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Cognitive Biases for Social Cues in Social Phobia

by

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Cognitive Biases for Social Cues in Social Phobia

Abstract

The literature review examines theories and research concerning information processing biases in social phobia, with a particular focus on selective attention for, and interpretation of, external social cues. After highlighting the clinical presentation and psychosocial impact of social phobia, theoretical conceptualizations are discussed, empirical findings are critically evaluated, and relevant therapeutic interventions are outlined.

The subsequent empirical paper describes an investigation of biases in initial orienting, and maintenance, of attention towards social cues (faces), in individuals with generalized social phobia (GSP) and healthy volunteers. Eye-movements within a modified visual probe task were monitored. There were two trial types: (i) trials in which an emotional face (angry or happy) was paired with a socially-relevant control stimulus (neutral face), and (ii) trials in which a face (angry, happy or neutral) was paired with a non-social control stimulus (household object). For each condition, the direction, speed and duration of initial gaze fixation were assessed. Results indicated that, in general, participants directed their gaze more often towards, and looked longer at, emotional (angry and happy) faces relative to neutral faces. In addition, participants (irrespective of group) initially oriented more often towards, and fixated for longer on, faces relative to objects. The magnitude of the latter bias (i.e. longer duration of initial fixation on faces) was significantly more pronounced in individuals with GSP, compared with controls. These findings are discussed in relation to the existing literature on attentional biases for external cues in GSP. Clinical implications and potential avenues for future research are considered.

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Acknowledgements

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Cognitive Processing of External Social Cues in Social Phobia:

Biases in Attention and Interpretation

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Cognitive Biases in Social Phobia:

Attention to, and Interpretation of, External Social Stimuli

Abstract

This review outlines the nature of social phobia and examines cognitive-behavioural accounts of this disorder. The paper centres around an exploration of the role of cognitive biases in the maintenance of social phobia, with a particular focus on biases in selective attention for, and interpretation of, external social cues. Empirical studies that have aimed to test some of the predictions derived from the theoretical models regarding such biases are described and evaluated. Subsequently, the clinical implications of this body of research and directions for further research are highlighted.

Keywords: social phobia; cognitive biases; selective attention; interpretation

Introduction

Social phobia* was first formally documented as a distinct mental health disorder when it was incorporated into the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III; American Psychiatric Association [APA], 1980). Despite this recognition, there continued to be a paucity of research relating to social phobia for much of the succeeding decade (Liebowitz, Gorman, Fyer, & Klein, 1985).

However, this was to change with the advent of a growing interest in the synthesis of cognitive and clinical psychology. Deliberation regarding the role of information processing phenomena (i.e. attention, interpretation, and memory) in emotional experiences, and the development and maintenance of emotional disorder, has provided the impetus for a substantive body of contemporary psychological work, both theoretical and empirical (Williams, Watts, MacLeod, & Mathews, 1997). Eysenck (2004) recently highlighted the "bidirectional influence" (p. 394) between cognitive and clinical domains of psychology, emphasizing the significant contribution of cognitive theory and research to the development of comprehensive models of clinical disorders; rigorous empirical investigation of these theoretical positions; and, innovation in terms of therapeutic intervention. Indeed, cognitive psychology has undeniably been extremely influential at a clinical level, and has contributed to the current dominance of the cognitive-behavioural approach as a framework for conceptualising and treating a wide range of psychological disorders, including social phobia, which forms the focus of the present paper.

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* Also known as social anxiety disorder (SAD)

There is now an extensive body of evidence to espouse the pivotal role of biases in attentional and interpretative processes in the presentation of clinical anxiety disorders, including social phobia. Therefore, it is the intention within this paper to focus on these aspects of information processing.

Whilst it has been acknowledged that biases in memory processes, particularly relating to information retrieval, may also play a role in psychopathology, it has been suggested that biased recall is perhaps more characteristic of depression rather than anxiety disorders (Mogg, Mathews, & Weinman, 1987; Williams et al., 1997). Regarding social phobia specifically, whilst there is scope for further research in this area, presently there is very little evidence to indicate that people with this disorder exhibit a consistent pattern of memory bias for threat-relevant information (Coles & Heimberg, 2002; Rapee, McCallum, Melville, Ravenscroft, & Rodney, 1994; Rinck & Becker, 2005; Stravynski, Bond, & Amado, 2004). Consequently, memory will not be considered further in this paper.

The purpose of the current review, therefore, is to: (a) provide an overview of the clinical presentation and psychosocial impact of social phobia; (b) outline contemporary theoretical models of social phobia; (c) consider the theoretical accounts of social phobia in relation to the wider perspective of general information-processing models of anxiety; (d) examine the empirical evidence relating to hypothesised attentional and interpretive biases in this disorder; (e) consider the clinical implications of this body of research; and, (f) identify potential areas for further investigation.

Social Phobia

Social phobia is a prevalent and debilitating mental health disorder (Neal & Edelmann, 2003). The exact definition of this anxiety disorder has been subjected to minor revision and refinement since its inception and the current edition of the DSM (DSM-IV-TR; APA, 2000) stipulates that social phobia is characterised by a "marked and persistent fear of one or more social or performance situations in which the person is exposed to unfamiliar people or to possible scrutiny by others" (p. 456). Essentially, the individual is afraid that he or she will behave in a manner that will result in humiliation or embarrassment. In particular, individuals with social phobia are concerned that they will appear awkward, incoherent, speechless, or visibly distressed (i.e. blushing, trembling, and sweating) during social encounters and, thus, draw unfavourable attention to themselves (Stravynski et al., 2004).

It is highlighted in the DSM-IV-TR (APA, 2000) that, for individuals with social phobia, exposure to feared social situations provokes an intense anxiety response, which may culminate in a situational, or predisposed, panic attack. Therefore, such situations are either endured with considerable anxiety and distress, or else avoided entirely. Finally, the diagnostic criteria further specify that an individual must recognise that their fear is excessive or unreasonable, and that, as a result of the avoidance, anxious anticipation, or distress suffered in the feared social or performance situation, the person must experience significant interference in their normal routine, occupational or academic functioning, social activities or relationships.

Two subtypes of social phobia have been specified: (a) generalised social phobia (GSP), where the individual experiences marked distress in a broad range of social situations; and (b) non-generalised or specific social phobia, where the anxiety

is only present during one or two specific (usually performance-related) situations, such as public speaking. There is ongoing debate concerning the nature of the relationship between these subtypes. Some authors have suggested that they represent a quantitative distinction within social phobia, falling on a conceptual continuum with varying degrees of severity ranging from shyness to avoidant personality disorder (e.g. Weinshenker et al., 1996; Widiger, 1992). However, in contrast, Hook and Valentiner (2002) have argued that these subtypes are in fact qualitatively distinct. Unfortunately, it is beyond the scope of this review to delineate the precise arguments and evidence used to support the opposing positions in this dispute and, therefore, readers are directed to the relevant papers for further information on this issue. To clarify, it is the generalised subtype of social phobia that will constitute the focus of consideration during the remainder of this review.

Epidemiology

Social phobia is the most prevalent anxiety condition and is in fact the third most common mental health disorder in the United States, superseded only by major depressive disorder and substance abuse (Moutier & Stein, 1999). Estimates of the lifetime prevalence of GSP have varied considerably (Wittchen & Fehm, 2003), with recent surveys indicating figures between 7-13% in Western countries (Furmark, 2002).

It has been suggested that the variability in prevalence estimates across studies is likely to be associated with the progressive refinement of diagnostic criteria, disparity between studies in terms of assessment methods and instruments, application of different thresholds for gauging distress and impairment, and possible variation in socio-environmental factors across cultures (Faravelli et al., 2000;

Furmark, 2002). Additionally, sample characteristics may influence prevalence figures. For instance, some epidemiological studies have reported a gender bias favouring women (e.g. Faravelli et al., 2000) and age is another important variable, with higher prevalence estimates being reported in studies conducted with samples comprising a higher proportion of younger adults (Lecruiber et al., 2000).

Aetiology

Typically, the onset of social phobia occurs during adolescence (Kasper, 1998). As highlighted by Neal and Edelmann (2003), the exact aetiology of GSP is complex and remains relatively poorly understood, although it is likely that this disorder is the consequence of an intricate interaction between various diathesis and stress factors. Indeed, a number of biological, psychological and environmental contributing factors have been identified. For instance, it has been purported that individuals may inherit a genetic susceptibility to the development of psychopathology under certain conditions, as indicated by the greater concordance of GSP in identical twins (Kendler, Neale, Kessler, Heath, & Eaves, 1992) and an increased incidence in first-degree relatives (Fyer, Mannuzza, Chapman, Martin, & Klein, 1995; Stein et al., 1998). However, it is still not clear to what extent this genetic inheritance conveys vulnerability for GSP specifically, as opposed to a more general propensity towards anxiousness (Rapee & Spence, 2004), the exact manifestation of which may depend upon the impact of other variables. Additional intrapersonal factors implicated in the aetiology of GSP include neurotransmitter dysregulation, particularly of dopaminergic and serotonergic systems (Mathew, Coplan, & Gorman, 2001), and dynamics relating to temperament (e.g. behavioural inhibition; see Biederman et al., 2001; Turner, Beidel, & Wolff, 1996).

External events and experiences that have been identified as having an influential role to play in the development of social phobia include: (1) conditioning through exposure to traumatic events, either directly or vicariously (Stemberger, Turner, Beidel, & Calhoun, 1995); (2) parenting style, particularly parental overprotection or rejection (Lieb et al., 2000) and use of shame as a disciplinary tactic (Bruch & Heimberg, 1994); (3) parental modelling of socio-evaluative anxiety or avoidance (Feldman & Rivas-Vasquez, 2003); (4) restricted social exposure (Rapee & Melville, 1997); and, (5) peer rejection (Vernberg, Abwender, Ewell, & Beery, 1992).

Unfortunately, it is not possible within the constraints of this review to elucidate each of these aetiological factors in greater depth and, therefore, interested readers are directed to the comprehensive summaries recently provided by Hudson and Rapee (2000), Ollendick and Hirshfeld-Becker (2002), Neal and Edelman (2003), and Rapee and Spence (2004), who have recently published a paper in which the variety of contributing factors are synthesised into a preliminary developmental model.

Psychosocial Impact

Muzina and El-Sayegh (2001) highlighted a variety of social and performance situations that are commonly feared and avoided by individuals with generalised social phobia (GSP), including: public speaking; writing whilst being observed; eating in front of other people; meeting or talking to strangers, people in authority or members of the opposite sex; asking questions or giving reports in groups; being the centre of attention; and, attending social gatherings (e.g. parties). As GSP tends to be a chronic disorder, which is unlikely to spontaneously remit

(Kasper, 1998), it may have a significant deleterious impact on numerous facets of an individual's life. Indeed, GSP is associated with impaired academic performance and occupational functioning, increased likelihood of relationship difficulties, and generally poor quality of life. Specifically, in terms of intimate relationships, it has been found that individuals with GSP are significantly more likely to remain single, whilst those who do marry report an increased degree of marital conflict and higher rate of divorce (Wittchen & Beloch, 1996).

Furthermore, people with this disorder commonly report reduced academic attainment, increased incidence of truancy from school, decreased likelihood of pursuing higher education courses and higher rates of subsequent unemployment (Kessler, 2003). Bruch, Fallon, and Heimberg (2003) reported that, for those individuals who are employed, social fears have a significant impact upon career selection, occupational advancement and adaptation within the working environment, although no differences in job satisfaction were found compared to non-anxious controls. Notably, the female participants with GSP in Bruch et al.'s (2003) study demonstrated increased avoidance of interpersonally-oriented occupations, compared to their non-anxious counterparts.

Comorbidity

In addition to impaired social functioning, GSP is also associated with a significantly increased risk of developing co-morbid mental health disorders. Indeed, Schneier, Johnson, Hornig, Liebowitz, and Weissman (1992) found that 69% of participants in their epidemiological sample met criteria for at least one additional psychiatric disorder in their lifetime, whilst Faravelli et al. (2000) reported a figure of 92% life-time comorbidity. The discrepancy between these two statistics may

reflect differences in the diagnostic criteria and assessment procedures employed, as the former study was undertaken prior to the publication of the fourth edition of the DSM (DSM-IV; APA, 1994), whilst the latter study was conducted after this revision. However, both studies highlight the issue of significant co-morbidity associated with GSP. Particularly common co-morbid conditions are major depression, panic disorder, agoraphobia and substance-misuse disorders, such as alcohol abuse (Feldman & Rivas-Vazquez, 2003). Such complex presentations have been linked to increased severity of functional impairment, higher utilisation of healthcare resources, poorer prognosis, and increased risk of suicide attempts (Lecrubier, 1998; Lydiard, 2001).

The above studies highlight the prevalent and persistent nature of GSP, together with the intense distress and adverse psychosocial consequences that commonly ensue. Having thus considered the main clinical characteristics of this condition, the following sections will focus upon an examination of the literature devoted to the theoretical and empirical exploration of the role of cognitive processes, especially attention and interpretation, which feature prominently in current conceptualisations of social phobia (Clark & Wells, 1995; Rapee & Heimberg, 1997). These models will now be expounded.

Contemporary Cognitive Models of Social Phobia

The cognitive-behavioural approach to formulating and treating emotional disorders was pioneered by Aaron T. Beck (1976). His seminal work has provided the foundations for the subsequent development of disorder-specific theoretical models for a range of conditions, including social phobia.

Beck, Emery, and Greenberg (1985)

The cognitive perspective on social phobia described by Beck et al. (1985) conceptualised this disorder in terms of a vicious cycle of events culminating in a self-fulfilling prophecy. This sequence was considered to begin with anticipatory anxiety prior to social and performance situations, arising from the exaggerated fear of negative evaluation that is the core characteristic of social phobia. Through a process termed "emotional reasoning" (Beck et al., 1985), individuals use their mood state as a source of information about a given situation. Thus, an individual who feels anxious about social situations is more likely to consider such events as highly threatening. The model highlighted the deleterious impact of the cognitive, physiological and behavioural symptoms of the resultant anxiety reaction, particularly in relation to deficits in verbal fluency and cognitive speed and flexibility. These symptoms, and associated deficits, serve to exacerbate perceived vulnerability in interpersonal interactions and produce genuine impairments in situational functioning, resulting in an increased likelihood of feared outcomes actually occurring. Beck et al. emphasised the role of shame as a crucial affective component of social phobia. These authors deemed a number of cognitive factors as centrally important, namely: (a) underestimation of coping capacity;
(b) magnification of situational demands; (c) rigid dysfunctional beliefs pertaining to social performance; and, (d) heightened perception of others as critical.
Furthermore, it was presumed that individuals with social phobia would exhibit biased cognitive processing, such that the detection and registration of internal and external stimuli that could be construed as consistent with these beliefs would be enhanced.

This initial model has been used to inform the subsequent development of more detailed psychological frameworks of social phobia. There are currently two such models (Clark & Wells, 1995; Rapee & Heimberg, 1997), both of which implicate information processing biases as a significant factor in the maintenance of this disorder.

Clark and Wells (1995)

Clark and Wells' (1995) formulation outlined a number of factors theorised to maintain social phobia, namely negative anticipatory and post-event processing, changes in attentional processing (particularly amplification of self-focussed attention and construction of self as a social object), anxiety-induced performance deficits and safety behaviours. These authors proposed that, for individuals with social phobia, entering a social or performance situation results in the activation of relevant assumptions, which arise from an interface between previous experiences and innate behavioural predispositions. Clark and Wells highlighted three specific categories of assumptions which are activated during social situations, namely: (a) excessively high standards for social performance (e.g. "I must always appear intelligent and witty"); (b) conditional beliefs concerning social evaluation and the consequences of acting in a certain way (e.g. "If I am quiet, people will think I am boring"); and, (c) unconditional negative beliefs about the self (e.g. "I'm stupid/inadequate").

Consistent with the theoretical position of Beck et al. (1985) described earlier, Clark and Wells (1995) propose that the activation of these assumptions leads to a perception of social occasions as threatening and the subsequent activation of an "anxiety program" (comprising cognitive, somatic, affective and behavioural

changes) which, in turn, serves to reinforce the perception of danger. Clark and Wells elaborated that "safety behaviours", such as avoiding eye contact and saying very little, carried out in an attempt to avert feared outcomes, are unhelpful in two ways. Firstly, such behaviours actually serve to maintain negative beliefs by limiting opportunities for disconfirmation. Secondly, these actions may have the unintended consequence of increasing the likelihood that others will think that the socially phobic individual does not like them, thus provoking an unfriendly or critical response.

Additionally, it was purported that a preoccupation with somatic reactions (e.g. blushing) and negative thoughts leads to processing of the self as a social object, with vivid mental images of the self as presumably seen from an observer's perspective. However, these images are contaminated by (often incorrect) inferences about the way the individual appears to others, based on information concerning internal state.

Thus, Clark and Wells (1995) propose that, when in social situations, socially phobic individuals become increasingly self-focused and direct attention *away* from external social cues. Therefore, socially phobic individuals preferentially attend to negative thoughts about themselves and associated feelings of anxiety whilst they are in social situations, rather than the responses of others around them.

