

University of Southampton

School of Psychology

Attentional and Interpretation Biases in Social Phobia

by

Sophie Littler

Thesis for the Doctoral Programme in Clinical Psychology

June 2006

WORD COUNT = 18, 834

Disclaimer Statement

I, the undersigned, confirm that the work that I have presented as my thesis is entirely my own work. Reference to, quotation from, and discussion of the work of any other person has been correctly acknowledged within the work in accordance with university guidelines for production of a thesis.

.....

Signature: _____ Date: _____

Abstract

Social phobia is an anxiety disorder in which irrational fears of social situations persist despite exposure to feared situations. Recent cognitive theories of social phobia suggest that the enduring nature of the disorder may result from the biased processing of information within feared social situations. It is important for health care professionals involved in treatment of social phobia to understand the information processing biases which maintain this disorder, in order to guide interventions. This thesis critically reviews models of threat processing in anxiety (e.g., Mogg & Bradley, 1998), cognitive models of social phobia (Clark & McManus, 2002; Rapee & Heimberg, 1997) and empirical evidence of information processing biases in anxiety disorders. Specific predictions regarding selective attention to stimuli of varying emotional intensity and interpretation of ambiguity in social phobia are examined.

In the present study individuals with a diagnosis of generalized social phobia, and non-socially phobic controls completed a modified visual probe task that measured attention allocation to angry, happy and fearful expressions of varying emotion intensities (25%, 50%, 75%, 100%). Participants subsequently classified ambiguous emotional faces blended from two component prototype emotional expressions; angry-happy, happy-fear and fear-angry. Measures of emotion recognition accuracy and response bias were computed for each of the three emotion-combinations.

Individuals with social phobia demonstrated a significant attentional bias towards expressions of strong (100%) emotional content, irrespective of type of emotion, relative to controls. However, the social phobia and control groups did not differ in their sensitivity to correctly classify ambiguous expressions, or in their tendency to classify a presented face as angry, happy or fearful. Findings are considered in light of evidence from other studies of attention and interpretive bias, and possible implications for models of threat processing are discussed.

Literature Review Contents

	Page
Title Page	8
Abstract	9
Social Phobia	10
Cognitive Models of Anxiety	13
Cognitive Models of Social Phobia	22
Attentional Bias in Social Phobia	29
Interpretation Bias in Social Phobia	42
Conclusion	49
References	95

Empirical Paper Contents

	Page
Title Page	51
Abstract	52
Introduction	53
Method	66
Results	74
Discussion	85
References	95
Appendices	115

List of Tables

	Page
Table 1: Comparison between the Scores of the Social Phobia (SP) and Control Groups on all Measures	75
Table 2: Attentional Bias Scores in the Social Phobia (SP) and the Control Groups	77
Table 3: Sensitivity and Response Bias Scores for each Continua and Group	82

List of Figures

	Page
Figure 1: Williams, Watts, MacLeod, and Mathews' (1988) Interaction Model of Anxiety	17
Figure 2: Mogg and Bradley's (1998) Cognitive Motivational Model of Anxiety	21
Figure 3: Clark and Wells' (1995) Cognitive Model of Social Phobia	24
Figure 4: Example angry face continuum used in the attentional task	71
Figure 5: Emotional face stimuli used in the interpretive task	72
Figure 6: Mean attentional bias scores for both groups across degrees of emotionally morphed faces	79

Acknowledgements

This research was carried out under the supervision of Dr Matt Garner and Dr David Baldwin at the University of Southampton, School of Psychology and School of Medicine, Department Of Psychiatry, Royal South Hants Hospital, Southampton. Both Dr Garner and Dr Baldwin supported the research proposal and the recruitment of participants. Dr Garner provided invaluable technical support, statistical advice and guidance in the write up of this dissertation. Dr Baldwin provided expert clinical input into diagnoses and treatment advice for participants. Dr Khalil Ajel also provided diagnostic and medical advice for participants, and Mrs Pamela Stacey provided administrative support.

Literature Review of Attentional and Interpretation Biases in Social Phobia

This preparation of this literature review has been based on the guidelines for submission to the Journal of Abnormal Psychology (see Appendix 1 for Instructions to Authors)

Abstract

Social phobia is an anxiety disorder characterised by irrational fears of social situations, which often remain despite regular exposure to feared situations. Recent cognitive theories of social phobia suggest that the enduring nature of the disorder may in part result from a series of maladaptive information processing biases that individuals with social phobia adopt when entering a feared social situation. It is important for health care professionals involved in treatment of social phobia to understand the information processing biases which maintain this disorder, in order to guide interventions. This literature review critically evaluates predictions from cognitive models of social phobia (Clark & McManus, 2002; Rapee & Heimberg, 1997), with specific reference to empirical evidence of biases in selective attention and interpretation of ambiguity.

Social Phobia

Definition

Social Phobia is an anxiety disorder characterised by a strong, persistent fear of social situations, in which sufferers believe that they are being evaluated by others (American Psychiatric Association, 1994). Social phobia may be discrete (i.e., restricted to eating in public, to public speaking, or to encounters with the opposite sex) or diffuse, involving almost all social situations outside the family circle. The feared social situations are avoided, anxiously anticipated, or are endured with a significant amount of distress, leading to reduced quality of life (Stein & Kean, 2000). Thus, social phobia involves marked impairment in an individuals' normal routine, occupational (academic) functioning and social functioning (Weiller, Bisserbe, Boyer, Lepine, & Lecrubier, 1996).

Symptoms

People with social phobia fear being humiliated or embarrassed by their actions and may become intensely anxious, with signs of autonomic arousal, including: increased heart rate, excessive sweating, flushing of the face, hand tremor, trembling voice and nausea. These cognitive and physical symptoms may cause additional anxiety, leading to maladaptive behavioural coping strategies, such as avoidance or social withdrawal (e.g., avoiding direct eye contact, see Alden & Taylor, 2004), which maintain the disorder.

Prevalence

Social anxiety is thought to be on a continuum from mild performance anxiety through to severe clinical social phobia (Stein, Torgrud, & Walker, 2000). An estimated 20% of the general population report irrational social fears, although many of these do not meet full diagnostic criteria for social phobia (Furmark et al., 1999; Pollard & Henderson, 1988). The average age of onset is considered to be mid to late adolescence (Beidel, 1988; Schneier, Johnson, Hornig, Liebowitz, & Weissman, 1992; Strauss & Last, 1993; Wittchen, Stin, & Kessler, 1999), however, a number of researchers have reported diagnoses of social phobia in children as young as 8 years of age (Albano & DiBartolo, 1997; Beidel & Turner, 1998). Social phobia is most common in later adolescence and adulthood, and is the third most common psychiatric disorder (Ollendick & Hirshfeld-Becker, 2002). European lifetime prevalence rates have been reported to be between 7% and 16% (Wittchen & Fehm, 2003), with women 50% more likely to develop the disorder than men (Chapman, Mannuzza, & Fyer, 1995; Moutier & Stein, 1999).

Comorbidity

The physical symptoms of social phobia frequently result in panic attacks. In addition, social phobia often leads to extreme social isolation and can be a precursor to depression and substance abuse, particularly alcohol (often in an attempt to self medicate, Merikangas & Angst, 1995). A survey of comorbidity in social phobia found that 46.7% of people with social phobia also had a mood disorder (e.g., major depression); 60.8% had another anxiety disorder (e.g.,

PTSD, GAD); and 40.6% had an addictive disorder (Kessler, Stein, & Berglund, 1998).

Treatment

Current treatment methods include cognitive behavioural therapy (CBT) and pharmacological interventions (e.g., selective serotonin re-uptake inhibitors), which have both been found to be effective in acute treatment and prevention of relapse (Baldwin et al., 2005; Bell, Malizia & Nutt, 1999; Blanco, Antia, & Liebowitz, 2003; Harmer, Shelley, Cowen, & Goodwin, 2002; Heimberg, 2002; Knutson et al., 1998; Mogg, Baldwin, Brodrick, & Bradley, 2004). However, a large proportion of people with social phobia fail to respond to drug interventions, (35% to 65%, see Davidson, 2003) and of those who do respond, residual symptoms often remains. It is widely acknowledged that many people receiving drug treatment for social phobia fail to achieve true recovery or remission (Davidson, 2003). As a result, individuals suffering with social phobia tend to require additional treatment, often in the form of psychological interventions.

CBT is a treatment approach based on the notion that the way an individual thinks about an event determines in part how they respond to that event, both in terms of affect and behaviour (Beck, 1976). CBT treatments of social phobia (and other anxiety disorders) are based on an accurate understanding of the cognitive and behavioural processes involved in the aetiology and maintenance the disorder. A review of cognitive models of anxiety now follows.

Cognitive Models of Anxiety

Cognitive models of anxiety disorders were devised in order to explain how the functional fear response, that enables a quick and effective response to danger, can be triggered by stimuli/situations, which do not pose any real threat. According to many cognitive theories, biases in information processing play an important role in the aetiology and maintenance of anxiety disorders (e.g., Beck, 1976; Eysenck, 1992; Williams, Watts, MacLeod, & Mathews, 1997). Specifically, the excessive perceptions of threat and danger that characterise anxiety disorders are thought to be caused and maintained by a tendency to selectively attend to threatening or negative information and to interpret ambiguous information in a negative fashion.

Beck's Schema Model

According to Beck (1976), depression and anxiety involve dysfunctional schemata (stored units of information that influence how attention, interpretation and memory perform when processing new information). In depression these schemata are concerned with loss or failure, whereas in anxiety, they are sensitive to threat or danger. When activated they lead to the selective processing of schema-congruent information. Beck (1976) further suggested that individual differences in the operation of such schemata determine vulnerability to specific emotional disorders. For example, an individual with high levels of anxiety would be characterised by a “hyperactive danger-schema” that may result in increased attention to external threat cues, a tendency to interpret ambiguous information in a threatening manner and increased recall of dangerous experiences. This model proposes that some

people may be predisposed to be more anxious than others, and negative experiences, which are stored as memories, exacerbate the degree of anxiety. These memories are said to increase the level of anxiety experienced by an individual, which is maintained by adaptations to cognitive processes including attention and interpretation. When this model was considered specifically in relation to social phobia, it predicted that there was a tendency; to detect and selectively orient towards cues from others that signal negative evaluation, to interpret ambiguous social information in negative fashion, and to selectively recall negative social experiences (Beck, Emery, & Greenberg, 1985).

Bower's Associative Network Theory

Bower (1981) also produced a general cognitive model for emotional disorders. He proposed that each emotion is represented as a node in an “associative network”, and each node is linked to other nodes within the network, such as memories of events that evoked certain emotional responses. When an emotion node is activated, associated nodes are more likely to be accessed. This helps in the processing of stimuli that are congruent with the activated emotion node. Thus, cognitive processes such as selective attention, memory and interpretation will all preferentially process stimuli congruent with an activated emotion node.

Both Beck's (1976) and Bower's (1981) models predict that emotional disorders have similar mood congruent biases in attention, memory and interpretation, and that all three aspects of the information processing system are biased within all mood disorders (e.g., social phobia and depression). Both

models suggest that the difference between the information processing associated with each disorder is the content of each bias. Anxiety is said to be associated with threat and danger, whilst depression is thought to be associated with loss or failure. Thus, these models propose that social phobia is associated with an extensive range of biases (in attention, interpretation and memory) promoting the selective processing of social information, which conveys negative evaluation and social disapproval.

Over recent decades, predictions from the early cognitive models of Beck (1976) and Bower (1981) have generated an extensive amount of empirical investigation as researchers sought to find evidence of biases in all aspects of information processing across a range of disorders. Initial (and subsequent) studies found evidence of an attentional bias to threat in anxiety disorders and a negative recall bias in depression (Bradley & Mathews, 1983; MacLeod, Mathews, & Tata, 1986). However, contrary to predictions from Beck (1976) and Bower (1981), an attentional bias was not found in depression, and anxiety did not appear to be associated with a bias towards recalling negative information (MacLeod et al., 1986; Mogg, Mathews, & Weinman, 1987). In an attempt to reconcile increasing evidence of an anxiety-related bias in selective attention and a negative bias in recall for self-relevant information in depression, Williams Watts, MacLeod, and Matthews (1988) proposed a model in which emotional disorders differed not only in content of bias, but also differed in the type of information processing bias.

Williams, Watts, MacLeod, and Matthews' Interaction Model

Williams, Watts, MacLeod and Matthews' (1988) suggested that different emotional disorders were associated with different patterns of information processing bias. They proposed that anxiety is associated with a bias in the early stages of information processing (e.g., attention) and depression with biases in later, more elaborative stages of information processing (e.g. memory). This contrasts with Beck's (1976) and Bowers' (1981) models, which suggested that the same cognitive mechanisms are biased in all affective disorders.

Williams et al.'s (1988) model (see Figure 1) involves an Affective Decision Mechanism (ADM), which integrates information relating to current mood (state anxiety) and stimulus properties, and a Response Allocation Mechanism (RAM), which co-ordinates subsequent processing based on the general mood (trait anxiety) of the individual. If the trait anxiety is high then attention is allocated more readily, whereas if trait anxiety is low then attention is directed away from the stimulus. Thus, under threat conditions, high trait anxious individuals become more vigilant, whereas low trait anxious people become more avoidant of threat.

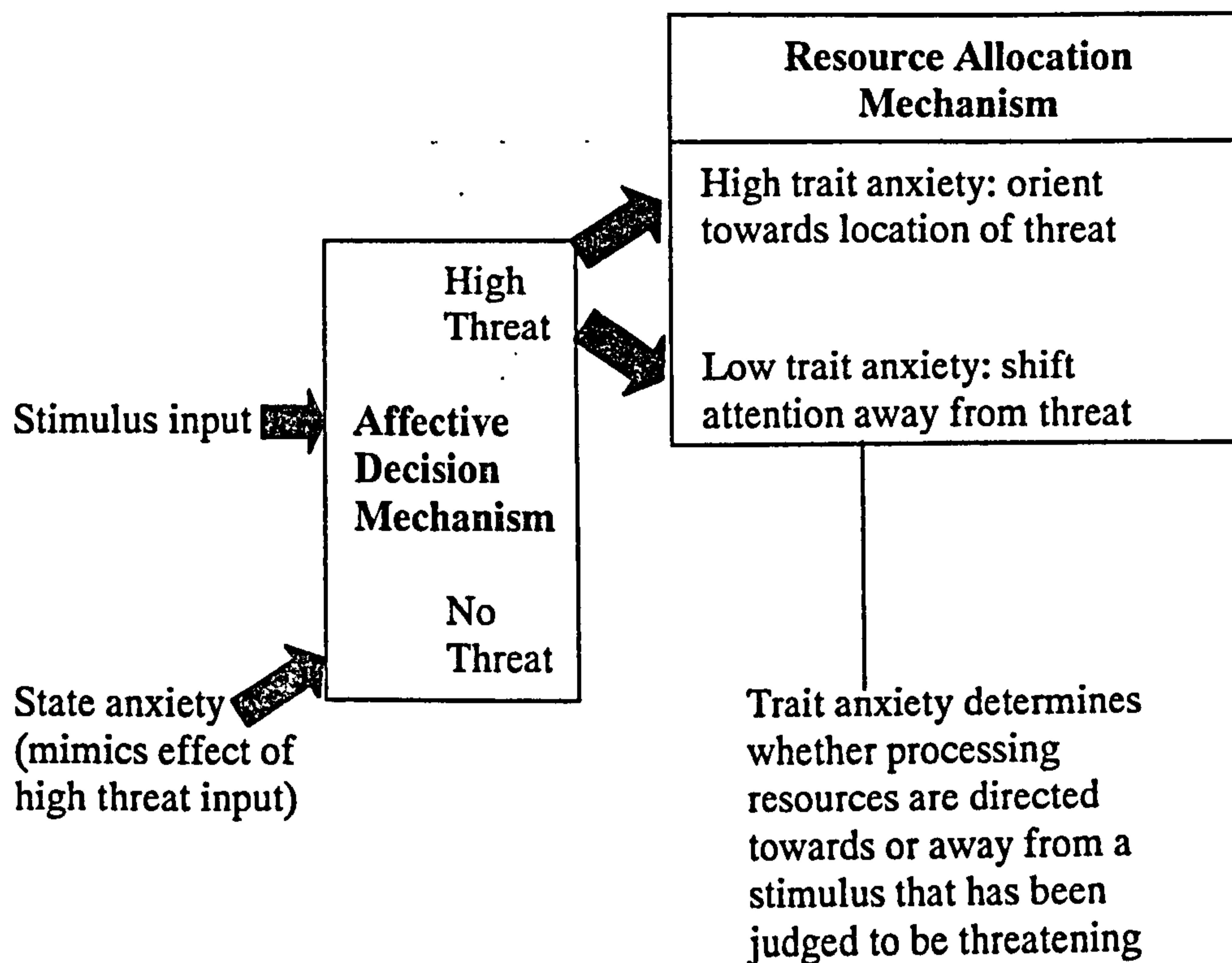


Figure 1. Williams, Watts, MacLeod, and Matthews (1988) Interaction Model of Anxiety

Williams, Watts, MacLeod and Matthews (1997) revised their original model by proposing that instead of a simple decision mechanism, as originally conceived, the ADM could be a processing network with specific units (threat units) that are primed as a result of prior learning and experience.

Despite these differences in underlying structure, both of Williams et al.'s (1988, 1997) models suggest that increased activation of threat units leads high anxious individuals to selectively process threat, whereas low anxious individuals are predicted to direct their attention away from negative stimuli. Crucially, as state anxiety increases the predisposition to attend to threat when trait anxiety is high, and to divert attention away from threat when trait anxiety

is low, becomes more evident. Thus, within these models, the direction of the attentional bias reflects an individual's vulnerability to generalised anxiety.

In the context of social phobia, Williams et al.'s (1988, 1997) models predict that high levels of social anxiety lead to preferential allocation of attention to negative social cues (e.g., expressions signalling negative social evaluation). In contrast, people with low levels of social anxiety would be predicted to shift their attention away from social cues, which they consider to be threatening. Furthermore, as anxiety associated with the social situation increases (e.g., perhaps in a performance situation), anxiety related individual differences in attention to threat (vigilance vs. avoidance) become more apparent.

Eysenck's Hypervigilance Theory

Anxiety related vigilance for threat is also a feature of Eysenck's (1992) Hypervigilance Theory. The model assumes that while attentional biases are found in individuals with high trait anxiety, low trait anxious individuals do not demonstrate attentional biases. In addition to hypervigilance for threat stimuli, individuals who have high trait anxiety are also predicted to be hypervigilant to non-threatening stimuli. They are thought to scan the environment in an attempt to locate any potential danger, and on locating a threatening stimulus, attention is focused solely on the threat. Therefore, individuals with social phobia would be expected to exhibit a high rate of environmental scanning and a broadening of the focus of attention prior to the detection of a social threat stimulus, but a narrowing of attention once the stimulus had been detected. Thus, Eysenck's (1992) model would predict that an individual with social

phobia would scan the environment for potential threat (e.g., expressions signalling negative evaluation) to a much greater degree than someone without social phobia. Once a threat stimulus is detected, individuals with social phobia would be expected to narrow their focus of attention onto the threat, whereas, individuals without social phobia are not predicted to focus any additional attention on social threat stimuli.

Taken together, Williams et al.'s (1988, 1997) and Eysenck's (1992) models suggest that preattentive processes and selective attention to negative social cues play a role in triggering and maintaining the socio-evaluative concerns experienced by socially phobic individuals within social situations. In contrast, the models predict that non-socially phobic individuals would allocate significantly less attention to cues that signal negative social information.

However, evolutionary models of threat processing (e.g., Oatley & Johnson-Laird, 1987), suggest that everyone must preferentially process negative stimuli that are of significant threat (i.e., attend to social cues that signal extreme negative evaluation). If this did not occur people would not be able to recognise the signs that indicate when a person is extremely angry and may become verbally or physically aggressive. Evolutionary theories would predict that people who lacked the ability to attend to and interpret real danger would be less likely to survive than those who possessed these information processing traits. Therefore, enhanced processing of significant threat cues would be passed on from generation to generation, and would become common to all members of the species. Thus, even if people have low trait anxiety they must

be attentive towards significant threat, however, this was not predicted by the models of Williams et al. (1988, 1997) and Eysenck (1992).

Cognitive Motivational Models of Anxiety

Mathews and Mackintosh (1998) modified Williams et al.'s (1988) model to incorporate attention processes, which are consistent with evolutionary theories in relation to low anxious individuals. They proposed that low anxious individuals' attentional avoidance occurs only under mild threat conditions, and when severe threat is present low anxious individuals switch over to attentional vigilance. Contrary to earlier models, Mathews and Mackintosh (1998) suggest that the difference between high and low trait anxious people is in the threshold at which stimuli are interpreted as threatening and are preferentially processed. Thus, attention to threat cues in anxiety depends on the interaction of two systems: a threat detection/evaluation system and an attentional control system to evaluate which environmental information needs to be attended to depending on the levels of threat and current level of motivation.

Mogg and Bradley (1998) devised a similar model to that of Mathews and Mackintosh (1998) (see Figure 2). They proposed that a Valence Evaluation System evaluates and interprets the level of threat in order to inform a Goal Engagement System whether to continue with current activities or to interrupt these in order to coordinate a response to motivationally relevant stimuli. The more threatening a stimulus is perceived to be, the more likely it is that attention will be allocated to it. However, if stimuli are evaluated as mildly aversive and of a low subjective threat value, then attention may be directed

away from them. Mogg and Bradley (1998) suggest that this avoidance of trivial aversive stimuli in the environment would be helpful in maintaining attention on current goals, and also in mood regulation.

