no social-evaluative threat was present.

In contrast, Gilboa-Schechtman et al. (1999) have demonstrated that people with social phobia have an attentional bias towards negative faces using the face-in-the-crowd paradigm. The task involved presenting participants with 12 photographs of the same face. On some trials all views of the face had identical emotional expressions (neutral, happy, angry, or disgusted), and on other trials one face expressed a different emotional reaction to the other 11 (its ‘crowd’). Participants were asked to report whether the facial expressions were all the same, or whether a different expression occurred in the crowd, as quickly and as accurately as possible. Gilboa-Schechtman et al. found that people who met criteria for social phobia exhibited shorter reaction times for detecting angry faces, compared to happy faces, when target emotional faces were presented in a background of neutral faces. Non-anxious controls showed a reduced tendency to detect angry faces more quickly. People with social phobia were also more distracted than non-anxious controls by both angry and happy crowds. The results of Gilboa-Schechtman et al.’s (1999) study are consistent with the notion of an attentional bias towards threatening faces among people with social phobia. They are inconsistent with Mansell et al.’s (1999) findings for conditions of no social-evaluative threat using the dot probe procedure.

It should be noted that, using the modified Stroop procedure, Amir et al. (1996) have previously demonstrated that people with social phobia display attentional bias indexed by Stroop interference only under low threat conditions, and that under conditions
designed to elicit social anxiety those with social phobia appear to suppress these interference effects. It may therefore be suggested that the inconsistencies between the findings of Mansell et al. (1999) and Gilboa-Schechtman et al. (1999) may be due to the anxiety levels experienced by subjects at the time of assessment. Further, it may be suggested that attentional bias effects on a facial dot probe task may only be observed among socially anxious groups under conditions where anxiety levels are not elevated.

A number of authors have suggested that stimulus duration may account for the observations of apparent attentional bias in some studies and avoidance in others. Clark and Wells (1995) proposed that at short stimulus durations attentional bias may be observed but that at longer durations avoidance may occur. In both Mansell et al.’s (1999) and Gilboa-Schechtman et al.’s (1999) paradigms stimuli were presented for 500ms. However, the stimuli were much more complex in the latter study (12 faces cf. two face/object pairs), and it may be argued that this procedure reduced the effective duration per image. Such an interpretation is consistent with the notion of attentional bias being observed at shorter durations.

A further difference between the two paradigms is that Mansell et al. (1999) presented participants with pairs of images comprising a face and a household object, while Gilboa-Schechtman et al. (1999) presented groups of faces. Arguably, the latter stimuli are more ecologically valid in the social context, and the stimuli used by Mansell et al. may be unlikely to elicit a differential reaction between groups because all subjects may preferentially respond to faces more than household objects. The studies presented here use a paradigm similar to that employed by Mansell et al. (1999). However, the pairs of stimuli presented on all trials are faces.

One of the important assumptions underlying studies of attentional bias is that interference arises when negative or threatening stimuli match the content of emotional concerns (Mathews, 1990). Alternatively, it is possible that interference is a function of a word or picture’s personal significance, and that it can arise from any emotionally-relevant stimuli. This view has been developed by Martin et al. (1991) who have shown that anxious patients were slower to name colours on a modified Stroop task presenting either positive or negative stimuli, in comparison to emotionally neutral stimuli. Mathews and Klug (1993), using a mixed group of subjects with clinical anxiety disorders, demonstrated that personal relevance, rather than emotionality per se, was associated with attentional bias responses. In a non-clinical sample, Riemann and McNally (1995) also found evidence of attentional bias towards emotional stimuli relevant to current concerns, whether the stimuli were positive or negative in emotional valence.