In a recent revision of Clark and Wells' (1995) model, Clark and McManus (2002) stated that "social phobics (reduced) processing of external social cues is biased in favour of detecting from others responses that can be interpreted negatively" (p. 93). Thus, it is advocated that, due to the preferential allocation of attentional resources to internal stimuli and avoidant safety behaviours, socially phobic individuals will exhibit reduced attention to external social cues, although

when it is not possible to avoid such cues, an attentional bias for potentially threatening social stimuli will be evident.

In summary, a number of specific hypotheses concerning information processing in socially anxious individuals can be derived from the work of Clark and his colleagues (Clark & Wells, 1995; Clark & McManus, 2002). Those hypotheses relevant to the processes of attention and interpretation indicate that: (a) self-focused attention will increase in social situations due to increased anxiety; (b) reduced processing of external social cues will occur when anxious; (c) (reduced) processing of external social cues will be biased in favour of the detection of cues that could be interpreted as signs of disapproval from others; and, (d) external social events will be interpreted in an excessively negative fashion.

Rapee and Heimberg (1997)

The model of social phobia proposed by Rapee and Heimberg (1997) shares elements in common with the previously outlined model of Clark and Wells (1995), although there are also some key distinctions.

Like their predecessors, Rapee and Heimberg (1997) considered mental imagery to be an important factor in social phobia, proposing that, upon entering a social situation, individuals form a mental representation of their external appearance and behaviour as presumably seen by the audience. This representation is influenced by information retrieved from long-term memory (concerning general appearance and prior experience in the situation), internal physiological cues (anxiety symptoms and proprioception) and external cues (audience feedback).

Furthermore, a prediction is formulated regarding the performance standard that an audience is expected to utilise. A determination is subsequently made by the

individual regarding whether they feel that they are performing in a manner than meets this presumed evaluation standard. The degree of discrepancy between the predicted audience standard and the person's perception of the audience's appraisal of their performance (and by extension, themselves), determines the perceived likelihood of negative evaluation from the audience. The anticipation of negative evaluation, and the perceived social consequences of this, further elicits anxiety. The associated physiological, cognitive and behavioural components of anxiety subsequently influence the individual's mental representation of his or her appearance, behaviour, or both, as seen by the audience. Thus a vicious cycle is established.

However, contrary to Clark and Wells (1995), Rapee and Heimberg (1997) contend that attentional resources are simultaneously focused onto *both* this internal representation of the self and close monitoring of any potential threat in the external social environment. Therefore, in direct contrast to Clark and Wells' model, Rapee and Heimberg proposed that social phobia would be inherently characterised by a rapid and extensive allocation of attentional resources *towards* the monitoring of potential external threat (i.e. indicators of possible negative evaluation, such as frowns or signs of boredom), in addition to a negative mental representation of the way that the self is portrayed to others. Therefore, according to this model, individuals with social phobia will scan the environment for any signs of impending negative evaluation, detect such signs rapidly and have difficulty disengaging attention from them.

In view of the differences between the two models in terms of their predictions about attentional biases in social phobia, it is useful to consider these

accounts in relation to the wider perspective of general information processing models of anxiety.

General Information Processing Models of Anxiety

A number of authors have attempted to elucidate the relationship between anxiety and information processing biases, and the mechanisms underlying this association. Wilson and MacLeod (2003) highlighted that these theoretical models can be divided into two perspectives. The first position supposes that individuals with high and low levels of anxiety-proneness demonstrate characteristic differences in attentional direction when a threatening stimulus is encountered (Williams, Watts, & MacLeod, 1988, 1997). However, other authors take an alternative stance, proposing instead that anxious and non-anxious individuals differ in their subjective evaluation of stimulus threat value and that differences in attentional bias are secondary to these evaluative biases (Mathews & Mackintosh, 1998; Mogg & Bradley, 1998). These models will now be briefly recounted.

Priming-Elaboration Model (Williams, Watts, & MacLeod, 1988, 1997)

Williams et al. (1988, 1997) propose that attentional bias results from the operation of two cognitive mechanisms, the affective decision mechanism (ADM) and the resource allocation mechanism (RAM). It was purported that the ADM operates at an automatic or pre-attentive stage of processing to assess the threat value of external cues, in light of stimulus intensity and current mood state. Meanwhile, the RAM, which is influenced by level of trait anxiety, allocates information processing resources. According to this model, high trait anxious individuals

preferentially allocate attentional resources towards stimuli appraised as threatening, whilst low trait anxious individuals shift resources away from threat.

However, critiques of this model have noted that these predictions appear to be illogical when considered from an evolutionary perspective, as it would be counter-intuitive to anticipate that individuals, even those with low trait anxiety, would continue to demonstrate avoidance in the face of increasing threat (Mogg & Bradley, 1998).

Therefore, subsequent models have offered an alternative perspective, indicating that the difference between high and low trait anxious individuals lies not in differential allocation of attentional resources in response to threat, but in disparate sensitivity to lower levels of threat.

Threat Evaluation System (TES; Mathews & Mackintosh, 1998)

Mathews and Mackintosh (1998) postulated the existence of an automatic threat evaluation system (TES), in which threat-related representations arising from a combination of innate (biologically prepared) or acquired processes (such as conditioning) are stored and subsequently accessed at an early and nonconscious stage of processing. Strong threat cues inevitably activate the TES and elicit an attentional response towards threat that interrupts ongoing conscious processing. However, anxiety level can act to modulate the output threshold of the TES so that as arousal increases, lower levels of threat become sufficient to trigger this system. It was hypothesized that competition for cognitive resources, or access to response systems, between the TES and effortful task-related processing would mean that as one gains in activation, the other would be simultaneously inhibited. Thus, this model predicts that anxious individuals should show an enhanced attentional bias for

threat cues, but that, up to a point, this bias can be countered under certain circumstances (e.g. by investing great effort in task-relevant activities).

Cognitive-Motivational Perspective (Mogg & Bradley, 1998)

Mogg and Bradley (1998) conceptualised anxiety as a product of the combined operation of two motivation-related systems: (a) *valence evaluation* (i.e. appraisal of the threat value of any given stimulus); and (b) *goal engagement* (i.e. direction of behaviour towards external motivationally-salient stimuli). From this cognitive-motivational perspective, attentional responses to threat arise from a specific combination of negative valence evaluation and external goal engagement. On the basis of this model, it would be predicted that increasing stimulus threat value would result in increased activation of the valence evaluation system, leading to increased attentional vigilance towards the stimulus in both high and low trait anxious individuals. Furthermore, Mogg and Bradley proposed that valence evaluation is influenced by both the features and context of the stimulus, together with individual differences relating to level of anxiety. These factors, therefore, serve to modulate the interpretation of ambiguous stimuli. This perspective also provides an account for the empirical observation that attentional bias is not evident in anxiety populations when depression is present as a co-morbid disorder (e.g. Musa, Lepine, Clark, Mansell, & Ehlers, 2003), as depression is considered to impair external goal engagement.

These various models of information processing offer an assortment of suggestions regarding the exact nature and function of the cognitive mechanisms that regulate processing of emotional information. However, there is agreement regarding the direction of the expected attentional bias. These models all predict that

anxious individuals will demonstrate vigilance for stimuli appraised as threatening, which would be more consistent with Rapee and Heimberg's (1997) predictions concerning attentional bias in GSP, as opposed to Clark and Wells (1995) proposal of attentional avoidance of external socially threatening stimuli.

A review of the empirical research regarding information processing in social phobia represents the next step in the resolution of this theoretical divergence.

Empirical Evidence Regarding Attention in Social Phobia

A consensus exists amongst cognitive models of social phobia (Clark & Wells, 1995; Rapee & Heimberg, 1997) that alterations in the allocation of attentional resources to internal and external stimuli upon exposure to anxiety-provoking situations contribute to the maintenance of this disorder. Both models concur that socially anxious individuals experience an increase in self-focused attention during social situations. This proposal has been experimentally corroborated and it has been demonstrated that interventions aimed at decreasing self-focused attention during social interactions can produce important therapeutic gains (Woody, Chambless, & Glass, 1997). For further details, interested readers are directed to the comprehensive review of theoretical positions and empirical evidence pertaining to the role of self-focused attention in social phobia provided by Spurr and Stopa (2002).

However, the models make contrary predictions regarding attentional biases for external stimuli. This disparity has provided the impetus for a significant body of research. Numerous experimental studies have attempted to ascertain whether individuals with social phobia do indeed demonstrate a specific attentional bias when confronted with socially relevant external stimuli, and, if so, to clarify the exact

nature of this bias. The empirical evidence, which will be reviewed below, has thus far been ambiguous and contradictory. This is due, at least in part, to variation in the experimental methodologies employed to investigate attentional bias and the assorted limitations of these designs. The methodologies utilised have been refined over time, in an attempt to improve the validity and reliability of research findings. Therefore, the studies outlined in this review have been demarcated according to the type of methodology employed, in order to reflect the process of methodological evolution.

Emotional Stroop Paradigm

The original Stroop colour-naming task (Stroop, 1935), devised to provide a measure of selective attention and response inhibition, required participants to name aloud the colour of the ink in which non-corresponding colour-words were printed (i.e. to say "green" in response to the presentation of the word RED printed in green ink). The Stroop effect refers to the observation that participants characteristically experience difficulty in inhibiting the reading response and so take significantly longer to name the ink-colour of incongruent colour-words than to identify the ink-colour of control stimuli (e.g. squares).

An adaptation of the Stroop task has been utilised by researchers considering attentional biases in emotional disorders. In this paradigm, the essential procedure remains the same, with participants being required to name the colour of printed words. However, emotionally laden stimulus words are substituted for the traditional colour-words. The time taken by an individual to name the ink colour (response latency) was considered to be an index of their ability to inhibit their

attention to the meaning of the word, that is longer response latencies were assumed to be indicative of increased difficulty ignoring the content of the word.

Interference in performance on emotional Stroop tasks (as indicated by increased response latencies) has been found across a range of anxiety disorders, including panic disorder (Ehlers, Margraf, Davies, & Roth, 1988; McNally, Riemann, & Kim, 1990), post-traumatic stress disorder (Foa, Freske, Murdock, Kozak, & McCarthy, 1991; Harvey, Bryant, & Rapee, 1996; McNally, English, & Lipke, 1993), obsessive-compulsive disorder (Hartston & Swerdlow, 1999), generalised anxiety disorder (GAD; Bradley, Mogg, Millar, & White, 1995; Mogg, Mathews, & Weinman, 1989), health anxiety (Owens, Asmundson, Hadjistavropoulos, & Owens, 2004), and social phobia (e.g. Amir, Freshman, & Foa, 2002).

Indeed, the performance of individuals with social phobia on emotional Stroop tasks has been compared with that of both healthy volunteers (Mattia, Heimberg, & Hope, 1993) and individuals with other clinical anxiety disorders, for instance panic disorder (Hope, Rapee, Heimberg, & Dombeck, 1990; Maidenberg, Chen, Craske, Bohn, & Bystritsky, 1996) and GAD (Becker, Rinck, Margraf, & Roth, 2001). Such studies have indicated that, in contrast to these other groups, individuals with social phobia demonstrate an attentional bias for social threat words (e.g. 'boring' and 'foolish'), as reflected in significantly impaired performance on Stroop tasks containing such stimuli, compared to non-words (e.g. XXXXX), colour words, words with a neutral valence, or other threat words (e.g. physical threat words).

Such findings supported the notion of specificity in the attentional bias demonstrated by individuals with GSP, as interference was evident only on those

trials where the experimental stimuli comprised salient negative words directly relevant to the social concerns characteristically associated with this disorder. However, research has indicated that specificity is not necessarily a feature of all anxiety disorders and, furthermore, that social-evaluative concerns are also present in other syndromes. For instance, Maidenberg et al. (1996) found that individuals with panic disorder exhibited longer response times to both physical and social threat words. These authors interpreted this finding as an indicator that individuals with panic disorder "may possess a broader fear network and thus display more generalised attentional bias to threat than socially anxious patients" (p. 529). Furthermore, Becker et al. (2001) reported that participants diagnosed with GAD also demonstrated a more pervasive attentional bias, as indicated by significantly increased response latencies when naming the print colour of a variety of words with affective connotations, including speech-related words (e.g. stutter, blush, embarrassment) and stimuli with a positive valence (e.g. sunset, victory) in addition to GAD-related words (e.g. debts, injury).

Finally, there is some evidence that state anxiety may also have a significant impact on Stroop performance in individuals with social phobia. Amir et al. (1996) utilised a repeated-measures experimental design, in which 14 individuals with social phobia and 14 community volunteers performed the Stroop task before and after an anxiety induction manipulation. This manipulation involved (mis)informing participants at the end of the first task that, following the completion of a second set of colour-naming trials, they would be required to give a three minute speech on a topic of their choice, which would be audio-taped for later scoring (although this was not actually the case). The results of the initial Stroop task replicated previous findings, as an interference effect specific to social threat words was evidenced by

the clinical group. However, this pattern of results was reversed under conditions of elevated anxiety, with socially anxious participants demonstrating facilitated task performance on social threat trials. Thus, the emotional Stroop effect was attenuated under conditions of increased state anxiety. Amir et al. surmised that this finding may have been due to compensation associated with the strategic modification of attentional processes by socially anxious individuals when they are highly anxious, for instance increased task-directed effort or threat-avoidance.

Summary and Evaluation of Emotional Stroop Findings

The results of emotional Stroop tasks have consistently indicated that individuals with GSP exhibit a specific deficit in task performance on trials comprising social threat words. However, uncertainty about the exact nature of the cognitive mechanisms that underlie the interference effect has constituted a significant conceptual limitation of the Stroop paradigm. Initially, findings of increased response latencies to social threat words exhibited by individuals with GSP were interpreted as evidence of an attentional bias towards threat, with a number of mechanisms proposed to explain this effect. For instance, it was suggested that the content of emotionally-laden stimulus material captured attentional resources due to the activation of specific knowledge structures representing personal threats, thus reducing the reserves available for task performance (Mogg et al., 1989). Such an interpretation would be consistent with the proposal of vigilance to external threat hypothesised in Rapee and Heimberg's (1997) model of social phobia.

However, researchers have since argued that increased response latencies could equally be explained by cognitive avoidance of semantic content (de Ruiter &

Brosschot, 1994; Heinrichs & Hoffman, 2001), which would be consistent with decreased attention to external social cues, as proposed by Clark and Wells (1995).

In addition to this interpretive ambiguity, the emotional Stroop paradigm has been subjected to further criticism for the typical reliance on linguistic stimuli. The possibility that verbal and visual information may be processed differently has been highlighted (Heinrichs & Hofmann, 2001; Musa et al., 2003). In particular, Musa et al. (2003) contended that it may be erroneous to assume that words, whilst externally presented stimuli, provide an index of external processing. It was posited that, as the content of social threat words closely parallels the self-image of an individual with social phobia, dwelling on such words could conceivably be regarded as an index of attention to negative internal representations. Musa et al. suggested that this ambiguity could be overcome in studies of external attention in social phobia through the utilization of more ecologically valid social stimuli, for instance pictures of faces. This proposal echoed the view advocated by Bradley et al. (1997), who noted that "the human face is a special stimulus for humans, being one of the most interesting and meaningful stimuli encountered from birth" (p. 26).

In summary, the limitations inherent in the Stroop paradigm have precluded elucidation of the exact nature of attentional bias in social phobia. Consequently, alternative experimental methodologies, such as the visual-search, visual-probe and attentional cueing paradigms, have been developed. These approaches, which will be reviewed below, have subsequently been favoured as more valid methods of detecting attentional bias in emotional disorders.

Visual Search (Face-in-the-Crowd) Paradigm

The face-in-the-crowd task was developed by Hansen and Hansen (1988). On each trial, participants are presented with an array of multiple faces. Whilst on some trials identical emotional expressions are displayed by each of the faces, on other trials one face (the target) portrays a different emotional expression to the others in the crowd (the distracters). The task assigned to participants is to indicate, as quickly and accurately as possible, whether or not a discrepant face was contained within the array.

To date, two studies have applied this paradigm to the investigation of visual attention biases in individuals with social anxiety. Esteves (1999) presented high and low socially anxious student participants with visual arrays composed of nine schematic faces. The results indicated that all participants, irrespective of level of social anxiety, demonstrated an attentional bias that favoured the detection of threatening faces. That is, both experimental groups detected angry target faces among happy distracter faces more quickly, and with fewer errors, than a happy face among angry distracters. This outcome was consistent with the results of studies using both photographic and schematic stimuli with unselected samples of undergraduate students (Fox et al., 2000; Hansen & Hansen, 1988; Öhman, Lundquist, & Esteves, 2001). Whilst no significant differences were evident between the groups in terms of detection time, participants with high social anxiety did exhibit a higher rate of errors (Esteves, 1999). The author suggested that a variety of explanations that could account for these results. For instance, the task may have been insufficient to elicit attentional bias, or high socially anxious participants may have prioritised speed at the cost of accuracy during the task.