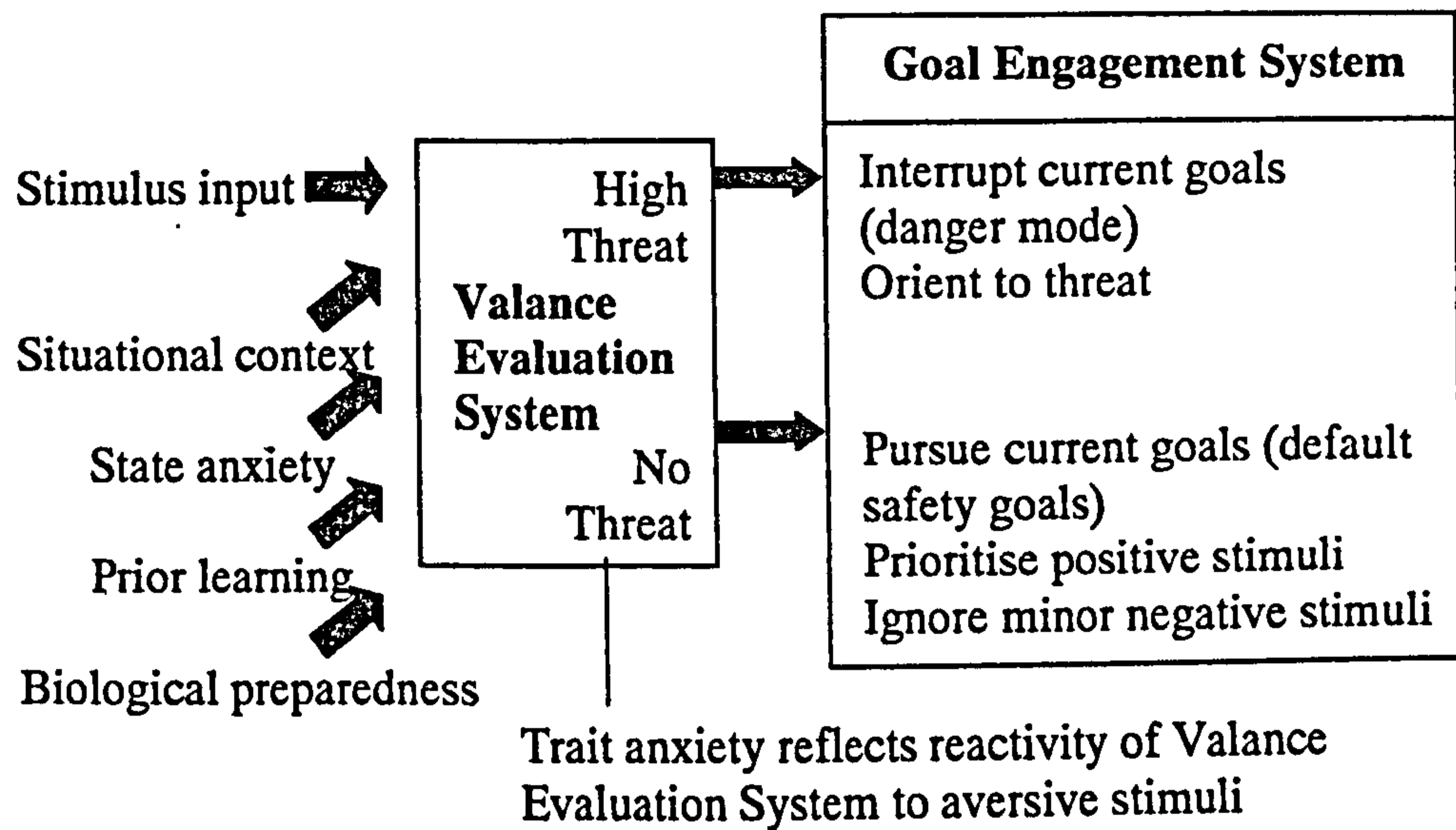


Figure 2. Mogg and Bradley's (1998) Cognitive Motivational Model of Anxiety

The main difference between the two cognitive motivational models is that Mogg and Bradley (1998) suggest that anxiety prone individuals have a lowered threshold for threat appraisal as a function of trait anxiety, and therefore, a bias in threat evaluation is the principle vulnerability factor for anxiety. In contrast, Mathews and Mackintosh (1998) suggest that the lowered threshold for threat estimation is primarily caused by state anxiety, though this effect is enhanced by trait anxiety.

According to these models, people with social phobia would be predicted to evaluate social situations as threatening (especially cues that convey social evaluation, such as facial expressions), and therefore, focus their attention on

such stimuli, while reducing attention to the task at hand (i.e., social interaction). More importantly, individuals with social phobia are more likely to appraise ambiguous sources of social information (ambiguous facial expressions) as negative, and as a result demonstrate an attentional bias to such stimuli. Whereas, low anxious individuals are less likely to negatively evaluate, and therefore selectively attend to, social stimuli. However, contrary to predictions from earlier models of Williams et al (1988, 1997) (which suggest that people with low trait anxiety are predisposed to allocate attention away from threat), the cognitive motivational models predict that when the stimulus threat value is sufficiently high, both socially phobic and non-socially phobic anxious individuals will demonstrate increased vigilance. Thus, differences between people with social phobia and those without are likely to become more apparent in the presence of mild to moderate, rather than intense threat stimuli.

The models discussed so far outline threat processing biases that are considered common to all forms of anxiety. The next section of this review will discuss specific cognitive models of social phobia and the biases in information processing they emphasise.

Cognitive Models of Social Phobia

Social phobia persists if left untreated despite the fact that people with social phobia enter at least some of their feared social situations on a regular basis and rarely receive negative feedback from others. Therefore, unlike other specific phobias (e.g., spider phobia), avoidance (i.e., lack of opportunity to disconfirm negative beliefs) cannot be the major maintenance factor of social phobia.

When feared social situations are encountered, people with social phobia fail to learn that their negative beliefs are unfounded and that their social performance is typically satisfactory. This suggests that other factors are involved in the maintenance of social phobia, such as information processing biases.

Clark and Wells (1995)

In their cognitive model of social phobia (see Figure 3), Clark and Wells (1995) suggested that early experiences lead to the development of dysfunctional assumptions about oneself and the world, which result in increased perception of threat in social situations. When entering a social situation, these pre-existing dysfunctional assumptions are enhanced and maintained through a series of vicious circles. When a social threat is perceived, an individual with social phobia experiences physiological symptoms of anxiety (e.g., blushing, sweating, trembling), which they use to construct an image of themselves as a social object (taken from the perspective of the observer). This attentional shift switches the focus of attention from the environment to internal processing of the self and further increases awareness of physiological symptoms of anxiety. When attention is focused internally it interferes with the processing of external social cues and can lead to unresponsive behaviour.

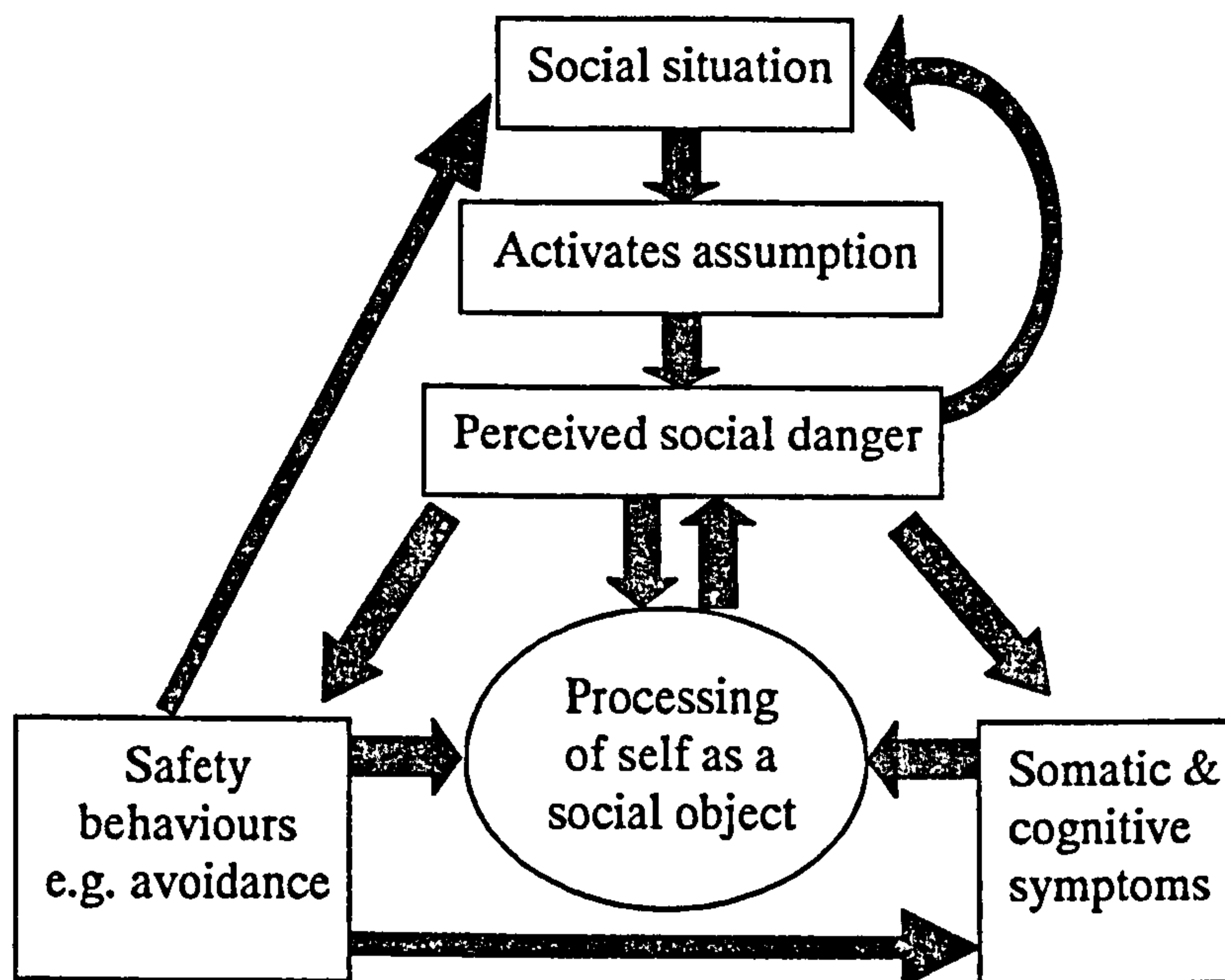


Figure 3. Clark and Wells' (1995) Cognitive Model of Social Phobia

Clark and Wells (1995) also propose that people with social phobia engage in a range of behaviours that are intended to reduce the risk of negative evaluation. Such behaviours include avoiding eye contact, not joining in conversations (to avoid saying anything embarrassing), or talking incessantly (as silences are believed to signify lack of social skill). However, while these 'safety behaviours' might alleviate discomfort in the short-term, they ultimately prove maladaptive, as they prevent people with social phobia from disconfirming their fears of being negatively evaluated by others. This can even make feared outcomes more likely. For example, a person rehearsing questions in their mind during a conversation is more likely to be perceived as odd or uninterested while avoiding eye contact. This also prevents people from accurately evaluating audience feedback and correcting their social-evaluative concerns.

Clark and McManus (2002) revised Clark and Wells' (1995) model to incorporate predictions from recent cognitive models of threat processing in anxiety. They proposed that while social phobia does involve reduced processing of social cues, socially phobic individuals also focus some attention externally, because they have an enhanced tendency to detect negative social cues rather than neutral or positive information. Thus, revised predictions from Clark and McManus (2002) can be considered consistent with predictions from general cognitive models of threat processing in anxiety, as vigilance for threat cues is considered to be a maintaining factor in social phobia.

In addition to biases in selective attention, Clark and Wells (1995) and Clark and McManus (2002) also discuss additional information processing biases that occur within the social situation and interfere with socially phobic individuals' processing of social cues. They suggest that there are two types of interpretation bias in social phobia. People with social phobia are predicted to interpret ambiguous social events negatively, and interpret mildly negative social events (e.g., mild criticism from an acquaintance) as catastrophic.

In summary, Clark and Wells' model (1995) hypothesises that in social phobia, attention is biased in favour of internal stimuli which limits processing of external social cues. This is considered to be a strategic effort to protect oneself from the distress of being negatively evaluated by others. However, revisions by Clark and McManus (2002) highlight the role of attentional bias to external social cues, as proposed by the general cognitive models of anxiety (Beck et al., 1985; Bower, 1981; Eysenck, 1992; Mathews & Mackintosh, 1998; Mogg

& Bradley, 1998; Williams et al., 1988, 1997). Furthermore, predictions of a negative interpretation bias in social phobia concur with Beck et al.'s (1985) prediction of negative interpretations as a maintaining factor in social phobia. The combined impact of attentional and interpretation biases is likely to increase perceptions of social threat, and prevent disconfirmation of socio-evaluative concerns.

Rapee and Heimberg (1997)

Rapee and Heimberg's (1997) model proposes that a social situation triggers a series of processes that generate and maintain social phobia. According to the model, when someone with social phobia encounters a social situation, they form a mental representation of their external appearance and behaviour, as seen by others. As in Clark and Wells' (1995) model, this mental representation is based on information retrieved from negatively biased memories of past social situations, shaped by dysfunctional assumptions, and internal cues (e.g., physiological symptoms). However, consistent with revised predictions from Clark and McManus (2002), Rapee and Heimberg (1997) emphasise the importance of external audience feedback (e.g., others' facial expressions) in the construction of this mental representation. Both models predict that attentional resources are allocated to salient aspects of the self-image, which are generally negative (e.g., voice, blushing, etc.). Thus, Rapee and Heimberg's (1997) model suggests that whilst individuals with social phobia focus some attention internally, attention continues to be focused externally, in order to monitor potential external threats, such as negative evaluation (e.g., frowns,

signs of boredom, etc.). If social threat is detected then attention switches from environmental scanning to being focused directly onto the threat stimulus.

Rapee and Heimberg (1997) suggested that individuals with social phobia make a prediction of the performance standard expected by the audience and then compare a mental representation of themselves with the predicted standard of their audience. The discrepancy between the two determines the amount of negative evaluation they expect to receive from others. It is likely that the negative information attended to, will undergo interpretation, in order to decide on the standard of performance expected by the audience and to inform an in-situ representation of the self. However, Rapee and Heimberg (1997) do not explicitly mention the role of interpretive bias in the maintenance of social phobia. This differs from the other cognitive models of social phobia and earlier models of anxiety, which all discuss interpretive/appraisal biases.

Summary of Cognitive Models of Social Phobia

Clark and Wells (1995) emphasise that when people with social phobia fear that they will be negatively evaluated they shift their attention towards internal threat stimuli such as their own anxiety response. This interferes with their opportunity to reappraise the situation as less threatening, conflicts with their social performance, and leads them to conclude that they may look as anxious as they feel inside. Clark and Wells (1995) also propose that people with social phobia may avoid attending to the social situation as a form of safety behaviour. For example, reducing eye contact could reduce the likelihood of

being brought into a conversation, thus decreasing the risk of embarrassment. Again, this prevents effective processing of the social situation.

Rapee and Heimberg (1997) also state that attention can be directed to threatening internal stimuli and that safety behaviours can entail avoidance of social interaction. However, they predict that individuals with social phobia scan their environment for any signs of impending negative evaluation, detect such signs rapidly, and have difficulty disengaging attention from them. Clark and McManus' (2002) revisions to Clark and Wells' (1995) model predict that in addition to attention being focused away from social situations, attention is focused externally and is biased in favour of selecting negative, threatening social cues. Taken together, proposals from Rapee and Heimberg (1997) and Clark and McManus (2002) can be considered consistent with predictions from general cognitive models of threat processing in anxiety (Beck, 1976; Bower, 1981; Eysenck, 1992; Mathews & Mackintosh, 1998; Mogg & Bradley, 1998; Williams et al., 1988, 1997). However, the exact nature of attentional bias in social phobia and other emotional disorders is not yet fully understood. The cognitive models reviewed above suggest that both attentional and interpretation biases have a major role in producing and maintaining anxiety disorders. It is, therefore, extremely important to study these processes in order to gain a better understanding of the biases involved in each specific anxiety disorder. To this end, several experimental paradigms have been developed in order to examine the attentional and interpretive processes emphasised by cognitive formulations of social phobia.

Attentional Bias in Social Phobia

As previously discussed, attentional processes are assumed to play an important role in social phobia. Vigilance is typically used to refer to selective attention for threat related stimuli, while avoidance is a defence reaction to prevent or minimize danger, by directing attention away from threat stimuli. A number of different experimental paradigms have been devised in order to investigate the attentional processes of people with anxiety disorders, a review of which now follows.

The Stroop Task

In order to investigate whether emotional disorders are associated with an attentional bias toward emotionally negative information, Mathews and MacLeod (1985) used a paradigm in which participants had to perform a task whilst ignoring emotional distracters. This paradigm was adapted from the Stroop Task (Stroop, 1935), which involves naming the ink colour in which words are printed, whilst ignoring the word content. Response latencies to classify colour can be used to infer the extent to which the word content attracts attention and interferes with colour-naming. Specifically, long response latencies are thought to indicate interference of word content in the processing of the colour of words, whereas short latencies indicate reduced attention to word content.

Mathews and MacLeod (1985) used a modified Stroop Task (Emotional Stroop) to examine attention to negative (relative to neutral) words in anxious and non-anxious individuals. Anxious participants were generally slower than

controls in colour-naming all words, but were particularly slow with threat words. Physical threat words resulted in significantly longer response times for participants who had anxiety related to physical threat (e.g., panic disorder).

Several variants of the emotional Stroop have been used to study attentional bias, and this paradigm has been used extensively with a variety of emotional disorders (e.g., Foa & McNally, 1986; Mathews & MacLeod, 1985; Mattia, Heimberg, & Hope, 1993; McNally, Riemann, & Kim, 1990; Watts, McKenna, Sharrock, & Trezise, 1986; Williams, Mathews, & MacLeod, 1996).

Hope, Rapee, Heimberg, and Dombek (1990) used a version of the emotional Stroop Task with a social phobia group and a panic disorder group. They aimed to compare allocation of attention to socially threatening words, physically threatening words and neutral words. People with social phobia were slower when naming the socially threatening words than the neutral words, while people with panic disorder were slower when naming physically threatening words compared to the neutral words. Hope et al.'s (1990) study was limited because positive words were not included, so conclusions cannot be drawn about how different anxiety disorders affect individuals' responses to positive information relative to neutral or negative information. In addition, the absence of a non-anxious control group prevented authors from concluding that evidence of Stroop interference for negative social words in social phobia is different from the reactions of non-anxious people.

In a similar study Mattia, Heimberg, and Hope (1993) observed increased response latencies to socially threatening words in people with social phobia. Comparison with a non-anxious control group suggested the Stroop interference in social phobia was greater than in controls. In addition, they found a significant reduction in Stroop interference after successful treatment indicating that the attentional bias had decreased with the reduction of symptoms of social phobia.

Several other studies have found that people with social phobia are slower to colour-name social threat words than physical threat words (Becker, Rinck, Margraf, & Roth, 2001; Lundh & Ost, 1996; Maidenberg, Chen, Craske, Bohn, & Bytritsky, 1996). These findings provide evidence of vigilance for negative social material in social phobia, which is consistent with the predictions from cognitive models of anxiety and social phobia (Beck et al., 1986; Bower, 1981; Clark & McManus, 2002; Eysenck, 1992; Mathews & Mackintosh, 1998; Mogg & Bradley, 1998; Rapee & Heimberg, 1997).

More recently, studies have focused on the content of the negative cognitions that are associated with social phobia. Spector, Pecknold, and Libman (2003) found that, compared with non-anxious controls, people with social phobia were slower to name the colours of social threat words describing negative evaluation (e.g., "criticise") and words that expressed the observable aspects of anxiety (e.g., "blushing"). However, there was no Stroop interference for anxiety words that were less noticeable to others (e.g., "palpitations"). It

remains important for future studies to clarify the specificity of attentional bias within social phobia.

Despite its extensive use to examine attentional bias in emotional disorders, the emotional Stroop does not provide an unambiguous measure of attention allocation. In the original Stroop Task, if there is no interference then it is assumed that the participant has successfully ignored the meaning of the word. However, in the emotional Stroop paradigm, the absence of a longer response latency for threatening words may reflect equally extensive attention allocation to both threatening and neutral words (Algom, Chajut, & Lev, 2004).

It has also been suggested that emotional Stroop interference is caused by emotional stimuli triggering task-irrelevant processes, such as negative thoughts, which compete for attentional resources or that Stroop interference might reflect effortful avoidance of negative word content (Williams, Mathews, & MacLeod, 1996). Given the ambiguity surrounding the use of the Stroop to gauge attention allocation, other tasks were devised in order to test predications of attentional biases in anxiety.

The Visual Probe Task with Words

MacLeod, Mathews, and Tata (1986) were the first to use the visual probe task to assess attentional processes in emotional disorders, as it was believed to be a more direct measure of attentional distribution than the emotional Stroop Task. In a typical version of the task, a trial begins with participants attending to a central fixation cross on a computer screen. The cross is replaced by two

stimuli, such as a threatening word and a neutral word. The words disappear after a brief period (e.g., 500 ms) and are replaced by one of two possible arrangements of dots, or alternatively arrows, either in the place where the threatening word had been displayed, or in the place where the neutral word had been displayed. Participants' reaction times to correctly classify the probes are measured. Faster reaction times to classify probes that appear in the location of the threat word relative to probes that appear in the location of the neutral word are considered to reflect vigilance (or selective attention) towards the threat word. In contrast, slower response latencies to classify threat word probes, relative to neutral word probes are considered to reflect avoidance. The visual probe task has several advantages over the emotional Stroop Task. It allows the simultaneous presentation of both threat and control words in different locations, and visuo-spatial components of attention can also be assessed.