The findings concerning specificity of responses to faces in social anxiety are inconsistent. Gilboa-Schechtman et al. (1999) found that people with social phobia responded differently to positive and negative target faces. However, Mansell et al. (1999) found that people with elevated social anxiety avoided both positive and negative faces under conditions of social-evaluative threat. Along with the modified Stroop task, the dot probe procedure has been used extensively in examining cognitive processing associated with anxiety. Understanding the factors that influence performance on this task is therefore important. Study 1 compares responses to positive and negative stimuli among socially anxious and non-anxious individuals, and investigates the usefulness of dot probe tasks using pairs of words and faces as stimuli in assessing attentional bias in subjects high and low in social anxiety. It is predicted that subjects
high in social anxiety will show an attentional bias towards socially threatening stimuli, but not positive stimuli, under conditions where social-evaluative threat is not present. A further aim of the present study is to directly compare the usefulness of the dot probe procedure using words to the dot probe procedure using faces in a single sample. It is expected that the facial dot probe would be a more sensitive index of attentional bias.

STUDY 1

METHOD

Subjects
A total of 33 undergraduate students (28 female) from the University of Sydney were recruited from a larger sample of more than 150 people who completed a measure state anxiety (Depression Anxiety Stress Scale [DASS]; Lovibond and Lovibond, 1995) while in groups of 15–20. People whose state anxiety in this situation was low (0–2) or high (> 28) were contacted and invited to participate in the study. Those who returned for individual testing subsequently completed a battery of tests including the Fear of Negative Evaluation questionnaire (FNE; Watson and Friend, 1969), and were allocated to social anxiety condition (high or low) based on their FNE score on the day of testing (see Table I).

Materials and Procedure

Dot Probe Tasks
The attentional tasks for words and faces were very similar. Each consisted of four practice trials and 40 experimental trials (20 positive-neutral pairs and 20 negative-neutral pairs) presented in a new random order to each person. For half the trials the positive or threat word appeared in the upper location, and for the other half it appeared in the lower location. As well, for half the trials, the dot appeared in the upper location and for the other half it appeared in the lower location. On each trial a focus stimulus appeared for 500 ms followed by the word/face pair for 500 msec. The probe was presented immediately after the offset of the word/face pair.

Verbal stimuli. Twenty negative, 20 positive and 40 neutral words were selected from a set of 116 words matched on number of syllables and printed word frequency (Kucera

<table>
<thead>
<tr>
<th></th>
<th>Low FNE Group</th>
<th>High FNE Group</th>
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<tr>
<td></td>
<td>(n = 15)</td>
<td>(n = 18)</td>
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<tr>
<td>Age</td>
<td>18.9 (0.92)</td>
<td>20.0 (4.1)</td>
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<tr>
<td>FNE</td>
<td>7.5 (5.2)</td>
<td>22.0 (4.7)</td>
</tr>
<tr>
<td>STAI-State</td>
<td>34.8 (11.7)</td>
<td>48.7 (12.7)</td>
</tr>
<tr>
<td>STAI-Trait</td>
<td>34.0 (9.9)</td>
<td>50.1 (12.9)</td>
</tr>
<tr>
<td>BDI</td>
<td>5.7 (4.2)</td>
<td>16.8 (8.8)</td>
</tr>
</tbody>
</table>

FNE: Fear of Negative Evaluation; STAI-State: Spielberger State-Trait Anxiety Inventory – State version; STAI-Trait: Spielberger State-Trait Anxiety Inventory – Trait version; BDI: Beck Depression Inventory.
and Francis, 1967). The lists of selected words are shown in Appendix A. The words were rated for emotional valence by an independent sample of 98 students. Subjects used a 7-point Likert scale ranging from extremely negative in emotional value (1), neutral (4), to extremely positive emotional value (7). The average rating of emotional valences for words used in the study were as follows: negative words, mean = 2.2 (SD = 0.48); neutral matched words, mean = 4.0 (SD = 0.26); positive words, mean = 5.8 (SD = 0.38); neutral matched words, mean = 3.99 (SD = 0.39). Each threat word was paired with its corresponding neutral word matched for length and frequency to make 20 negative-neutral word pairs and each positive word was paired with its corresponding neutral word matched for length and frequency to make 20 positive-neutral word pairs. Analysis revealed that the emotional valence ratings were significantly different between the negative and neutral items ($t(19) = 16.04$, $p < 0.05$), and between the neutral and positive items ($t(19) = 12.9$, $p < 0.05$).