In a similar study, Gilboa-Schechtman, Foa, and Amir (1999) compared the performance of a clinical sample of individuals with GSP and non-anxious controls on a face-in-the-crowd task, in which arrays comprising 12 images of the same face were presented. These authors found that participants with GSP exhibited enhanced detection of angry, compared to either happy or disgusted, target faces in a neutral crowd. The non-anxious participants also demonstrated faster detection of angry faces compared to happy faces, although the extent of the bias was significantly less pronounced. Furthermore, individuals with GSP demonstrated significantly slowed performance times on trials composed of angry or happy distracter faces compared to neutral faces, which indicated a sensitivity to crowd-type that was not demonstrated by the non-anxious participants. Gilboa-Schechtman et al. concluded that their results provided partial support for the notion of increased vigilance for threat cues, especially angry faces, in social phobia. The possibility that participants with GSP may not have perceived happy faces as unambiguously positive was also raised.

To summarise, the findings of visual search studies provide partial support for the theoretical position of Rapee and Heimberg (1997), that individuals with social phobia demonstrate rapid detection of external social threat. It would appear that there is a general tendency for all individuals to detect angry faces in disparate arrays with greater speed and accuracy, although this attentional bias may be particularly acute in individuals with clinical levels of social phobia.

Visual-Probe Paradigm

The visual-probe paradigm* was developed by MacLeod, Mathews, and Tata (1986). This paradigm refers to a procedure in which the simultaneous computerised presentation of two experimental stimuli is followed by the subsequent presentation of a probe (e.g. a small dot or arrow) situated in the same spatial location as one of the stimuli. The task requires participants to respond to this probe by pressing a predetermined response key. The time taken to respond to the probe has been taken as an index of whether visual attention was oriented towards or away from a critical stimulus, as reaction times are typically faster when probes are situated in a location on the screen to which an individual was already directing their attention (Posner, Snyder, & Davidson, 1980).

A number of visual-probe studies have been conducted during the past decade with the aim of investigating selective attention for external social cues (i.e. faces) in social anxiety. Several such papers have reported results that would be consistent with the hypothesis made by Clark and Wells (1995), that individuals with social anxiety engage in reduced processing of external social cues. For instance, Mansell, Clark, Ehlers, and Chen (1999) paired photographs of faces comprising positive, negative and neutral expressions with non-social (household) objects and presented these to participants for 500ms. The results of this study indicated that high socially anxious students, in contrast to their low socially anxious counterparts, directed their attention away from both positive and negative faces, although this effect only occurred in a social-evaluative threat condition, when participants anticipated that they would have to give a speech following the task. Similarly, Chen, Ehlers, Clark, and Mansell (2002) reported that, even in the absence of a stress

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* Also known as the dot-probe paradigm

manipulation, a clinical group of participants with GSP were faster at identifying probes occurring in the location of a non-social stimulus (i.e. household objects) presented for 500ms, regardless of whether the simultaneously presented social stimulus consisted of positive, negative or neutral facial expressions. In contrast, no such attentional preference was exhibited by the control group. These results suggested attentional avoidance of social cues (faces) relative to objects in GSP.

However, the findings of other visual-probe studies have provided support for the opposing theoretical prediction of Rapee and Heimberg (1997), that an attentional bias favouring the detection of threatening stimuli is characteristic of individuals with social phobia. For instance, Mogg and Bradley (2002) reported that individuals with high levels of social anxiety demonstrated automatic, or pre-attentive, vigilance towards masked threat faces. Similarly, Pishyar, Harris, and Menzies (2004) paired emotional and neutral faces and found that high socially anxious undergraduate students demonstrated a strategic attentional bias towards negative faces, whilst low anxious students demonstrated a bias towards positive faces, regardless of whether faces were pictured in front view or profile.

The key distinguishing feature that appears to differentiate studies reporting attentional vigilance for social threat from those which have found evidence of avoidance is the nature of the control stimuli utilised. Whilst individuals with high levels of socio-evaluative anxiety have demonstrated vigilance for threatening faces when such stimuli are paired with other face types, avoidance of threat has been found when non-social control stimuli are simultaneously presented. Thus, Mathews and MacLeod (2005) have argued that current evidence would appear to support a conclusion that attentional bias to faces in socially anxious individuals varies

according to context, which would be consistent with the proposal of Clark and McManus (2002).

In addition to variability in control stimuli, a second proposed explanation for the conflicting findings of visual-probe studies concerns variability in the duration of stimulus presentation. The visual-probe paradigm has been the subject of criticism as it provides only a "snap-shot" of attention allocation at the end of the stimulus presentation time (Hermans, Vansteenwegen, & Eelen, 1999; Mogg, Millar, & Bradley, 2000). The duration of stimulus presentation is likely to determine the opportunity for one or more shifts of attention between stimuli, so that short exposure durations may reflect initial attentional capture, whereas longer durations reflect subsequent maintenance of attention. This is particularly important in light of the suggestion that attentional biases may vary over time, as has indeed been the case in observed vigilant-avoidant attentional patterns (e.g. Mogg et al., 1987). Accordingly, researchers have attempted to investigate this issue through the experimental manipulation of stimulus presentation times.

Only one visual-probe study to date has specifically examined the time-course of attentional bias in GSP (Mogg, Philippot, & Bradley, 2004). These authors compared a clinical sample of individuals with GSP and a non-anxious control group on a visual-probe task in which photographs depicting either angry or happy facial expressions were presented together with neutral expressions at two exposure durations, 500ms and 1250ms. The results indicated that participants with GSP demonstrated enhanced vigilance for angry faces at 500ms, but no attentional bias in the 1250ms condition. These results were suggestive of an initial orienting bias favouring threat cues in individuals with GSP, but provided no evidence to support a bias in the maintenance of attention.

Summary and Evaluation of Visual-Probe Findings

The majority of visual-probe studies have found evidence to indicate the operation of an attentional bias, although, due to conflicting findings, the exact nature of this bias remains unclear. One potential explanation for this lack of clarity is that attentional bias may not be a static phenomenon, but may in fact vary across time and situational variables.

Whilst the visual-probe paradigm has undoubtedly facilitated the investigation of the nature of stimuli that capture the attention of people with social phobia, it has been noted that it is virtually impossible to distinguish whether findings are the result of enhanced engagement or difficulty disengaging attention (Fox, Russo, Bowles, & Dutton, 2001). Therefore, interest has turned to the further investigation of this issue.

Attention Cueing Paradigm: Facilitated Engagement or Maintenance of Attention?

The delineation of different components of visual attention constitutes an important distinction within the literature, and Posner and Petersen (1990) propose that orientating of attention can be divided into three subsystems, namely the "engagement", "disengagement", and "shifting" of attentional resources. In order for an individual to perform different actions, attention must first be selectively orientated towards a stimulus, and subsequently maintained, discontinued and redirected as appropriate.

A literature search revealed only one published study that has examined disengagement of attention in GSP (Amir, Elias, Klumpp, & Przeworski, 2003). Amir et al. (2003) utilised an adaptation of the cueing task originally designed by Posner (1980). This paradigm involves the presentation of a cue (a flickering box in

the original version vs. a word in Amir's et al.'s modified task) in one of two possible locations, either to the left or right of a fixation point, followed by a target (asterisk) in either the cued or uncued location, which participants are required to detect. Reflexive allocation of attention towards the initial cue means that subsequent appearance of the target in the uncued location necessitates disengagement of attention from the cued location, shifting of attention, and re-orientation towards the target. The results of Amir et al.'s investigation indicated that individuals with social phobia had difficulty disengaging their attention from socially threatening words, compared to positive or neutral words.

However, the authors acknowledged that their results should be interpreted with some caution in view of the presence of additional co-morbid diagnoses in their clinical group, a lack of data pertaining to the performance of other clinically anxious populations and the omission of alternative threat words (e.g. physical threat), issues which preclude definitive conclusions regarding the specificity of their findings to social phobia. Furthermore, as noted earlier, linguistic stimuli may not offer a reliable index of attention to external stimuli. Therefore, replication of Amir et al.'s study using pictorial social stimuli (e.g. faces) would be useful.

Indeed, previous attention cueing studies conducted by Fox and colleagues have indicated that individuals with elevated levels of state and trait anxiety exhibit increased difficulty in disengaging attention from emotional social stimuli presented in a visual modality. For instance, Fox et al. (2001) found evidence of delayed disengagement from angry faces, relative to positive or neutral faces, in individuals with high levels of state anxiety, whilst Fox, Russo, and Dutton (2002) reported that high trait anxious individuals demonstrated delayed disengagement from schematic emotional facial expressions (both angry and happy), relative to neutral expressions.

Thus, in summary, Amir et al.'s (2003) attention cueing study suggested that attentional bias for socially relevant threat words in GSP may relate to increased difficulty disengaging attentional resources from social threat cues. However, further research is required before firm conclusions can be drawn on this matter.

Eye-Movement Monitoring Studies

Recent technological advancements have provided new opportunities to address the methodological shortcomings of previous paradigms, by directly monitoring the direction of an individual's gaze throughout stimulus presentation. Mogg et al. (2000) highlighted that "eye-movements are rapid, naturalistic and normally automatic in that individuals commonly look at stimuli that attract their attention" (p. 696). Therefore, the application of eye-movement monitoring to the study of attention is advantageous as this methodology has good ecological validity, because it is expected that observations regarding the allocation of attention within the experimental situation should more closely reflect behaviour in real-life situations.

However, to date, only a limited number of published studies have investigated biases of selective attention in anxious populations utilising an eye-movement monitoring paradigm. For example, Mogg et al., (2000) monitored the direction and latency of initial eye-movements of individuals with GAD in response to pairs of pictures comprising one emotional facial expression (angry, happy, or sad) and one neutral expression. Each pair of photographs was presented for 1000ms within the format of a probe-detection task. Findings indicated that individuals with GAD, without co-morbid depressive disorder, were significantly more likely to look first at threat faces than neutral faces, compared with healthy controls or depressed

individuals. Furthermore, the speed of this initial shift in gaze toward threat faces was also increased in GAD, relative to the other two groups. These findings provide support for an anxiety-related attentional bias in initial orienting towards threat, in terms of both direction and speed.

However, a somewhat different pattern of results was found by Rohner (2002) in a study of eye-movements in high and low trait anxious students during the presentation of pictures depicting angry, happy and neutral facial expressions. No between group differences were evident in the period between 0-1000ms, with both high and low anxious students showing a preference for looking at angry faces more than happy faces. However, during the time-period 2000-3000ms, the high trait anxious individuals averted their gaze from angry faces more than happy faces. Rohner suggested that threat-avoidance in high trait anxious individuals may be a strategic affect-regulation strategy, employed "in an attempt to minimise the mild discomfort they experience when looking at angry faces" (p. 843).

Although there is no published work in which the eye-movements of individuals with GSP have been examined during viewing of competing stimuli, Horley, Williams, Gonsalvez, and Gordon (2003) examined eye-movements to different facial features within individually presented emotional faces. They assessed temporal (i.e. number of fixations, total fixation duration, median fixation duration) and spatial measures (i.e. direction) of eye-movements during presentation of colour-digitised photographs of the same individual displaying neutral, happy and sad facial expressions. The results indicated that individuals with GSP demonstrated avoidance of salient facial features, particularly the eyes, compared to controls. This avoidance was most apparent for sad faces, compared to happy faces. In fact, individuals with social phobia in fact evidenced a distinctive "hyperscanning"

strategy for processing faces, which was characterised by a lack of fixations, both in number and duration, and an increased raw scanpath length. The authors posited that these observations could be explained in terms of a coping strategy of strategic avoidance, due to hypervigilence for potential sources of negative social evaluation. However, it is not clear to what extent sad faces are perceived as threatening by individuals with GSP and, therefore, it would be useful to examine scanning patterns for alternative facial expressions (e.g. angry, fearful, disgusted, and bored).

In contrast to the above results, Green, Williams, and Davidson (2003) found that psychiatrically healthy individuals demonstrated an increase in the number and duration of fixations to feature areas of threat-related facial expressions (i.e. fear and anger), compared to non-threat expressions (i.e. sad, happy, neutral). These authors concluded that this "vigilant" style of visual scanning in healthy individuals would be consistent with the hypothesis that the detection and monitoring of social threat is advantageous in evolutionary terms.

Empirical Evidence Regarding Biased Interpretation of External Stimuli

It is the central tenet of cognitive approaches that emotional responses are determined not by events per se, but rather the interpretation of an event (Beck, 1976). Arguably, according to Mackintosh and Mathews (2003), the perceived emotional valence of a stimulus is its single most important attribute.

Current theoretical models of social phobia propose that biased cognitive processing of external information in this disorder is not limited to attentional processes, but further encompasses a characteristic negative interpretation bias. The empirical evidence gathered to date (key studies to be outlined) would appear to support this theoretical supposition, indicating that individuals with social phobia

have a tendency to interpret ambiguous social stimuli in a negative fashion and to interpret mildly negative stimuli in a catastrophic manner.

Interpretation of Social Senarios

Amir, Foa, and Coles (1998) presented participants with 22 ambiguous scenarios, 15 of which were concerned with social events and seven of which depicted non-social events. Participants were subsequently presented with positive, negative and neutral interpretations and asked to rank them with respect to the likelihood of this interpretation coming into their own mind, or the mind of a "typical" person. The results of this study revealed that individuals with GSP were significantly more likely to make a negative interpretation of an ambiguous social event than either patients with obsessive-compulsive disorder or non-patient controls and that this effect was specific to the self-referent condition. In contrast, no differences were found between the groups in terms of their interpretation of non-social events. These authors concluded that their study provided the first demonstration of the existence of a negative interpretation bias for socially-relevant stimuli in GSP. Stravynski et al. (2004) argued that this conclusion was perhaps premature, citing several limitations of Amir et al.'s study, in particular issues pertaining to the statistical analysis conducted and the unknown ecological validity of the experimental scenarios.

However, subsequent research findings have strengthened Amir et al.'s (1998) position. Stopa and Clark (2000) also examined interpretations of ambiguous scenarios depicting social and non-social events, together with appraisal of unambiguous scenarios of mildly negative social events. Interpretations were assessed through participant's responses to open-ended questions, together with

rankings and belief ratings of experimenter-provided alternative explanations. These researchers found that, in comparison to both individuals with other clinical anxiety disorders and healthy volunteers, patients with GSP were more likely to interpret ambiguous social events in a negative fashion and exhibited a tendency to catastrophize unambiguous, mildly negative social events.

Furthermore, there is mounting evidence to suggest that the negative interpretation bias in GSP extends beyond the evaluation of ambiguous social scenarios, and is also evident in the appraisal of positive social events (Gilboa-Schechtman, Franklin, & Foa, 2000; Vonaken, Bogels, & de Vries, 2003; Wallace & Alden, 1997). In particular, following positive social interactions, individuals with social phobia expressed concerns that others would expect more of them in future interactions (Wallace & Alden, 1997). This is a particularly important finding, as this would go some way towards explaining why the negative beliefs of individuals with GSP are not modified or disconfirmed in light of successful performance in social situations.

Related to interpretative processes are judgments pertaining to the perceived probability and cost of an event occurring. Researchers have consistently found evidence to support the operation of a judgment bias in GSP, as demonstrated by a tendency to overestimate the probability and cost of negative social events or negative evaluation (Foa, Franklin, Perry, & Herbert, 1996; Lucock & Salkovskis, 1988; McManus, Clark, & Hackman, 2000; Vonaken et al., 2003).

The above studies provide support for the existence of a negative interpretation bias relating to social interactions in GSP. However, an alternative view has also been suggested, in which it is proposed that individuals with social anxiety may instead lack a positive bias that is present in non-anxious individuals.

There is now some empirical evidence to support this position. For instance, Hirsch and Mathews (1997, 2000) have reported that non-anxious individuals characteristically evidence a positively valenced on-line inferential bias when encountering ambiguous social information, which is impaired in people with social phobia. Similar findings were obtained by Constans, Penn, Ihen, and Hope (1999), who reported that while socially anxious undergraduate students interpreted an ambiguous interpersonal scenario in a more threatening manner than controls, this bias "was marked not so much by an outright negative interpretation style, but rather by a failure…to show a positive interpretation" (p. 643). Hirsch and Mathews (2000) suggested that a positive interpretation bias may serve a protective function that assists in the maintenance of positive mood state and self-esteem, a lack of which in socially anxious individuals may increase vulnerability to anxious mood.

However, it may not be the case that differences in interpretation of social stimuli can be explained by either one or other of these explanations. In fact, it may be that a synthesis of both positions can best explain the nature of interpretation biases in social anxiety. Furthermore it is possible that, as with attentional biases, interpretation biases may not be static over time. This would be consistent with the findings of Brendle and Wenzel (2004), who examined both immediate and delayed interpretation biases. These authors found that, in the immediate condition, high socially anxious individuals rated negative interpretations as being more likely than non-anxious individuals, a bias that was particularly pronounced in self-relevant positive passages. Individuals with high levels of social anxiety also rated positive interpretations as being less likely, a bias that was particularly pronounced in respect of positive passages after a 48-hour delay.

In addition to the examination of interpretations of social scenarios, the processing of external non-verbal information relevant to social evaluation, such as emotional facial expressions, is also of considerable theoretical and clinical interest (Philippot & Douilliez, in press) and this will now be considered in more detail.

