

Interpretation Bias and Social Anxiety

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Socially anxious (SA) individuals interpret ambiguous social events negatively. It is not clear, however, whether this bias is due to general distress (e.g., depression and general anxiety) or level of social anxiety. In the current study we conducted two experiments examining interpretation bias in SA individuals using videos. Each video involved an actor or actress who approached the camera and commented on some aspect of the individual's belongings or actions. Twenty-four (24) videos were ambiguous (e.g., "That is an interesting shirt you have on"), 24 were positive (e.g., "I really like your shoes"), and 24 were negative (e.g., "That is a horrible hair cut"). Participants were instructed to rate the emotional valance of each video as to how they would feel in that situation. SA individuals rated the valance of ambiguous social interactions as more negative than did nonanxious individuals. Moreover, SA individuals maintained this bias when compared to a high trait anxious and dysphoric control group. These findings demonstrate the unique role of social anxiety in the biased interpretation of ambiguous social interactions.

KEY WORDS: social anxiety; interpretation; information processing.

Social interactions involve ambiguous, negative, and positive cues. For example, when approaching one's boss with a report, the frown on the boss's face may indicate disapproval of one's performance (threat interpretation) or the boss's negative response to the information contained in the report (nonthreat interpretation). Indeed, in the latter case one's boss may be pleased with the accuracy of the report thereby reacting favorably to one's performance. Similarly, a blind date's yawn at dinner may indicate boredom (threat) or a hard day (nonthreat). Individuals with social anxiety may interpret ambiguous social situations more negatively than do nonanxious individuals. Additionally, these individuals may evaluate actual positive or negative feedback more negatively than do nonanxious individuals. Researchers have examined these biases in the laboratory.

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Several researchers have developed interpretation questionnaires based on the pioneering work of Butler and Mathews (1983) in Generalized Anxiety Disorder. These questionnaires comprise ambiguous scenarios (e.g., "You see a group of friends having lunch, they stop talking when you approach") and three interpretations of the scenario: positive (e.g., "They are about to ask you to join"), negative (e.g., "They were saying negative things about you"), and neutral (e.g., "They just ended their conversation"; e.g., Amir, Foa, & Coles, 1998; Constans, Penn, Ihen, & Hope, 1999; Stopa & Clark, 2000; Roth, Antony, & Swinson, 2001). Participants rank order the interpretations according to which would be most likely come to mind if they were in a similar situation.

As a rule, these studies suggest a negative interpretation bias for ambiguous social events in SP. However, only the Constans et al. (1999) study examined the hypothesis that the obtained bias may be due to level of general anxiety or depression. Constans et al. (1999) addressed this issue by conducting analysis of covariance showing that after a negative affect composite score was partialled out, group differences remained. This approach is commonly seen in the literature, but it may not be appropriate for many of these cases. For example, Miller and Chapman (2001, p. 41) report approximately one third of the grant applications submitted to NIMH Clinical Psychopathology Review Committee used questionable or clearly invalid ANCOVA approaches. Specifically, according to these authors the use of analysis of covariance is inappropriate when the covariate is not independent of the grouping variable. For example, when measuring age as a grouping variable and examining its effect on weight, height would not be an appropriate covariate because height is correlated with age. Thus, one would be asking whether older children would differ from younger children in weight if they did not differ in height. Because height and age are correlated, "there is no way to equate older and younger children on height, because growth is an inherent (not chance or noise) differentiation of the two groups" (Miller & Chapman, 2001, p. 44). In this example, partialing out height would also remove important variation in age, leaving specious data. This approach is commonly applied in studies examining anxiety and depression. Because current models of anxiety and depression suggest that these two constructs are conceptually related and co-occur for meaningful reasons, applying ANCOVA leaves "pure" groups that no longer represent the construct of interest (Miller & Chapman, 2001).

Thus, researchers must examine specificity in anxiety and depression using alternative methods. One such method is to create matched groups. For example, Miller and Chapman (2001) suggest designing a study that includes depressed individuals varying in level of anxiety. In the current study, we followed this suggestion by including dysphoric and generally anxious individuals who vary in level of social anxiety. This design allows us to conclude that any observed effects are due to social anxiety and not dysphoria or general anxiety.