**Facial stimuli.** Twenty negative, 20 positive and 40 neutral photographs of faces were selected from a set of 300 faces acquired by asking 100 randomly selected people to pose with each of three expressions: positive (happy), negative (disgusted/judgmental); neutral. Models were provided with sample facial expressions for the positive and negative categories taken from Izard’s (1971) images of enjoyment and contempt respectively. All photographs were rated for emotional valence by an independent sample of 34 students. Subjects used a 7-point Likert scale ranging from extremely negative in emotional value (1), neutral (4), to extremely positive emotional value (7). The average rating of emotional valence for the photos used in this study were as follows: negative faces, mean = 2.4 (SD = 0.39); neutral, mean = 3.9 (SD = 0.33); positive, mean = 5.6 (SD = 0.40). Analysis revealed that the emotional valence ratings were significantly different between the negative and neutral faces ($t(19) = 14.7$, $p < 0.05$) and between the neutral and positive faces ($t(19) = 15.9$, $p < 0.05$). The final sets of positive, negative, and neutral stimuli used in the facial dot probe task were selected to balance the proportion of photographs that were male (45% in each condition) and the proportion that were Anglo Celtic (65% in each condition).

**Fear of Negative Evaluation (FNE)**

The FNE is a 30-item true-false self-report questionnaire that provides a measure of apprehension about others’ evaluations, distress over negative evaluation, and the expectation of negative evaluation (Watson and Friend, 1969). Sample items include “I am afraid that I may look ridiculous and make a fool of myself”. Watson and Friend (1969) report a one-month test-retest correlation of 0.78 in an undergraduate sample.

**State-Trait Anxiety Inventory (STAI)**

The STAI (Spielberger et al., 1983) is a 40 item self-report questionnaire assessing both current (state) and general (trait) anxiety. The STAI is commonly used in research and clinical settings and the internal consistency of the measure among samples of college students is above 0.9 (Spielberger et al., 1983).

**Beck Depression Inventory (BDI)**

The BDI (Beck et al., 1961) is a 21 item self-report scale measuring severity of depressive symptoms. Each item comprises four statements reflecting gradations in the intensity of depressive symptoms. Respondents are asked to choose the statement that best describes the way they have felt over the past week. The BDI is the most commonly used questionnaire for measuring depression in clinical and research studies. The
reliability coefficient by the split-half method is 0.91. The convergent validity with clinical evaluation of depression is 0.64 (Salaberria and Echeburúa, 1998).

All subjects completed the series of tasks in the same order: verbal dot probe, facial dot probe, FNE, STAI-State, STAI-Trait, BDI.

RESULTS

Subjects were divided into groups based on their FNE score. The low and high FNE groups differed significantly on STAI-State ($t(31) = 3.2, p < 0.05$), STAI-Trait ($t(31) = 3.9, p < 0.05$), BDI ($t(31) = 4.47, p < 0.05$), and FNE score ($t(31) = 8.4, p < 0.05$). There was no difference between the two groups in age ($t(31) = 1.09, p > 0.05$; see Table I).

Dot Probe Tasks

Trials where reaction times were $\geq 2$ standard deviations below or above the mean were discarded. Measures of attentional bias were calculated using the formula described by MacLeod and Mathews (1988) as follows:

$$\frac{(ED/PrU - EU/PrU) + (EU/PrD - ED/PrD)}{2}$$

where $E =$ emotional word or face, $D =$ down, $Pr =$ probe, and $U =$ Up.

A positive value indicates a shift of attention towards the emotional stimuli relative to the neutral stimuli, a negative value indicates a shift of attention away from the emotional stimuli relative to the neutral stimuli and a score of 0 on the attentional bias index indicates no preferential allocation of attention.