Interpretation of Emotional Facial Expressions

Few studies have examined whether individuals with social anxiety interpret emotional facial expressions in a more negative manner than individuals without significant social fears, and the evidence thus far is rather mixed.

Winton, Clark, and Edelmann (1995) investigated this issue in a sample of students with high and low levels of social-evaluative concerns using forced-choice identification of briefly presented facial expressions. The data indicated that high socially anxious individuals were significantly more accurate at identifying negative expressions and less accurate at identifying neutral expressions than individuals with fewer fears of negative evaluation. However, further analysis revealed that this difference was actually attributable to a negative response bias, rather than an enhanced ability to detect negative expressions. That is, individuals with high fear of negative evaluation were not more sensitive to negative expressions per se, but rather were "more likely to rate briefly presented facial expressions as negative in the absence of having abstracted more affective information from the expressions" (Winton et al., 1995, p. 195), resulting in an increased rate of false alarms.

Similarly, Philippot and Douilliez (in press) failed to find evidence of a negative interpretation bias in GSP. These authors presented a series of emotional faces, comprising happy, angry, sad, disgusted and fearful expressions at varying levels of intensity (0%, 30%, 70%, 100%), to individuals with GSP, outpatients with

other anxiety conditions, and healthy controls with no known history of psychological disorder. There were no significant differences between the groups in terms of decoding accuracy, attributed emotion intensity, or reported difficulty of the task.

The only study to report results consistent with the proposal of a negative interpretive bias for emotional facial expressions in social anxiety was that of Richards et al. (2002). In this study, individuals with high and low levels of social anxiety were asked to classify the emotional expression of a series of photographic-quality "interpolated ("morphed") facial images that were derived from combining 6 basic prototype emotional expressions to various degrees" (p. 273). Compared to their low anxious counterparts, the high anxious group demonstrated an enhanced sensitivity to fear, which was only evident when fear was one of the two component emotions and did not reflect a general bias for producing more fear responses. Furthermore, the inclusion of an anxiety-provoking mood manipulation condition indicated that this sensitivity was not moderated by increases in state anxiety. Conversely, there was no difference between the groups in the classification of faces containing anger, although the mood manipulation did have a general effect on the evaluation of these faces. Both high and low socially anxious individuals exhibited enhanced sensitivity for anger when state anxiety was increased.

Having reviewed the empirical evidence pertaining to attentional and interpretive biases in social phobia, the clinical relevance of these findings will now be explored.

Clinical Implications

The theoretical models of social phobia outlined in this review have significant clinical implications (Musa & Lepine, 2000). Theories pertaining to factors that maintain mental health difficulties are applied in the development of disorder-specific treatment guidelines, and hypotheses concerning the role of attentional and interpretive biases in GSP have shaped the psychological treatment of this disorder (Hirsch & Clark, 2004).

Indeed, there is a vital and reciprocal link between psychological theory and clinical practice, such that practice is both evidence-based and also evidence generating.

Cognitive-behavioural therapy (CBT) is currently "the most thoroughly studied nonpharmacological approach to the treatment" of GSP (Heimberg, 2002, p. 101) and there is substantial evidence to indicate the efficacy of this approach. For instance, Deacon and Abramowitz (2004) examined four meta-analytic reviews of CBT for social phobia (Fedoroff & Taylor, 2001; Feske & Chambless, 1995; Gould, Buckminster, Pollack, Otto, & Yap, 1997; Taylor, 1996). On the basis of their review, these authors concluded that the current meta-analytic findings provided consistent support for the efficacy of CBT and further indicated that exposure was a necessary ingredient for effective psychological interventions for social phobia.

Within the framework of CBT, a variety of specific intervention strategies may be employed during the course of therapy to assist individuals with social phobia to overcome their difficulties. Commonly applied techniques include: (a) social skills training to improve eye contact, non-verbal communication, assertiveness and self-expression (Antony, 1997); (b) exposure to social situations

(both imaginal and in-vivo); (c) reduction of safety behaviours (Morgan & Raffle, 1999; Wells et al., 1995); (d) attentional retraining (Wells, White, & Carter, 1997); and, (e) modification of dysfunctional beliefs, through cognitive restructuring (Taylor et al., 1997), behavioural experiments (Wells & Papageorgiou, 2001), and video feedback to modify distorted self-images (Harvey, Clark, Ehlers, & Rapee, 2000). Several resources detailing CBT intervention for social phobia are now available to clinicians (Heimberg & Becker, 2002; Huppert, Roth, & Foa, 2003; Wells, 1997).

CBT can be delivered efficaciously in both individual and group formats. Indeed, group CBT has received recognition as an empirically validated therapy for social phobia (Chambless et al., 1996). Group-based programmes may be advantageous in terms of cost-effectiveness (Gould et al., 1997) and the inherent exposure opportunities; although individual therapy may provide a superior forum for the identification and effective modification of idiosyncratic maintaining factors (Stangier, Heidenreich, Peitz, Lauterbach, & Clark, 2003).

However, the effective psychological treatment of individuals with GSP continues to pose a significant challenge to clinicians, due to the often entrenched nature of this disorder and the associated beliefs, avoidance and safety behaviours, combined with high levels of comorbidity. Therefore, it is essential to attain a comprehensive understanding of the factors that contribute to the maintenance of this condition in order to maximise the effectiveness of any intervention package and the various components contained therein.

Awareness of information-processing biases offers not only a guide to appropriate intervention strategies, but also provides a useful measure of treatment outcome and efficacy. For instance, Mattia et al. (1993) compared the Stroop

performance of 33 individuals with social phobia before and after treatment for this disorder. Participants were randomly allocated to a 12-week treatment group, receiving either monoamine-oxidase-inhibitor medication, pill placebo or cognitive-behavioural group therapy. At the end of the treatment, participants were classified by raters (who were unaware of the treatment condition) as either treatment responders or non-responders, according to the magnitude of symptom reduction. Analysis of Stroop task performance revealed that, whilst there was no significant difference between the two groups prior to treatment, those subsequently classified as treatment responders demonstrated a significant decrease in response latency to social threat words, while treatment non-responders did not.

Observations regarding the positive impact of interventions that directly target attentional and interpretive biases (e.g. Wells et al., 1997), and findings that these processes alter during successful treatment (Mattia et al., 1993; McManus et al., 2000; Wilson & Rapee, 2005), have led researchers to conclude that there is persuasive evidence to indicate that such biases "are indeed related to change in social phobia and may mediate improvements in symptoms during treatment" (Böegels & Mansell, 2004, p. 825).

Directions for Further Research

A comprehensive understanding of the exact nature of cognitive biases in the maintenance of GSP has not yet been achieved and it is clear from the present review that a number of areas merit further investigation.

Regarding attentional biases, some studies suggest that GSP is associated with attentional biases towards threat, as demonstrated through increased detection of, and initial orienting towards, angry faces relative to neutral faces (Gilboa-

Schechtman et al., 1999; Mogg et al., 2004) and difficulty disengaging attention from threat cues relative to neutral cues (Amir et al., 2003). However, other studies have indicated avoidance of social cues (faces) relative to non-social cues (Chen et al., 2002). Therefore, further empirical work is necessary to clarify the specific nature of attentional bias in GSP. In particular, it is essential for future research to continue to investigate patterns across various aspects of orientation, namely initial engagement, disengagement and shifting of attention (Posner & Petersen, 1990). Recent technological advancement has enabled researchers to develop experimental paradigms that measure attention more directly, are more sensitive to attentional shifts and have greater ecological validity than those previously employed. Indeed, eye-movement monitoring would appear to offer much in the pursuit of the above aims and there is a need to supplement the limited, although growing, body of published work utilising this approach.

There is also considerable scope for further research in the field of interpretive biases and GSP. For instance, there is some ambiguity regarding the possibility that GSP may be associated with a lack of a positive interpretive bias, rather than the presence of a negative bias (Hirsch & Clark, 2004; Hirsch & Mathews, 2000), although it is unclear whether this applies to visual cues (faces) as well as verbal stimuli. Indeed, there is a need to clarify whether individuals with GSP actually interpret external social stimuli, such as facial expressions, in a more negative (or less positive) fashion than non-anxious individuals, as no firm conclusions can be drawn from the limited and contradictory evidence currently available. Additionally, further investigation of the time-course of interpretation biases may enhance our understanding of the pre- and post-event processing hypothesised to contribute to the maintenance of GSP (e.g. Clark & Wells, 1995).

Finally, further work is necessary to elucidate the nature of the relationship between information processing biases and GSP. There has been some debate about whether observed biases are a product of anxiety, or if in fact such processes may potentially play a causal role in the development of anxiety (Böegels & Mansell, 2004). The most compelling evidence to support the proposal of a causal relationship comes from studies in which experimentally induced processing biases have been found to modify subsequent emotional responses in healthy volunteers (e.g. MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002; Mathews & Mackintosh, 2000; Mathews & MacLeod, 2002). However, there are currently no published studies in which attentional or interpretive biases for social threat cues have been systematically manipulated, and the effects of this on levels of social anxiety, or emotional responses to socially stressful situations, explored.

In conclusion, whilst our knowledge of the cognitive aspects of social phobia has undoubtedly been significantly enhanced over the past two decades, there is a need for ongoing investigation of information processing biases in this disorder.

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Initial Orienting and Maintenance of Attention in Social Phobia:

An Eye Movement Study

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Initial Orienting and Maintenance of Attention in Social Phobia:

An Eye-Movement Study

Abstract

This study investigated initial orienting and maintenance of attention in individuals with Generalized Social Phobia (GSP) and healthy volunteers, using eye-movement monitoring within a modified visual probe task. Trials comprised either paired photographs of faces (angry, happy, neutral) with household objects, or emotional faces (angry or happy) with neutral faces. Three aspects of initial gaze fixation were assessed: direction, speed and duration. Results indicated that all participants directed their gaze more often towards, and looked longer at, emotional (angry and happy) faces relative to neutral faces. Similarly, all participants initially oriented more often towards, and fixated for longer on faces relative to objects, with the magnitude of this bias being significantly more pronounced in individuals with GSP. Theoretical and clinical implications are discussed.

Key words: social phobia; attentional bias; eye fixation; facial stimuli

Introduction

Social phobia (also known as social anxiety disorder) is a prevalent and incapacitating anxiety disorder (Neal & Edelmann, 2003), characterised by an extreme and persistent fear of social or performance situations, which entail potential scrutiny by others (Diagnostic and Statistical Manual of Mental Health Disorders [DSM-IV]; American Psychiatric Association [APA], 1994). Individuals with social phobia experience intense anxiety about behaving in an embarrassing or humiliating manner under such circumstances, often resulting in active avoidance of feared situations in the longer term. Social phobia typically manifests during adolescence and, without treatment, is likely to follow a chronic course (Kasper, 1998). The distress and avoidance associated with social phobia may culminate in significant interference across a variety of life domains, including academic and occupational pursuits (Kessler, 2003; Bruch, Fallon, & Heimberg, 2003), leisure and social activities (Kasper, 1998) and intimate relationships (Wittchen & Beloch, 1996). Social phobia is also associated with an increased risk of developing co-morbid mental health disorders, particularly major depression, panic disorder, agoraphobia and substance-misuse disorders (Feldman & Rivas-Vazquez, 2003).

Once a neglected condition (Liebowitz, Gorman, Fyer, & Klein, 1985), social phobia has received a considerable amount of attention in the empirical literature during recent years. The advent of cognitive approaches to emotional disorder has resulted in biases across various aspects of cognition being implicated in the persistence of psychopathology. This perspective has had a significant impact upon current conceptualisations of social phobia, the focus of experimental investigations, and the development of therapeutic interventions for this disorder (Musa & Lepine, 2000).

Indeed, there are currently two primary psychological models of social phobia, both of which implicate information processing biases, particularly relating to attentional allocation, in the maintenance of the disorder (Clark & Wells, 1995; Rapee & Heimberg, 1997). These models have many areas of overlap, as well as several key distinctions. For instance, both models emphasise the role of mental imagery, proposing that socially anxious individuals form a mental representation of themselves as they presume that others see them; however, this image is often distorted and overly negative. Furthermore, these theoretical models also share the view that individuals with social phobia will demonstrate heightened self-focus in anxiety-provoking social situations.

However, a crucial divergence between the models pertains to the opposing predictions made regarding selective attention for external social cues. Clark and Wells (1995) propose that when self-focussed attention increases, attention is directed *away* from external social cues. Thus, socially phobic individuals selectively attend to interoceptive cues (such as negative thoughts about themselves and feelings of anxiety) whilst they are in social situations, rather than the responses of others around them. This purported attentional bias is further compounded by engagement in a range of "safety behaviours", such as averting gaze, in an attempt to prevent feared outcomes, namely confirmation of negative evaluation. However, paradoxically, these responses in fact serve to maintain anxiety. Avoidance of external social cues prevents accurate appraisal and habituation, thus inhibiting opportunities to disconfirm dysfunctional beliefs. Furthermore, socially anxious individuals may appear uninterested or aloof and inadvertently provoke negative reactions from others, thus creating a self-fulfilling prophecy in which their fears are realised.

In contrast to Clark and Wells (1995), Rapee and Heimberg (1997) purport that social phobia is characterised by a rapid and extensive allocation of attentional resources towards the monitoring of potential external threat (i.e. indicators of possible negative evaluation, such as frowns or signs of boredom). Specifically, according to this model, individuals with social phobia will scan the environment for any signs of impending negative evaluation, detect such signs rapidly and have difficulty disengaging attention from them. This prediction of vigilance for threat is consistent with the hypotheses made by general information processing models of anxiety (Mathews & Mackintosh, 1998; Mogg & Bradley, 1998; Williams, Watts, & MacLeod, 1988, 1997). Vigilance for external threat cues contributes to a vicious cycle of increasing anxiety and impaired performance in social situations, possibly due to competition for cognitive resources.

Initial studies designed to empirically test theoretical predictions of attentional bias for external social stimuli utilised the emotional Stroop paradigm. This approach involves assessing response times of participants when naming aloud the ink-colour in which emotionally laden words are printed and comparing this with colour-naming times for matched control words or nonwords. Such studies have consistently indicated that individuals with social phobia demonstrate a specific increase in colour-naming times for social threat words, compared to neutral or other non-social threat words (Becker, Rinck, Magraf, & Roth, 2001; Hope, Rapee, Heimberg, & Dombeck, 1990; Maidenberg, Chen, Craske, Bohn, & Bystritsky, 1996; Mattia, Heimberg, & Hope, 1993). These findings support the "specificity hypothesis", the proposal that attentional bias is limited to stimuli that are relevant to the specific concerns associated with the anxiety disorder under investigation.

However, it remains unclear whether the results of emotional Stroop tasks are due to vigilance for, or avoidance of, the semantic content of linguistic stimuli, both of which could impede colour-naming times (de Ruiter & Brosschot, 1994; Heinrichs & Hoffman, 2001).

Selective attention in social phobia has been further investigated using visual probe studies, which have provided contradictory results. In this paradigm, the simultaneous presentation of two stimuli (i.e. a pair of words, or a pair of faces) is followed by the subsequent presentation of a probe (e.g. a small dot or arrow) in the same spatial location as one of the stimuli. The time taken to respond to the probe provides an index of whether visual attention was directed towards or away from a stimulus, as reaction times are faster when probes appear in a location on the screen to which an individual was already attending (MacLeod, Mathews, & Tata, 1986).

In order to test theoretical predictions of sensitivity to nonverbal external cues that could be construed as indicators of negative evaluation, a number of visual probe studies have used facial expressions as stimuli. The results of several such studies provide support for an attentional bias towards threat faces relative to neutral faces in socially anxious individuals (Mogg & Bradley, 2002; Pishyar, Harris, & Menzies, 2004). However, other investigations (Chen, Ehlers, Clark, & Mansell, 2002; Mansell, Clark, Ehlers, & Chen, 1999) found evidence that individuals with social anxiety avoid faces when paired with non-social cues (household objects). Thus, it would appear that the direction of attentional bias for faces may vary according to the nature of the control stimuli with which these cues are paired (Mathews & MacLeod, 2005).

In light of such findings, Clark and McManus (2002) proposed a refinement of Clark and Wells' (1995) model, stating that "social phobics (reduced) processing of external social cues is biased in favour of detecting from others responses that can be interpreted negatively" (p. 93). Thus, Clark and McManus advocate a position where attentional bias is considered to be dependent upon the context in which external social cues are encountered, such that when there is the opportunity to avoid social cues, people with social phobia will do so; however, when presented with competing social cues, they will selectively attend to stimuli with a negative valence.

However, attentional bias may not be limited solely to stimuli that would traditionally be considered to be threatening. Mansell et al. (1999) reported that, when anticipating social-evaluative threat, (non-clinical) socially anxious individuals demonstrated avoidance of emotional faces in general, both positive and negative. Chen et al. (2002) found that individuals with clinical generalised social phobia (GSP) exhibited avoidance of positive, negative and neutral facial expressions relative to non-social stimuli. The latter findings suggest that GSP may be associated with avoidance of social cues in general, rather than specific avoidance of threat-related expressions.