In summary, a number of studies have suggested that socially anxious individuals interpret ambiguous social interactions and physical symptoms of anxiety negatively. However, a number of questions remain regarding the role of interpretation bias in social anxiety. First, is this bias specific to social anxiety, or the result of general distress? A second question regarding the role of interpretation bias in

social anxiety is whether these biases are only evident when interpreting ambiguous situations or also present when interpreting positive and negative situations. Indeed, it is likely that other negative emotions (e.g. depression) play a role in the interpretation of the negative events. Finally, a third question regarding the role of interpretation bias in social anxiety is whether the findings obtained with written material will generalize to more ecologically valid material such as videos of social interactions. A methodology relying on written material (e.g., threat-related and neutral words or sentences) has inherent limitations because of its restricted ecological validity in representing social threat situations rich in verbal and nonverbal cues. As Veljaca and Rapee (1998) suggested, the use of written stimuli has allowed considerable experimental control. However, these paradigms may lack “real-world” relevance (Thorpe & Salkovskis, 1997).

To our knowledge, only one study has examined interpretation of social interaction videos in socially anxious and nonanxious individuals. In this study Pozo, Carver, Wellens, and Scheier (1991) had participants interact with “other participants” via a two-way television system. The format of the interaction was such that “the other participant” asked a prewritten question and the participant then spent 30 s responding. In reality, “the other participant” was a videotaped confederate who gave positive, neutral, or negative facial expressions while asking the questions. Following the interactions, participants answered the following questions: “In your opinion, how negatively or positively does this person feel about you right now?” and “How interested do you think this person is in getting to know you?” These questions were combined to calculate an index of perceived acceptance. Both socially anxious and nonanxious groups were responsive to changes in facial expression in the confederate. However, socially anxious individuals tended to rate the confederate as less accepting than did nonanxious individuals in all situations. These authors concluded that socially anxious individuals construe others’ reactions more negatively than nonanxious participants. Yet, in this study participants were not presented with ambiguous feedback, a common occurrence in social situations. Furthermore, these researchers only varied facial expressions of the confederates in a scripted interaction. Therefore, it is not clear whether these finding will generalize to various positive and negative social interactions involving verbal and nonverbal cues.

The purpose of the current study was to examine three specific questions. First, we attempted to address the specificity of the role of interpretation bias to social anxiety by including a control group comprising high trait anxious and dysphoric participants. Because this control group is matched in level of trait anxiety and dysphoria to the social anxiety group, it is likely that any differences that emerge can be attributed to level of social anxiety rather than level of general distress. Second, we questioned whether interpretive biases are specific to ambiguous social interactions by including negative and positive videos. Finally, we examined whether the interpretation bias for written ambiguous social information would generalize to social interaction videos. We hypothesized that socially anxious individuals would interpret ambiguous social interactions more negatively than would nonanxious controls. If negative interpretation of ambiguous social interactions is specific to social anxiety, then group differences should remain when comparing socially

anxious individuals to a group of anxious and dysphoric controls. We report the results of two experiments examining these hypotheses.

EXPERIMENT 1

Method

Participants

Participants were 40 undergraduate students at the University of Georgia who received partial course credit for their participation. To select these individuals, we first screened 170 individuals using the Fear of Negative Evaluations questionnaire (FNE; Watson & Friend, 1969). Previous studies have used the FNE to differentiate individuals with social anxiety from individuals with other anxiety disorders and nonanxious controls (e.g., Stopa & Clark, 2000). We used this measure to identify 20 participants scoring in the top 15-percentile and 20 participants scoring in the bottom 15-percentile of the sample. However, because some researchers have questioned the utility of the FNE in assessing social anxiety by asserting that this measure more likely assesses general distress (Turner & Beidel, 1988), we also asked participants to complete the Inventory of Social Interactions (ISI; Amir, Bower, Briks, & Freshman, 2003), a psychometrically valid measure of social anxiety modeled after the diagnostic criteria for social phobia as described in *DSM-IV* (American Psychiatric Association, 1994). The ISI has been used to differentiate socially anxious individuals from nonsocially anxious individuals (Amir et al., 2003).

The ISI provides information regarding fears in 13 social situations (e.g., dating, public speaking) as well as level of avoidance of these situations. This self-report measure asks respondents whether they find their social fears to be unreasonable and whether others have commented that the respondents' social anxiety is excessive. Finally, the ISI asks respondents to rate their level of functional impairment in seven areas (e.g., workplace, school, household, leisure activities) as a result of social anxiety. The ISI was used informally to check the validity of the FNE in selecting socially anxious individuals who reported interference due to their social anxiety. As expected, the socially anxious (SA) group endorsed more social fears and social avoidance than did controls. They also reported that they, and others, thought that their social fears were excessive. Finally, the SA group reported interference in social functioning on average in four of the seven domains of life. The nonanxious control group did not report any interference from social fears.