Word Task

A $(2) \times 2$ analysis of variance with the within subjects factor of type of word (social threat or positive) and the between subjects factor of level of social anxiety (low or high) was carried out. There was no main effect of type of word ($F(1,31) = 0.98, p = 0.33$), or of level of social anxiety ($F(1,31) = 0.11, p = 0.74$). The interaction of word type and level of social anxiety was not significant ($F(1,31) = 2.99, p = 0.09$; see Fig. 1).

Facial Task

A $(2) \times 2$ analysis of variance with the within subjects factor of facial expression (threatening or happy) and the between subjects factor of level of social anxiety (low or high) was carried out. There was no main effect of type of face ($F(1,31) = 1.98, p = 0.17$) or of level of social anxiety ($F(1,31) = 1.31, p = 0.26$). However, the interaction of facial expression and level of social anxiety was significant ($F(1,31) = 38.2, p < 0.05$). Those with low social anxiety preferentially attended towards happy faces and away from threatening faces. Those with high social anxiety preferentially attended towards threatening faces and away from happy faces (see Fig. 2).
As BDI scores also differed between the groups the analysis were repeated using BDI scores as a covariate. The pattern of results was identical in this second set of analyses.

DISCUSSION

The results of Study 1 indicated that within non-clinical samples higher levels of social anxiety were associated with attentional bias towards negative facial stimuli. This finding is consistent with the view that those with high social anxiety respond with a shift of attention towards the location of threat. However, the interaction between level of anxiety and word type did not reach significance on the task using words as stimuli, implying that the verbal dot probe task may be a less sensitive index of attentional bias in social anxiety than the facial dot probe procedure. This latter finding is consistent with previous reports that attentional bias effects are limited (e.g. Asmundson and Stein, 1994) or absent (e.g. Horenstein and Segui, 1997) when assessed using word stimuli among people with social phobia.
There have been conflicting reports in the literature concerning the pattern of attentional responses to threatening/emotional facial stimuli among those with social anxiety. Gilboa-Schechtman et al. (1999) reported that those with social phobia appeared to preferentially detect angry faces in a crowd of neutral distractors, while Mansell et al. (1999) reported that socially anxious people avoided negative faces in favor of household objects. The present study used a paradigm very similar to that chosen by Mansell et al. (1999), with the exception that emotional face/neutral face pairs rather than face/household object pairs were presented on each trial, and participants were not subjected to conditions likely to elicit social anxiety. When subjects were choosing between pairs of faces, those with elevated social anxiety displayed faster responses to probes in the location of threatening facial stimuli.

It may be argued that the absence of social-evaluative threat accounts for the present findings using the facial dot probe paradigm, and this is consistent with the findings of Amir et al. (1996) using the emotional Stroop task. Yuen (1994) and Mansell et al. (1999), both included a social-evaluative threat manipulation. However, Mansell et al. also included a non-threat condition, and the present results are inconsistent with the findings for Mansell et al.’s non-threat condition.

The explanation for differences between the present findings and those of Mansell et al. (1999) is likely to be concerned with the differences in stimuli between the two studies. As noted above, Mansell et al. compared responses to negative, positive, and neutral faces presented with pictures of household objects. It is somewhat surprising given the nature of the stimuli that none of Mansell et al.’s subjects preferentially attended to any of the facial stimuli. It may be expected that the controls at least would preferentially attend to facial stimuli rather than household objects. Faces are uniquely important to humans, and elicit orienting responses even in infants. It may therefore be expected that low anxious subjects would prefer to direct their attention towards a picture of a face, especially a neutral or positive face, rather than a picture of a clock or a vacuum cleaner. Further research is needed to verify whether the nature of the stimulus pairs accounts for the presence of vigilance responses found here compared to avoidance responses reported by Mansell et al. (1999).

A further important finding from the present study concerns the specificity of the attentional bias response observed in Study 1. Socially anxious individuals displayed vigilance towards threatening faces and avoidance of positive faces and low anxious controls avoided negative faces and attended to positive faces. The responses of the socially anxious participants in the present study are consistent with the findings of Gilboa-Schechtman et al. (1999), and inconsistent with those of Mansell et al. (1999), who found that socially anxious people avoided both positive and negative faces under conditions of social-evaluative threat. Again, important differences between the stimuli used by Mansell et al. and those used in the present procedure may account for these findings. Study 2 was conducted to extend and replicate the findings of Study 1.