One limitation of the visual probe paradigm is that it provides only a "snapshot" of attention at the time of stimulus offset (Hermans, Vansteenwegen, & Eelen, 1999; Mogg, Millar, & Bradley, 2000). This is significant as there is some evidence to suggest that attentional bias may not be a static phenomenon, but rather may alter over time. Indeed, Heinrichs and Hofmann (2001) proposed that social phobia may be characterised by a vigilant-avoidant pattern of attentional processing, whereby anxious individuals demonstrate vigilance for threatening stimuli in the early stages of processing, and subsequent strategic attentional avoidance,

presumably in an attempt to counter the anxiety reaction elicited by the anticipation or detection of threat.

Mogg, Philippot, and Bradley (2004) used the visual probe task to examine the course of attentional biases for emotional face stimuli in a clinical sample of individuals with GSP, compared with non-anxious controls. The task used two exposure durations (500 ms vs. 1250 ms) and findings indicated that individuals with GSP exhibited evidence of initial vigilance for angry faces (relative to neutral faces) compared to controls in the 500ms condition. This would be consistent with a bias in initial orienting to threat faces in GSP. However, there was no evidence of biased processing of threat at the longer stimulus duration.

A further limitation of the visual probe paradigm is that it does not differentiate whether observed biases in attention are attributable to facilitated engagement of attention to social stimuli, or difficulty disengaging attention once such cues are detected. The cued-target paradigm has enabled researchers to further investigate patterns of disengagement of attention from social cues. This approach was recently employed by Amir, Elias, Klumpp, and Przeworski (2003) to investigate disengagement of attention from socially-relevant linguistic cues in GSP. These authors presented socially-relevant threat words (e.g. embarrassed, humiliated), positive words (e.g. delighted, confident) and neutral words (e.g. dishwasher, tile) in one of two possible locations. Stimulus presentation was followed by the onset of a target in either the cued or alternative location, which participants were required to detect. Longer reaction times indicated that, compared to non-anxious participants, individuals with GSP exhibited difficulty disengaging their attention from socially-relevant threat words in order to respond to the target.

However, there is a need to further investigate attentional disengagement from non-verbal social stimuli.

A relatively new method of investigating attentional biases in anxiety involves monitoring participant gaze during stimulus presentation. Using this approach, Hermans et al. (1999) reported a vigilant-avoidant attentional pattern in individuals with spider phobia when viewing spiders; Mogg et al. (2000) found evidence of initial vigilance to threat faces in generalised anxiety disorder relative to depressed individuals or healthy volunteers; whilst Calvo and Lang (2004) reported preferential attention to emotionally valenced pictures (both pleasant and unpleasant) in undergraduate students during the first 500 ms of presentation, but not subsequently. Horley, Williams, Gonsalvez, and Gordon (2003) utilised eye-movement monitoring to investigate processing of facial features in individuals with GSP. This study revealed a "hyperscanning" strategy, characterised by avoidance of certain features (e.g. the eyes and mouth), which are particularly salient in the conveyance of emotional affect.

However, to date, no published studies have applied eye movement monitoring to test the competing theoretical predictions regarding the nature of attentional biases for in social phobia for external social cues relative to non-social cues, and for different types of facial expressions (Clark & McManus, 2002; Rapee & Heimberg, 1997). The aim of the present study was to investigate biases in initial orienting and maintenance of attention for social and threat-related cues in GSP, using the more sensitive measure of eye-movement monitoring. Specifically, biases in initial orienting were assessed from the direction and latency of initial gaze fixation in response to social cues (faces), whilst biases in the maintenance of attention were assessed from the duration of the initial fixation.

On the basis of theoretical inferences about the nature of attentional biases in social phobia, the following experimental hypotheses were generated:

1. On trials presenting competing social cues (i.e. angry or happy faces paired with neutral faces), individuals with GSP will demonstrate relative biases in selective attention that favour social-threat stimuli (angry faces), relative to matched controls. These will be evidenced by increased probability of directing initial gaze towards angry faces, together with shorter latencies and longer fixation duration. This hypothesis is consistent with the theoretical positions of Rapee and Heimberg (1997) and Clark and McManus (2002).

2. On trials presenting social cues together with non-social cues (i.e. angry, happy, or neutral faces paired with non-social objects), individuals with GSP will differ from controls in their pattern of attentional bias, although different cognitive models of social anxiety make competing predictions concerning the nature of this bias. Following Rapee and Heimberg (1997), it is predicted that individuals with GSP would again demonstrate vigilance for social threat stimuli, as evidenced by increased fixation direction, reduced latency and longer duration of gaze towards angry faces relative to other stimuli. However, according to Clark and Wells (1995), individuals with GSP should show reduced attention towards social cues relative to non-social stimuli, resulting in reduced orientation to and maintenance of gaze on faces, relative to objects.

Method

Design

The study used a mixed design, with both between and within-subject independent variables (IVs). The between-subjects factor was participant group and comprised two levels (individuals with generalised social phobia vs. non-anxious controls). There were two main within-subject IVs, depending on the type of control stimulus used in each condition. For trials in which emotional faces were paired with neutral faces, the within-subject IV was type of emotional expression, and contained 2 levels (angry vs. happy). For trials in which social cues (faces) were paired with non-social cues (household objects), the within-subject IV was face type and comprised 3 levels (angry, happy, neutral).

Three dependent variables (DVs) provided measures of the initial orienting and maintenance of attention. Specifically, these were: (1) direction of initial eye movement; (2) time taken to make initial fixation (latency); and, (3) total time spent looking at the initially-fixated picture, before shifting gaze away from it (fixation duration).

A minimum significance level of .05 was set for all statistical tests.

Participants

There were two groups of participants, as follows:-

Generalised Social Phobia (GSP) Group. The clinical participants were recruited through posters in local GP surgeries (see Appendix 4), together with advertisements at a local out-patient mental health service, in a local newspaper, and on a University website (see Appendix 5 for a copy of the press release issued). Individuals responding to the advertisements were invited to attend a screening

interview, at which time the Mini International Neuropsychiatric Interview (MINI, Sheehan et al., 1998) was administered and people were asked to complete a self-report version of the Leibowitz Social Anxiety Scale (LSAS-SR; Leibowitz, 1987).

The MINI (v 5.0), a structured diagnostic interview with an administration time of approximately 15 minutes, is compatible with the diagnostic criteria of both the International Classification of Diseases (ICD-10; World Health Organisation, 1992) and DSM-IV (APA, 1994). This instrument was used to screen for 18 of the most prevalent Axis I psychiatric disorders, including social phobia. The interviews were conducted by a Trainee Clinical Psychologist trained in the use of this measure and diagnoses were reviewed with a Consultant Psychiatrist.

Exclusion criteria specified that participants should not have co-morbid psychosis, bi-polar disorder or significant current drug or alcohol abuse, as assessed by the diagnostic interview. Of the 20 individuals who came forward and attended the screening interview, two were excluded as they did not meet criteria for GSP and two subsequently withdrew from the study without completing the experimental task.

Thus, the clinical group comprised 16 individuals (10 females: 6 males), aged between 21 and 61 years ($M = 43.4$ years, $SD = 12.1$), who fulfilled the criteria for a diagnosis of Generalised Social Phobia.

Control (CON) Group. The control group was recruited through distribution of an invitation letter (see Appendix 6) to friends, family and acquaintances, and their friends, family and colleagues. Individuals with no current emotional difficulties or history of social phobia were invited to contact the researcher if they were willing to take part (a copy of the brief screening questioning administered is

included in Appendix 7). A total of 20 healthy volunteers (10 females, 10 males), aged between 24 and 53 years ($M = 40.4$ years, $SD = 10.9$) were recruited.

The groups were matched in terms of age, gender and years of education (refer to Appendix 8 for a copy of the demographic information sheet). Furthermore, all participants spoke English as their first language.

Materials and Apparatus

The stimulus materials comprised pairs of black and white photographs, with each pair containing a critical stimulus and a control stimulus (either a neutral face or a non-social object). There were 16 picture pairs for each of five stimulus pairings: (1) angry face with neutral face; (2) happy face with neutral face; (3) angry face with household object (e.g. lamp, clock); (4) happy face with household object; and, (5) neutral face with household object. For each stimulus pair where an emotional face was paired with a neutral face, these pictures were of the same individual, in order to control for variables extraneous to emotional expression (e.g. contrast). For pairs where faces were paired with household objects, the pictures of each pair were matched as far as possible for characteristics such as complexity, contrast and brightness.

Each picture pair was presented twice, with the location of the critical stimulus being counterbalanced, so that for every picture pair each picture appeared on both the left and right hand side of the screen. This resulted in 32 experimental trials for each stimulus pairing, with 160 trials presented in total. In each experimental condition, half of the presented faces were male and half were female. The pictures, which measured 77mm by 110cm, were presented side-by-side with a distance of 110mm between the inner edges.

The pictures were selected from a pool of over 600 photographs collated from several sources, namely: (a) Bradley et al., (1998); (b) Ekman and Friesan (1976) Pictures of Facial Affect; and, (c) NimStim Face Stimulus Set (http://www.macbrain.org/faces/index.htm)[1].

The visual-probe task was presented using MEL version 2 software (Schneider, 1995), running on a Pentium III 450MHz PC, with a MEL version 2 manual response box. Participants' eye movements were monitored during the task, using a 60Hz infra-red pan/tilt tracking system (Model 504, supplied by Applied Science Laboratories, Bedford, Massachusetts) and E5000 software (Applied Science Group, 2000).

Self-Report Measures. The following self-report questionnaires were utilised:

Leibowitz Social Anxiety Scale–Self-Report Version (LSAS-SR; Leibowitz, 1987). Originally designed as a clinician-rated scale, this instrument has recently been utilised in a self-report format (Baker, Heinrichs, Kim, & Hofmann, 2002; Fresco et al., 2001). Participants are asked to rate, on four-point Likert scales, both their degree of anxiety (0 = none; 1 = mild; 2 = moderate; 3 = severe) and avoidance (0 = never; 1 = occasionally; 2 = often; 3 = usually) associated with each of 24 social situations. The possible scoring range is therefore 0 to 144. In terms of its psychometric properties, the self-report version has been reported to correlate highly with the clinician-administered version (r = .85 for patients and r = .82 for non-anxious controls; Fresco et al., 2001), in addition to demonstrating sensitivity to treatment change, discriminant and convergent validity (e.g. correlation (r = .64)

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[1] Development of the MacBrain Face Stimulus Set was overseen by Nim Tottenham and supported by the John D. and Catherine T. MacArthur Foundation Research Network on Early Experience and Brain Development. Please contact Nim Tottenham at tott0006@tc.umn.edu for more information concerning the stimulus set.

with Social Phobia and Anxiety Inventory; Turner, Beidel, & Dancu, 1996), good internal consistency (α = .95), and, test-retest reliability (12 week interval; r = .83) (cited statistics reported by Baker et al., 2002).

Fear of Negative Evaluation Scale (FNES; Watson & Friend, 1969). This scale contains 30 statements pertaining to evaluation by others and assesses distress, apprehensiveness and expectations regarding negative evaluation. Oei, Kenna, and Evans (1991) reported that this scale had high internal consistency (α = .94).

Social Avoidance and Distress Scale (SADS; Watson & Friend, 1969). This 28-item self-report measure assesses actual and desired tendencies to escape from social situations and avoid being in the company of, and talking to, others. Regarding the psychometric properties of the scale, there is evidence to support the internal consistency of this measure (α = .94; Oei et al., 1991).

State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). This inventory assesses levels of both current ('state') anxiety and general anxiety proneness ('trait' anxiety). Each of the two subscales is comprised of 20 items that participants are asked to rate according to a four-point Likert scale, resulting in a score in the range 20-80. The validity of this measure is supported by adequate test-retest reliability of the trait-anxiety subscale (r = .86) and good correlations with other anxiety measures, such as the Taylor Manifest Anxiety Scale (Taylor, 1953) and the IPAT Anxiety Scale (Krug, Scheier, & Cattell, 1976), with reported correlation coefficients of .80 and .75, respectively (Spielberger et al., 1983).

Beck Depression Inventory- Second Edition (BDI-II; Beck, Steer, & Brown, 1996). This 21-item instrument examines the occurrence and severity of depressive symptoms over a two-week time period and has been found to have sound psychometric properties. For instance, Steer, Ball, Ranieri, and Beck (1997) examined the convergent validity of this measure and found that it was highly correlated (r = .89) with the depression subscale of the Symptom Checklist-90-Revised (SCL-90-R; Derogatis, 1994). Furthermore, the BDI-II measure has been reported to demonstrate high internal consistency (α = .94; Arnau, Meagher, Norris, & Bramson, 2001) and criterion-related validity (Arnau et al., 2001; Sprinkle et al., 2002). Possible scores range from 0 to 63, and Beck et al., (1996) recommended that scores should be interpreted as indicative of the following levels of depression: 0-13 = minimal, 14-19 = mild; 20-29 = moderate; 30+ = severe.

Abbreviated version of the Marlow-Crowne Social Desirability Scale (SDS; Strahan & Gerbasi, 1972). This abbreviated scale asks for True/False responses to 10 statements and has been found to correlate highly (r = .96) with the full SDS (Fischer & Fick, 1993). High scores may indicate a tendency towards higher levels of defensiveness (e.g. under reporting negative information in order to create a favourable impression), which may affect accounts of psychological distress assessed using self-report measures.

Procedure

Participants were required to give informed consent in writing (see Appendix 9) prior to taking part. Before undertaking the eye-tracking task, participants were asked to read a Snellen eye chart, in order to ensure that visual acuity was within normal limits. Following this, participants were seated at a distance of 100 cm from

the computer screen, with the infra-red camera positioned 50 cm in front of them, below their right eye.

Standardised verbal instructions regarding the completion of the task were provided and supplemented by congruent directions printed on the screen. Participants were instructed to keep their head still throughout the calibration and test procedures. The eye-tracking equipment was calibrated for each individual participant by instructing the participant to look at numbered points on the screen (1-9), whilst their gaze position was recorded for each point. The numbers were presented in a 3 x 3 array, with number 1 appearing at the top left and 9 at the bottom right. In the event that calibration quality deteriorated during the experiment, the task was briefly interrupted in order to repeat this process.

Each trial of the task commenced with the presentation of a fixation cross in the centre of the screen for 1000 ms prior to the presentation of the stimulus pictures. Participants were instructed to look at this fixation cross in order to provide standardisation of the focus of attention immediately prior to the onset of the experimental stimuli. The stimulus picture pairs were then presented side-by-side on the screen for 2000 ms.

Immediately following the disappearance of the stimulus pictures, a small probe comprising either a vertical or horizontal pair of dots (: or ..) was presented in the same spatial location as one of the pictures. The probe position and type was balanced across trials. Participants were required to classify the type of probe by pressing one of two labelled response buttons on the response box, as quickly and accurately as possible. The probe remained on the screen until the manual response or for a maximum of 10 seconds. This probe task was included primarily to ensure that participants remained attentive to the task, without placing undue emphasis on

the picture content. In a further effort to alleviate the repetitive nature of the task, the inter-trial interval varied randomly between 750 ms and 1250 ms.

To ensure that participants were fully conversant with the procedure, the task began with the presentation of 10 practice trials (the data from which were not recorded), followed by 160 experimental trials presented in a random order. Eye-movement data were recorded for each trial from the time that the fixation cross appeared on the screen until the manual reaction-time response or probe offset.

Following completion of the visual-probe task, participants undertook a computerised emotion discrimination task, which is not reported here as it addressed different theoretical questions and hypotheses to those of the present investigation.

Following the computer-based tasks, participants were asked to complete the battery of self-report measures described above, namely the STAI, SADS, FNES, BDI-II and abbreviated SDS. At the end of the session, participants were debriefed verbally, supplemented by the provision of a written debriefing statement (see Appendix 10).

Data Preparation

Eye movement (EM) data were prepared and analysed using the Eyenal Data Analysis Program (Applied Science Group, 2000). The location of gaze was measured once every 8 ms. Eye movements that were stable within one degree of visual angle for 100 ms or more were classified as a fixation to that position, the duration of which was recorded. Fixations were categorized as being directed towards the left or right pictures if they were 3.0 degrees wide of the central position (previously occupied by the fixation cross) on the horizontal plane. Supplementary criteria for each trial stipulated that participants must have been directing their gaze

to the central fixation region prior to picture onset and that EMs occurred at least 100 ms after picture onset (to eliminate anticipatory eye movements) and before picture offset. Additionally, for the duration measure, it was further specified that termination of gaze direction towards the picture must be initiated by the participant themselves, rather than being an artefact of picture offset, as this would not provide an accurate index of participants' behaviour.

Eye movement data was collected from a total of 36 participants (16 individuals with GSP; 20 healthy volunteers). Unfortunately, computer failure resulted in loss of EM data from three participants in the GSP group. Furthermore, two healthy volunteers were identified as outliers on the basis of a high percentage of trials with missing data (in excess of 25%) and were therefore excluded from all analyses.

Participants made an initial fixation to one of the stimulus pictures on 88.2% of trials. Participants did not direct their gaze towards the fixation cross prior to picture onset on 0.8% of trials and fixated within 100 ms of picture onset for 3.6% of trials. The amount of missing EM data did not differ significantly between the GSP and control groups ($p > .05$, all comparisons).