Participants also completed the Anxiety Sensitivity Index (ASI; Reiss, Peterson, Gursky, & McNally, 1986), the Beck Depression Inventory (BDI; Beck & Steer, 1987), and the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). SA participants were more depressed (BDI: $t[38] = 5.67, p < .001$), trait-anxious (STAI-Trait: $t[38] = 6.30, p < .001$), state-anxious (STAI-State: $t[38] = 5.59, p < .001$), anxiety-sensitive (ASI: $t[38] = 4.48, p < .001$), and fearful of negative evaluation (FNE: $t[38] = 5.31, p < .001$) than were controls. Demographic information as well as the means and standard deviations for the above scales are presented in Table I.

Table I. Demographic and Psychometric Data

Variable	<i>M (SD)</i>		
	SA group	Control group	AD group
Experiment 1			
Age	19 (1.1)	19 (2.6)	—
Education (years)	13.6 (1.1)	13.5 (2.5)	—
ASI	25.0 (10.2)	12.1 (7.8)	—
BDI	14.6 (7.7)	3.9 (3.3)	—
STAI-S	50.9 (8.9)	34.5 (9.6)	—
STAI-T	53.1 (8.9)	35.4 (8.9)	—
FNE	23.7 (8.6)	11.5 (6.3)	—
ISI	22.7 (3.2)	3.8 (2.1)	—
Experiment 2			
Age	18 (3.6)	19 (1.2)	18 (0.6)
Education (years)	13.1 (2.8)	13.7 (1.1)	12.5 (0.7)
ASI	25.4 (10.7)	12.3 (5.8)	19.7 (9.1)
BDI	17.1 (8.3)	4.5 (3.5)	16.2 (6.9)
STAI-S	47.1 (8.9)	32.7 (7.5)	50.7 (7.3)
STAI-T	51.7 (8.8)	33.4 (7.1)	49.5 (7.3)
FNE	21.4 (8.4)	10.5 (5.5)	13.8 (1.9)
ISI	22.6 (4.3)	3.6 (1.5)	10.8 (2.8)

Note. ASI: Anxiety Sensitivity Index; BDI: Beck Depression Inventory, STAI-S: Spielberger State-Trait Anxiety Inventory-State Form, STAI-T: Spielberger State-Trait Anxiety Inventory-Trait Form, FNE: Fear of Negative Evaluation, ISI: Inventory of Social Interactions.

Materials

We created 72 brief (4–6 s) video clips by having two actors and two actresses approach the camera and comment on 18 (six positive, six negative, six ambiguous) aspects of the individual's actions or belongings (Amir et al., 2003). Twenty-four videos were positive (e.g., "I really like your shoes"), 24 were negative (e.g., "That is a horrible hair cut"), and 24 were ambiguous (e.g., "That is an interesting shirt you have on"). These videos were then digitized and recorded into a computer. Participants rated the emotionality of each video according to how they would feel if they were in that situation. Participant ratings of their emotionality were provided on a 7-point Likert scale, with "–3" meaning *very negative emotion*, "+3" meaning *very positive emotion*, and "0" meaning *neutral/no emotion*. The ratings had good to adequate internal consistency for each scenario type. As expected ratings of ambiguous ($\alpha = .62$) scenarios had lower internal consistency than did the ratings of positive ($\alpha = .94$) or negative ($\alpha = .88$) scenarios.

Procedure

Participants first read and signed a consent form. They were then told that the purpose of this study was to examine how people rated social interactions. They were asked to complete a few questionnaires. Participants were asked to view a number of videos and rate them on how they would feel if they were in that situation. The 72 videos were presented in random order.

