The effect of single-session interpretation modification on attention bias in socially anxious individuals

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ABSTRACT

Research suggests that individuals with social anxiety interpret ambiguous social information negatively (e.g., Amir, Foa, & Coles, 1998) and that much negative interpretation bias may share a common mechanism with other information processing biases (e.g., Mathews, Mackintosh, & Fulcher, 1997). In the current study, we examined effectiveness of an Interpretation Modification Program in changing attention biases in socially anxious individuals. Participants were randomly assigned to either an Interpretation Modification Program (IMP) that guided them to make benign interpretations of ambiguous social scenarios or an Interpretation Control Condition (ICC) that did not guide participants' interpretation in either direction. Results revealed that individuals in the IMP group demonstrated greater ability to disengage attention from threat stimuli after completing the program, while individuals in the ICC did not. These results are consistent with the hypothesis that information processing biases in anxious individuals may share a common mechanism that may contribute to the maintenance of anxiety.

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1. Introduction

According to cognitive models of social phobia (SP), socially anxious individuals are characterized by biases in information processing. These biases maintain anxiety in social situations in part by influencing judgments about environmental cues (Clark & Wells, 1995; Rapee & Heimberg, 1997). Indeed, research has demonstrated that individuals with social anxiety demonstrate biases in interpretation, attention, and imagery when compared to non-anxious individuals (Hirsch & Clark, 2004 for a review). From a theoretical perspective, the different types of information processing biases in anxiety may share a common mechanism (Williams, Watts, MacLeod, & Mathews, 1997). For example, anxiety may prime individuals toward threatening perceptual representations that increase both attentional activation for threatening stimuli as well as negative evaluation of an ambiguous situation (Mathews, Mackintosh, & Fulcher, 1997). Moreover, different forms of information processing biases may work reciprocally or additively to maintain anxiety (Hirsch, Clark, & Mathews, 2006). Despite potential for a common underlying mechanism of information processing biases in SP, few studies have examined causal

relationships between various types of biases. To examine causality, it is necessary to manipulate one form of information processing, and subsequently examine the effect on a separate information processing domain.

Prior research has demonstrated that interpretation bias is one form of information processing that is malleable (Grey & Mathews, 2000; Mathews & Mackintosh, 2000). Procedures designed to manipulate interpretations usually introduce contingencies between ambiguous stimuli and the valence of a target word that resolves the ambiguity of the information, encouraging participants to think of the ambiguous information in either a negative or positive way. Several studies have demonstrated that these types of cognitive bias modification programs effectively induce interpretation biases in non-anxious individuals (Grey & Mathews, 2000; Mathews & Mackintosh, 2000), and that the effects of such modification are resilient across time (24 h), as well as novel settings, experimenters, and training formats (Mackintosh, Mathews, Yiend, Rideway, & Cook, 2006; Yiend, Mackintonsh, & Mathews, 2005). In addition, changing interpretations has been shown to transfer to other forms of information processing in an unselected sample (i.e., mental imagery; Hirsch, Mathews, & Clark, 2006).

Interpretation Modification Programs also appear to be effective in changing this bias in individuals with social anxiety (Beard & Amir, 2008; Murphy, Hirsch, Mathews, Smith, & Clark, 2007). For example, Beard and Amir (2008) demonstrated that a

computer-based Interpretation Modification Program (IMP), delivered twice a week for four weeks, can be used to facilitate benign interpretations in individuals with high levels of social anxiety (see Section 2 for details of this paradigm). Before and after the IMP, participants completed a Word Sentence Association Paradigm (WSAP) to assess interpretation change with novel stimuli (Beard & Amir, 2009). Results indicated that the IMP modified interpretation bias, such that participants endorsed more benign and fewer threat interpretations after the program relative to individuals in the control group. Thus, interpretation modification procedures appear capable of influencing interpretation bias in socially anxious populations. However, thus far no published studies have examined the effects of such interpretation modification paradigms on other forms of information processing associated with anxiety and anxiety vulnerability in socially anxious individuals.