The dependent variable of EM direction bias was computed by calculating, for each participant and pair type, the number of trials in which the initial eye movement was towards the critical stimulus, as a percentage of the total number of trials with valid eye movements. A score of 50%, therefore, reflects no direction bias, as the participant would have made an equal number of initial eye movements to both stimuli. Bias scores in excess of 50% are indicative of a preference to look first at the critical stimulus rather than the control.

Kolmogorov-Smirnov (K-S) tests demonstrated that the distributions of the EM direction, latency and duration data were not inconsistent with a normally distributed population.

Results

Relationships between Self-Report Measures

Preliminary analyses were conducted to examine the relationships between the self-report measures administered, and the Pearson's correlation coefficients are reported in Table 1.

Table 1

Correlations between Self-Report Measures

Measure	1	2	3	4	5	6
1. LSAS-SR Total Score	-					
2. STAI-State Scale	.71**	-				
3. STAI-Trait Scale	.87**	.74**	-			
4. SADS	.89**	.56**	.78**	-		
5. FNES	.74**	.59**	.75**	.81**	-	
6. BDI-II	.61**	.64**	.82**	.48**	.51**	-
7. SDS	.02	-.08	.07	-.05	-.07	-.05

Note: LSAS-SR = Leibowitz Social Anxiety Scale – self-report version; STAI = Spielberger State-Trait Anxiety Inventory; SADS = Social Anxiety and Distress Scale; FNES = Fear of Negative Evaluation Scale; BDI-II = Beck Depression Inventory – Second Edition; SDS = Marlowe-Crowne Social Desirability Scale (short form); ** = $p < .01$ (two-tailed).

The significant positive correlations between the mood-related measures indicate strong relationships between these measures. There were no significant correlations between the SDS and any other of the questionnaires.

Sample Characteristics

The group characteristics are summarised in Table 2. Data are only reported for those participants included in the subsequent eye-movement analyses, resulting in a clinical group of 13 individuals with GSP and a control group of 18 individuals.

In view of the identified associations between the mood-related measures, comparison of the two participant groups on these variables was conducted using a multivariate analysis of variance (MANOVA). This analysis revealed that the mean scores of the GSP group were significantly higher than those of the CON group on all mood-related self-report measures. However, independent t-tests indicated that the groups did not differ in term of age, years of education or social desirability scores. Furthermore, there was no significant difference between the groups in terms of gender ratio, χ^2 (1, $N = 31$) = 0.41, *ns*.

Nine of the 13 participants in the GSP group satisfied criteria for additional Axis 1 disorders. The specific details of the identified co-morbid disorders were as follows: generalised anxiety disorder (n = 1); obsessive-compulsive disorder (OCD) ($n = 1$); MDD and OCD ($n = 1$); panic disorder and agoraphobia ($n = 2$); MDD and dysthymia ($n = 2$); MDD, dysthymia and previous alcohol abuse within the past 12 months ($n = 1$); and, finally, MDD, dysthymia, agoraphobia, post-traumatic stress disorder and OCD ($n = 1$). One participant was taking psychotropic medication (selective serotonin reuptake inhibitor).

Table 2

Descriptive Statistics, MANOVA and t-test Results for Self-Report Measures and Demographic Variables

	Generalised Social Phobia		Controls		
Variable	*M*	*SD*	*M*	*SD*	*F*(1,29)
Wilks' Lambda λ					32.13**
LSAS-SR Total	84.23	20.58	27.44	13.98	83.95**
STAI-State Scale	44.85	12.10	28.44	5.25	26.45**
STAI-Trait Scale	56.77	13.44	34.61	6.19	38.13**
SADS	22.54	5.25	3.50	4.26	124.03**
FNES	24.77	4.57	9.28	5.29	72.37**
BDI-II	15.85	14.89	5.89	5.30	6.92*
	M	*SD*	*M*	*SD*	*t*(29)
SDS	4.31	2.32	4.72	2.14	0.51
Age	42.38	13.10	39.22	10.91	0.73
Years of Education	14.23	2.77	13.50	2.64	0.75
Gender Ratio (m/f)	5/8		9/9		

Note: *M* = Mean; *SD* = Standard Deviation; LSAS-SR = Leibowitz Social Anxiety Scale – self-report version; STAI = Spielberger State-Trait Anxiety Inventory; SADS = Social Anxiety and Distress Scale; FNES = Fear of Negative Evaluation Scale; BDI-II = Beck Depression Inventory – Second Edition; SDS = Marlowe-Crowne Social Desirability Scale (short form); * = $p < .05$ (two-tailed); ** = $p < .01$ (two-tailed).

Following examination of the sample characteristics, the experimental hypotheses were tested by comparing the initial fixation direction, latency and duration of the GSP and CON groups in the two separate conditions comprising: (1) emotional-neutral face picture pairs, and (2) face-object picture pairs.

Eye Movement Data: Emotional vs. Neutral Faces

Descriptive statistics pertaining to the direction, latency and duration of initial fixation on trials of angry-neutral and happy-neutral face pairs are shown in Table 3.

Summary of Eye Movement Data for Emotional vs. Neutral Faces

Variables		Generalised Social Phobia		Controls	
Pair Type	Picture Type	*M*	*SD*	*M*	*SD*
EM Direction Bias Scores (%)					
Angry-Neutral	Angry	53.37	7.00	51.61	6.06
Happy-Neutral	Happy	50.46	6.01	52.60	7.51
Latency to Initial Fixation (ms)					
Angry-Neutral	Angry	340.96	88.63	317.98	52.07
	Neutral	330.57	68.23	324.08	80.59
Happy-Neutral	Happy	342.70	48.97	317.35	47.88
	Neutral	343.77	95.14	315.67	58.28
Gaze Duration on Initially-Fixated Picture (ms)					
Angry-Neutral	Angry	423.13	114.95	440.99	90.11
	Neutral	362.82	94.44	392.00	111.25
Happy-Neutral	Happy	421.52	107.45	407.12	89.46
	Neutral	369.41	111.00	391.94	105.89

Note: *M* = Mean; *SD* = Standard Deviation.

Fixation direction. EM direction bias scores were entered into a 2 x 2 mixed design analysis of variance (ANOVA), with social anxiety group (GSP vs. CON) as a between-subjects variable and type of emotional face (angry vs. happy) as a within-subjects variable. The results revealed no significant main effects of group ($F < 1$) or face type ($F < 1$) and no significant interaction between these factors ($F(1,29) = 1.36$, *ns*).

In order to investigate whether participants looked more frequently towards emotional faces compared to neutral faces, a one-sample t-test was conducted to compare the mean bias scores of the entire sample against the no-bias value of 50%.

This analysis confirmed that participants directed their gaze more often towards emotional faces relative to neutral faces (i.e. on 52% of trials) and that this bias was significant ($t(30) = 2.35, p = .03$).

Fixation latency. One of the clinical participants was excluded from analyses of fixation latency due to highly variable latencies, as revealed by examination of box plots[2]. Fixation latency data was entered into a 2 x 2 x 2 mixed design ANOVA, with group (GSP vs. CON), fixation location (emotional vs. neutral face), and type of emotional face (angry vs. happy) as IVs. No main effects or interactions were significant at the .05 significance level.

Fixation duration. Examination of box plots indicated that one of the control participants was an outlier in terms of fixation duration variability; therefore, this participant was excluded from the duration analyses[1]. Duration data (i.e. the length of time for which participants' maintained their gaze upon the initially-fixated picture on trials comprising emotional/neutral face pairs) were entered into a 2 x 2 x 2 mixed design ANOVA, with group (GSP vs. CON) as a between-subjects variable, and fixation location (emotional vs. neutral face) and type of emotional face (angry vs. happy) as within-subjects variables. This analysis showed a significant main effect of fixation location ($F(1,28) = 15.49, p = .001$). In general, participants looked significantly longer at emotional faces (425 ms) than neutral faces (379 ms). However, there were no significant main effects of group or face type on fixation duration, and no significant interactions ($p > .05$, all comparisons).

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[1] Analyses for other dependent variables were repeated with this participant excluded. The results (main effects and interactions) were consistent with those reported in the main text.

Eye Movement Data: Faces vs. Objects

A summary of the descriptive statistics for the direction, latency and duration of initial fixation on face-object trials is provided in Table 4 below.

Table 4

Summary of Eye Movement Data for Faces vs. Objects

Variables		Generalised Social Phobia		Controls	
Pair Type	Picture Type	*M*	*SD*	*M*	*SD*
EM Direction Bias Scores (%)					
Angry-Object	Angry	71.31	14.50	67.33	16.87
Happy-Object	Happy	72.83	10.22	65.56	16.56
Neutral-Object	Neutral	68.05	7.69	65.87	14.57
Latency to Initial Fixation (ms)					
Angry-Object	Angry	347.24	60.23	326.53	57.83
	Object	341.19	114.96	327.18	56.24
Happy-Object	Happy	341.85	62.87	328.74	58.14
	Object	389.51	168.96	318.97	68.25
Neutral-Object	Neutral	344.47	64.13	325.51	53.56
	Object	359.63	94.02	349.02	91.38
Gaze Duration on Initially-Fixated Picture (ms)					
Angry-Object	Angry	504.20	121.91	468.38	94.48
	Object	281.47	111.07	325.49	127.36
Happy-Object	Happy	462.49	127.73	457.65	93.49
	Object	264.93	90.04	378.12	176.96
Neutral-Object	Neutral	477.12	118.45	469.24	127.05
	Object	310.25	128.38	367.16	124.25

Note: *M* = Mean; *SD* = Standard Deviation.

Fixation direction. A 2 x 3 mixed design factorial ANOVA of direction bias scores, with group (GSP vs. CON) and face type (angry, happy, neutral) as independent variables (IVs) was conducted. This analysis revealed no significant main effect of group ($F < 1$) or face type ($F(2,58) = 1.21$, *ns*) and no significant face type x group interaction ($F(2,58) = 1.16$, *ns*).

Overall, participants were more likely to look initially at faces rather than objects (68% of trials), irrespective of face type. A one-sample t-test confirmed that this orienting bias towards faces was significantly greater than the chance level of 50% ($t(30) = 7.69, p < .001$).

Fixation latency. A 2 x 2 x 3 mixed design ANOVA with group (GSP vs. CON), fixation location (face vs. object), and face type (angry, happy, or neutral) as IVs revealed no significant results ($p > .05$, all analyses).

Fixation duration. Duration data for trials comprising face-object pairs were entered into a 2 x 2 x 3 mixed design ANOVA, with group (GSP vs. CON), fixation location (face vs. object) and face type (angry, happy, neutral) as IVs. This analysis revealed a significant main effect of fixation location ($F(1,28 = 51.07, p < .01$), with all participants looking significantly longer at faces (473 ms) than objects (321 ms). There was also a significant interaction between group and fixation location ($F(1,28) = 4.24$, $p < .05$). Post hoc contrasts were conducted to further investigate this interaction and indicated no significant differences between the GSP and control groups in terms of their fixation duration to either faces or objects. However, the magnitude of the difference between the fixation duration towards faces relative to objects was significantly greater in the GSP group than in the control group. Specifically, the GSP group looked at faces for an average of approximately 200 ms longer than they looked at objects ($t(12) = 5.67, p < .01$), whereas controls looked on

average about 100 ms longer at faces than objects ($t(16) = 3.99, p < .01$). This group x fixation location interaction was not affected by face type ($F < 1$). This pattern of results is illustrated in Figure 1 below.

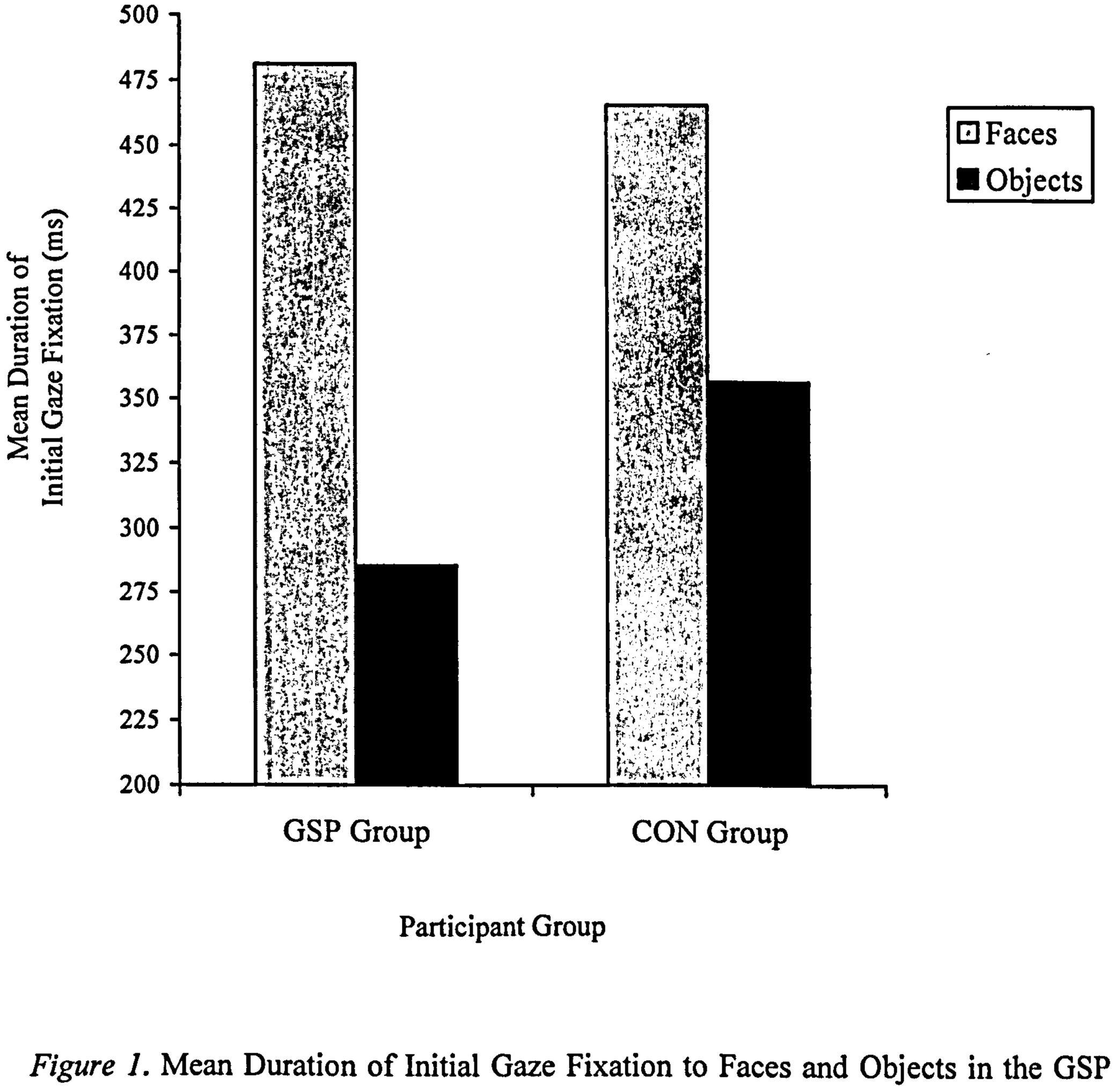

Figure 1. Mean Duration of Initial Gaze Fixation to Faces and Objects in the GSP and Control Groups.

Discussion

The current study investigated biases in initial orienting and maintenance of visual attention in GSP through examination of the direction, latency and duration of initial eye movements to social and non-social stimuli. In order to assess predictions that attentional bias for social cues may be modulated by context (Clark & McManus, 2002; Mathews & MacLeod, 2005), two different conditions were examined: (1) bias for emotional faces (angry, happy) relative to matched neutral faces; and (2) bias when social cues (angry, happy, or neutral faces) were presented alongside control stimuli comprising non-social (household) objects. The main finding from the eye-movement data was that individuals with GSP looked relatively longer than controls at faces when they were presented alongside non-social objects. The overall pattern of results in each of the two experimental conditions will now be considered in turn.

Orienting and Maintenance of Attention: Emotional vs. Neutral Faces

As discussed earlier, according to theoretical predictions, it would be expected that social anxiety would be characterised by an attentional bias favouring the rapid detection of external signals conveying potential social threat or negative evaluation, relative to neutral social cues (Clark & McManus, 2002; Rapee & Heimberg, 1997). Rapee & Heimberg (1997) further proposed that individuals with social anxiety would also have difficulty disengaging their attention from such stimuli once detected.

Initial orienting. No significant differences were evident in this study between participants with GSP and controls in terms of the direction, or latencies, of their first EMs towards angry or happy faces, relative to neutral expressions. Thus,

there was no evidence in this study of enhanced vigilance for social threat cues relative to neutral social cues in social phobia. These present findings would not support the predictions of specific attentional bias for threatening social stimuli, derived from the current cognitive-behavioural models of social phobia (Clark & McManus, 2002; Rapee & Heimberg, 1997), or more general models of information processing in anxiety (Mathews & Mackintosh, 1998; Mogg & Bradley, 1998).