MacLeod et al. (1986) found that clinically anxious participants consistently appeared to shift attention toward threat words, because they produced shorter response latencies for probes appearing in the location of threat relative to neutral word stimuli. Clinically depressed participants did not show this vigilance and the non-clinical control group tended to shift attention away from the threat words. These results support predictions of vigilance for threat in anxiety from Williams et al.'s (1988) interaction model and the cognitive motivational models (Mathews & Mackintosh, 1998; Mogg & Bradley, 1998)

In a study of visuo-spatial attentional bias in social phobia, Asmundson and Stein (1994) used the visual probe task and found that people with social phobia were quicker than the non-clinical control group to detect probes appearing in any location after the social threat words had been displayed in the upper half of the screen. This result was not found when the content of the words was neutral or related to physical threat. However, it is important to note that these findings did not provide evidence that the socially phobic group attended more to the location of the social threat word. Some other visual probe studies have failed to find clear evidence for selective attention to social threat words in social phobia (Amir, Elias, Klumpp, & Przeworski, 2003; Horenstein & Segui, 1997) and in non-clinical individuals with high levels of social anxiety (Mansell, Ehlers, Clark, & Chen, 2002).¹

The null results from initial visual probe studies of attentional bias in social phobia contrast with predictions from cognitive models of social phobia. However, it should be noted that the cognitive models specifically describe in-situ processing biases that occur while the individual is experiencing social stress. It is therefore important to examine whether attentional bias to threat is more apparent when examined within a relevant social context, such as a social interaction. Mansell et al. (2002) tested whether high and low socially anxious individuals attended to social threat words and positive social words, with and

¹ In some instances, experimental designs have compared people with high and low levels of social anxiety rather than people with and without social phobia, however, the results obtained in such analog research have usually generalized to clinical populations (Stopa and Clark 2001). Some of the advantages of using analog samples include rapid piloting of new paradigms and the use of more complex experimental designs that require substantial sample sizes.

without the threat of social evaluation (being told that they have to give a speech). High levels of social anxiety were not related to any difference in attention to word stimuli between the groups.

A recent study using the visual probe task suggested that comorbid depression may neutralise vigilance for social threat words in social phobia. Musa, Lepine, Clark, Mansell, and Ehlers (2003) found vigilance to social threat words only when those with depression were excluded. Participants with depression and controls did not demonstrate any attentional bias (as predicted by Williams et al., 1988, 1997; Mathews & Mackintosh, 1998; Mogg & Bradley, 1998). Musa et al. (2003) also noted that the vigilance was specific to social threat words and not physical threat words only in those people without other comorbid anxiety disorders (e.g., panic disorder). Thus, the visual probe task with words was able to identify vigilance specifically to social threat words, but only in people with social phobia who had no other clinically significant emotional disorders.

Despite extensive use, there are several limitations of the visual probe task with words. Threat words are likely to be used more frequently by people with high levels of anxiety than by people with low anxiety levels (Mogg & Bradley, 1999). This means that the attentional biases found for threat words may be due to familiarity rather than them being considered threatening. Also, single word stimuli lack ecological validity and while allowing specificity of concerns to be probed, can be limited in their threat value (Mogg & Bradley, 1999). Therefore, research studies which have used words in assessment of attentional biases may

only provide a limited understanding of the attentional biases in social phobia. More recently, researchers have examined attention allocation to other sources of social information that might convey negative appraisal to people with social phobia (i.e., facial expressions).

The Visual Probe Task with Faces

In real social situations, social threat stimuli consist of other people's behaviour, body language, facial expressions and verbal communication (Mogg & Bradley, 1999). An angry or threatening face, staring at another person is considered to be a direct sign of hostility (Ohman, Flykt, & Esteves, 2001), and is therefore likely to be central to the social-evaluative concerns of individuals with social phobia. As such, several studies have explored selective attention to images of facial expressions in people with social phobia and people with high levels of social anxiety, using the visual probe task.

Mansell, Clark, Ehlers, and Chen (1999) developed a version of the visual probe task that attempted to simulate the two contrasting kinds of stimuli to which a socially anxious person may attend in a real life situation: a face (with a negative, neutral or positive expression) and an everyday object (e.g., a chair) presented side by side for 500 ms. High and low socially anxious participants carried out the task in a socio-evaluative threat condition (expecting to give a speech) or a non-threatening condition. They found that the high socially anxious individuals who were expecting to give a speech attended towards the objects and neutral facial expressions rather than the emotional expressions. In contrast no bias in attention was found in the low social anxiety group. There

was no difference between the two groups' response times in the no-threat condition, although general trait anxiety was associated with vigilance to negative faces.

In a subsequent study Chen, Ehlers, Clark, and Mansell (2002) found that participants with social phobia avoided faces (in preference of attending to objects), without the presence of an explicit social threat condition. The control group exhibited no such attentional biases. Taken together, these findings support proposals that individuals with social phobia might avoid processing social cues as a safety-behaviour to minimise state anxiety. This avoidance of social threat stimuli is in concordance with the prediction of the Clark and Wells (1995) model of social phobia. However, these results were not predicted by general cognitive models of anxiety (Beck, 1976; Bower, 1981; Eysenck, 1992; Williams et al., 1988, 1997) and more recent cognitive formulations of social phobia (Rapee & Heimberg, 1997; Clark & McManus, 2002).

Despite evidence that individuals with social phobia have a tendency to avoid social cues when they have the opportunity to do so, findings from studies presenting competing social stimuli (i.e., a neutral face and an angry face) appear to provide evidence of vigilance for negative social stimuli in social phobia. Mogg and Bradley (2002) found that high socially anxious individuals selectively attended to briefly presented (17 ms) threatening expressions rather than neutral faces. This effect remained when co-varying for levels of general trait anxiety and depression.

In another study, Mogg, Philippot, and Bradley (2004) presented participants with happy-neutral and angry-neutral face pairs at display times of 500 and 1250 ms. They found that the socially phobic group selectively attended to the angry faces at 500 ms. There was a non-significant tendency for this effect to reverse when the face pairs were on screen for 1250 ms, as the socially phobic group had slightly slower response times for probes appearing in the location of the angry faces. This pattern of results provides initial evidence that social phobia might be characterised with a two stage pattern of attentional bias when processing competing social cues; with initial vigilance for threat being followed by subsequent avoidance of threat cues. This pattern provides some support for predictions from cognitive models (Beck, 1976; Bower, 1981; Beck et al., 1986; Clark & McManus, 2002; Eysenck, 1992; Mathews & Mackintosh, 1998; Mogg & Bradley, 1998; Rapee & Heimberg, 1997; Williams et al., 1988, 1997) and warrants further research.

To date, few studies have investigated a shift in attention to internal information (as predicted by the cognitive models of social phobia, Clark & McManus, 2002; Rapee & Heimberg, 1997). Mansell, Clark, and Ehlers (2003) used a new attentional paradigm, which compared attention to internal versus external threat cues in people with performance anxiety relative to those without. They used a tactile stimulus (a vibration on the finger), which the participants were told was an indication of changes in their internal physiological arousal state. At the same time, participants also had to respond to an external visual stimulus (the visual probe task with faces). When those with performance anxiety were told they would be giving a speech, they

responded more quickly to the internal stimuli than the external stimuli, consistent with attention being directed internally (Clark & Wells, 1995; Clark & McManus, 2002). Additional evidence of an attentional bias to internal sources of negative information was provided by Pineles and Mineka (2005). They compared socially anxious and non-anxious individuals on a visual probe paradigm involving external (faces) and internal (visual and auditory representations of participants' heart rates) cues of potential threat. High socially anxious individuals preferentially attended to pictures reflecting internal/physiological cues (e.g., heart rate), supporting Clark and Wells' (1995) self-focus hypothesis.

In summary, visual probe studies using facial expressions (but not word stimuli) have shown vigilance followed by avoidance of threat stimuli in social phobia. This pattern of bias is consistent with Clark and McManus' (2002) updated model of social phobia, and the pattern of bias observed in other anxiety disorders (for review see Mogg & Bradley, 2005). The studies that have found vigilance in social phobia displayed two social stimuli for brief periods, and did not involve a socially evaluative threat condition. Some studies found evidence of avoidance of social threat stimuli, such as when the stimuli were displayed for longer periods, or when participants had the option of attending to a non-threatening stimulus (i.e., when a face was displayed opposite a non-social stimulus such as an object), or when participants believed that they would subsequently be in a socially evaluative condition (i.e., giving a speech). These findings suggest that vigilance for external social threat cues, predicted by Rapee and Heimberg (1997) and Clark and McManus (2002), may

predominate when there are competing social threat cues, and when gaze aversion strategies are more difficult to adopt. Whereas, avoidance of social cues may predominate as a defensive mechanism when the individual is distracted by thoughts of subsequent negative evaluation, and when there is a neutral non-social stimulus available onto which attention can be diverted. This pattern of attentional bias has been explored in a recent study employing eye-movement monitoring of attention deployment (Garner, Mogg, & Bradley, in press).

Garner et al. (in press) monitored participants' eye movements during the presentation of happy-neutral face pairs, angry-neutral face pairs and face-object pairs. They found that when state anxiety was low (in the absence of a social stressor), socially anxious people tended to direct their gaze towards neutral faces (rather than objects) more often than the low socially anxious individuals, whereas both groups oriented and maintained their gaze towards emotional faces. This appears to demonstrate that people with high levels of social anxiety are vigilant towards threat of low severity (as suggested by Mathews & Mackintosh, 1998; Mogg & Bradley, 1998). However, this effect reversed as state anxiety increased (in a social stress condition). The high socially anxious individuals showed less orienting and maintenance of attention to neutral faces compared with the low socially anxious group. However, socially anxious individuals did demonstrate quicker orienting toward emotional faces, but maintained their attention on the emotional faces for a shorter period of time than the low socially anxious individuals (see Horley, Williams, Gonsalvez, & Gordon, 2003 for similar results using a scan-path

analysis of face processing). These results suggest that when state anxiety is high, attention is rapidly allocated towards cues signalling social evaluation, but is quickly diverted away from such stimuli. Garner et al.'s (in press) study shows perhaps the most compelling evidence for both vigilance and avoidance of social threat in social anxiety, and the conditions under which they operate. Social anxiety appeared to lead to a general avoidance of social cues, when attention could be oriented to a non-social cue (object), and a vigilant-avoidant attentional bias when selecting between competing (emotional-neutral) social cues; thus providing support for recent models of social phobia (Clark & McManus, 2002; Rapee & Heimberg, 1997).

Summary of Attentional Bias Research in Social Phobia.

In summary, the emotional Stroop task has been the most widely used assessment of attentional bias, and has provided some evidence that social phobia involves vigilance to social threat. Studies using social stimuli that are more relevant to the concerns of individuals with social phobia (i.e., facial expressions) have found evidence of initial vigilance to threat followed by avoidance. There are also indications that during real social threat, attention switches to internal cues (Mansell et al., 2003; Pineles & Mineka, 2005). Taken together these findings support proposals that social phobia is a disorder maintained by a series of complex attentional processes selecting between internal and external sources of socially relevant information. (e.g., Clark & McManus, 2002; Clark & Wells, 1995; Rapee & Heimberg, 1997). However, the processes that have been proposed to drive attentional biases in social phobia are less well understood. As noted earlier, recent cognitive models of

threat processing in anxiety (e.g., Mathews & Mackintosh, 1998; Mogg & Bradley, 1998) emphasise the role of stimulus appraisal mechanisms in modulating attention allocation. These suggest that anxiety-related differences in selective attention reflect differences in the way socially phobic and non-socially phobic individuals evaluate the intensity and type of emotion displayed in facial expressions. However, only one visual probe study has examined the relationship between threat intensity and attentional bias in anxiety (Wilson & MacLeod, 2003). They found that both high and low anxious participants avoided looking at faces with mild degrees of anger and both were vigilant to faces with high levels of anger. However, low anxious participants avoided moderately angry faces, to which highly anxious participants were vigilant.

These findings provide compelling evidence of anxiety related differences in evaluation and attention to threat; however it remains to be clarified whether individual differences in stimulus appraisal might underlie the attentional biases in social phobia reviewed above. The next section extends discussion of anxiety-related differences in stimulus appraisal to the interpretive biases, proposed to characterise social phobia.

Interpretation Bias

As mentioned previously, in addition to attentional biases, differences in the way information is interpreted are thought to play a major role in producing and maintaining emotional disorders. Some cognitive theories of social phobia (Clark & McManus, 2002; Clark & Wells, 1995) proposed an interpretation bias, in which ambiguous cues are interpreted as threatening, and mildly

aversive social information is interpreted to be catastrophic. However, Rapee and Heimberg (1997) did not mention the role of an interpretation bias in their model of social phobia. Clark and McManus (2002) suggested that people with social phobia tend to perceive innocuous comments or behaviours by others as indications of criticism, disapproval or rejection, and tend to interpret their own social performance as poorer than that of others. This section reviews the various paradigms that have examined interpretation biases in anxiety disorders.

Interpretation of Words and Sentences

Stopa and Clark (2000) asked people with social phobia, people with other anxiety disorders, and non-clinical controls to read ambiguous scenarios of social and non-social situations. After reading each scenario, participants were asked to write down the first explanation of the scenario that came to mind and also rank order the likelihood of a set of pre-defined explanations. People with social phobia generated more negative interpretations of the ambiguous social situations than the control groups. The bias was specific to social situations and could not be explained in terms of general anxiety, because people with other anxiety disorders and non-anxious controls did not show the bias. In addition to interpreting ambiguous social events more negatively, people with social phobia were found to make more extreme negative (catastrophic) interpretations of mildly negative social events than did people with other anxiety disorders, and non-clinical controls. These results support the predictions of a negative and catastrophic interpretation bias in social phobia, as proposed by Clark and McManus (2002).

In a similar study Amir, Foa, and Coles (1998) asked people with social phobia, people with obsessive-compulsive disorder, and non-anxious controls, to read ambiguous scenarios (about social or non-social situations), and to consider three alternative interpretations of each scenario. Participants rank-ordered the three interpretations of each scenario in relation to how likely they were to have come to mind in a similar situation. Amir et al. (1998) found that people with social phobia rated the negative interpretations as more likely to come to mind, than did the obsessive-compulsive and non-anxious control groups. This effect was specific to social information, as the social phobia group did not differ from the other two groups on non-social scenario ratings. The interpretation bias was also specific to the self-ratings, as the groups did not differ when ratings were made in relation to how a typical person would perform.

In a related study Constans, Penn, Ihen, and Hope (1999) required participants to independently rate their agreement with positive or negative interpretations of ambiguous social information. They found that non-anxious controls had a bias to generate positive interpretations, while the socially anxious participants were more balanced in their interpretations. These findings suggest individuals with high levels of social anxiety make less positive interpretations of social information, in comparison with people who have low levels of social anxiety. Taken together, these findings provide evidence of a more negative/less positive interpretative bias in social phobia, as would be predicted from many of the cognitive models of anxiety (Beck et al., 1986; Bower, 1981; Clark &

McManus, 2002; Clark & Wells, 1995; Mathews & Mackintosh, 1998; Mogg & Bradley, 1998).

The early studies reviewed above examined biases in interpretation when individuals were asked to evaluate previously described social scenarios off-line. However, the cognitive models of Clark and Wells' (1995) and Clark and McManus' (2002) emphasise in-situ biases, which are thought to occur when socially phobic individuals encounter and process social situations on-line. As a result, some studies have also examined on-line interpretations. Eysenck, Mogg, May, Richards, and Mathews (1991) presented anxious and non-anxious participants with a set of ambiguous sentences that could be resolved in a negative or positive fashion; such as "The doctor examined little Emma's growth." Alternative versions of these sentences, which had been changed to make them obviously negative or positive (e.g., by referring to cancer or height) were then rated for similarity of meaning to the original sentences. The non-anxious group rated the positive versions as more similar to the original sentences than negative versions, whereas the anxious group rated a similar number of both the positive and the negative as being equivalent in meaning to the original. This suggests that non-anxious individuals were biased in favour of non-threatening or positive interpretations, whereas anxious participants appeared to be less biased. However, this may not have targeted on-line interpretations, because participants had to recall the original sentence and the possible interpretations, therefore, the interpretation may only have been made retrospectively.

To overcome this problem, Calvo, Eysenck, and Estevez (1994) presented people who had test-anxiety with incomplete sentences that implied a threatening continuation, and then immediately required a quick lexical decision for probe words that confirmed or disconfirmed the threatening meaning. If an inference had already been made about the likely outcome, then participants should have been faster to recognize a word that matched the inference. The non-anxious controls were faster than the test-anxious group at identifying word probes that disconfirmed the threatening meaning. Thus the non-anxious controls were more likely than were test-anxious individuals to make on-line inferences about a positive outcome.

Hirsch and Mathews (1997) investigated the extent to which individuals with high or low levels of anxiety about interviews, made emotionally-congruent interpretive inferences while reading descriptions of a relevant ambiguously-threatening event (being interviewed for a job). The non-anxious individuals were found to make positively biased interpretations of ambiguous information, while the highly anxious individuals made more realistic interpretations. Hirsch and Mathews (2000) conducted another study in which they used a lexical decision task to investigate on-line interpretations. People with social phobia showed no evidence of making on-line emotional inferences, in contrast with socially non-anxious controls who were found to be biased in favour of positive inferences.

The studies of interpretation discussed so far suggest that social anxiety is associated with a negative interpretation bias when retrospectively reviewing

previous social information, and lack the positive (protective) bias demonstrated by non-anxious individuals when processing ambiguous lexical information on-line. Perhaps surprisingly, there are few studies that have examined whether social phobia is associated with a bias in the interpretation of other sources of ambiguous social information, such as facial expressions.

Interpretation of facial expressions

As in studies of attentional bias, it is assumed that faces are more natural threat stimuli than words. However, to date, few studies using faces as stimuli to test interpretive processes in social phobia have been published. Pozo, Carver, Wellens, and Scheier (1991) investigated whether people with high social anxiety differed from those with low social anxiety in how they interpreted the facial expressions of an interaction partner. They answered questions in a structured interview, replying to what they thought was the live image of the interaction partner on a monitor, but was actually a video recording. The videotaped interviewer either maintained a consistently neutral facial expression or varied in expression (positive, neutral, or negative). Participants rated the interviewer's approval of them and interest in them. The high social anxiety group made less positive interpretations of the interviewer's facial expressions than did the non-socially anxious group

Winton, Clark, and Edelman (1995) investigated whether social anxiety is associated with an enhanced ability to detect negative emotion in others. Participants performed two tasks before and after a social threat was introduced. The first task involved identifying the emotion of facial expressions

(negative vs. neutral). The second involved rating the overall emotion conveyed in brief video recordings of an actor, and detecting discrepancies in the affect conveyed by the visual and auditory stimuli of the video. Overall the results suggested that the high socially anxious group had a response bias towards identifying others' emotional expressions as negative, but no enhanced ability to discriminate between different emotional states in others.

In a subsequent study, Richards et al. (2002) asked high and low socially anxious individuals to classify the emotional expressions of photographs of facial images that were derived from combining basic prototype emotional expressions to produce various degrees of emotional intensity (morphed images). The high socially anxious group was more likely to classify faces, containing some degree of fear, as fearful. However, an important limitation of this study is that it did not examine whether socially anxious individuals' increased ability to identify fear was due to an enhanced sensitivity to detect fear in ambiguous emotional expressions, which contained a small amount of fear, or simply whether socially anxious individuals had a response bias to label faces as fearful (as found by Winton et al., 1995).

The evidence reviewed above suggests that social phobia is associated with a tendency to interpret ambiguous social information more negatively, and/or less positively, than non-anxious individuals. These findings provide some support for predictions from Clark and Wells' (1995) and Clark and McManus' (2002) models of social phobia and general cognitive models of anxiety that propose negative biases in the interpretation of ambiguous information as one

of the main vulnerability factors for anxiety (Beck et al., 1986; Bower, 1981; Mathews & Mackintosh, 1998; Mogg & Bradley, 1998). However, it remains necessary for future studies to clarify whether the biased appraisal of ambiguous facial expressions in social phobia is better characterized by an enhanced or reduced sensitivity to specific emotional expressions, or simply by a tendency to classify faces (ambiguous or otherwise) negatively.

Conclusion

This review has examined the current evidence base for attentional and interpretative bias in social phobia. A detailed understanding of the mechanisms thought to underlie social phobia is important because treatment interventions for social phobia can be improved by gaining a more detailed understanding of the factors that cause and maintain the condition. Over recent years, the continued evaluations of both the general cognitive models of threat-processing in anxiety, and specific cognitive theories of social phobia, have produced an extensive empirical literature. As discussed, limitations with various attentional paradigms have prevented unambiguous assessment of attention allocation. However, findings to date suggest social phobia is associated with a complex pattern of attentional bias characterized by reduced processing of external social cues in favour of internal information and external non-social stimuli; together with a vigilant-avoidant attentional style when presented with multiple/competing cues signaling (negative) social evaluation. However, it remains necessary for future studies to examine the biases in evaluation of threat severity proposed to underlie attentional bias in social phobia.

Biases in stimulus appraisal are also considered likely to be central to the interpretative biases proposed to characterize socially phobic individuals' distorted evaluation of ambiguous social information. There is much evidence of negative off-line and less positive on-line inferential biases in social phobia, however, predicted biases in the interpretation of ambiguous emotional expressions has received considerably less research. It therefore seems necessary for future studies to further provide evidence for, and clarify the relationship between theoretically and clinically relevant attentional and interpretative face processing biases in social phobia (Clark & McManus 2002; Rapee & Heimberg, 1997).

Empirical Paper

Attentional and Interpretation Biases in Social Phobia

This preparation of this literature review has been based on the guidelines for submission to the Journal of Abnormal Psychology (see Appendix 1 for Instructions to Authors)

Abstract

Cognitive theories of social phobia suggest the disorder involves dysfunctional attentional and interpretative biases, which individuals with social phobia adopt when entering a feared social situation. Cognitive motivational models predict that anxiety leads to vigilance for stimuli of a lower threat value than that of stimuli which trigger vigilance in people with low trait anxiety.