STUDY 2

The notion of self-focused processing derived from the work of Duval and Wicklund (1972) has recently been applied to understanding social anxiety (e.g. Wells and Mathews, 1994). According to the theory, external stimuli guide whether attention is
focused outward toward the environment, or back toward oneself. Distracting stimuli, engaging activities, and tasks that require conscious or effortful participation are thought to draw attention outward toward the external events. Stimuli such as mirrors, cameras, and tape recorders or an audience are regarded as directing the focus of attention inwards, towards the self (Buss, 1980; Hass and Eisenstadt, 1990). This self-directed attention promotes a comparison of what one believes one is like with one’s ideal on the salient dimensions, generally resulting in dissatisfaction with the self.

In the self-consciousness literature dissatisfaction with the self is regarded as a necessary antecedent of social anxiety (e.g. Buss, 1980; Fenigstein et al., 1975), and a number of authors have found that people with elevated social anxiety or social phobia evaluate themselves more negatively than samples low on indices of social anxiety (Beidel et al., 1985; Cacioppo et al., 1979). Wells and Mathews (1994) have proposed that self-focused processing may have important attentional consequences for people with social phobia when they are experiencing anxiety-eliciting situations. They suggest that self-focused processing would lead to a shift of attention away from the phobic stimuli (i.e. other people) and towards the self so that, under conditions of evaluative threat, people with social phobia would be expected to avoid external, threatening stimuli, particularly on tasks using ecologically valid stimuli likely to elicit anxiety.

Study 2 was designed to examine the generalizability of the findings of Study 1 using similar stimuli with greater ecological validity in the context of social anxiety. The dot probe stimuli were modified so that subjects were presented with pictures of two faces in profile apparently looking at each other. As in Study 1, the expression on one of the faces was varied so that it was positive, negative or neutral. The second face always had a neutral expression, and in half the trials it was the individuals’ own face. This paradigm made it possible to determine whether subjects with elevated social anxiety were attending towards images of negative emotional facial expressions, as was observed in Study 1, while also allowing a comparison of trials where one’s own face was the apparent object of inspection by the “emotional” face to those where another persons’ face was apparently being examined. Arguably, evaluative threat and ecological validity would be greater in the trials where one’s own face was presented. Wells and Mathew’s model of self-focused processing would suggest that subjects with elevated social anxiety would avoid threatening emotional faces when the concurrent presence of the individual’s own face increased evaluative threat.

METHOD

Subjects

A total of 29 undergraduate students (24 female) from the University of Sydney were recruited using the procedure described for Study 1. The characteristics of the sample are presented in Table II.

Materials and Procedure

Dot probe task

The attentional task consisted of 12 practice trials and 192 experimental trials (64 positive-neutral pairs, 64 negative-neutral pairs, 64 neutral-neutral pairs) presented in a
new random order to each subject. For half the trials, the emotional face appeared in the left location, and for the other half it appeared in the right location. As well, for half the trials, the dot appeared in the left location and for the other half it appeared in the right location. For half of the trials (i.e. 32 trials from each of the positive, negative and neutral conditions) the second face was the individual’s own. On each trial a focus stimulus appeared for 500 ms followed by the pair of faces for 500 ms. The probe was presented immediately after the offset of the faces.

The stimuli comprised 32 negative, 32 positive and 32 neutral profiles. Half of the profiles in each set were left and half were right. These were selected from a set of 215 faces acquired using the same approach as in Study 1. All photographs were rated for emotional valence by an independent sample of 36 students using the procedure described for Study 1. The ratings were not significantly different between right profile and left profile faces ($t(15) = 0.84, p > 0.05$; $t(15) = 1.02, p > 0.05$; $t(15) = 0.73, p > 0.05$ for negative, positive and neutral faces respectively), so in the following analysis they were combined. The average rating of emotional valence for the photographs used in this study were as follows: positive faces, mean = 5.97 (SD = 0.44); neutral faces, mean = 3.76 (SD = 0.20); negative faces, mean = 1.85 (SD = 0.42). The emotional valence ratings were significantly different between the negative and neutral faces ($t(31) = 22.3, p < 0.05$) and between the neutral and positive faces ($t(31) = 27.3, p < 0.05$). The final sets of stimuli were selected to balance the proportion of photographs that were male (35.3% in each condition) and the proportion that were Anglo Celtic (64.7% in each condition).