This reported lack of attentional bias for social threat faces relative to neutral faces in GSP also contrasts with a number of studies within the existing empirical literature. Specifically, the current results are discrepant with previous findings of vigilance for threat faces in visual-probe studies assessing manual reaction time (Mogg & Bradley, 2002; Mogg et al., 2004; Pishyar et al., 2004), and a more pronounced bias for the rapid detection of threat faces in visual search studies (Gilboa-Schechtman et al., 1999). Furthermore, the present findings are inconsistent with previous empirical studies which have indicated a bias in initial orienting of attention that favours threat faces relative to neutral faces, as indicated by both direction and speed of gaze toward threat, in other clinical anxiety disorders, such as GAD (Mogg et al., 2000).

The lack of significant group differences could be related to factors specific to the current investigation. Pertinent sample characteristics and methodological issues that may have contributed to this (e.g. sample size and co-morbid diagnoses) will be discussed in detail later in this section.

Maintenance of attention. There was also no evidence to indicate that individuals with GSP exhibited a bias in the maintenance of attention for emotional faces, relative to controls. This fails to support Rapee and Heimberg's (1997) proposal that GSP will be associated with a difficulty in disengaging attention from

social threat cues. The present null findings are also not in accord with recent findings from a cueing task, in which individuals with GSP had a specific difficulty disengaging attention from social threat words (Amir et al., 2003). As stated previously, factors which might account for the current results will be considered later.

General biases. The results indicated a general bias in the direction of orientation and maintenance of attention for emotional social cues. All participants looked significantly more often, and for longer, at both angry and happy faces relative to neutral faces. This indication of a universal bias in the initial orienting and maintenance of attention towards emotional faces may be consistent with an evolutionary advantage for an ongoing awareness of the emotional state of others (Green, Williams, & Davidson, 2003).

Orienting and Maintenance of Attention: Faces vs. Objects

The present study also investigated patterns in initial orienting when social cues (faces) were presented in combination with non-social cues (household objects) in order to test competing theoretical predictions regarding the nature of the attentional bias that would be expected under such conditions. According to the theoretical model of Rapee and Heimberg (1997), it would be expected that individuals with GSP would demonstrate vigilance for threat (angry) faces, as evidenced by significantly increased fixation direction, reduced fixation latency and longer fixation duration. However, the opposing prediction of Clark and Wells (1995) would suggest that individuals with GSP would in fact demonstrate

avoidance of faces, resulting in reduced orientation and maintenance of attention towards such stimuli.

Initial orienting of attention. The present findings provided no evidence of any bias in initial orienting for social cues relative to non-social cues in GSP, as no significant group differences were found on the measures of initial gaze direction or latency of first fixation. These current data do not support the predictions of either theoretical conceptualisation of social phobia (Clark & Wells, 1995; Rapee & Heimberg, 1997), as individuals with GSP failed to display increased, or reduced, initial orienting to social stimuli relative to non-social cues. Furthermore, the present findings contrast with a previous investigation using a visual-probe paradigm, which indicated that socially anxious individuals demonstrated avoidance of faces compared to non-anxious controls, as indicated by slower responses to probes occurring in the same spatial location previously occupied by face stimuli (Chen et al., 2002).

Maintenance of attention. A significant difference between the GSP and control groups emerged in terms of a bias in initial fixation duration, which favoured faces. All participants demonstrated significantly longer gaze duration towards faces (irrespective of their emotional expression) relative to objects; however, the extent of this bias favouring faces over objects was significantly more pronounced in those individuals with GSP, relative to the controls.

This increased maintenance of attention towards social cues relative to non-social cues contrasts with predictions that individuals with GSP would demonstrate avoidance of social stimuli under such conditions (Clark & McManus, 2002; Clark & Wells, 1997). However, the present findings seem more compatible with Rapee and Heimberg's (1997) proposal that socially anxious individuals will demonstrate

difficulty disengaging attention from threatening socially-relevant external stimuli. However, in the present study, there were no significant differences in fixation duration across the various face types. This would suggest that the bias for increased maintenance of initial attention in individuals with GSP was not specifically threat related, as they showed a general bias to look longer at all social stimuli relative to non-social stimuli. It is possible that all types of faces, when looking directly at the participant, may have a greater threat value for individuals with GSP than for controls.

The findings of delayed disengagement in the overt orienting task used in this study are partially consistent with the empirical findings regarding covert orienting recently reported by Amir et al. (2003). These authors proposed that observations of attentional bias in social phobia may be due not to enhanced attraction of attention, but rather increased difficulty subsequently disengaging attention from threatening stimuli in GSP. Should this indeed be the case, this finding has important clinical implications. Increased difficulty in disengaging attention from certain cues is likely to result in less efficient processing of information in other locations and impaired performance within social situations. Therefore, individuals with GSP may benefit from instruction in the use of disengagement, or attention re-orientation, strategies.

However, it is important to note that Amir et al. examined attentional bias for socially-relevant words, rather than faces. It is possible that linguistic and visual cues may be processed differently (Musa, Lepine, Clark, Mansell, & Ehlers, 2003) and, therefore, only tentative connections can be drawn between the present results and these previous findings at this time.

General biases. The present results indicated that both groups of participants looked preferentially towards faces relative to objects, irrespective of the emotional

valence of the face. This finding would be consistent with the assertion of Bradley et al. (1997) that "the human face is a special stimulus for humans, being one of the most interesting and meaningful stimuli encountered from birth" (p. 26).

In summary, the current results did not support the hypothesis that individuals with GSP would demonstrate specific biases in initial orienting of attention in response to external social stimuli, as indicated by preferential gaze direction and speed of initial attentional capture. However, the finding that participants with GSP exhibited increased duration of initial fixation to faces relative to objects would suggest that such individuals were slower than their non-anxious counterparts to disengage their attention from external social cues relative to non-social stimuli.

Correlations between Self-Report Measures of Anxiety and Depression

There were significant positive correlations between the self-report measures of anxiety and depression. Correlations between the LSAS-SR, SADS and FNES would be consistent with the notion that these measures assess slightly different aspects of social phobia, with individuals who were more fearful of negative evaluation by others reporting correspondingly higher levels of social distress and avoidance. The presence of additional anxiety disorders within the clinical sample may contribute to the finding that higher scores on these measures of social phobia were associated with higher levels of trait anxiety. However, this association could also be explained by the hypothesis that general anxiety-proneness may be a risk factor for the development of GSP (Rapee & Spence, 2004). The relationship between state anxiety and the other variables confirms that the experimental situation was more anxiety-provoking for those individuals with higher levels of general and

social anxiety and depression. The positive correlations between the measures of anxiety and the depression inventory are consistent with previous findings (e.g. Richter, Werner, Heerlein, Kraus, & Sauer, 1998). Indeed, these disorders often co-occur (Dobson, 1985; Zimmerman, McDermut, & Mattia, 2000) and also have some overlapping features (Endler, Macrodimitris, & Kocovski, 2003), for instance fatigue, poor concentration, sleep disturbance, and agitation. However, it is also possible that these measures may actually tap into a global underlying variable of personality type or temperament, such as neuroticism (Tyrer, Seivewright, & Johnson, 2003) or behavioural inhibition (Turner, Beidel, & Wolff, 1996), which could potentially mediate vulnerability to the development of affective disorders.

Critique of Study and Directions for Future Research

There may be a variety of potential explanations for the unexpected outcomes of this study and some caution may be warranted when interpreting the present findings for several reasons. For instance, the majority of the clinical sample in this study met criteria for at least one additional anxiety or mood-related disorder. Therefore, it is possible that the presence of these co-morbid conditions may have influenced the outcomes. This high level of co-morbidity, combined with the lack of additional clinical control groups, means that it is not possible to draw definitive conclusions about the specificity of the present findings to GSP. For instance, there is some evidence to suggest that concurrent depression may degrade anxiety-related attentional biases (Musa et al., 2003).

For this reason, some studies have recruited a sample of individuals meeting criteria only for the disorder under investigation (e.g. GAD) and compared them with individuals diagnosed with another disorder (e.g. depression), in order to obtain accurate information about the nature of information processing biases associated with a given condition (e.g. Mogg at al., 2000). Unfortunately, the present small sample sizes did not allow these analyses. Thus, it may be prudent to replicate the current study under such conditions.

Additionally, due to computer failure, the analysable data set for the clinical group was smaller than anticipated. Whilst significant effects of direction and latency have been reported in previous eye movement studies using similar sample sizes for groups of GAD, depressed and control participants (e.g. Mogg et al., 2000, $n = 14$), it would of course be useful to replicate this study with a larger sample in order to increase the sensitivity of the study.

Whilst the current study included happy faces in addition to angry faces, it would be informative for future research to extend this further and assess attentional responses to other emotional expressions, for instance sad, fearful and disgusted faces. This would provide valuable information about the extent to which attentional bias generalises across different types of external emotional stimuli. Finally, it may also be useful in future studies to consider the inclusion of physiological measures of anxiety responses to experimental stimuli, for instance changes in galvanic skin response or heart-rate, which would provide an objective measure of state anxiety as an adjunct to self-report assessment. Such objective measures would enable researchers to further investigate the links between attentional bias, physiological arousal, and subjective mood.

Conclusion

In conclusion, the current study suggests that the primary mechanism of attentional bias in social phobia may be a specific difficulty in disengaging attention from social cues. This finding contributes to a small but evolving body of evidence which suggests that disengagement mechanisms are a key feature of attentional biases in both non-clinical anxiety (Fox, Russo, & Dutton, 2002) as well as GSP (Amir et al., 2003). However, it is clear that further research using sensitive measures of attention allocation, such as eye-movement monitoring, is necessary to establish the exact nature of attentional bias in social phobia and test further the predictions made within the current theoretical models of this disorder.

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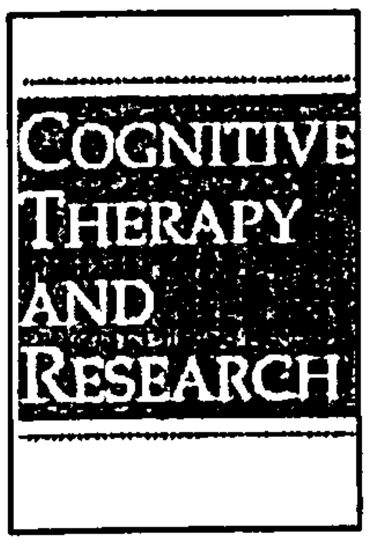
APPENDICES

LIST OF APPENDICES

Appendix 1

Notes for Contributors – Cognitive Therapy and Research



Cognitive Therapy and Research

Editor-in-Chief: R.E. Ingram
ISSN: 0147-5916 (print version)
ISSN: 1573-2819 (electronic version)
Journal no. 10608
Plenum US

Aims and scope

Cognitive Therapy and Research is a broadly conceived interdisciplinary journal that stimulates and communicates research and theory on the role of cognitive processes in human adaptation and adjustment. Contributions integrate such diverse areas of psychology as clinical, cognitive, counseling, developmental, experimental, learning, personality, and social. The journal publishes experimental studies; theoretical, review, technical, and methodological articles; case studies; and brief reports. The majority of publication space is devoted to experimental studies.

Instructions for Authors

General
In general, Cognitive Therapy and Research follows the recommendations of the Publication Manual of the American Psychological Association (5th Ed., 2001), and it is suggested that contributors refer to this publication.

Manuscript Submission
Inquiries regarding journal policy and other such general topics should be sent to the Editor:

Rick E. Ingram
Department of Psychology
Southern Methodist University
Dallas, TX 75275

e-mail: ringram@mail.smu.edu

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Manuscript Style

All pages should be typed double-spaced and numbered (including pages containing the title, authors names and affiliation footnotes, abstract, acknowledgments, references, tables, and figure caption list).

A title page is to be provided and should include the title of the article, authors name (no degrees), authors affiliation, and suggested running head. The affiliation should comprise the department, institution (usually university or company), city, and state (or nation) and should be typed as a footnote to the authors name. The suggested running head should be less than 80 characters (including spaces) and should comprise the article title or an abbreviated version thereof. For office purposes, the title page should include the complete mailing address, telephone number, fax number and e-mail address of the one author designated to review proofs.

An abstract following APA guidelines is to be provided, preferably no longer than 75–150 words.

A list of 4–5 key words is to be provided directly below the abstract. Key words should express the precise content of the manuscript, as they are used for indexing purpose.

Illustrations (photographs, drawings, diagrams, and charts) are to be numbered in one consecutive series of Arabic numerals. The captions for illustrations should be typed on a separate page. Photographs should be large glossy images, showing high contrast. Color art should be in the CYMK color space.

Tables should be numbered (with Roman numerals) and referred to by number in the text. Each table should be typed on a separate page. Center the title above the table, and type explanatory footnotes (indicated by superscript lowercase letters) below the table.

List references alphabetically at the end of the paper and refer to them in the text by name and year in parentheses.

Authors are encouraged to condense reports as much as possible and to be ready to provide more extensive details upon request. To assist in the standardization of assessment and treatment replications, authors of clinical outcome studies are required to submit a copy of their treatment manual and specific scoring procedures with the manuscripts.

Topical relevance, methodological accuracy, and clarity of reporting (for both procedures and outcome) are of critical importance in experimental studies. Particular attention should be given to such considerations as the maximization of internal and external validity, the optimal use of multimethod assessment, and a comprehensive reporting of results.

Authors will be responsible for providing readers with copies of raw data, treatment and scoring manuals, and relevant experimental materials upon request (with incurred expenses accruing to the requestor). Case studies and brief reports should communicate important and heuristic observations, such as replication attempts, innovative techniques, and successful examples of how scientific research can be effectively integrated with clinical responsibilities.

For brief reports, authors should set the character-space limit at 60 characters per line and should not exceed 380 lines of text (exclusive of the title page, abstract, and footnotes). References should not exceed 25 citations, and there should be no more than 2 tables or figures.

Blind Review

Authors requesting blind review should submit the manuscript in a form appropriate to this process (see the APA Publication Manual). Every effort will be made to expedite feedback to the author and to effect rapid publication of accepted manuscripts.

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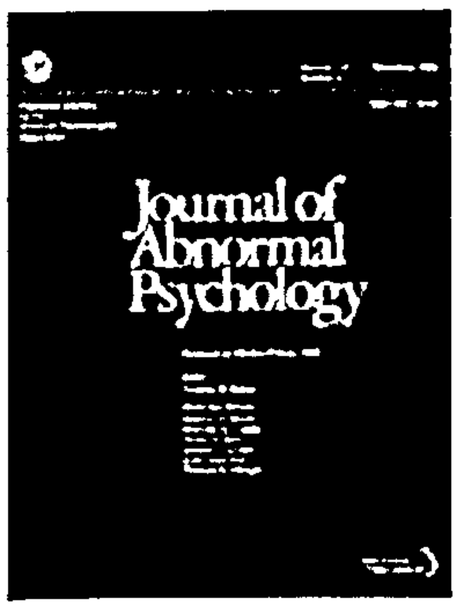
Appendix 2

Notes for Contributors – Journal of Abnormal Psychology



Journal of Abnormal Psychology

Editor: Timothy B. Baker, PhD
Incoming Editor: David Watson, PhD
ISSN: 0021-843x
Published Quarterly, beginning in February

Journal Description

The *Journal of Abnormal Psychology* publishes articles on basic research and theory in the broad field of abnormal behavior, its determinants, and its correlates. The following general topics fall within its area of major focus: (a) psychopathology - its etiology, development, symptomatology, and course; (b) normal processes in abnormal individuals; (c) pathological or atypical features of the behavior of normal persons; (d) experimental studies, with human or animal subjects, relating to disordered emotional behavior or pathology; (e) sociocultural effects on pathological processes, including the influence of gender and ethnicity; and (f) tests of hypotheses from psychological theories that relate to abnormal behavior. Thus, studies of patient populations, analyses of abnormal behavior and motivation in terms of modern behavior theories, case histories, and theoretical papers of scholarly substance on deviant personality and emotional abnormality would all fall within the boundaries of the journal's interests. Each article should represent an addition to knowledge and understanding of abnormal behavior in its etiology, description, or change. In order to improve the use of journal resources, it has been agreed by the two Editors concerned that the *Journal of Abnormal Psychology* will not consider articles dealing with diagnosis or treatment of abnormal behavior, and the *Journal of Consulting and Clinical Psychology* will not consider articles dealing with the etiology or descriptive pathology of abnormal behavior. Therefore, a study that focuses primarily on treatment efficacy should be submitted to the *Journal of Consulting and Clinical Psychology*. However, a longitudinal study focusing on developmental influences or origins of abnormal behavior should be submitted to the *Journal of Abnormal Psychology*.

Instructions to Authors

Effective in January 2005, incoming editor David Watson is receiving all new submissions to the journal. Submissions that are accepted will be published beginning in the 2006 volume.

Authors should ensure that their manuscripts and cover letters meet the criteria below and submit electronically (.rtf, PDF, or .doc).

In addition, authors should mail one hard copy of their manuscript and a signed cover letter, prepared as detailed below, to the address below.