In the present study people with clinical social phobia and non-clinical controls completed a visual probe task that measured attention allocation to angry, happy and fearful expressions of varying emotion intensities (25%, 50%, 75%, 100%). Participants also classified ambiguous emotional faces blended from two component prototype emotional expressions; angry-happy, happy-fear and fear-angry. Measures of emotional recognition accuracy and response bias were computed for each of the three emotion-combinations.

The socially phobic group demonstrated a significant attentional bias towards expressions of strong (100%) emotional content, irrespective of type of emotion, relative to controls. However, the groups did not differ in their sensitivity to correctly classify ambiguous expressions, or in their tendency to classify a presented face as angry, happy or fearful. The results are compared with empirical evidence from other studies of information processing bias in anxiety and social phobia, and the cognitive models of anxiety and social phobia are discussed in relation to the findings of this study.

Introduction

Social phobia is an anxiety disorder, which involves severe and persistent fear related to social situations involving possible scrutiny by others (American Psychiatric Association, 1994). Individuals with social phobia believe that they will behave in an embarrassing or humiliating manner during social interactions, and in extreme cases, actively avoid feared situations. However, while 'behavioural avoidance' (Beck, 1976) may prevent people with social phobia from disconfirming pre-existing fears of negative evaluation, social phobia is thought to be maintained by a number of other factors. This is because many sufferers are unable to avoid facing their fears in everyday life, and despite this behavioural exposure (which is typically an effective method of reducing the symptoms of anxiety disorders; Kazdin, 1978), people with social phobia fail to habituate to social situations.

Cognitive models of social phobia attempt to explain how information processing biases might play a significant role in maintaining the disorder. In an early cognitive formulation of social phobia, Clark and Wells (1995) suggested that social phobia was maintained by a range of information processing biases adopted before, during and after social interactions, with particular emphasis placed on those in-situ biases adopted within the feared social situation. Upon entering a feared social situation, perceptions of threat are characterised by the activation of negative assumptions about poor performance and negative evaluation, which lead to reduced processing of external social cues and a tendency to interpret ambiguous social cues in a negative fashion. Once a social scenario elicits perceptions of threat and

danger, physiological symptoms of anxiety increase (e.g., blushing, sweating, trembling), and are used to construct an image of the self as a social object (taken from the perspective of the observer), which emphasises negative aspects of performance and behaviour. This attentional shift switches the focus of attention from the environment to internal processing of the self, further increases awareness of physiological symptoms of anxiety, and interferes with processing of external social cues.

Clark and Wells (1995) also propose that people with social phobia engage in a range of behaviours intended to reduce the risk of negative evaluation. Such behaviours include avoiding eye contact, not joining in conversations, or talking incessantly for fear of silences. However, while these 'safety behaviours' might alleviate discomfort in the short-term, they actually prevent detailed processing of the social situation and hamper disconfirmation of pre-existing fears of negative evaluation, thus maintaining the phobia.

A similar cognitive model of social phobia was constructed by Rapee and Heimberg (1997). They suggested that upon entering social situations, individuals with social phobia are motivated to monitor socially-relevant information from a range of sources. In an effort to assess whether their performance achieves a perceived (typically high) performance standard, people with social phobia allocate attentional resources to both a detailed monitoring of internal cues (used to develop a representation of how they appear to others) and to external social cues, such as audience feedback. Rapee and Heimberg (1997) suggest that attention to external social cues (e.g., facial

expressions) is biased in favour of detecting cues that signal negative evaluation (e.g., signs of boredom, frowns). Furthermore, socially phobic individuals detect such signs rapidly, and have difficulty disengaging attention from them. Thus, Rapee and Heimberg (1997) make similar predictions to Clark and Wells (1995) regarding the importance of self-focus in maintaining anxious concerns. However, the models make competing predictions regarding the extent to which phobic individuals process external social information. Clark and Wells (1995) suggest that people with social phobia avoid attending to external cues, as their attention is focused internally, while Rapee and Heimberg (1997) consider greater vigilance for external social cues plays a significant role in enhancing and maintaining perceptions of threat in social phobia.

More recently Clark and McManus (2002) elaborated on Clark and Wells's (1995) original model of social phobia by explaining that although reduced processing of social cues prevents accurate audience appraisal and plays an important role in maintaining socio-evaluative concerns in social phobia, attention is also directed to external social information, where cues signalling negative evaluation (e.g., angry faces) and ambiguous cues are interpreted negatively.

The specific cognitive models of social phobia reviewed above compliment predictions made by general models of threat processing in anxiety (e.g., Beck, 1976; Bower, 1981; Eysenck, 1992; Mathews & Mackintosh, 1998; Mogg & Bradley, 1998; Williams, Watts, MacLeod, & Mathews, 1988, 1997). General

cognitive models of anxiety suggest that anxious individuals' perceptions of threat and danger are in part caused and maintained by a tendency to selectively process negative aspects of the environment. In an early cognitive formulation of anxiety Williams et al. (1988) proposed that anxious individuals selectively allocate attention towards threat information, particularly when levels of state anxiety are high. In contrast, non-anxious individuals were considered to shift attention away from threat stimuli, and avoidance was thought to increase with state anxiety (Williams et al., 1988, 1997). Thus, when entering feared social situations (e.g., when giving a performance) the model predicts that individuals with social phobia might selectively attend to negative facial expressions (consistent with Rapee & Heimberg, 1997) but that low anxious individuals become increasingly avoidant of threat cues as state anxiety increases. While predictions of vigilance for threat in social phobia are consistent with proposals from Rapee and Heimberg (1997), the notion that low anxious individuals increasingly avoid threat as anxiety increases has less support. Specifically, according to evolutionary models of fear and threat processing, even low anxious individuals should selectively process external cues that are of a significant threat value (or encountered within a significantly threatening situation). Indeed, avoidance of such cues would be maladaptive (Darwin, 1972; Ohman, Flykt, & Esteves, 2001). As a result, recent cognitive models of anxiety revise earlier predictions regarding attention to threat in anxious and non-anxious individuals, and more clearly describe mechanisms that might underlie individual differences in threat processing.

In their cognitive-motivational analysis of anxiety Mogg and Bradley (1998; see also Mathew & Mackintosh, 1998) propose that anxiety disorders (e.g., social phobia) are characterised by an attentional bias to threat (e.g., negative social cues), however, low anxious individuals also selectively attend to stimuli of sufficient threat value. Thus the model suggests that individuals (irrespective of anxiety level) are motivated to attend to those stimuli that they subjectively evaluate (by a "Valence Evaluation System") as threatening. As such, the anxiety-related differences in attention allocation to threat become apparent when individuals differ in their evaluation of a stimulus as threatening. Thus, while Williams et al. (1988, 1997) considered the direction of the attentional bias to threat (i.e., vigilance vs. avoidance) to be the principle vulnerability factor for anxiety, Mogg & Bradley instead suggest a tendency to evaluate a stimulus as threatening predisposes an individual to anxiety.

According to models that emphasise biases in valence evaluation/stimulus appraisal, individuals with social phobia differ from non-anxious individuals in the extent to which they evaluate social stimuli as threatening. Thus, while everyone would be predicted to selectively process facial expressions that display strong negative evaluation, only people with social phobia would be predicted to negatively evaluate and, therefore, orient towards mild emotional expressions. Interestingly, a bias in stimulus evaluation would not only underlie attentional bias in social phobia, but also the proposed tendency to interpret ambiguous social events/information in a negative fashion, and mildly negative information in a catastrophic fashion (Clark & Wells, 1995).

To summarize, recent years have seen the development of a series of cognitive models, which propose that perceptions of social threat in social phobia are enhanced and maintained by an attentional bias to negative social cues, and a tendency to interpret ambiguous cues as negative. Furthermore, general cognitive models of anxiety suggest these biases reflect individual differences in stimulus evaluation. Given the clinical importance cognitive models have in informing the development of efficacious psychological treatments (e.g., CBT), it is necessary to empirically clarify whether predicted attentional and interpretative biases are evident in social phobia.

Attentional Biases in Social Phobia

Early studies examining attentional bias in anxiety disorders used a modified version of the Stroop Task (Stroop, 1935). The emotional Stroop task (Mathews & MacLeod, 1985) involves words of a threatening nature and other neutral words being displayed in different coloured ink, which participants are asked to name, whilst ignoring the word meaning. Vigilance for threat in anxiety is said to lead to anxious individuals taking longer to colour-name words that are relevant to their anxious concerns (e.g., public speaking in social phobia), relative to non-threat words, compared to low anxious individuals.

Several studies using the emotional Stroop have demonstrated that people with social phobia are slower to colour-name social threat words compared to people with other anxiety disorders and non-anxious controls (e.g., Becker, Rinck, Margraf, & Roth, 2001; Hope, Rapee, Heimberg, & Dombeck, 1990; Lundh & Ost, 1996; Maidenberg, Chen, Craske, Bohn, & Bytritsky, 1996;

Mattia, Heimberg, & Hope, 1993). While these findings suggest that people with social phobia are vigilant for negative information related to social situations, some authors have questioned the extent to which Stroop interference unambiguously reflects vigilance as opposed to effortful avoidance of word content. Furthermore, emotional Stroop interference could be caused by the emotional word triggering processes, such as negative thoughts (Williams, Mathews, & MacLeod, 1996) which are not relevant to attentional processes. Therefore, longer response times may not necessarily be indicative of vigilance, but may instead be the result of distraction by task irrelevant processes. As a result, researchers have turned to other paradigms which examine biases in visuo-spatial attention in anxiety.

The visual probe task with words requires participants to look at a fixation cross in the middle of the screen, which is replaced by two stimuli (e.g., a threatening and a neutral word). These stimuli are then replaced by one of two possible types of probe, either in the location where the threatening word had been displayed or where the neutral word had been displayed. Participants' reaction times to correctly classify the probe are measured. Faster reaction times to classify probes that appear in the same location as the threat word (relative to non-threat word) indicate vigilance for threat with slower reaction times conversely indicating avoidance.

In an initial study, MacLeod, Mathews, and Tata (1986) found that high trait anxious individuals were significantly faster to classify probes appearing in the location of threat relative to non-threat words, in comparison to low anxious

individuals. This is consistent with predictions of vigilance for threat in anxiety. Vigilance for threat word stimuli was also found in a more recent study of social phobia (Musa, Lepine, Clark, Mansell, & Ehlers, 2003), however, a number of other studies have failed to find any evidence of an attentional bias to social threat words in social phobia or in people with high levels of social anxiety (Amir, Elias, Klumpp, & Przeworski, 2003; Horenstein & Segui, 1997; Mansell, Ehlers, Clark, & Chen, 2002).

Mixed evidence of attentional bias for threat words in social phobia provides only partial support for predictions from cognitive models, and is limited when considering that effects might reflect individual differences in word usage (i.e., greater threat word usage and familiarity in socially phobic individuals, Mogg & Bradley, 1999). Another limitation of studies using words as threat stimuli is that they do not pose any direct threat (i.e., aren't encountered as direct threat stimuli in naturally occurring social settings), and so are less likely to be considered as an ecologically valid source of threat compared to other social stimuli (e.g., facial expressions). As a result, researchers have increasingly adapted visual probe tasks by examining attentional biases to emotional expressions in social phobia.

Initial studies using the modified visual probe task examined socially anxious and non-anxious individuals' allocation of attention to face versus non-face (object) stimuli. Results indicated that individuals with high levels of social anxiety avoided emotional faces (when experiencing social stress, Mansell, Clark, Ehlers, & Chen, 1999) and individuals with social phobia were more

likely to avoid faces (Chen, Ehlers, Clark, & Mansell, 2002) when paired with objects, compared to non-anxious controls. These findings support the idea that reduced processing of social cues is characteristic of social phobia (Clark & McManus 2002; Clark & Wells, 1995). In contrast, studies that have examined selective attention between competing social cues (e.g., an angry face paired with a neutral face) have found a different pattern of attentional bias. For example, vigilance for threat faces has been observed at early stages of face presentation in social anxiety (Mogg & Bradley, 2002) and social phobia (Mogg, Philippot, & Bradley, 2004). Interestingly in this latter study, initial vigilance for threat when faces were presented for 500 ms appeared to shift towards avoidance of threat cues when faces were presented for the longer time of 1250 ms (Mogg et al., 2004). This vigilance-avoidance pattern of attentional bias in social phobia has received additional support from a recent study that used eye-movement measures to assess attention allocation within a visual probe task (Garner, Mogg, & Bradley, in press) and a study utilizing visual scan-path analyses of emotional face processing (Horley, Williams, Gonsalvez, & Gordon, 2003).

Taken together these studies provide some support for predictions that social phobia is characterised by reduced processing of social cues (when a non-social object is available) (Clark & McManus 2002; Clark & Wells, 1995), but vigilance for threat when processing competing social material (Clark & McManus, 2002; Rapee & Heimberg, 1997). However, whether socially phobic and non-socially phobic attentional biases vary according to differences in threat severity (Mogg & Bradley, 1998) remains to be explored.

Only one study has used the visual probe task with faces to examine the relationship between threat intensity and attentional bias in anxiety. Wilson and MacLeod (2003) examined high and low trait anxious individuals' attentional bias to very low, low, moderate, high, and very high threat stimuli (i.e., angry-neutral faces that had been morphed to display different strengths of emotion). Results indicated that both people with high trait anxiety and low trait anxiety tended to avoid looking at faces containing low levels of anger, and were both vigilant to faces with high levels of anger. However, faces with moderate levels of anger were avoided by the low anxious group and attended to by the high anxious group. This finding supports cognitive motivational models of anxiety, which propose that individual differences in threat evaluation underlie attentional biases (Mathews & Mackintosh, 1998; Mogg & Bradley, 1998).

It remains unclear whether individuals with clinical social phobia might also demonstrate enhanced vigilance for social cues that convey a mild/moderate amount of negative evaluation relative to non-socially phobic individuals. Furthermore, it seems necessary to extend the limited literature that has examined the negative interpretation biases proposed to maintain the perception of negative evaluation in social phobia (Clark & McManus, 2002).

Interpretation Biases in Social Phobia

To date, the study of interpretive bias in social phobia has compared anxious and non anxious individuals' interpretations of ambiguous descriptions of social scenarios, words and sentences (see Hirsch & Clark, 2004, for review).

Evidence from studies using lexical material has found evidence that people with social phobia interpret previously described social scenarios negatively (Amir, Foa, & Coles, 1998; Stopa & Clark, 2000), and that people with high social anxiety lack the healthy 'positive' interpretation bias demonstrated by non-anxious individuals (Constans, Penn, Ihen, & Hope, 1999). Taken together these findings provide some support for predictions from cognitive models (Beck, 1976; Bower, 1981; Clark & McManus, 2002; Clark & Wells, 1995; Mathews & Mackintosh, 1998; Mogg & Bradley, 1998).

In addition to studies that have assessed off-line interpretations of ambiguous social information (i.e., previously described scenarios), research has examined whether social phobia is associated with negative interpretation of social information on-line. Tasks examining speeded lexical designs to examine interpretations of ambiguous sentences, suggest socially anxious individuals fail to make the positive on-line inferences that characterise low anxious controls (Hirsch & Mathews, 1997, 2000).

More recently, studies have examined whether these maladaptive interpretation biases extend to other sources of ambiguous social information (e.g., ambiguous facial expressions). In an initial study, Winton, Clark, and Edelmann (1995) found that socially anxious individuals were more likely to classify briefly presented faces as negative compared to controls, but were not more sensitive at identifying negative emotion. In a related study, Richards et al. (2002) morphed different emotional expressions and found that people with high social anxiety interpreted faces containing a small degree of fear as more

fearful than they actually were, while people with low social anxiety showed no such bias. However, it is not clear whether this bias reflected enhanced sensitivity to specific emotional expressions, or alternatively, a tendency to classify all stimuli as being fearful. At the time of writing, no published studies have examined interpretation of ambiguous faces in people with a diagnosis of social phobia.

Aims of the Current Study

The aim of the present study was to extend previous research into attentional and interpretive biases in social phobia, by examining the extent to which anxiety-related differences in attentional processes vary as a function of emotion intensity (Mathews & Mackintosh, 1998; Mogg & Bradley, 1998). Biases in stimulus appraisal are also considered likely to be central to the interpretive biases proposed to characterize social phobia. However, no studies have examined socially phobic individuals' appraisals of ambiguous emotional expressions, or the relationship between appraisal of ambiguous expressions and attention towards expressions of varying emotional intensities.

Participants with a diagnosis of generalized social phobia and healthy controls completed two tasks. To compare attentional bias to faces as a function of emotion intensity, participants completed a modified visual probe task. Angry, happy and fearful faces were combined with neutral expressions in order to create expressions with 25%, 50%, 75% and 100% emotion intensities. Angry and happy expressions have been extensively used in studies examining attentional bias in other anxiety disorders (see Mogg & Bradley, 1998 for

review). There is also increasing evidence of anxiety-related individual differences in the processing of secondary sources of threat (such as fear expressions, see Fox et al., 2005). In light of predictions from cognitive models of social phobia (Clark & McManus, 2002; Rapee & Heimberg, 1997) it was hypothesised that individuals with social phobia would demonstrate greater vigilance for negative (angry and fear) expressions relative to healthy controls. Furthermore, based on cognitive motivational theories of anxiety, it was predicted that individuals with social phobia would demonstrate vigilance not only for potent signs of negative evaluation, but also expressions of moderate fear and anger intensity. In contrast, healthy controls would only be vigilant for stimuli that conveyed potent expressions of negative affect.

To examine interpretive biases, participants were asked to classify ambiguous emotional expressions blended from two component emotional expressions (used in the attention task); angry-happy, happy-fear and fear-angry. This combination of expressions allows the specificity of any group differences in recognition accuracy or response bias (a tendency to simply label any presented expression as depicting a certain emotion) to be identified. To check groups did not differ in their ability to recognise non-ambiguous emotional expressions, all participants classified all prototype images used to create emotional blends.

Consistent with proposals from specific cognitive models (Clark & McManus, 2002; Clark & Wells, 1995) it was predicted that individuals with social phobia would be less accurate in classifying subtle, emotionally ambiguous facial expressions relative to controls. It was further predicted that socially phobic

individuals' reduced discrimination accuracy would be associated with a tendency to classify ambiguous expressions in a more negative fashion, compared to controls. Finally, in line with evidence of positive inferential processes in low, but not high socially anxious individuals (Hirsch & Mathews, 1997; 2000) it was further predicted that controls would demonstrate a response bias favouring the classification of ambiguous faces as happy.

Method

Ethical approval for this study was obtained from the North and Mid Hampshire Local Research Ethics Committee, and approval was also given by the Research and Development Department for the Hampshire Partnership NHS Trust (see Appendix 2).

Participants

Suitable clinical participants (meeting DSM-IV diagnostic criteria for generalised social phobia) were recruited from the Mood Disorder Clinic at the Royal South Hants Hospital, the National Phobic's Society website, and in the local media (see Appendix 3). Verbal consent was obtained for the researcher to approach people attending the outpatient clinic. Individuals who were interested in participating were given an information sheet (see Appendix 4) detailing the aims of the study, what it would involve, and their rights as participants. They had the opportunity to ask any questions and consent was obtained in writing from those who wished to participate in the study (see Appendix 5).

Control group participants were recruited from advertisements at the University of Southampton and in the local media (see Appendix 3). They were informed about the selection criteria for the study and were warned that the study would involve them giving information about their mood (i.e., anxiety, depression) and concerns (e.g., social worries). Those who wished to participate were given an information sheet (see Appendix 6) and had the opportunity to ask any questions. Consent was obtained in writing (see Appendix 5).

All participants were aged between 18 and 65 years. Participants in the clinical group had a diagnosis of social phobia, as determined by the Modified International Neuropsychiatric Interview (Sheehan & Lecrubier, 1998). The control group participants were matched as closely as possible to the clinical group participants on the basis of age, gender and level of education, and had no known history of psychiatric disorder.

13 clinical participants and 16 control participants were recruited. One participant in the clinical group provided incomplete data for the attention and interpretative tasks. Two participants in the control group had uncharacteristically high scores on a measure of social anxiety (greater than 60 on the Liebowitz Social Anxiety Scale, Liebowitz, 1987), which were more than 3.5 standard deviations above the mean level of social anxiety in the control group. These scores were further confirmed as outliers using Box-plots, therefore, data from these participants were removed from all analyses. Thus,

data is reported for 12 participants in the clinical group (7 males, 5 females, mean age 32) and 14 control participants (5 males, 9 females, mean age 28).

Measures

The Modified International Neuropsychiatric Interview (MINI) (Sheehan & Lecrubier, 1998) – The MINI is a structured diagnostic interview, which is used as a standard clinical tool at the Mood Disorder Clinic where the study was conducted. It was developed to meet the need for a simple, short and reliable diagnostic structured interview exploring DSM-IV criteria. It generates positive diagnoses for common psychiatric disorders, such as: depressive disorders, anxiety disorders, eating disorders and substance abuse. It also explores psychotic symptoms. The instrument was validated by an international study (Amorim, Lecrubier, Weiller, Hergueta, & Sheehan, 1998).

Montgomery Asberg Depression Rating Scale (MADRS) (Montgomery & Asberg, 1979) – The MADRS is a depression rating scale designed to be particularly sensitive in the clinical range. The inter-rater reliability is high and scores on the scale correlate significantly with scores on another standard rating scale for depression (e.g., Hamilton Rating Scale, Hamilton, 1986), indicating its validity as a general severity estimate (Khan, Khan, Shankles, & Polissar, 2002).