In the present study we examined the hypothesis that a computerized Interpretation Modification Program (IMP) can be used to modify attention bias in individuals high in social anxiety, relative to an Interpretation Control Condition (ICC). To this end, we manipulated interpretations in a group of high socially anxious individuals, and measured attention bias before and after the modification procedure. To measure attention, we selected an attention disengagement task. Cognitive psychologists have suggested that visual spatial attention is comprised of multiple sub-components, including facilitation and inhibition of attention to different locations (Posner, 1980). When attention is captured by a place in the visual field (i.e., facilitation), other mechanisms act to inhibit attention from areas outside the particular attended place. Posner has theorized that the process of shifting attention is a multi-step process, involving: (1) interruption of ongoing activity, (2) disengaging attention from the present stimuli, (3) moving attention to the new location, and (4) reengaging attention to the new stimulus. A number of studies have indicated that anxious individuals may experience particular difficulty disengaging attention from threatening information (e.g., Amir, Elias, Klumpp, & Przworski, 2003; Fox, Russo, Bowles, & Dutton, 2001, Yiend & Mathews, 2001). Given that difficulty with attention disengagement from threat appears to be one form of information processing bias characteristic of social anxiety (Amir et al., 2003), we hypothesized that this bias might be effected a modification program designed to change another form of cognitive bias, namely interpretations. Thus, to assess attention bias, we utilized a modified Posner task previously utilized in studies of attention disengagement in social anxiety (Amir et al., 2003; Amir, Weber, Beard, Bomyea, & Taylor, 2009; Posner, 1980).

In the current study, we hypothesized that participants in the IMP would demonstrate a transfer of interpretation modification to attention processes. Specifically, we hypothesized that individuals in the IMP would demonstrate less difficulty disengaging their attention from threat-related information after modification relative to the ICC group.

2. Method

2.1. Participants

Participants comprised 57 (IMP = 29; ICC = 28) individuals recruited with an advertisement for "individuals with difficulty giving speeches." Participants were further screened based on their self-report Liebowitz Social Anxiety Scale-Self-Report score (LSAS-SR; Liebowitz, 1987) and invited to participate if they scored greater than 25 on this measure (Amir et al., 2009). This resulted in a mean LSAS-SR score of 48.2 (SD = 20.2) for our participants, placing their mean score approximately four standard deviations above the mean for individuals with no

Axis-I diagnosis (M = 10.2, SD = 9.3; Fresco et al., 2001; Rinck & Becker, 2005) and approximately one standard deviation below the mean for individuals with a diagnosis of Generalized Social Phobia (M = 73.37, SD = 23.23; Fresco et al., 2001).

2.2. Design

The study was a 2 (Group: IMP, ICC) × 2 (Time: pre-IMP/ICC, post-IMP/ICC) design with repeated measurement on the second factor.

2.3. Measures

All participants completed the Spielberger State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), LSAS-SR, Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996), and Interpretation Questionnaire (Amir, Foa, & Coles, 1998). The Interpretation Questionnaire asks participants to read ambiguous scenarios and three experimenter-provided explanations of the scenario (one negative, one positive, and one neutral). Participants are asked to rank order the three according to which explanation would come to their mind first, second, and third. As in previous studies, we calculated the mean rankings for negative interpretations of social situations. Lower numbers indicate that negative interpretations are more likely to come to mind first.

2.4. Procedure

Participants completed two phases in the experimental protocol. In the first phase, they completed the self-report questionnaires described above. In addition, to examine the influence of change in interpretation bias on change in attention bias, participants completed a modified Posner procedure as described in Amir et al. (2003). In this task a cue word appears in one of two locations on the computer screen, either to the left or the right of a central fixation cross. After the cue word disappears, participants attempt to detect a probe ("*") that appears in one of two locations. Cue words can be either valid (i.e., the probe appears in the same location as the cue word) or invalid (i.e., the probe appears in a location opposite the cue word). The participant then indicates which side of the screen the probe appears on by clicking a corresponding mouse button. Reaction time to identify the probe location on invalid trials following a threat word are a measure of attention disengagement from threat (Amir et al., 2003).

The Posner task comprised eight social threat and eight neutral word cues. Words were presented in lowercase (3–5 mm) against a black background in the center of the computer monitor. Words remained on the screen for 600 ms and the probe remained on the screen until the participant had responded. The inter-trial interval was 1650 ms. Participants saw 192 experimental trials total in random order; 2/3 (128) were valid trials, 1/6 (32) were invalid trials, and 1/6 (32) were un-cued trials.

In the second phase of the study, participants were randomly assigned to one of two computer tasks, either the Interpretation Modification Program (IMP) or the Interpretation Control Condition (ICC). During each trial the participant saw a word representing either a social threat (e.g., "embarrassing") or benign (e.g., "funny") interpretation of an ambiguous sentence that followed (e.g., "People laugh after something you said."). They were then asked to decide whether the word was related to the sentence or not. The IMP reinforced participants for endorsing a benign interpretation of the ambiguous sentence. That is, participants received positive feedback (i.e., "You are correct!") when they endorsed a benign interpretation or rejected a threat interpretation of an ambiguous sentence. Participants received