David Watson, PhD
Incoming Editor, *Journal of Abnormal Psychology*
Department of Psychology
The University of Iowa
Iowa City, IA 52242-1407

IMPORTANT: If you submitted your manuscript prior to January 1, 2005, to outgoing editor Timothy B. Baker and are responding to the editor's request to submit a revision of that manuscript, please use this Manuscript Submission Portal.

General correspondence may be directed to the Editor's Office.

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, each copy of 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 a maximum of 120 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 half of the associated production costs; an estimate of these costs is available from the APA production office on request.

Articles will be published in six different sections of the *Journal*: Brief Reports, Regular Articles, Extended Articles, Case Studies, Commentaries, and Theories and Methods. In preparing a Brief Report, authors should to set the character–space limit at 60 characters per line and should not exceed 410 lines of text and references (exclusive of the title page, abstract, author note, footnotes, tables, and figures). There should be no more than two figures or tables. For Brief Reports, the length limits are exact and must be strictly followed.

In preparing a Brief Report, authors should use 12-point Times Roman type with 1-in. (2.54-cm) side margins and should not exceed 16 pages of text and references (exclusive of the title page, abstract, author note, footnotes, tables, and figures). There should be no more than two figures or tables. Regular Articles addressing theories and methods should not exceed 36 manuscript pages (text and references). 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 what is possible in the 36-page limit for Regular Articles). Typically, Extended Articles will report multiple experiments, multifaceted longitudinal studies, transdisciplinary investigations, or studies that are extraordinarily complex in terms of methodology or analysis. 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.

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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 or date, in whole or substantial part, has not been previoiusly 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 electronically 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 files for production. If your manuscript is accepted for publication, please follow the guidelines for file formats and naming provided at 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 3

Local Research Ethics Committee Approval Letters

Ref: CPW/hph

28 January 2004

Miss D Rutherford
School of Psychology
Shackleton Building 44
University of Southampton
Highfield
Southampton
SO17 1BJ

SOUTHAMPTON & SOUTH WEST HAMPSHIRE LOCAL RESEARCH ETHICS COMMITTEES

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Southampton
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023 8036 3462
Fax: 023 8036 4110

clair.wright@gp-j82203.nhs.uk
General Enquiries: sharon.atwill@gp-j82203.nhs.uk
Application Submission: submissions@gp-j82203.nhs.uk

Dear Miss Rutherford,

REC Ref: 337/03/w – Overt orienting of attention and interpretation bias in social phobia.

The Chairman, Dr Audrey Kermode on behalf of the Southampton & South West Hampshire LREC has considered your response to the issues raised by the Committee at the first review of your application on 26th November 2003, as set out in our letter dated 02nd December 2003. The documents considered were as follows:

Letter from Miss Rutherford dated 23rd January 2004
Amended Q14 of the Old LREC Application
Amended Q19 of the Old LREC Application
Amended Q22 of the Old LREC Application
Amended Q29 of the Old LREC Application
Research Protocol, Version 2 dated January 2004
Information Sheet (B) – For Healthy Volunteers, Version 2 dated January 2004
Recruitment Poster, dated January 2004

The Chairman, acting under delegated authority, is satisfied that your response has fulfilled the requirements of the Committee. You are therefore given approval for your research on ethical grounds providing you comply with the conditions set out below:

Conditions of approval:

- *(Where approval is given before receipt of CTX)* Please let the LREC have a copy of the CTX when it is available. If changes to the protocol are required by the MHRA (Medicines and Healthcare Products Regulatory Agency), the LREC approval will become void until those changes have been made and the revised protocol will need to be approved.

- You do not undertake this research in any NHS organisation until the relevant NHS management approval has been received.

- You do not deviate from, or make changes to, the protocol without the prior written approval of the LREC, except where this is necessary to eliminate immediate hazards to research participants or when the change involves only logistical or administrative aspects of the research. In such cases, the LREC should be informed within seven days of the

implementation of the change. Likewise, you should also seek the relevant NHS management approval for the amendment, or inform the NHS organisation of any logistical or administrative changes.

- You complete and return the standard progress report form to the LREC one year from the date of this letter and thereafter on an annual basis. This form should also be used to notify the Committee when your research is completed and should be sent to the REC within three months of completion. For a copy of the progress report please see www.corec.org.uk.

- If you decide to terminate this research prematurely, a progress report form should be sent to the LREC within 15 days, indicating the reason for the early termination. For a copy of the progress report please see www.corec.org.uk.

- You must advise the LREC of all Suspected Serious Adverse Reactions (SSARs) and all Suspected Unexpected Serious Adverse Reactions (SUSARs).

- You advise the LREC of any unusual or unexpected results that raise questions about the safety of the research.

- The project must be started within three years of the date of this letter.

'Lead' LREC – other local submissions

Where this LREC is taking the role of 'Lead' LREC, it is your responsibility to ensure that any other local researchers within the Hampshire & Isle of Wight Strategic Health Authority seek the approval of the relevant LREC before starting their research. To do this you should submit **one copy** of the following documents to the relevant LRECs:

- This approval letter
- Part C of the REC Application form (with pertinent local details)
- LREC-approved version of the patient information sheet and consent form, in the appropriate local format (ie on pertinent headed paper and showing pertinent local contact details)
- Principal (local) investigator's CV.

No other documents are required by the LREC to consider locality issues.

NHS LRECs are compliant with the International Conference on Harmonisation/Good Clinical Practice (ICH GCP) Guidelines for the conduct of trials involving participation of human subjects.

Your application has been given a unique reference number, please use it on all correspondence with the LREC.

Yours sincerely

Mrs Clair Wright
LREC Manager
Southampton & South West Hampshire LRECs

Appendix 4

Recruitment Poster

University of Southampton

ARE YOU AFFECTED BY SOCIAL PHOBIA?

Do you regularly experience high levels of distress in social situations? Do you avoid social situations to avoid becoming distressed? Are you terrified of embarrassing yourself in front of other people? Do you find meeting and talking to people very difficult? Do you get very worried about attending parties and other social events? Do you feel extremely uncomfortable eating or drinking in public?

If the answer to these questions is *YES*, then you could be suffering from social phobia.

Around 1 in 10 of us experience social phobia, and for some the effects are long-lasting. Social phobia can interfere with someone's work, social life or relationships, and can lead to other forms of significant distress, such as depression.

If you are aged 18-60 and think you may have social phobia, researchers at the University of Southampton are keen to talk to you.

The researchers will ask you about your experiences and tell you about a research project that is being run at the moment, in collaboration with doctors in the Mood Disorders Service at the Royal South Hants Hospital. This project aims to give a better understanding of social phobia and involves filling in some questionnaires and completing a series of short computer-based exercises that will involve looking at some pictures (including faces) on the computer screen. You will also have an opportunity to discuss potential treatment options.

If you are interested in taking part in this study and would like to know more, please contact Dr David Baldwin on 02380 825533 or send an email to the researchers at dlr201@soton.ac.uk

Appendix 5

Press Release

Press Release October 2003

People with social phobia wanted to take part in Southampton study

A research team at the University of Southampton is seeking people who regularly experience high levels of distress in social situations, or avoid social situations in order to avoid becoming distressed, to take part in a new study into social phobia. The project aims to give a better understanding of social phobia, in particular the role of information processing in maintaining this disorder.

Are you terrified of embarrassing yourself in front of other people? Do you find meeting and talking to people very difficult? Do you get very worried about attending parties and other social events? Do you feel extremely uncomfortable eating, drinking or writing in public? If the answer to these questions is *yes*, then you could be suffering from social phobia.

Around 1 in 10 of us experience social phobia, and for some the effects are long-lasting. Social phobia can interfere with someone's work, social life or relationships, and can lead to other forms of significant distress, such as depression.

Researchers at the University of Southampton are keen to talk to anyone aged 18-60 who regularly experiences the difficulties described above and thinks that they may have social phobia.

Taking part in the study, which is being run in collaboration with doctors in the Mood Disorders Service at the Royal South Hants Hospital, will involve a short interview in which you will be asked about your experiences, filling in some questionnaires and completing a series of short computer-based tasks which will involve looking at some pictures (including faces) on the computer screen. You will also have an opportunity to discuss potential treatment options.

Dr David Baldwin, Senior Lecturer in Psychiatry at the University's School of Medicine, is involved in the research:
"Social phobia is a common and serious anxiety disorder, associated with marked impairments in academic performance, employment and relationships. The causes of social phobia are unclear and we hope that this research will help identify factors that may be important. This in turn may help with the development of new treatment approaches".

If you are interested in taking part in this study and would like to know more, please contact Dr David Baldwin on 02380 825533 or send an email to the researchers at dlr201@soton.ac.uk

Notes for editors:

Volunteers for the study should live in the Southampton area.

The University of Southampton is a leading UK teaching and research institution with a global reputation for leading-edge research and scholarship. The University has 20,000 students and over 4,500 staff and plays an important role in the City of Southampton. Its annual turnover is in the region of £200 million.

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For further information:

Dr David Baldwin, Department of Mental Health, School of Medicine, University of Southampton
(tel: 023 8082 5533)

Donna Rutherford, Clinical Psychology, School of Psychology, University of Southampton
(email: dlr201@soton.ac.uk)

Lisa Chung, Press Officer, University of Southampton
(tel: 023 8059 4993)

1 October 2003 – Version 1

Appendix 6

Invitation Letter for Healthy Volunteers

University of Southampton

School of Psychology

Doctoral Programme in Clinical Psychology

University of Southampton
Highfield
Southampton
SO17 1BJ
United Kingdom

Telephone +44 (0)23 80 595321
Fax +44 (0)23 80 592588

INVITATION LETTER
(for healthy volunteers)

Dear

My name is Donna Rutherford and I am a Trainee Clinical Psychologist, studying for my Doctorate at the University of Southampton. As part of my course, I am conducting a research project, which is concerned with exploring the relationship between social phobia and processing of information.

I would like to take this opportunity to invite you to participate in this study.

Before you decide whether you wish to take part, it is important for you to understand what the research will involve. Please read the following information carefully and discuss it with others if you wish.

Who is being invited to take part?
In this part of the study, I am looking for volunteers who do *not* have any current mental health difficulties or any history of social phobia. Therefore, prior to taking part, you will be asked to complete a couple of short questionnaires. One of these forms will ask whether you have ever received medical or psychiatric treatment for emotional difficulties, and whether any such difficulties are a current problem for you. The second is concerned with your reactions to social situations.

What will taking part involve?
The study will involve completing some questionnaires and carrying out some simple computer-based exercises. The computer tasks will consist of looking at pictures on the screen (some of which will be faces) and reaction time tasks. The direction of your gaze will be monitored using a camera during one of the tasks. You will be asked to come along to the University, at a time that is convenient for you, in order to undertake the tasks. This will take approximately an hour or so of your time.

What will happen to the data collected?
All data collected during the course of the study will be kept strictly confidential. Personal information will not be released to, or viewed by, anyone other than researchers involved in this project. The write-up of the study will not include your name or any other identifying characteristics.

July 2004 – Version 1
(for Study No. 337/03/w)

What are the potential benefits of this research?
The information from this study may help us to better understand social phobia. The development of our understanding is essential in order to improve further the effectiveness of interventions to treat this common and distressing disorder.

Who has reviewed the study?
This study has been approved by the Southampton & South West Local Research Ethics Committee and the Department of Psychology Research Ethics Committee at the University of Southampton.

What should I do next if I am interested in taking part in the study?
If you feel that you meet the above criteria and are willing to take part in the study, or if you have any questions about participating, please contact me via e-mail at dlr201@soton.ac.uk, by telephone on 07717 442345, or by returning the attached response slip in the stamped addressed envelope provided.

When we arrange to meet, I will again check with you that you have read and understood the inclusion criteria and information regarding participation in the study. You will also be asked to sign a consent form indicating your agreement to take part.

However, your participation is entirely voluntary and you are still free to withdraw your participation at any time, without giving a reason. You may decide not to take part, or withdraw at any time, without incurring any displeasure or penalty.

I appreciate that you are busy and, therefore, if you do not reply to this letter, you will not be approached again.

Thank you for taking the time to read this.

July 2004 – Version 1
(for Study No. 337/03/w)

University of Southampton

School of Psychology

Doctoral Programme in Clinical Psychology

University of Southampton
Highfield
Southampton
SO17 1BJ
United Kingdom

Telephone +44 (0)23 80 595321
Fax +44 (0)23 80 592588

RESPONSE SLIP

Title of Project: Information Processing in Social Phobia

Name of Researcher: Donna Rutherford, Trainee Clinical Psychologist

☐ Yes, I am interested in taking part in the study titled 'Information Processing in Social Phobia'.

Name *(please print in BLOCK CAPITALS)*: .....

☐ Yes, I agree to be contacted again to make arrangements to participate in the above study.

Please indicate your preferred method of contact by ticking the appropriate box:

E-mail ☐ Address: .....

Telephone ☐ Number(s): .....

.....

July 2004 – Version 1
(for Study No. 337/03/w)

Appendix 7

Information Questionnaire for Healthy Volunteers

ADDITIONAL INFORMATION

All information contained in this form will be treated with absolute confidentiality.

Please delete as appropriate.

1. In the past, when you have been emotionally upset, has it been so severe that you have:

a) Discussed it with a friend? YES / NO

b) Visited your GP? YES / NO

c) Received treatment, such as medication? YES / NO
or professional counselling? YES / NO
or been under the care of a psychiatrist? YES / NO

2. If you have ever received any treatment, such as tablets or professional counselling, for an emotional problem, is this still a current problem for you? YES / NO

Appendix 8

Demographic Information Sheets

Study: Information Processing In Social Phobia

Demographic Information Sheet (A)

Please complete the following information:

- Sex (*please tick as appropriate*): Male ☐ Female ☐
- Age: .....
- Age at which you left school/college/university: .....
- Employment status (*please tick as appropriate*):

Full-time	☐	Part-time	☐
Self-employed	☐	Student	☐
Unemployed	☐	Other	☐

please specify: .....

- Marital status (*please tick as appropriate*):

Single	☐	Cohabiting	☐
Married	☐	Divorced	☐
Other	☐	*please specify*:	

- Age at which you began to experience difficulties with social phobia: .....
- Are you currently taking any medication(s)? (*please tick as appropriate*)

Yes	☐	No	☐

If you answered 'Yes', please specify the medication(s) that you are taking:

.....

Approximately how long have you have been taking the medication(s)?

.....

Study: Information Processing In Social Phobia

Demographic Information Sheet (B)

Please complete the following information:

- Sex (*please tick as appropriate*): Male ☐ Female ☐

- Age: .....

- Age at which you left school/college/university: .....

- Employment status (*please tick as appropriate*):

Full-time	☐	Part-time	☐
Self-employed	☐	Student	☐
Unemployed	☐	Other	☐

please specify: .....

- Marital status (*please tick as appropriate*):

Single	☐	Cohabiting	☐
Married	☐	Divorced	☐
Other	☐	*please specify*:	

- Are you currently taking any medication(s)? (*please tick as appropriate*)

Yes	☐	No	☐

If you answered 'Yes', please specify the medication(s) that you are taking:

.....

Approximately how long have you have been taking the medication(s)?

.....

Appendix 9

Consent Form

University of Southampton

School of Psychology

Doctoral Programme in Clinical Psychology

University of Southampton
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Southampton
SO17 1BJ
United Kingdom

Telephone +44 (0)23 80 595321
Fax +44 (0)23 80 592588

CONSENT FORM

Title of Project: Information Processing in Social Phobia

Name of Researcher: Donna Rutherford, Trainee Clinical Psychologist

Please read the following statements carefully and initial the appropriate box.

1. I confirm that I have read and understood the information sheet provided for the above study. ☐

2. I confirm that I have had an opportunity to ask questions and that these questions have been answered to my satisfaction. ☐

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

4. I agree to take part in the above study. ☐

Name *please print in BLOCK CAPITALS*	Date	Signature
Researcher	Date	Signature
Name of person taking consent (if different from researcher) *please print in BLOCK CAPITALS*	Date	Signature

1 October 2003 – Version 1
(for Study No. 337/03/w)

Appendix 10

Debriefing Statement

University of Southampton

School of Psychology

Doctoral Programme in Clinical Psychology

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01 October 2003 – Version 1
(for Study No. 337/03/w)

DEBRIEFING STATEMENT

Study Title: Information Processing in Social Phobia

Thank you for participating in this research. Your data will help to improve our understanding of information processing in social phobia. Clarification of this issue may help with the development of new treatment approaches and the evaluation of treatment outcomes.

Once again, I would like to remind you that the results of this study will not include your name or any other identifying characteristics.

If you have any further questions, please do not hesitate to contact me, Donna Rutherford. You can e-mail me at dlr201@soton.ac.uk or leave a message with the Department of Psychology at Southampton University on 02380 595321.

If you have any questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee, Department of Psychology, University of Southampton, SO17 1BJ (tel: 023 8059 3995).

It is anticipated that this study will be completed by autumn 2004. If you would like to be informed of the results of the study, please complete the slip below.

☐ Yes, I would like to be informed of the results of the study titled 'Information Processing in Social Phobia'.

Name (*block capitals*): .....

Please indicate your preferred method of contact by ticking the appropriate box:

E-mail ☐ Address: .....

Letter ☐ Address: .....

.....