Liebowitz Social Anxiety Scale (LSAS) (Liebowitz, 1987) – The LSAS is a scale that assesses fear and avoidance in 24 situations, which are likely to elicit social anxiety. Respondents rate the amount of fear and avoidance they would

have experienced in each of the situations during the past week. The LSAS has proved to be highly reliable and has demonstrated strong convergent validity (Heimberg et al., 1999). The LSAS has also shown adequate discriminant validity by demonstrating significantly stronger correlations with measures of social anxiety than with measures of depression in a sub-sample of patients who had completed acute treatment (Heimberg et al., 1999).

State Anxiety Inventory (SAI) (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs., 1983) – This 20-item self-report measure assesses levels of transient state anxiety, has well established psychometric properties (Wells, 1997) and is used extensively in experimental psychopathology research.

Beck Depression Inventory, version II (BDI-II) (Beck, Brown & Steer, 1996) – This 21-item self-report instrument examines severity of depressive symptoms and has been found to have good psychometric properties (Kendall, Hollon, Beck, Hammen, & Ingram, 1987).

Social Avoidance and Distress Scale (SADS) (Watson & Friend, 1969) – This 28-item self-report measure assesses symptom severity in social phobia and has been widely used in social phobia research (Wells, 1997).

Fear of Negative Evaluation Scale (FNES) (Leary, 1983) – This is a 30-item self-report measure that is often used in social phobia research. It has high internal consistency of 0.90 (Leary, 1983).

Social Desirability Scale-Abbreviated (SDS) (Strahan & Gerbasi, 1972) – This is a 10-item self-report scale, in which high scores may indicate a tendency to under or over report information in order to create a favourable impression. A short form of the SDS was used, which was found to correlate .96 with the full SDS (Fischer & Fick, 1993). This scale was included because defensiveness may be a confounding variable affecting measures of anxiety and attentional bias (e.g., Eysenck, 1997; Fox, 1993).

Measure of Attentional Bias: The Modified Visual Probe Task

Prototype angry, fearful, happy and neutral expressions from four male and four female models (code: 21m, 23m, 27m, 34m, 01f, 03f, 07f, 08f) were selected from the NimStim face set (MacArthur Foundation Research Network on Early Experience and Brain Development, 2002). For each of the eight models, all three prototype expressions were blended with the neutral expression to create 8 angry-neutral, 8 fear-neutral and 8 happy-neutral continua. Each continuum was prepared using Gryphon Morph v2.5 software (Maxwell, 1994), which is similar to the methods of delineation and interpolation used in studies investigating categorical perception of emotional expression (e.g., Young et al., 1997). Each continuum contained four expressions of increasing emotional intensity: three morphed expressions (25%, 50%, 75%) and the emotion prototype (100%) (see Figure 4). The resulting 96 emotional faces were paired with the neutral expression of the same model, greyscaled and presented as the stimulus pairs in the visual probe task.



Neutral 25% Angry 50% Angry 75% Angry Angry Prototype

Figure 4: Example angry face continuum used in the attentional task

The stimuli were presented using MEL version-2 software (Schneider, 1995) on a Pentium III 450 MHz PC and 15" VGA monitor. Reaction time responses were obtained via a MEL version-2 response box.

Interpretation Task

Prototype angry, happy and fearful expressions from the same four male and four female models used in the attention task were used to create three emotional continua (per model): Angry-Happy, Happy-Fear and Fear-Angry (see Figure 5). Prototype images were combined to create two emotional facial expressions that slightly differed in emotional valence for each of the three emotional continua (e.g., for the angry-happy continua one face was 60% angry: 40% happy, and the other 40% angry: 60% happy). The preparation of each continuum used Gryphon Morph v2.5 software (Maxwell, 1994) and is similar to image manipulation techniques used in studies investigating categorical perception of emotional expression (e.g., Young et al., 1997). Stimuli were 120 mm high and 90 mm wide, and were presented in greyscale

- psychiatrist for up to 30 minutes in order to discuss any diagnoses and consider treatment options.

Attention Task – Participants completed both information processing tasks in a testing cubicle with the lights off. They were seated 1m in front of a computer screen, with their heads supported by a chin rest in order to minimise head movements during the attentional task. Each trial of the task started with a central fixation cross shown for 1000 ms which was replaced by a pair of pictures presented side by side for 500 ms. The pictures measured 90 x 110 mm with their inner edges 45 mm apart. Immediately after the presentation of the picture pair, a probe (either two vertical dots : or two horizontal dots ..) was presented until response, or for a maximum of 10 seconds, in the position of one of the preceding pictures. The visual angle between the two probe positions was 7.7 °. Participants were asked to press one of the two response buttons as quickly as possible to classify the probe as vertical or horizontal. The inter-trial interval varied randomly between 750 ms and 1250 ms. Participants were instructed to look at the fixation cross at the start of each trial. There were 8 practice trials followed by 2 buffer trials and 384 randomly presented experimental trials. The 96 face pairs were presented 4 times, balanced for emotional face location and probe location. The task took approximately 30 minutes to complete.

Interpretation Task – Each of the three continua were presented in a separate block (order counterbalanced across participants). Each trial began with a fixation cross shown for 500 ms which was replaced by a face until response,

followed by an inter-trial interval of 1000 ms. Participants were informed that their task was to classify each face using one of six response options labeled on the keyboard in front of them. For example, during the Angry-Happy block, the response options were: “Very Angry”, “Moderately Angry”, “Slightly Angry”, “Slightly Happy”, “Moderately Happy” or “Very Happy”. For each block, the 16 prototype expressions used to create ambiguous expressions, and all 32 morphed ambiguous expressions were presented once in a random order. The task took approximately 25 minutes to complete.

Self-Report Measures – Just before the attentional task and after the interpretation task, participants rated their current mood using the Spielberger State Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). At the end of the session, participants completed the following questionnaires: Beck Depression Inventory (Second edition) (BDI-II, Beck, Brown, & Steer, 1996), Social Avoidance and Distress Scale (SADS, Watson & Friend, 1969), Fear of Negative Evaluation Scale (FNES, Leary, 1983), and a short form of the Social Desirability Scale (SDS, Strahan & Gerbasi, 1972). Finally, participants were verbally debriefed and given a written description of the study to take home (see Appendix 7). This final part of the procedure took 20-30 minutes to complete.

Results

Group Characteristics

The social phobia group had significantly higher scores on all measures of social anxiety and mood compared to controls (see Table 1 for means and t-test

results). Groups did not differ significantly in SDS scores, age, education or gender ratio, $\chi^2 = 0.54, N = 26, ns$.

Table 1
Comparison between the Scores of the Social Phobia (SP) and Control Groups on all Measures

	SP		Controls		<i>t</i> (24)	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
LSAS ANXIETY	40.417	8.469	14.571	6.186	8.974	<.001
LSAS AVOID	33.750	13.390	10.143	6.150	5.922	<.001
LSAS TOTAL	74.167	21.468	24.714	11.822	7.421	<.001
SAI-S 1	42.250	8.996	30.857	7.513	3.521	<.005
SAI-S 2	41.833	10.521	29.500	7.02468	3.562	<.005
BDI-II	19.667	12.773	2.214	3.378	4.930	<.001
MADRS	19.417	12.011	4.643	3.272	4.428	<.001
FNES	25.000	4.862	11.000	7.060	5.786	<.001
SADS	22.667	4.830	2.857	2.656	13.217	<.001
SDS	4.667	1.435	5.4286	1.742	1.204	.240
Age	31.417	11.912	27.571	13.653	0.759	.455
Education	19.583	2.539	18.714	0.825	1.212	.237
Gender ratio, m/f	6/6		5/9			

Note. LSAS ANXIETY = Liebowitz Social Anxiety Scale: Index of anxiety (Liebowitz, 1987); LSAS AVOID = Liebowitz Social Anxiety Scale: Index of avoidance; LSAS TOTAL = Liebowitz Social Anxiety Scale: Total score; SAI-S 1 = State Anxiety Inventory: prior to experimental tasks (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs., 1983); SAI-S 2 = State Anxiety Inventory: after experimental tasks; BDI-II = Beck Depression Inventory: version II (Beck, Brown & Steer, 1996); MADRS = Montgomery Asberg Depression Rating Scale; FNES = Fear of Negative Evaluation Scale (Leary, 1983); SADS = Social Avoidance and Distress Scale (Watson & Friend, 1969); SDS = Social Desirability Scale (Strahan & Gerbasi, 1972); Education = Age when left full time education.

Data Preparation for Attention Task

Data from trials with errors were eliminated, (4.2% of data) and, following inspection of box and whisker plots, reaction times (RTs) of more than 1250 ms were excluded as outliers. Mean RTs were calculated for each Emotion x Morph Intensity x Emotional Face Location x Probe Location condition (see Appendix 8). Consistent with previous studies examining attentional bias to emotional material in anxiety (e.g., Bradley, Mogg, Falla, & Hamilton, 1998), attentional bias scores were computed for each Emotion x Morph condition. Attentional bias indices (for each Emotion x Intensity pair-type) were calculated to express the degree to which RTs were reduced for probes appearing in the location of emotional faces, compared to neutral faces. This attentional bias was computed using the following equation (cf. Bradley et al., 1998; MacLeod & Mathews, 1988):

$$\frac{(PL | AFR - PL | AFL) + (PR | AFL - PR | AFR)}{2}$$

2

where PL | AFR corresponds to classification latencies from trials involving the probe left and, angry face 25% intensity right conditions. Attentional bias scores will be 0 in the absence of a bias in selective attention, positive in the presence of an attentional bias toward critical face stimuli, and negative in the presence of an attentional bias away from critical face stimuli (see Table 2 for attentional bias scores).

Table 2
Attentional Bias Scores in the Social Phobia (SP) and the Control Groups

Variables	SP		Controls	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Critical picture				
Angry 25%	22.730	72.605	-0.402	40.601
Angry 50%	34.536	61.858	7.906	35.260
Angry 75%	30.061	52.570	2.240	42.524
Angry 100%	66.193	92.494	12.655	47.936
Fearful 25%	-7.378	32.042	-14.435	33.589
Fearful 50%	-9.377	42.948	-15.477	34.020
Fearful 75%	36.866	76.982	0.866	40.288
Fearful 100%	59.912	76.291	1.349	39.594
Happy 25%	-2.035	53.670	-8.301	44.479
Happy 50%	13.547	47.127	13.156	29.408
Happy 75%	-9.586	54.107	13.339	32.608
Happy 100%	70.948	71.678	21.514	46.215

Mean Attentional Bias scores were entered into a 2 x 3 x 4 mixed design ANOVA with Group (SP vs. control) as a between subjects-factor, and Emotional Face (angry, fear, happy) and Emotion intensity (25%, 50%, 75%, 100%) as within-subjects factors.

There was a significant interaction between emotion intensity and group, $F(3, 72) = 4.150, p = .009$, (see figure 6). Follow-up one-way ANOVAs with emotion intensity as a within-subjects factor were conducted for each group separately. Results for the control group were non-significant, $F(3, 39) = 1.661, p = .191$. In the social phobia group there was a significant main effect of emotion intensity, $F(3, 33) = 11.199, p < .001$. Post hoc pair-wise comparisons reveal the social phobia group had a significantly greater attentional bias for 100% expressions compared to all other intensities ($ps <$

.023), all other comparisons were non-significant. A series of independent samples t-tests were conducted to examine whether social phobics and controls differed in attentional bias at each emotion intensity. The social phobia group had a significantly larger attentional bias to 100% expressions compared to controls, $t(24) = 2.88, p < .01$. Groups did not differ for any other intensities, $t(24) < 1.69, ps > .10$.

In addition a significant main effect indicated that the socially phobic group had a significantly greater attentional bias (vigilance; 25.53 ms) for emotional faces, irrespective of emotion type and intensity compared to the control group (2.87 ms), $F(1, 24) = 6.673, p = .016$. There was a significant main effect of emotion intensity, $F(3, 72) = 11.549, p < .001$. Post hoc Bonferoni pair-wise comparisons indicate that overall, participants had a greater attentional bias towards 100% expressions (38.76 ms) compared to all other emotion intensities ($ps < .02$; 25% = -1.64ms; 50% = 7.38ms; 75% = 12.30ms); all other pair-wise comparisons were non-significant. However, it is important to note that these main effects were qualified by the Group x Emotion Intensity interaction reported earlier.

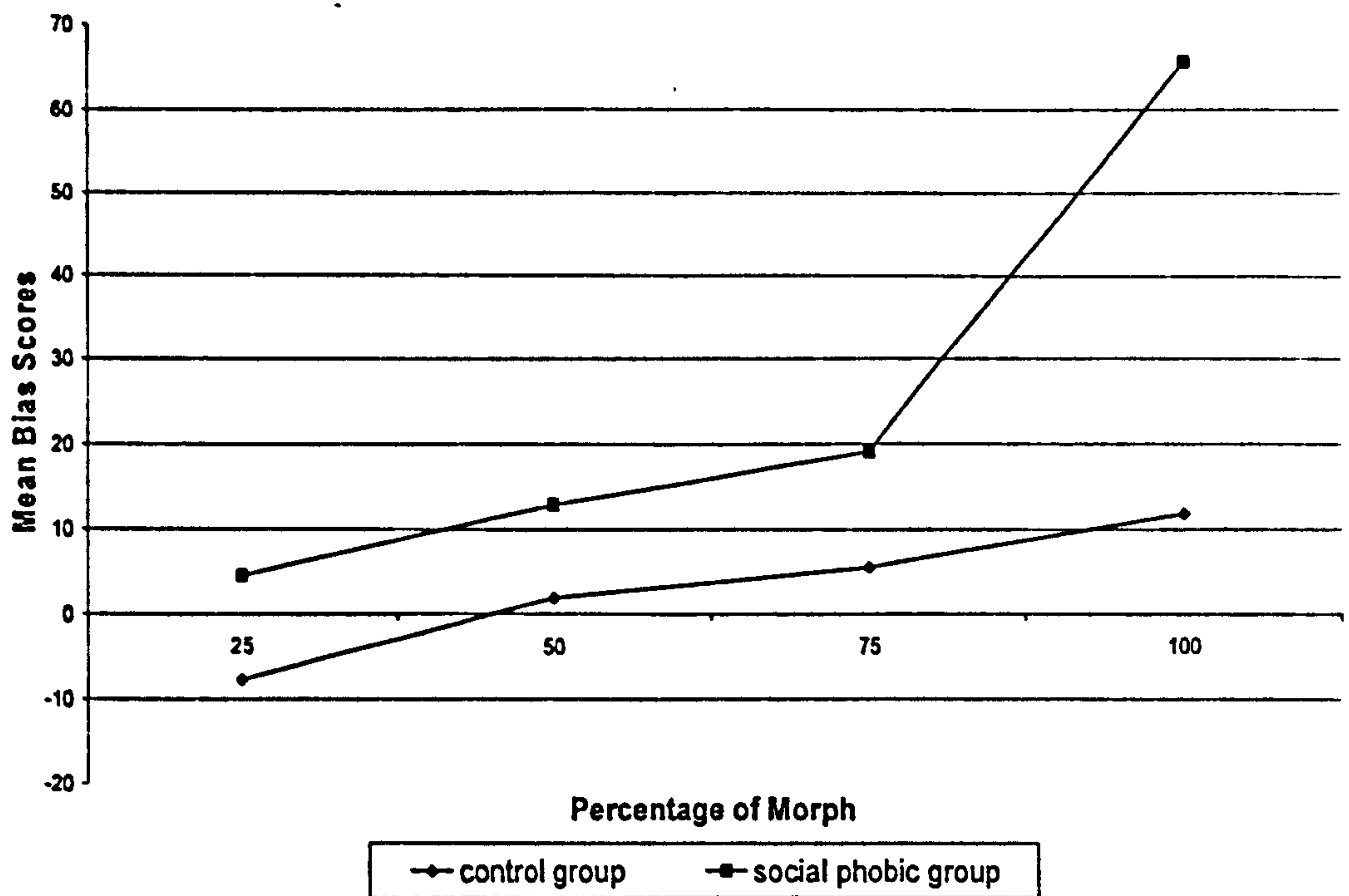


Figure 6: Mean attentional bias scores for both groups across degrees of emotionally morphed faces

Finally, to examine whether either group exhibited significant vigilance (or avoidance), attentional bias scores for each intensity were compared against zero (no bias). The social phobia group demonstrated a significant attentional bias to 100% expressions, $t(11) = 3.64, p < .005$ and a non-significant trend to be vigilant for 75% expressions, $t(11) = 1.96, p = .07$. All other results for the social phobia group, $t_s(11) < 1.34, p_s > .21$, and control groups, $t_s(13) < 1.13, p_s > .11$, were non-significant. All other results from the ANOVA were non-significant; Emotion $F(2, 48) = 2.449, p = .097$, Emotion x Group $F(2, 48) = 1.678, p = .198$, Emotion x Intensity $F(6, 144) = 1.191, p = .314$, and Group x Emotion x Intensity, $F(6, 144) = 0.573, p = .752$.

Interpretation of Ambiguous Emotional Expressions

One participant in the clinical group provided incomplete data for the interpretation task and was removed from subsequent analyses, leaving 11 clinical participants and 14 controls. All participants correctly identified every single prototype face as angry, happy or fearful. Thus, individuals with social phobia and healthy controls did not differ in their ability to recognise the prototype emotions used to generate ambiguous expressions.

Consistent with recent studies of face processing bias in psychiatric disorders (Surguladze et al., 2004), raw data from ambiguous face trials were transformed into measures of accuracy (ability to discriminate between the two component emotions) and response bias (tendency to select a given response independent of face content) for each of the three continua using non-parametric signal detection analysis. Consistent with Donaldson (1992), a hit (H) denotes an accurate classification of the dominant emotion (e.g., an “angry” classification of a face that was 60% angry and 40% happy) and a false alarm (FA) is when the weaker emotion is identified rather than the stronger emotion (e.g., an “angry” classification of a face that was 40% angry and 60% happy). Following from Donaldson (1992), using the distribution-free non-parametric model, the discrimination index A' was computed using the formulae:

- (i) For $H \geq FA$: $A' = 0.5 + [(H - FA)(1 + H - FA)]/[4H(1 - FA)]$
- (ii) For $FA > H$: $A' = 0.5 - [(FA - H)(1 + FA - H)]/[4FA(1 - H)]$.

The bias index B''_D was calculated using the formula:

$$B''_D = [(1 - H)(1 - FA) - (H)(FA)] / [(1 - H)(1 - FA) + (H)(FA)].$$

The discrimination scores range between 0 and 1. When $H = FA$ (i.e., performance is at chance), $A' = 0.5$. A score above 0.5 indicates above chance discrimination between component emotions (e.g., angry-happy). Response bias measures range between -1 and $+1$, with positive values reflecting conservative performance (e.g., reluctance to classify a face as angry) and negative values indicating liberal response bias (willingness to classify a presented face as angry, Donaldson, 1992). A zero value indicates a neutral bias. Kolmogorov-Smirnov tests revealed all distributions of sensitivity A' and response bias B''_D did not differ significantly from normality, $ps > .76$. Sensitivity and response bias scores for each continua and group are presented in Table 3.

Table 3
Sensitivity and Response Bias Scores for each Continua and Group

		SP		Controls	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
A'	Angry-Happy	.84	.069	.82	.07
	Happy-Fear	.82	.072	.83	.09
	Fear-Angry	.79	.081	.85	.06
B'' _D	Angry (A-H)	-.36	.52	-.56	.50
	Happy (H-F)	.42	.43	.50	.36
	Fear (F-A)	-.04	.48	-.05	.62

Note: see footnote ¹

Sensitivity to Discriminate Emotions

A 3 x 2 ANOVA was carried out on A' scores, with continuum (angry-happy, happy-fear and fear-angry) and group (SP vs. controls) as independent variables. All results were non-significant; Continua, $F < 1$; Group, $F < 1$; Continua x Group, $F(2, 46) = 1.76, ns$.

¹ It was not possible to include response bias scores in an overall 3 (continuum) x 2 (group) ANOVA because, for each continuum, two response bias scores could be calculated which have the same absolute value, but which have opposite signs (e.g., the angry-fear continuum could yield one response bias score for reporting angry faces, and the identical response bias score with the opposite sign for reporting fear faces. Thus, the results from a 3-way ANOVA would vary depending on which of the two alternative response bias scores were entered for each continuum. (This problem does not apply to analysis of A' scores, because there is only a single measure of discrimination accuracy for each continuum).

Response Bias

The response bias scores were analysed using a series of independent t-tests.

The social phobia and control groups did not differ on any measure of response bias, $t_s(23) < 0.98$, $p_s > .34$.

Correlations between Questionnaire, Attentional Bias, Sensitivity and Response Bias Scores. (See Appendix 9 for Correlation data for all measures)

Correlations were calculated between all questionnaire measures and attentional bias (AB) scores for each emotion across all degrees of intensity, and across all signal detection measures (discrimination and response bias scores for each continuum). Distributions of questionnaire scores did not differ significantly from normality (p 's $< .05$).

The FNES was positively correlated with the mean 75% angry face AB score, $r = .40$, $df = 23$, $p < .05$; with the mean 100% angry face AB score, $r = .48$, $df = 23$, $p < .05$; with the mean 100% fearful face AB score, $r = .55$, $df = 23$, $p < .01$.; with the mean 100% happy face AB score, $r = .44$, $df = 23$, $p < .05$. The SAI2 was positively correlated with the mean 100% happy face AB score, $r = .44$, $df = 23$, $p < .05$. There were no other significant correlations between questionnaire scores and indices of attentional, discrimination and response bias. There were no significant correlations between attentional bias scores and measures of discrimination and response bias.