All subjects completed the series of tasks in the same order: facial dot probe, FNE, STAI-State, STAI-Trait, and BDI.

RESULTS

Subjects were divided into groups based on their FNE score. The low and high FNE groups differed significantly on STAI-State ($t(27) = 5.6, p < 0.05$), STAI-Trait ($t(27) = 7.2, p < 0.05$), BDI ($t(27) = 5.1, p < 0.05$), and FNE score ($t(27) = 12.5, p < 0.05$). There was no difference between the two groups in age ($t(27) = 0.37, p > 0.05$; see Table II).

<table>
<thead>
<tr>
<th>Low FNE Group</th>
<th>High FNE Group</th>
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<tbody>
<tr>
<td>Age</td>
<td>20.2 (4.6)</td>
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<tr>
<td>FNE</td>
<td>5.1 (2.4)</td>
</tr>
<tr>
<td>STAI-State</td>
<td>28.5 (8.4)</td>
</tr>
<tr>
<td>STAI-Trait</td>
<td>31.6 (6.1)</td>
</tr>
<tr>
<td>BDI</td>
<td>5.9 (4.4)</td>
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</table>

FNE: Fear of Negative Evaluation; STAI-State: Spielberger State-Trait Anxiety Inventory – State version; STAI-Trait: Spielberger State-Trait Anxiety Inventory – Trait version; BDI: Beck Depression Inventory.
Dot Probe Task

A measure of attentional bias was calculated using the approach described in Study 1. A positive value indicates a shift of attention towards the emotional stimulus relative to the neutral stimulus, a negative value indicates a shift of attention away from the emotional stimulus relative to the neutral stimulus and a score of 0 on the attentional bias index indicates no preferential allocation of attention.

A $(2) \times (2) \times 2$ analysis of variance was carried out. The within subjects factors were facial expression (threatening or happy) and facial condition (own face present or absent) and the between subjects factor was level of social anxiety (low or high). There was no main effect of facial expression ($F(1,27) = 0.15, p = 0.70$), facial condition ($F(1,27) = 0.003, p = 0.96$) or level of social anxiety ($F(1,27) = 0.80, p = 0.38$). The interaction of facial expression and level of social anxiety was significant ($F(1,27) = 15.58, p = 0.001$). The three way interaction of facial expression, facial condition and level of social anxiety was not significant ($F(1,27) = 0.3, p = 0.59$). From Fig. 3 it is apparent that, as in Study 1, those with low social anxiety appeared to preferentially attend towards happy faces and away from threatening faces. Those with high social anxiety appeared to preferentially attend towards threatening faces and away from happy faces, and this pattern emerges for facial pairs in which the person’s own face was present as well as pairs in which the person’s own face was not present (see Fig. 3).

To verify that the patterns of performance were identical for the two facial conditions (self present and absent), the analyses were repeated examining each of these conditions separately. Two analyses of variance were conducted each with two factors: level of social anxiety (high and low) and facial expression (threatening or happy). The results of these two analyses exactly replicated the findings of Study 1, that is, there was no main effect of facial expression or of level of social anxiety, but the interaction of face type and level of social anxiety was significant for both items where one’s own face was present ($F(1,27) = 0.0, p = 0.99$; $F(1,27) = 0.59, p = 0.45$; $F(1,27) = 11.6, p = 0.002$ for the main effects of facial expression and level of social anxiety and the interaction of facial expression and level of social anxiety respectively) and where one’s own face was absent ($F(1,27) = 0.38, p = 0.55$; $F(1,27) = 0.12, p = 0.73$; $F(1,27) = 7.9, p = 0.009$ for the main effects of facial expression and level of social anxiety and the interaction of facial expression and level of social anxiety respectively).