When the scores for the social phobia group were analysed separately, the FNES was positively correlated with the mean 75% angry face AB score, $r = 0.69$, $df = 9$, $p < .05$. The MADRS was negatively correlated with the mean 75% fearful face AB score, $r = 0.70$, $df = 9$, $p < .05$; with the mean 50% happy face AB score, $r = 0.70$, $df = 9$, $p < .05$; with the mean 100% happy face AB score, $r = 0.61$, $df = 9$, $p < .05$; with the mean 25% emotion AB score, $r = 0.69$, $df = 9$, $p < .05$. The SADS was negatively correlated with the mean 75% fearful face AB score, $r = 0.69$, $df = 9$, $p < .05$; with the mean 50% happy face AB score, $r = 0.76$, $df = 9$, $p < .01$; with the mean 100% happy face AB score, $r = 0.83$, $df = 9$, $p < .01$; with the mean 50% emotion AB score, $r = 0.61$, $df = 9$, $p < .05$; with the mean 100% emotion AB score, $r = 0.72$, $df = 9$, $p < .05$. The SADS was positively correlated with the mean 75% happy face AB score, $r = 0.64$, $df = 9$, $p < .05$. The LSASAN was negatively correlated with the mean 25% emotion AB score, $r = 0.66$, $df = 9$, $p < .05$; with the mean 25% emotion AB score, $r = 0.61$, $df = 9$, $p < .05$. The LSASTOT was negatively correlated with the mean 25% emotion AB score, $r = 0.65$, $df = 9$, $p < .05$.

When the scores for the control group were analysed separately the LSASAV was negatively correlated with the mean 25% angry face AB score, $r = 0.61$, $df = 12$, $p < .05$; with the mean 100% fearful face AB score, $r = 0.57$, $df = 12$, $p < .05$. The LSASTOT was negatively correlated with the mean 25% angry face AB score, $r = 0.59$, $df = 12$, $p < .05$. The BDI was negatively correlated with the mean 75% angry face AB score, $r = 0.64$, $df = 12$, $p < .05$; with the mean 25% happy face AB score, $r = 0.64$, $df = 12$, $p < .05$.

There did not appear to be any consistent patterns across particular measures or across type of emotion or emotional intensity. There were no correlations between measures and interpretation bias scores.

Discussion

The present study tested predictions from recent cognitive models of social phobia (Clark & McManus, 2002; Rapee & Heimberg, 1997) with reference to predicted biases in attention and interpretation of ambiguity. In order to test predictions that social phobia is characterised by an attentional bias to cues that convey a moderate or strong degree of negative evaluation, relative to healthy controls (Mogg & Bradley, 1998), individuals with social phobia and healthy controls completed a modified visual probe task containing angry, happy and fearful expressions of varying emotion intensities. In addition, participants classified ambiguous facial expressions comprising angry-happy, happy-fear and fear-angry emotional expressions. Results revealed that individuals with social phobia exhibited a larger attentional bias for facial expressions displaying strong emotions, irrespective of the type of emotional expression, relative to healthy controls. However, social phobia and control groups did not differ in their sensitivity to correctly classify ambiguous emotional expressions, or in their tendency to classify a presented face as angry, happy or fearful. The specific pattern and implication of results in each task will be considered in turn.

Attentional Bias in Social Phobia

Recent cognitive models of social phobia propose that when presented with competing social cues, individuals with social phobia will selectively process cues signalling negative evaluation (Clark & McManus, 2002; Rapee & Heimberg, 1997). In the present study, individuals meeting DSM-IV criteria for generalized social phobia demonstrated greater vigilance for expressions displaying a strong (100%) degree of anger, happiness and fear (relative to neutral faces), compared to non-socially phobic controls. The attentional bias to strong emotional expressions found in the social phobia group was not only greater than that of controls, but also significantly greater than either group's attentional bias to expressions displaying more moderate emotion intensities (25%, 50% and 75%). In addition, socially phobic individuals demonstrated significant attentional biases (relative to no bias) to expressions displaying strong (100%) emotional expressions and a tendency to selectively process moderate (75%) emotional expressions. In contrast, control participants' attention allocation was unaffected by type and intensity of emotional expression. Finally, across the whole sample, high levels of social anxiety (as measured by the FNES) were associated with greater vigilance to 100% angry, happy and fear intensities, and 75% angry faces.

Findings from the modified visual probe task might be considered to provide some support for predictions from specific cognitive models of social phobia, and those from general cognitive models that emphasise the role of vigilance for threat processing in maintaining anxiety (Beck, 1976; Bower, 1981; Clark & McManus, 2002; Eysenck, 1992; Mathews & Mackintosh, 1998; Mogg &

Bradley, 1998; Rapee & Heimberg, 1997; Williams et al., 1988, 1997). However, while socially phobic individuals were vigilant for potent negative (angry and fear) expressions, they were similarly vigilant for happy faces. These findings contrast with evidence of vigilance for angry (but not happy) faces in individuals with a diagnosis of social phobia (Mogg, Philippot and Bradley, 2004) and high levels of trait social anxiety (Mogg & Bradley, 2002). However, present findings do compliment those from other studies that have demonstrated selective processing of emotional (rather than simply threatening) expressions; i.e., faster orienting to emotional (angry and happy relative to neutral) faces in individuals with high levels of social anxiety (Garner et al, in press), reduced processing of emotional faces (relative to non-social objects) in social anxiety (Mansell et al., 1999) and social phobia (Chen et al, 2002). While these studies have demonstrated different patterns of vigilance and avoidance (most likely reflecting the use of face or object control stimuli, Clark & McManus, 2002) these studies (and present findings) do suggest that individuals with social phobia might selectively process emotional faces in a similar fashion. The present non-specific bias for emotional cues also supports findings from other studies reporting similar attentional bias for positive and negative stimuli in other forms of anxiety (e.g., Bradley et al., 1999; Martin, Williams, & Clark, 1991; Mathews & Klug, 1993; Mogg & Marden, 1990). However, it is necessary to note that vigilance in the present study can be more readily attributed to social phobia, as state anxiety, and other measures of mood, were not strongly correlated with vigilance for emotional expressions, whereas social anxiety (FNES) was associated with increased vigilance to all emotions.

Evidence of vigilance for emotional (including happy) material in social phobia might appear to contrast with predictions from cognitive models of anxiety that suggest individuals selectively process stimuli that have been subjectively evaluated as threatening (Mathews & Mackintosh, 1998; Mogg & Bradley, 1998). However, it is conceivable that present findings reflect socially anxious individuals evaluation of happy expressions in a negative fashion (e.g., as sign of mocking) and allocation of attentional resources towards them along with other stimuli evaluated as threatening (see Bradley et al., 1999). The extent to which different anxiety disorders are associated with significant differences in the evaluation of emotional expressions as threatening requires additional research.

Contrary to predictions, there was no evidence that individuals with social phobia preferentially attended to moderate signs of negative evaluation (relative to controls), nor that healthy controls oriented towards expressions conveying extreme (i.e., 100%) threat (as predicted by Mathews & Mackintosh, 1998; Mogg & Bradley, 1998). The ANOVA results in the present study did not indicate comparatively greater vigilance for moderate negative faces in social phobia relative to controls. However, significant correlations were found between increased social anxiety scores (FNES) and attentional bias to angry faces of moderate intensity (75%), which provides some support for proposals that anxiety is associated with increased negative appraisal and vigilance for moderate threat (Mathews & Mackintosh, 1998; Mogg & Bradley, 1998).

Present findings contrast with those from Wilson and MacLeod (2003) in which both high and low trait anxious individuals tended to avoid looking at faces containing low levels of anger, and were both vigilant to faces with high levels of anger, with individual differences in attention allocation evident at more moderate levels of threat intensity. Direct comparison of present findings with those from Wilson and MacLeod is limited as participants' general level of trait anxiety was not measured in the present study. However, both studies did use similar visual probe paradigms and examined attention to face stimuli 500ms after stimulus onset. It is important to note that Wilson and MacLeod defined emotion intensities according to participants' explicit ratings of stimulus threat value. In the present study stimulus selection favoured angry, happy and neutral expressions that were easily identifiable (note that participants in the present study classified every prototype expression correctly in the face classification task). However, while the present study sought to examine the effect of emotional intensity on attentional bias in social phobia, it is recommended that future studies take a variety of stimulus appraisal measures so that relationships between attentional bias and stimulus "threat" evaluation can be clarified further.

Interpretation Bias in Social Phobia

In the present study, people with generalized social phobia and non-socially phobic control participants classified ambiguous emotional expressions blended from original prototype expressions; angry-happy, happy-fear and fear-angry. The prototypes were the same ones used in the attention task. Analyses compared groups on two measures of explicit stimulus evaluation;

sensitivity and response bias. Results indicate that individuals with social phobia and controls did not differ in their sensitivity to identify the emotionality of ambiguous facial expressions, nor in their tendency to classify a presented face as displaying anger, happiness or fear. Furthermore, there were no significant relationships between self-report measures of social anxiety (or state anxiety and depression), and indices of sensitivity or response bias. Thus, findings from the present study fail to support models that propose individuals with social phobia are less accurate (sensitive) in classifying subtle, emotionally ambiguous facial expressions and more likely to classify ambiguous faces as negative relative to controls (Clark & McManus, 2002). These results are unexpected given extensive evidence of impaired emotional expression recognition in other disorders associated with impaired social perception and functioning, such as depression (see review by Venn, Watson, Gallagher, & Young, 2006).

Present findings also differ from two previous studies examining emotion recognition in socially anxious individuals. Winton, Clark, and Edelmann (1995) found that socially anxious individuals were more likely to classify briefly presented faces as negative compared to controls, but were not more sensitive at identifying negative emotion. However, while the brief presentation of stimuli arguably rendered faces ambiguous, the stimuli used did not accurately model the subtle, sustained expressions typically encountered within social situations. In a subsequent study, Richards et al. (2002) found that that people with high social anxiety interpreted faces containing a small degree of fear, which were displayed until response, as more fearful relative to low

anxious controls. These findings extend those from studies demonstrating negative (less positive) off-line and on-line interpretations of ambiguous social scenarios and sentences in social anxiety and social phobia (e.g., Stopa & Clark, 2000; Hirsch & Mathews, 1997; 2000).

It is unclear, why evidence of a negative interpretative style, particularly regarding fear recognition (Richards et al., 2002), was not observed in the present study. One explanation might be that the present face classification task was rendered insensitive to anxiety-related differences in emotion recognition, because it was completed following a lengthy visual probe task that presented the same prototype angry, happy and fear expressions. While, there was no evidence that attentional bias to emotional faces (particularly 100% expressions) was associated with enhanced sensitivity on the emotion classification task (i.e., no significant correlations), such priming might reasonably be expected to have occurred.

Although priming might have masked individuals' differences, it is important to note that the present null results are consistent with findings from the only other study that has examined emotional expression recognition in individuals with a diagnosis of generalized social phobia. Philippot and Douilliez, (2005) compared people with generalized social phobia, people with other anxiety disorders, and non-anxious controls on an emotional facial expression classification task. Results revealed no significant differences between groups on measures of expression decoding accuracy, emotion intensity ratings, or reported task difficulty.

Taken together, findings to date provide mixed evidence that social phobia is associated with a tendency to dysfunctionally appraise ambiguous facial expressions. Therefore, given that recent cognitive models of anxiety emphasise the role of biased threat appraisal in anxiety vulnerability, it is necessary for future studies to clarify the existence and clinical/therapeutic relevance of facial expression recognition biases in social phobia.

Clinical Implications

The present findings provide support for the existence of a potentially dysfunctional attentional bias to cues signaling (potentially negative evaluation) in social phobia. Future research is required to clarify whether these biases reflect the extent to which individuals with social phobia consider cues that signal social communication/evaluation as aversive. If such cues are demonstrated to be threatening to people with social phobia, then present findings suggest attention retraining (to reduce attention allocation to threat) might be incorporated/emphasized in CBT treatments for social phobia (Clark & McManus, 2002).

However, while attentional bias to threat might be reasonably considered to maintain perceptions of negative social evaluation, it seems less clear that these biases are a vulnerability factor for the development and maintenance of social phobia. Specifically, evidence of negative biases in clinical samples in no way demonstrates that social phobia is caused or maintained by such biases. Instead, it is necessary to experimentally manipulate/induce these biases and show that

such manipulation modulates the severity or persistence of social phobia (Clark & McManus, 2002; Mathews & Macleod, 2002).

Up until recent years, none of the research has been able to identify whether information processing biases are a symptom of affective disorders or whether these biases may actually be a causal factor. Thus an exciting literature has been developed that suggests manipulation of certain cognitive biases can modulate levels of state anxiety. For example, MacLeod, Rutherford, Campbell, Ebsworthy, and Holker (2002) induced different attentional biases in response to emotional stimuli by manipulating the spatial location of probes and words differing in emotional content in a visual probe task. Results indicated that participants trained to display attentional avoidance of negative information subsequently reported lower levels of negative mood, relative to individuals trained to attend to threat. Similar elevations in self-reported negative mood have been demonstrated in participants trained to interpret ambiguous scenarios in a threatening fashion, relative to those trained to make benign inferences (Mathews & Mackintosh, 2000). Hirsch, Mathews, Clark, Williams and Morrison (2003) have demonstrated that non-anxious individuals who had been trained to hold in mind a negative self-image, experienced higher levels of state anxiety and interpreted social situations as more threatening than did participants whose self-images were not manipulated. A further study found that, when holding a negative image in mind, individuals with social phobia reported greater anxiety, rated anxiety symptoms as more visible and evaluated their social performance more negatively, than when thinking of a control image (Hirsch, Clark, Mathews, & Williams, 2003).

Taken together, these findings provide evidence that certain types of information processing bias play a causal role in the generation and maintenance of a variety of negative mood states and cognitions. While future research needs to assess the causal nature of specific biases in relation to distinct emotional disorders, psychological interventions for social phobia should continue to attempt to modify the dysfunctional information processing biases (i.e., in selective attention) that are increasingly shown to characterise the disorder.

References

- Albano, A. M., & DiBartolo, P. M. (1997). Cognitive-behavioural treatment of obsessive-compulsive disorder and social phobia in children and adolescents. In L. Vandecreek, S. Knapp & T. L. Jackson (Eds.), *Innovations in clinical practice: A source book* (pp 41-58). Florida: Professional Resource Press.
- Alden, L. E., & Taylor, C. T. (2004). Interpersonal processes in social phobia. *Clinical Psychology Review, 24*, 857-882.
- Algom, D., Chajut, E., & Lev, S. (2004). A rational look at the emotional Stroop phenomenon: A generic slowdown, not a Stroop effect. *Journal of Experimental Psychology, 133*, 323-338.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC.
- Amir, N., Elias, J., Klumpp, H., & Przeworski, A. (2003). Attentional bias to threat in social phobia: Facilitated processing of threat or difficulty disengaging attention from threat? *Behaviour Research and Therapy, 41*, 1325-1335.
- Amir, N., Foa, E. B., & Coles, M. E. (1998). Negative interpretation bias in social phobia. *Behaviour Research and Therapy, 36*, 945-957.

Amorim, P., Lecrubier, Y., Weiller, E., Hergueta, T., & Sheehan, D. (1998). DSM-III-R Psychotic Disorders: procedural validity of the Mini International Neuropsychiatric Interview (MINI): Concordance and causes for discordance with the CIDI. *European Psychiatry, 13*, 26-34.

Asmundson, G. J. G., & Stein, M. B. (1994). Selective processing of social threat in patients with generalized social phobia: Evaluation using a dot-probe paradigm. *Journal of Anxiety Disorders, 8*, 107-117.

Baldwin, D. S., Anderson, I. M., Nutt, D J., Bandelow, B., Bond, A., Davidson, J. R. T., den Boer, J. A., Fineberg, N. A., Knapp, M., Scott, J., & Wittchen, H. U. (2005). Evidence-based guidelines for the pharmacological treatment of anxiety disorders: Recommendations from the British Association for Psychopharmacology. *Journal of Psychopharmacology, 19*, 567-596.

Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. New York: International Universities Press.

Beck, A. T., Emery, G., & Greenberg, R. L. (1985). *Anxiety disorders and phobias: A cognitive perspective*. New York: Basic Books.

Beck, A. T., Steer, R. A., & Brown, G. K. (1994). *The Beck Depression Inventory (version 2) BDI-II Manual*. London: Harcourt Brace & Company.

Becker, E. S., Rinck, M., Margraf, J., & Roth, W. T. (2001). The emotional Stroop effect in anxiety disorders: General emotionality or disorder specificity? *Journal of Anxiety Disorders, 15*, 147-159.

Beidel, D. (1988). Psychophysiological assessment of anxious emotional states in children. *Journal of Abnormal Psychology, 97*, 80-82.

Beidel, D., & Turner, S. M. (1998). *Shy children, phobic adults: Nature and treatment of social phobia*. Washington DC: American Psychological Association.

Bell, C. J., Malizia, A. L., & Nutt, D. J. (1999). The neurobiology of social phobia. *European Archive of Psychiatry and Clinical Neuroscience, 249*, 11-18.

Blanco, C., Antia, S. X., & Liebowitz, M. R. (2003). Pharmacotherapy of Social Anxiety Disorder. *Biological Psychiatry, 51*, 109-120.

Bower, G. H. (1981). Mood and memory. *American Psychologist, 36*, 129-148.

Bradley, B. P., Mogg, K., White, J., Groom, C., & de Bono, J. (1999). Attentional bias for emotional faces in generalized anxiety disorder. *British Journal of Clinical Psychology, 38*, 267-278.

Bradley, B., & Mathews, A. (1983). Negative self-schemata in clinical depression. *British Journal of Clinical Psychology*, 22, 173-182.

Bradley, B., Mogg, K., Falla, S. J., & Hamilton, L. R. (1998). Attentional bias for threatening facial expressions in anxiety: Manipulation of stimulus duration. *Cognition and Emotion*, 12, 737-753.

Calvo, M. G., Eysenck, M. W., & Estevez, A. (1994). Ego-threat interpretive bias in test anxiety: On-line inferences. *Cognition and Emotion*, 8, 127-146.

Chapman, T. F., Mannuzza, S., & Fyer, A. J. (1995). Epidemiology and family studies of social phobia. In R. G. Heimberg, M. Liebowitz, D. Hope & F. Schneier (Eds.), *Social phobia: Diagnosis, assessment and treatment* (pp. 21-46). New York: Guildford Press.

Chen, Y. P., Ehlers, A., Clark, D. M., & Mansell, W. (2002). Patients with generalized social phobia direct their attention away from faces. *Behaviour Research and Therapy*, 40, 677-687.

Clark, D. M., & McManus, F. (2002). Information processing in social phobia. *Biological Psychiatry*, 51, 92-100.

Clark, D. M., & Wells, A. (1995). A cognitive model of social phobia. In R. G. Heimberg, M. Liebowitz, D. Hope & F. Schneier (Eds.), *Social phobia: Diagnosis, assessment and treatment* (pp. 69-93). New York: Guildford Press.

Constans, J. I., Penn, D. L., Ihen, G. H., & Hope, D. A. (1999). Interpretive bias for ambiguous stimuli in social anxiety. *Behaviour Research and Therapy*, 37, 643-651.

Darwin, C. R. (1972). *The expression of the emotions in man and animals*. London: John Murray.

Davidson, J. R. T. (2003). Pharmacotherapy of social phobia. *Acta Psychiatrica Scandinavica*, 108, 65-71.

Donaldson, W. (1992). Measuring recognition memory. *Journal of Experimental Psychology*, 121, 275-277.

Eysenck, M. W. (1992). *Anxiety: The cognitive perspective*. London: Lawrence Erlbaum Associates.

Eysenck, M. W. (1997). *Anxiety and cognition: A unified theory*. Hove: Erlbaum.

Eysenck, M. W., Mogg, K., May, J., Richards, A., & Mathews, A. (1991). Bias in interpretation of ambiguous sentences related to threat in anxiety. *Journal of Abnormal Psychology*, 100, 144-150.

Fischer, D. G., & Fick, C. (1993). Measuring social desirability: Short forms of the Marlowe-Crowne Social Desirability Scale. *Educational and Psychological Measurement, 53*, 417-424.

Foa, E. B., & McNally, R. J. (1986). Sensitivity to feared stimuli in obsessive-compulsives: A dichotic listening analysis. *Cognitive Therapy and Research, 10*, 477-485.

Fox, E. (1993). Allocation of visual attention and anxiety. *Cognition and Emotion, 7*, 207-215.

Fox, E., Russo, R., & Georgiou, G. A. (2005). Anxiety modulates the degree of attentive resources required to process emotional faces. *Cognitive, Affective and Behavioral Neuroscience, 5*, 396-404.

Furmark, T., Tillfors, M., Everz, P. O., Marteinsdottir, I., Gefvert, O., & Fredrikson, M. (1999). Social phobia in the general population: prevalence and sociodemographic profile. *Social Psychiatry and Psychiatric Epidemiology, 34*, 416-424.

Garner, M. J., Mogg, K., & Bradley, B. P. (in press). Overt orienting to emotional facial expressions in social anxiety. *Journal of Abnormal Psychology*.

- Hamilton, M. (1986). The Hamilton rating scale for depression. In *Assessment of Depression* (eds N. Sartorius & T. A. Ban), pp. 143-152. Berlin: Springer.
- Harmer, C. J., Shelley, N. C., Cowen, P. J., & Goodwin, G. M. (2002). Repeated administration of citalopram or reboxetine reduces the perception of negative emotions from facial expression. *Journal of Psychopharmacology*, *16*, 70-75.
- Heimberg, R. G. (2002). Cognitive Behavioural Therapy for Social Anxiety Disorder: Current Status and Future Directions. *Biological Psychiatry*, *51*, 101-108.
- Heimberg, R. G., Horner, K. J., Juster, H. R., Safren, H. A., Brown, E. J., Schneier, F. R., & Liebowitz, M. R. (1999). Psychometric properties of the Liebowitz Social Anxiety Scale. *Psychological Medicine*, *29*, 199-212.
- Hermans, D., Vansteenwegen, D., & Eelen, P. (1999). Eye movement registration as a continuous index of attention deployment: Data from a group of spider anxious students. *Cognition and Emotion*, *13*, 419-434.
- Hirsch, C. R., & Clark, D. M. (2004). Information-processing bias in social phobia. *Clinical Psychology Review*, *24*, 799-825.
- Hirsch, C. R., & Mathews, A. (1997). Interpretative inferences when reading about emotional events. *Behaviour Research and Therapy*, *35*, 1123-1132.

Hirsch, C. R., & Mathews, A. (2000). Impaired positive inferential bias in social phobia. *Journal of Abnormal Psychology, 109*, 705-712.

Hirsch, C. R., Clark, D. M., Mathews, A., & Williams, R. (2003). Self-images play a causal role in social phobia. *Behaviour Research and Therapy, 41*, 909-921.

Hirsch, C. R., Mathews, A., Clark, D. M., Williams, R., & Morrison, J. (2003). Negative self-imagery blocks inferences. *Behaviour Research and Therapy, 41*, 1383-1396.

Hope, D. A., Rapee, R. M., Heimberg, R. G., & Dombeck, M. J. (1990). Representations of the self in social phobia: Vulnerability to social threat. *Cognitive Therapy and Research, 14*, 477-485.

Horenstein, M., & Segui, J. (1997). Chronometrics of attentional processes in anxiety disorders. *Psychopathology, 30*, 25-35.

Horley, K., Williams, L. M., Gonsalvez, C., & Gordon, E. (2003). Social phobics do not see eye to eye: A visual scan-path study of emotional expression processing. *Journal of Anxiety Disorders, 17*, 33-44.

Kazdin, A. E. (1978). *History of behaviour modification: Experimental foundations of contemporary research*. Baltimore: University Park Press.

Kendall, P. C., Hollon, S. D., Beck, A. T., Hammen, C. L., & Ingram, R. (1987). Issues and recommendations regarding use of the Beck Depression Inventory. *Cognitive Therapy and Research, 11*, 289-299.

Kessler, R. C., Stein, M. B., & Berglund, P. (1998). Social phobia subtypes in the national comorbidity survey. *American Journal of Psychiatry, 155*, 613-619.

Khan, A., Khan, S. R., Shankles, E. B., & Polissar, N. L. (2002). Relative sensitivity of the Montgomery-Asberg Depression Rating Scale, the Hamilton Depression rating scale and the Clinical Global Impressions rating scale in antidepressant clinical trials. *International Clinical Psychopharmacology, 17*, 281-285.

Knutson, B., Wolkowitz, O. M., Cole, S. W. Chan, T., Moore, E. A., Johnson, R. C., Terpstra, J., Turner, R. A., & Reus, V. I. (1998). Selective alteration of personality and social behavior by serotonergic intervention. *American Journal of Psychiatry, 155*, 373-379.

Leary, M. R. (1983). A brief version of the Fear of Negative Evaluation Scale. *Personality and Social Psychology Bulletin, 9*, 371-375.

Liebowitz, M. (1987). Social phobia. *Modern Problems of Pharmacopsychiatry*, 22, 141-173.

Lundh, L. G., & Ost, L. G. (1996). Stroop interference, self-focus and perfectionism in social phobics. *Personality and Individual Differences*, 20, 725-731.

MacArthur Foundation Research Network on Early Experience and Brain Development, 2002. <http://www.macbrain.org/resources.htm>

MacLeod, C., & Cohen, I. L. (1993). Anxiety and the interpretation of ambiguity: A text comprehension study. *Journal of Abnormal Psychology*, 102, 238-247.

MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology*, 95, 15-20.

MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology*, 95, 15-20.

MacLeod, C., Rutherford, E. M., Campbell, L., Ebsworthy, G., & Holker, L. (2002). Selective attention and emotional vulnerability: Assessing the causal basis of their association through the experimental manipulation of attentional bias. *Journal of Abnormal Psychology*, 111, 107-123.

Maidenberg, E., Chen, E., Craske, M., Bohn, P., & Bytritsky, A. (1996). Specificity of attentional bias in panic disorder and social phobia. *Journal of Anxiety Disorders, 10*, 529-541.

Mansell, W., Clark, D. M., & Ehlers, A. (2003). Internal versus external attention in social anxiety: An investigation using a novel paradigm. *Behaviour Research and Therapy, 41*, 555-572.

Mansell, W., Clark, D. M., Ehlers, A., & Chen, Y. (1999). Social anxiety and attention away from emotional faces. *Cognition and Emotion, 13*, 673-690.

Mansell, W., Ehlers, A., Clark, D. M., & Chen, Y. (2002). Attention to positive and negative social-evaluative words: Investigating the effects of social anxiety, trait anxiety and social threat. *Anxiety Stress and Coping, 15*, 19-29.

Martin, M., Williams, R. M., & Clark, D. M. (1991). Does anxiety lead to selective processing of threat-related information? *Behaviour Research and Therapy, 29*, 147-60.

Mathews, A., & Klug, F. (1993). Emotionality and interference with color-naming in anxiety. *Behaviour Research and Therapy, 31*, 57-62.

Mathews, A., & Mackintosh, B. (1998). A cognitive model of selective processing in anxiety. *Cognitive Therapy and Research, 22*, 539-560.

Mathews, A., & Mackintosh, B. (2000). Induced emotional interpretation bias and anxiety. *Journal of Abnormal Psychology, 109*, 602-15.

Mathews, A., & MacLeod, C. (1985). Selective processing of anxiety cues in threat states. *Behaviour Research and Therapy, 23*, 563-569.

Mathews, A., & MacLeod, C. (2002). Induced emotional biases have causal effects on anxiety. *Cognition and Emotion, 16*, 310-315.

Mathews, A., Richards, A., & Eysenck, M. (1989). Interpretation of homophones related to threat in anxiety states. *Journal of Abnormal Psychology, 98*, 31-34.

Mattia, J. I., Heimberg, R. G., & Hope, D. A. (1993). The revised Stroop colour-naming task in social phobics. *Behaviour Research and Therapy, 31*, 305-313.

Maxwell, D. (1994). *Morph (Version 2.5)* [Computer software]. San Diego: Gryphon Software Corporation.

McNally, R. J., Riemann, B. C., & Kim, E. (1990). Selective processing of threat cues in panic disorder. *Behaviour Research and Therapy, 28*, 407-412.

Merikangas, K. R., & Angst, J. (1995). Comorbidity and social phobia: Evidence from clinical, epidemiologic, and genetic studies. *European Archive of Psychiatry and Clinical Neuroscience*, 244, 297-303.

Mogg, K., & Bradley, B. P. (1998). A cognitive-motivational analysis of anxiety. *Behaviour Research and Therapy*, 36, 809-848.

Mogg, K., & Bradley, B. P. (1999). Some methodological issues in assessing attentional biases for threatening faces in anxiety: A replication study using a modified version of the probe detection task. *Behaviour Research and Therapy*, 37, 595-604.

Mogg, K., & Bradley, B. P. (2002). Selective orienting of attention to masked threat faces in social anxiety. *Behaviour Research and Therapy*, 40, 1403-1414.

Mogg, K., & Bradley, B. P. (2005). Attentional bias in generalised anxiety disorder versus depressive disorder. *Cognitive Therapy and Research*, 29, 29-45.

Mogg, K., & Marden, B. (1990). Processing of emotional information in anxious participants. *British Journal of Clinical Psychology*, 29, 227-229.

Mogg, K., Baldwin, D. S., Brodrick, P., & Bradley, B. P. (2004). Effect of short-term SSRI treatment on cognitive bias in generalised anxiety disorder. *Psychopharmacology*, 176, 466-470.

Mogg, K., Mathews, A., & Weinman, J. (1987). Memory bias in clinical anxiety. *Journal of Abnormal Psychology, 96*, 94-98.

Mogg, K., Millar, N., & Bradley, B. P. (2000). Biases in eye movements to threatening facial expressions in generalised anxiety disorder and depressive disorder. *Journal of Abnormal Psychology, 109*, 695-704.

Mogg, K., Philippot, P., & Bradley, B. P. (2004). Selective attention to angry faces in clinical social phobia. *Journal of Abnormal Psychology, 113*, 160-165.

Montgomery, S. A., & Asberg, M. (1979). A new depression scale designed to be sensitive to change. *The British Journal of Psychiatry, 134*, 382-389.

Moutier, C. Y., & Stein, M. B. (1999). The history, epidemiology and differential diagnosis of social anxiety disorder. *Journal of Clinical Psychiatry, 60*, 4-8.

Musa, C., Lepine, J. P., Clark, D. M., Mansell, W., & Ehlers, A. (2003). Selective attention in social phobia and the moderating effect of a concurrent depressive disorder. *Behaviour Research and Therapy, 41*, 1043-1054.

National Phobic's Society. www.phobics-society.org.uk

Oatley, K., & Johnson-Laird, P. (1987). Towards a cognitive theory of emotions. *Cognition and Emotion, 1*, 29-50.

Ohman, A., Flykt, A., & Esteves, F. (2001). Emotion drives attention: Detecting the snake in the grass. *Journal of Experimental Psychology, 130*, 446-478.

Ollendick, T. H., & Hirshfeld-Becker, D. R. (2002). The developmental psychopathology of social anxiety disorder. *Biological Psychiatry, 51*, 44-58.

Philippot, P., & Douilliez, C. (2005). Social phobics do not misinterpret facial expression of emotion. *Behaviour, Research and Therapy, 43*, 639-652.

Pineles, S. L., & Mineka, S. (2005). Attentional Biases to internal and external sources of potential threat in social anxiety. *Journal of Abnormal Psychology, 114*, 314-318.

Pollard, C. A., & Henderson, J. G. (1988). Four types of social phobia in a community sample. *The Journal of Nervous and Mental Disease, 176*, 440-445.

Pozo, C., Carver, C. S., Wellens, A. R., & Scheier, M. F. (1991). Social anxiety and social perception: construing others' reactions to the self. *Personality and Social Psychology Bulletin, 17*, 355-362.

Rapee, R. M., & Heimberg, R. G. (1997). A cognitive-behavioural model of anxiety in social phobia. *Behaviour Research and Therapy*, 35, 741-756.

Richards, A., French, C. C., Calder, A. J., Webb, B., Fox, R., & Young, A. W. (2002). Anxiety-related bias in the classification of emotionally ambiguous facial expressions. *Emotion*, 2, 273-287.

Schneider, W. (1995). *MEL Professional version 2.0*. Psychology Software Tools, Inc: Pittsburgh.

Schneier, F. R., Johnson J., Hornig, C. D., Liebowitz, M. R., & Weissman, M. M. (1992). Comorbidity and morbidity in an epidemiologic sample. *Archives of General Psychiatry*, 49, 282-288.

Sheehan, D., & Lecrubier, Y. (1998). Mini International Neuropsychiatric Interview: English version 5.0.0. *Journal of Clinical Psychiatry*, 59, 34-57.

Spector, I., Pecknold, J. C., & Libman, E. (2003). Selective attentional bias related to the noticeable aspect of anxiety symptoms in generalized social phobia. *Journal of Anxiety Disorders*, 17, 517-531.

Spielberger, C. D. (1983). *Manual for the State-Trait Anxiety Inventory (STAI)*. Paulo Alto: Consulting Psychologists Press.

Stein, M. B., & Kean, Y. M. (2000). Disability and quality of life in social phobia: Epidemiologic Findings. *American Journal of Psychiatry*, *157*, 1606-1613.

Stein, M. B., Torgrud, L. J., & Walker, J. R. (2000). Social phobia symptoms, subtypes, and severity: Findings from a community survey. *Archives of General Psychiatry*, *57*, 1046-1052.

Stopa, L., & Clark, D. M. (2000). Social phobia and interpretation of social events. *Behaviour Research and Therapy*, *38*, 273-283.

Stopa, L., & Clark, D. M. (2001). Social Phobia: Comments on the viability and validity of an analogue research strategy and British norms for the fear of negative evaluation questionnaire. *Behavioural and Cognitive Psychotherapy*, *29*, 423-430.

Strahan, R., & Gerbasi, K. C. (1972). Short homogenous versions of the Marlowe-Crowne Social Desirability Scale. *Journal of Clinical Psychology*, *28*, 191-193.

Strauss, C. C., & Last, C. G. (1993). Social and simple phobias in children. *Journal of Anxiety Disorders*, *7*, 141-152.

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, 18, 643-662.

Surguladze, S. A., Young, A. W., Senior, C., Brebion, G., Travis, M. J., & Phillips, M. L. (2004). Recognition accuracy and response bias to happy and sad facial expressions in patients with major depression. *Neuropsychology*, 18, 212-218.

Venn, H. R., Watson, S., Gallagher, P., & Young, A. H. (2006). Facial expression perception: an objective outcome measure for treatment studies in mood disorders? *International Journal of Neuropsychopharmacology*, 9, 229-45.

Watson, D., & Friend, R. (1969). Measurement of social-evaluative anxiety. *Journal of Consulting and Clinical Psychology*, 33, 448-457.

Watts, F., McKenna, F. P., Sharrock, R., & Trezise, L. (1986). Colour-naming of phobia-related words. *British Journal of Psychology*, 77, 97-108.

Weiller, E., Bisserbe, J. C., Boyer, P., Lepine, J. P., & Lecrubier, Y. (1996). Social phobia in general health care: an unrecognised under-treated disabling disorder. *The British Journal of Psychiatry*, 168, 169-174.

Wells, A., & Clark, D. M. (1997). Social phobia: A cognitive approach. In G. C. L. Davey (Ed.), *Phobias: A handbook of description, treatment and theory*. (pp. 3-26). Chichester: Wiley.

Williams, J. M. G., Mathews, A., & MacLeod, C. (1996). The emotional Stroop task and psychopathology. *Psychological Bulletin*, *120*, 3-24.

Williams, J. M. G., Watts, F. N., MacLeod, C., & Mathews, A. (1988). *Cognitive psychology and emotional disorders*. Chichester: Wiley.

Williams, J. M. G., Watts, F. N., MacLeod, C., & Mathews, A. (1997). *Cognitive psychology and emotional disorders*. (2nd ed.). Chichester: Wiley.

Wilson, E., & MacLeod, C. (2003). Contrasting two accounts of anxiety-linked attentional bias: Selective attention to varying levels of stimulus threat intensity. *Journal of Abnormal Psychology*, *112*, 212-218.

Winton, E., Clark, D. M., & Edelmann, R. J. (1995). Social anxiety, fear of negative evaluation and the detection of negative emotion in others. *Behaviour Research and Therapy*, *33*, 193-196.

Wittchen, H. U., & Fehm, L. (2003). Epidemiology and natural course of social fears and social phobia. *Acta Psychiatrica Scandinavica*, *108*, 4-8.

Wittchen, H. U., Stin, M. B., & Kessler, R. C. (1999). Social fears and social phobia in a community sample of adolescents and young adults: Prevalence, risk factors and co-morbidity. *Psychological Medicine*, *29*, 309-323.

Young, A. W., Rowland, D., Calder, A. J., Etcoff, N. L., Seth, A., & Perrett, D. I. (1997). Facial expression megamix: Tests of dimensional and category accounts of emotion recognition. *Cognition*, 63, 271-313.

Yuen, P. K. (1994). *Social anxiety and the allocation of attention: Evaluation using facial stimuli in a dot-probe paradigm*. Unpublished manuscript.

Appendices

Appendix 1 - Journal of Abnormal Psychology: Instructions to Authors

Appendix 2 - Ethics Approval Letter

Appendix 3 - Press Release

Appendix 4 - Information Sheets for Clinical Participants

Appendix 5 - Consent Form

Appendix 6 - Information Sheet for Control Participants

Appendix 7 - Debrief Sheets

**Appendix 8 - Mean Reaction Times of the Social Phobia and Control Groups
on the Visual Probe Task**

Appendix 9 – Correlation data for all measures

Appendix 1

Journal of Abnormal Psychology: Instructions to Authors

Editor: David Watson, PhD

Published Quarterly, beginning in February Instructions to Authors

Authors should ensure that their manuscripts and cover letters meet the criteria below before submitting their manuscripts electronically (in .rtf, PDF, or .doc format) via the Submission Portal Entrance.

In addition to postal addresses and telephone numbers, authors are requested to supply electronic mail addresses and fax numbers, if available, for potential use by the editorial and production offices. Authors should keep a copy of the manuscript to guard against loss.

Masked reviews are optional and must be specifically requested in the cover letter accompanying the submission. For masked reviews, the manuscript must include a separate title page with the authors' names and affiliations, and these ought not to appear anywhere else in the manuscript. Footnotes that identify the authors must be typed on a separate page. Authors are to make every effort to see that the manuscript itself contains no clues to their identities.

Most of the articles published in the Journal of Abnormal Psychology are reports of original research, but other types of articles are acceptable. Short Reports of replications or of failures to replicate previously reported results are given serious consideration. Comments on articles published in the journal are also considered. Case studies from either a clinical setting or a laboratory will be considered if they raise or illustrate important questions that go beyond the single case and have heuristic value. Manuscripts that present or discuss theoretical formulations of psychopathology, or that evaluate competing theoretical formulations on the basis of published data, may also be accepted. Finally, the Journal will consider articles that present, explicate, or evaluate experimental or analytic methods of particular relevance to psychopathology. For further information on content, authors may refer to the Journal Description.

Manuscript preparation: Authors must prepare manuscripts according to the Publication Manual of the American Psychological Association (5th ed.).

Abstract and keywords: All manuscripts must include an abstract that contains 125–180 words typed on a separate sheet of paper. After the abstract, please supply up to five keywords or brief phrases. All copy must be double-spaced, and further typing instructions, especially in regard to tables, figures, references, metrics, and abstracts, appear in the Manual. See APA's Checklist for Manuscript Submission. Also, all manuscripts are copyedited for bias-free language (see chap. 2 of the Publication Manual).

References: References should be listed in alphabetical order. Each listed reference should be cited in text, and each text citation should be listed in the References.

Figures: Graphics files are welcome if supplied as Tiff, EPS, or PowerPoint. High-quality printouts or glossies are needed for all figures. The minimum line weight for line art is 0.5 point for optimal printing. When possible, please place symbol legends below the figure image instead of to the side. Original color figures can be printed in color at the editor's and publisher's discretion provided the author agrees to pay \$255 for one figure, \$425 for two figures, \$575 for three figures, \$675 for four figures, and \$55 for each additional figure.

Articles will be published in five different sections of the Journal: Brief Reports, Regular Articles, Extended Articles, Case Studies, and Commentaries:

Brief Reports must not exceed 5,000 words in overall length. This limit includes all aspects of the manuscript (title page, abstract, text, references, tables, author notes and footnotes, appendices, figure captions) except figures. Brief Reports also may include a maximum of two figures. For Brief Reports, the length limits are exact and must be strictly followed.

Regular Articles typically should not exceed 9,000 words in overall length (excluding figures).

Extended Articles are published within regular issues of the Journal (they are not free-standing) and are reserved for manuscripts that require extended exposition beyond the normal length restrictions of a Regular Article. Typically, Extended Articles will report multiple experiments, multifaceted longitudinal studies, cross-disciplinary investigations, or studies that are extraordinarily complex in terms of methodology or analysis. Any submission that exceeds a total of 12,000 words in length automatically will be considered for publication as an Extended Article.

Case Studies and Commentaries have the same length requirements as Brief Reports.

Components of all cover letters, in addition to items 1–4 below, will contain the following: (a) the full postal and email address of the corresponding author; (b) the complete telephone and fax numbers of the same; (c) the proposed category under which the manuscript was submitted; and (d) a request for masked review, if desired, along with a statement ensuring that the manuscript was prepared in accordance with the guidelines above. Authors should also specify the overall length of the manuscript (in words) and indicate the number of tables and figures that are included in the manuscript.

Permissions: Authors are required to obtain and provide to the editor on final acceptance all necessary permissions to reproduce any copyrighted work, including, for example, test instruments and other test materials or portions thereof. A statement addressing permissions should be included in the cover letter regarding any submitted work containing any of these listed (or similar) items. Final files for production should be prepared as outlined in Preparing Your Electronic Files for Production.

Publication policy: APA policy prohibits an author from submitting the same manuscript for concurrent consideration by two or more publications. APA's policy regarding posting articles on the Internet may be found at Posting Articles on the Internet. In addition, it is a violation of APA Ethical Principles to publish "as original data, data that have been previously published" (Standard 8.13). As this journal is a primary journal that publishes original material only, APA policy also prohibits the publication of any manuscript that has already been published in whole or substantial part elsewhere. Authors have an obligation to consult journal editors about prior publication of any data on which their article depends. As such, corresponding authors need to clearly state in the cover letter that (a) the manuscript and data, in whole or substantial part, have not been previously published or presented; and (b) that the manuscript is not currently being considered by other journals nor will it be while it is under consideration of the Journal of Abnormal Psychology.

In addition, APA Ethical Principles specify that "after research results are published, psychologists do not withhold the data on which their conclusions are based from other competent professionals who seek to verify the substantive claims through reanalysis and who intend to use such data only for that purpose, provided that the confidentiality of the participants can be protected and unless legal rights concerning proprietary data preclude their release" (Standard 8.14). APA expects authors submitting to this journal to adhere to these standards. Specifically, authors of manuscripts submitted to APA journals are expected to ensure the availability of their data throughout the editorial review process and for at least 5 years after the date of publication. Authors should state in a signed cover letter that they have complied with APA ethical standards in the treatment of their sample, human or animal. A copy of the APA Ethical Principles may be obtained from the Ethics Office web site or by writing the APA Ethics Office, 750 First Street, NE, Washington, DC 20002-4242. The cover letter should also indicate that no substantial portion of the article has appeared or is being considered for publication elsewhere.

Last, as the APA requires authors to reveal any possible conflict of interest in the conduct and reporting of research (e.g., financial interests in a test procedure, funding by pharmaceutical companies for drug research), authors must disclose the presence or absence of such conflicts in the cover letter. Authors of accepted manuscripts will be required to transfer copyright to APA.