![FIGURE 3](image-url)  
**FIGURE 3** Mean attentional bias scores for threat, neutral, and happy faces for high social anxiety and low social anxiety groups in Study 2. A positive score indicates vigilance, a negative score indicates avoidance.
As BDI scores also differed between the groups the analyses were repeated using BDI scores as a covariate. The pattern of results was identical in this second set of analyses.

**DISCUSSION**

The results of Study 2 were remarkably consistent with those of Study 1. Again, higher levels of social anxiety were associated with attentional bias towards negative facial stimuli. This bias was evident regardless of whether or not the individual’s own face was present on the screen. This manipulation was introduced to increase the degree of social-evaluative threat, and to examine the direction of attention when one’s own image was present.

The attentional bias response observed in both studies reported here was quite specific. Socially anxious individuals displayed vigilance towards threatening faces and avoidance of positive faces and low anxious controls avoided negative faces and attended to positive faces. This is consistent with the findings reported by Gilboa-Schechtman et al. (1999), and inconsistent with those of Mansell et al. (1999). Interestingly, those with low social anxiety, who also had low scores on measures of depression, state anxiety and trait anxiety, appeared to avoid threatening faces and favor positive facial expressions in both Study 1 and Study 2. Bradley et al. (1997) also found that people selected for low levels of depression appeared to selectively avoid threatening faces.

It was expected that under conditions of evaluative threat likely to elicit self-focused processing (i.e. when one’s own face was present on the screen) that people with social phobia would avoid attending to threatening stimuli. However, no such tendency was observed in the present study. It may be that the presence of one’s own face on the screen did not influence evaluative threat in the way that was intended. This possibility needs to be examined directly in future work.

**GENERAL DISCUSSION**

This paper has presented the findings of two studies designed to assess attentional bias among people with social anxiety using words (Study 1) and facial stimuli (Studies 1 and 2). The results of both suggested that, when presented with pairs of positive/neutral and negative/neutral faces, high socially anxious people preferentially attend to negative faces rather than neutral faces, and prefer neutral faces to positive faces, while the pattern for low anxious controls is opposite. In Study 1, the facial task appeared to be a more sensitive index of attentional bias in a non-clinical sample with high social anxiety than a comparable task using words as stimuli, as no attentional allocation effects reached significance on the dot probe task with word stimuli.

An important issue raised by the present study concerns the most appropriate stimuli for evaluating attentional effects in social anxiety. MacLeod and Mathews (1991) demonstrated that attentional bias would only be evident in generalized anxiety disorder patients to the extent that tasks required resources to be assigned to more than one stimulus simultaneously. Many investigations across a range of anxiety conditions have since sought to disambiguate the interaction between anxiety and the kinds of stimuli that elicit attentional bias responses. The findings of the present studies,
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examinined in the context of recent conflicting reports in the literature, suggest that when pairs of faces are presented in a dot probe procedure, people with elevated social anxiety will preferentially attend to threatening faces and will avoid positive facial expressions, while those selected for low social anxiety will preferentially attend to positive expressions and will avoid threatening faces. When taken in the context of Mansell et al.’s (1999) findings it may be suggested that the nature of the competing, simultaneously presented stimuli is an important determinant of the attentional response.

References


**APPENDIX A**

Emotionality ratings for words used in the experimental task (Study 1).

<table>
<thead>
<tr>
<th>Positive Words</th>
<th>Mean</th>
<th>Neutral Words</th>
<th>Mean</th>
<th>Negative Words</th>
<th>Mean</th>
<th>Neutral Words</th>
<th>Mean</th>
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<td>4.1</td>
<td>Lonely</td>
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<td>Jersey</td>
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<td>Corn</td>
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<td>Frequency</td>
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<td>3.5</td>
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Mean 5.8  3.9  2.2  4.0