Preparing Your Electronic Files for Production -If your manuscript was mask reviewed, please ensure that the final version for production includes a byline and full author note for typesetting.

Appendix 2

Ethics Approval Letter



**NORTH AND MID HAMPSHIRE LOCAL
RESEARCH ETHICS COMMITTEE**

1ST Floor, Regents Park Surgery
Park Street, Shirley
Southampton
SO16 4RJ

STA

29 November 2005

Miss Sophie Littler
Trainee Clinical Psychologist
University of Southampton
Doctoral Programme in Clinical Psychology
Highfield Campus, Building 44
Southampton
SO17 1BJ

Tel: 023 8036 2863
Fax: 023 8036 4110

Email: GM.E.hio-au.NMHREC@nhs.net

Dear Miss Littler

Full title of study: Cognitive Bias In Social Phobia and the Effect of SSRI Treatment.
REC reference number: 05/Q1703/54

Thank you for your letter of 07 November 2005, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised.

Ethical review of research sites

The favourable opinion applies to the research sites listed on the attached form.

Conditions of approval

The favourable opinion is given provided that you comply with the conditions set out in the attached document. You are advised to study the conditions carefully.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
Application	5	09 September 2005
Investigator CV	1	09 September 2005
Protocol	2	09 May 2005
Covering Letter		30 August 2005
Summary/Synopsis	1	09 September 2005
Letter from Sponsor	1	05 September 2005
Advertisement - Press release		07 November 2005
Advertisement - Poster & Press Release		07 November 2005
Advertisement - for Control Group on University Intranet		

An advisory committee to Hampshire and Isle of Wight Strategic Health Authority

GP/Consultant Information Sheets	1	30 August 2005
Participant Information Sheet - Clinical	2	07 November 2005
Participant Consent Form	1	09 May 2005
Response to Request for Further Information		07 November 2005
Process or Recruitment		
Letter of Indemnity	1	05 September 2005
MINI Interview/questionnaire	1	09 September 2005
Supervisor CV	1	09 September 2005
Clinical Debriefing Sheet	2	07 November 2005
Control Debriefing Sheet	2	07 November 2005
Measure of protect researcher		
Outline of Proposed Research	1	
Dissertation Research Proposal	1	21 February 2005
Feedback on dissertation proposal	1	10 March 2005
Response to Reviewer's Feedback		09 May 2005

Research governance approval

The study should not commence at any NHS site until the local Principal Investigator has obtained final research governance approval from the R&D Department for the relevant NHS care organisation.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

05/Q1703/54	Please quote this number on all correspondence
-------------	--

With the Committee's best wishes for the success of this project

Yours sincerely



Mrs Jane Ogden-Swift
Chair

Email: GM.E.hio-au.NMHREC@nhs.net

Enclosures:

Standard approval SL-AC2
Site approval form

Copy to: Dr Martina Dorward
Research Support Office Building 27
Room 3043 University of Southampton
Highfield, Southampton
SO17 1BJ

SF1 list of approved sites

An advisory committee to Hampshire and Isle of Wight Strategic Health Authority

Hampshire Partnership

15 November 2005

Sophie Littler
Trainee Clinical Psychologist
Dept Psychology
University of Southampton
Highfield
SOUTHAMPTON
SO17 1BJ

1st Floor Department of Psychiatry
Royal South Hants Hospital
Brintons Terrace
SOUTHAMPTON
SO14 0YG

Tel: 023 8082 5054
Fax: 023 8023 4243

Dear Sophie

Research Project – WHC 619 Cognitive bias in social phobia and the effect of SSRI treatment

This letter provides the formal Hampshire Partnership Trust approval required for your project to commence. ***NB: You should not approach NHS patients or staff regarding this study until you have received full permission for the study from LREC.*** Also please note that this trust approval (and your ethics approval) only applies to the current protocol. Any changes to the protocol can only be initiated following further approval from the ethics committee via a protocol amendment; the R&D office should be informed of these changes.

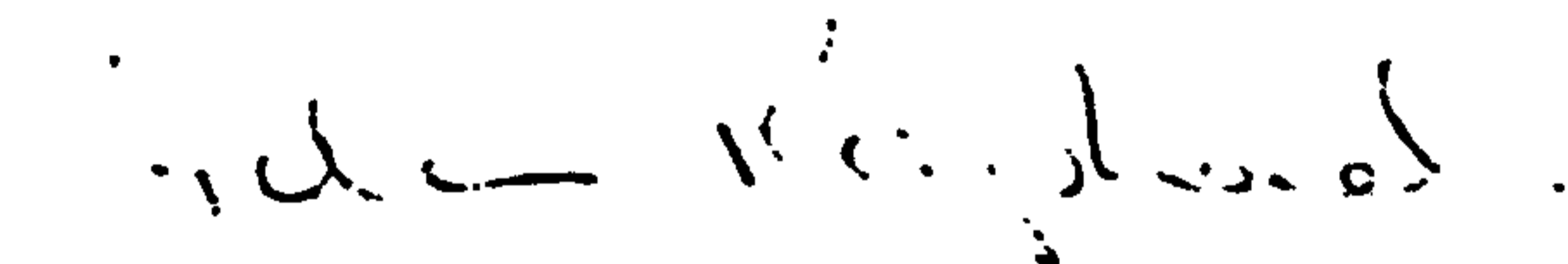
Overleaf are a list are details of information that the R & D Office will require during the period of your research.

The conditions of this approval require you as Principal Investigator to ensure that the study is conducted within the Research Governance framework and I encourage you to become fully conversant with the Research Governance Framework (RGF) on Health and Social Care document, which is available from the following link:
www.nq.gov.uk/PolicyAndGuidance/ResearchAndDevelopment/ Any breaches of the RGF constitute non-compliance with the RGF and as a result Trust approval may be withdrawn and the project suspended until such issues are resolved.

Your project is registered on the R&D database with identification number WHC 619. It would be helpful if you could use this number on all correspondence with the R & D Office.

Please do not hesitate to contact us should you require any additional information or support. May I also take this opportunity to wish you every success with your research
With best wishes

Yours sincerely



Helen Raphael (Mrs)
Research & Development Manager
Southampton City PCT (and Hampshire Partnership Trust)



Trust Headquarters, Maples, Horseshoe Drive, Tatchbury Mount, Calmore, Southampton SO40 2RZ

Appendix 3

Press Release

7 November 2005

Processing of Emotional Information in Social Phobia

Social phobia or social anxiety disorder is a common and distressing problem that can cause sufferers immense difficulties in all areas of their lives, affecting their performance at work and personal relationships.

Now, a team of researchers from the University of Southampton is about to embark on a study which aims to develop a better understanding of how social phobia affects sufferers' thinking and attention. Their findings could help to develop strategies in the future to treat people who experience high levels of anxiety in social situations.

Social phobia is much more severe than just shyness. It is characterised by a marked fear or dread of social situations and of behaving in an embarrassing way whilst talking or meeting with other people, especially strangers.

The research team is currently looking to recruit two groups of volunteers, aged between 18 and 65, in the Southampton area, to take part in the study. The first group will be for people who regularly experience high levels of personal distress in social or performance situations. They may also avoid these kinds of situations altogether in order to avoid becoming distressed. Researchers are also keen to talk to anyone who would be interested in being part of the **control group** who will be assessed to compare their reactions with those of people with social phobia.

The study will involve a short interview during which participants will be asked about their experiences. They will then have to complete a series of computer-based tasks and a number of questionnaires. Where appropriate, there will be an opportunity to discuss possible treatment options with members of the research team.

Dr David Baldwin, a Senior Lecturer in Psychiatry in the University's School of Medicine who is one of the leaders of the research team, says: 'This new study builds on our earlier work in this area. We aim to develop a better understanding of the relationships between emotions, thinking and attention to different types of information. We hope the findings will prove useful in devising new treatment approaches for this common and very upsetting medical condition.'

The research is being carried out in collaboration between researchers in the Schools of Psychology and Medicine and doctors in the Mood Disorders Service at the Royal South Hants Hospital in Southampton.

For further information or to participate in this study, contact Dr David Baldwin on 023 8082 5533 or email Sophie Littler at sbl103@soton.ac.uk.

Appendix 4

Information Sheets for Clinical Participants

Date: 8/2/06

Clinical Participants Information Sheet

Processing of Emotional Information in Social Phobia:

INFORMATION SHEET

You are being invited to take part in a research study. Before you decide whether to participate it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part. *Your GP would need to be contacted prior to any involvement in the study to ensure your wellbeing.*

Thank you for reading this.

What is the purpose of the study?

This study aims to develop a better understanding of the relationship between emotions, thinking and attention to different types of information.

Why have I been chosen?

You have been chosen because we need to compare the responses of people with high levels of social anxiety to people with low levels of social anxiety.

Do I have to take part?

It is up to you to decide whether or not you wish to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part, you are still free to withdraw at any time and without giving a reason. If you decide not to take part, or to take part and then leave at anytime, this will not affect the standard of care you receive or reflect badly upon you in any way.

What will happen to me if I take part?

You will be asked a series of questions about your mood. You will then carry out a computer-based task where you will be asked to respond as quickly as possible to the appearance of a target on the screen by pressing a button on the computer keyboard. Your reactions will be monitored while you are doing this. You will be asked to complete a second task that involves classifying the emotional expressions displayed in a series of faces. Finally, you will be asked to fill in some questionnaires. This will all be completed in a single visit to the Royal South Hants Hospital. It is anticipated that this will last up to a maximum of 3 hours.

You will then have an appointment with Dr. David Baldwin (Consultant Psychiatrist) in order to establish whether or not you have social phobia and to discuss treatment options. Your GP will be informed if a diagnosis of social phobia, or any other psychiatric condition, is found and also if you decide to undergo treatment. If you are already taking medication for social phobia, but decide that you wish to change to a different treatment, then this would be discussed with your GP. If it is decided that a different treatment would be more beneficial to you, then there will be a washout period of at least one week between ending one treatment and starting another.

In approximately 6 weeks time (after you have seen Dr David Baldwin) we will invite back to again complete the questionnaires and computer tasks described above.

This will also be completed in a single visit to the Hospital. It is anticipated that this will last for about two hours.

You will be reimbursed for your travel expenses.

What are the possible benefits of taking part?

You are unlikely to receive any direct personal benefits from taking part in this study. However, information obtained during the course of the study may help us to develop a better understanding of how emotions affect attention and thinking. This in turn may be useful for the future development of strategies to help treat people with high levels of anxiety.

Will my taking part in this study be kept confidential?

All information that is collected about you during the course of the research will be kept strictly confidential and your name will not be used when analysing the data obtained. Any information about you that leaves the clinic will have your name removed so that you cannot be recognised from it.

What will happen to the results of the research study?

A report of the study will be written and useful findings will be shared with colleagues through publication. A summary of the results will be made available on request.

Who is organising and funding the research?

This study is being organised and funded by the University of Southampton.

Who has reviewed the study?

The Southampton and South West Hampshire Local Research Ethics Committee and School of Psychology, University of Southampton Ethics Committee have reviewed this study.

If you have any questions, or wish to request a summary please contact:

Sophie Littler, Department of Clinical Psychology, University of Southampton,
SO17 1PN

Tel: 023 8082 5533, Email: sbl103@soton.ac.uk

Appendix 5

Consent Form

08/02/06

Participant Identification Number for this Study:

CONSENT FORM

Processing of Emotional Information in Social Phobia:

Researcher: Sophie Littler, Trainee Clinical Psychologist

Please initial box

1. I confirm that I have read and understood the information sheet dated 08/02/06 for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

3. I agree to take part in the above study.

Name of Participant

Date

Signature

Researcher

Date

Signature

Appendix 6

Information Sheet for Control Participants

Date: 8/2/2006

Control Participants Information Sheet

Processing of Emotional Information in Social Phobia

INFORMATION SHEET

You are being invited to take part in a research study. Before you decide whether to participate it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

Thank you for reading this.

What is the purpose of the study?

This study aims to develop a better understanding of the relationship between emotions, thinking and attention to different types of information. We need to study the responses of a sample of the general population and compare these to the responses of people with social phobia. Specifically, we are looking for volunteers who have not experienced, or required treatment for social phobia in the past.

Do I have to take part?

It is up to you to decide whether or not you wish to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part, you are still free to withdraw at any time and without giving a reason. If you decide not to take part, or to take part and then leave at anytime, this will not reflect badly upon you or impact upon your future employment / job status in any way.

What will happen to me if I take part?

You will be asked a series of questions about your mood. You will then carry out a computer-based task where you will be asked to respond as quickly as possible to the appearance of a target on the screen by pressing a button on the computer keyboard. Your reactions will be monitored while you are doing this. You will be asked to complete a second task that involves classifying the emotional expressions displayed in a series of faces. Finally, you will be asked to fill in some questionnaires. This will all be completed in a single visit to the Royal South Hants Hospital. It is anticipated that this will last up to a maximum of two and a half hours.

Should your answers on any of these questionnaires reveal a high level of negative emotion (i.e., anxiety or depression), this will be discussed with you and a referral to your GP could also be arranged.

You will be reimbursed for your travel expenses.

What are the possible benefits of taking part?

You are unlikely to receive any direct personal benefits from taking part in this study. However, information obtained during the course of the study may help us to develop a better understanding of how information is processed in social phobia. This in turn may be useful for the future development of strategies for treatment.

Will my taking part in this study be kept confidential?

All information that is collected about you during the course of the research will be kept strictly confidential and your name will not be used when analysing the data obtained. Any information about you will have your name removed so that you cannot be recognised from it.

What will happen to the results of the research study?

A report of the study will be written and useful findings will be shared with colleagues through publication. A summary of the results will be made available on request.

Who is organising and funding the research?

This study is being organised and funded by the University of Southampton.

Who has reviewed the study?

The Southampton and South West Hampshire Local Research Ethics Committee and School of Psychology, University of Southampton Ethics Committee have reviewed this study.

If you have any questions, or wish to request a summary please contact:

Sophie Littler, Department of Clinical Psychology, University of Southampton,
SO17 1PN

Tel: 023 8082 5533, Email: sbl103@soton.ac.uk

Appendix 7

Debrief Sheets

Version 2 (07/11/05)

Clinical Participant Debriefing Sheet

Processing of Emotional Information in Social Phobia:

You have just taken part in a study designed to measure how mood affects what we notice and pay attention to, and how we interpret ambiguous information. We were interested to know how this was different when you were shown pictures of happy, angry or emotionless faces on the computer tasks.

Our mood can change from day to day, however, for some people, their thoughts or feelings may trouble them on a more regular basis. If you found any of the questions you were asked distressing, there are several sources of advice which are available and which may prove helpful in dealing with these. These include Dr David Baldwin (Tel: 02380 825533) at the Department of Psychiatry and your General Practitioner.

We hope that our results will help us to better understand how mood affects attention and interpretation, and therefore also thinking and judgement. This in turn may be useful for the future development of strategies to help change the patterns of attention and interpretation that are thought to contribute to and maintain high levels of anxiety.

Please feel free to ask questions or make comments on any aspect of this study.

Thank you for your help.

For further details, questions or comments please contact:

Sophie Littler,
Department of Clinical Psychology,
School of Psychology,
University of Southampton,
SO7 1BJ
Tel: 023 8059 5321.
Email:sl103@soton.ac.uk

Control Participant Debriefing Sheet

Processing of Emotional Information in Social Phobia:

Debriefing Sheet

You have just taken part in a study designed to measure how mood affect what we notice and pay attention to, and how we interpret ambiguous information. We were interested to know how this was different when you were shown pictures of happy, angry or emotionless faces on the computer tasks.

Our mood can change from day to day, however, for some people, their thoughts or feelings may trouble them on a more regular basis. If you found any of the questions you were asked distressing, there are several sources of advice which are available and which may prove helpful in dealing with these, including your General Practitioner or contact the researcher (details below).

We hope that our results will help us to better understand how mood affects attention and interpretation, and therefore also thinking and judgement. This in turn may be useful for the future development of strategies to help change the patterns of attention and interpretation that are thought to contribute to and maintain high levels of anxiety.

Please feel free to ask questions or make comments on any aspect of this study.

Thank you for your help.

For further details, questions or comments please contact:

Sophie Littler,
Department of Clinical Psychology,
School of Psychology,
University of Southampton,
SO7 1BJ
Tel: 023 8059 5321.
Email: sl103@soton.ac.uk

Appendix 8

Mean Reaction Times of the Social Phobia and Control Groups on the Visual Probe Task

Critical	Variables		SP		Controls	
	Critical	Probe	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
picture	picture	location				
Angry 25%	Left	Left	718.569	107.765	621.491	103.282
		Right	742.497	158.441	621.943	92.551
	Right	Left	737.903	134.121	602.431	85.931
		Right	716.372	134.100	603.688	74.581
Angry 50%	Left	Left	725.991	118.188	600.528	88.418
		Right	760.374	138.808	620.648	106.992
	Right	Left	746.611	138.608	589.745	70.422
		Right	711.921	142.973	594.052	70.268
Angry 75%	Left	Left	723.744	112.239	610.449	99.991
		Right	761.936	144.913	612.223	100.005
	Right	Left	747.159	135.401	610.490	81.691
		Right	725.229	140.272	607.783	102.235
Angry 100%	Left	Left	714.505	149.719	612.907	82.824
		Right	778.966	155.152	618.119	105.320
	Right	Left	790.770	178.154	621.425	109.983
		Right	722.845	166.877	601.328	72.738
Fearful 25%	Left	Left	720.976	111.418	629.790	118.068
		Right	709.337	106.639	572.299	83.475
	Right	Left	743.063	131.021	615.862	108.123
		Right	746.179	133.190	587.241	86.303
Fearful 50%	Left	Left	727.958	102.596	597.047	104.958
		Right	696.632	109.226	577.321	67.096
	Right	Left	745.274	143.430	579.869	81.294
		Right	732.702	96.851	591.096	69.390
Fearful 75%	Left	Left	715.754	126.207	588.014	88.362
		Right	713.167	113.261	607.457	91.882
	Right	Left	766.502	168.980	566.550	93.295
		Right	690.182	123.757	584.260	76.825

Fearful	Left	Left	719.531	98.751	591.476	67.303
		Right	758.341	138.177	586.076	80.459
100%	Right	Left	759.784	128.829	599.676	75.006
		Right	678.771	119.665	591.578	73.333
Happy	Left	Left	742.150	126.005	595.883	76.090
		Right	715.579	99.340	572.094	68.615
25%	Right	Left	742.835	113.381	596.189	101.951
		Right	720.334	136.255	589.003	95.230
Happy	Left	Left	734.768	129.589	587.153	93.061
		Right	725.960	118.669	604.427	89.638
50%	Right	Left	743.485	130.153	604.710	91.908
		Right	707.584	138.962	595.673	92.245
Happy	Left	Left	710.522	103.848	602.613	78.609
		Right	713.563	143.898	611.889	90.678
75%	Right	Left	721.114	92.583	588.207	78.777
		Right	743.327	111.582	570.805	77.007
Happy	Left	Left	678.427	142.514	587.707	89.605
		Right	765.950	160.335	588.675	95.253
100%	Right	Left	764.113	130.063	610.556	101.644
		Right	709.740	133.859	568.496	70.237

		AGE	GEN	EDU	MEDS	LSASAN	LSASAV	LSASTO	STAI-1	STAI2	MADRS	BDI	SADS	FNES	PRI
SAIS1	Pearson	-.310	.106	-.206	-.111	.016	.198	.130	1	.526	.048	.266	.155	.162	.246
	Sig. (2-	.327	.742	.521	.730	.960	.538	.688		.079	.883	.404	.631	.615	.440
	N	12	12	12	12	12	12	12	12	12	12	12	12	12	12
SAIS2	Pearson	-.139	.529	-.159	.045	.410	.565	.514	.526	1	.288	.329	.197	.226	.297
	Sig. (2-	.666	.077	.621	.889	.186	.056	.087	.079		.363	.296	.539	.481	.349
	N	12	12	12	12	12	12	12	12	12	12	12	12	12	12
MADRS	Pearson	.502	-.181	-.465	.559	.786(**)	.712(**)	.755(**)	.048	.288	1	.750(**)	.781(**)	-.167	-.039
	Sig. (2-	.096	.573	.128	.059	.002	.009	.005	.883	.363		.005	.003	.605	.905
	N	12	12	12	12	12	12	12	12	12	12	12	12	12	12
BDI	Pearson	.249	-.123	-.663(*)	.420	.581(*)	.486	.532	.266	.329	.750(**)	1	.437	.148	.142
	Sig. (2-	.435	.704	.019	.174	.047	.109	.075	.404	.296	.005		.155	.647	.659
	N	12	12	12	12	12	12	12	12	12	12	12	12	12	12
SADS	Pearson	.132	-.072	-.390	.233	.468	.492	.492	.155	.197	.781(**)	.437	1	-.081	.232
	Sig. (2-	.682	.824	.210	.467	.125	.104	.105	.631	.539	.003	.155		.802	.469
	N	12	12	12	12	12	12	12	12	12	12	12	12	12	12
FNES	Pearson	-.333	.251	-.022	-.418	-.026	-.001	-.011	.162	.226	-.167	.148	-.081	1	.143
	Sig. (2-	.291	.432	.946	.176	.935	.997	.972	.615	.481	.605	.647	.802		.657
	N	12	12	12	12	12	12	12	12	12	12	12	12	12	12
PRI	Pearson	-.549	.121	-.391	-.229	-.167	-.161	-.166	.246	.297	-.039	.142	.232	.143	1
	Sig. (2-	.064	.707	.209	.473	.604	.618	.606	.440	.349	.905	.659	.469	.657	
	N	12	12	12	12	12	12	12	12	12	12	12	12	12	12

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

a Cannot be computed because at least one of the variables is constant.