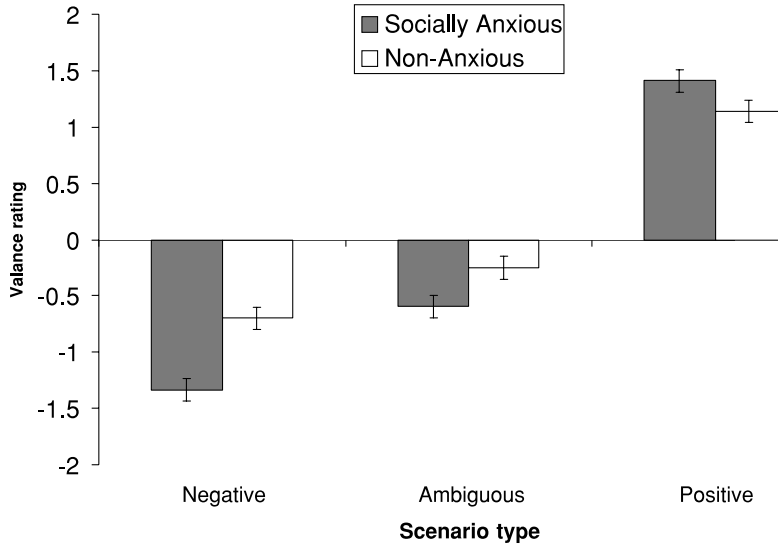


Fig. 1. Experiment 1: Emotionality ratings by group and video type.

Results

We calculated means and standard deviations for video emotionality rating for each video type for each group. These data are presented in Fig. 1.

Participants' mean ratings for the video types were submitted to a 2 (group: SA, controls) \times 3 (video type: negative, positive, and ambiguous) analysis of variance with repeated measurement on the last factor. This analysis revealed significant main effects of Video Type, $F(1, 38) = 103.5, p > .001$, and Group, $F(1, 38) = 20.4, p < .001$, that were modified by an interaction of Video type \times Group, $F(1, 38) = 4.6, p < .05$. To follow up this interaction we conducted simple effects analysis.

Simple effects of Group revealed that the SA group rated negative videos, $F(1, 38) = 16.4, p < .001$, and ambiguous videos, $F(1, 38) = 7.3, p < .05$, as more negative than did controls. No group differences emerged for positive videos, $F(1, 38) = 1.9, p = .2$.

Simple effects of Video Type revealed that both the SA group, $F(1, 38) = 98.0, p < .001$, and the control group, $F(1, 38) = 25.3, p < .001$, differentiated among the video types. Both groups rated the positive videos as more positive than the ambiguous videos and the ambiguous videos as more positive than the negative videos.³

³Follow-up post hoc analyses revealed that SA individuals rated negative videos as more negative than ambiguous videos, $t(19) = 7.6, p < .001$, positive videos as more positive than ambiguous videos, $t(19) = 9.5, p < .001$, and positive videos as more positive than negative videos, $t(19) = 13.4, p < .001$. Controls rated negative videos as more negative than ambiguous videos, $t(19) = 5.9, p < .001$, ambiguous videos as more negative than positive videos, $t(19) = 6.6, p < .001$, and negative videos as more negative than positive videos, $t(19) = 7.2, p < .001$.

Discussion

Individuals with social anxiety rated ambiguous and negative videos as more negative compared to nonanxious individuals. However, the paradigm used in Experiment 1 was new. Therefore we attempted to replicate our results with a larger sample. Additionally, we included a second control group comprising high trait anxious and dysphoric individuals (AD) to further examine the specificity of the interpretation bias.

EXPERIMENT 2

Method

Participants

The participants were undergraduate students at the University of Georgia. They received partial course credit for their participation. We first screened 240 undergraduate students and used the same criteria as Experiment 1 to identify 28 SA participants scoring in the top 15th percentile of the FNE and reporting several domains of interference on the ISI, 15 AD participants matched to the SA group on the STAI-T and BDI, but scoring below the 50th percentile on the FNE, and 30 nonanxious controls scoring in the bottom 15th percentile on the FNE, STAI-T, and BDI. SA and AD participants were more depressed (BDI: $F[2, 70] = 32.58, p < .001$), trait-anxious (STAI-Trait: $F[2, 70] = 44.40, p < .001$), state-anxious (STAI-State: $F[2, 70] = 32.29, p < .001$), and anxiety-sensitive (ASI: $F[2, 70] = 16.92, p < .001$) than controls. The SA and AD group did not differ from each other on the above measures. However, the SA participants were more fearful of negative evaluation (FNE: $F[2, 70] = 21.63, p < .001$) than were the AD group and the controls. Demographic information as well as the means and standard deviations for the above scales are presented in Table I. The Materials, Methods, and Procedure were identical to that of Experiment 1. Ratings had good internal consistency for negative videos ($\alpha = .87$), positive videos ($\alpha = .88$), and ambiguous videos ($\alpha = .82$).

Results

We calculated means and standard deviations for ratings of video emotionality for each video type within each group. These data are depicted in Fig. 2.

Participants' mean ratings of video type were submitted to a 3 (group: SA, controls, and AD) \times 3 (video type: negative, positive, and ambiguous) analysis of variance with repeated measurement on the last factor. This analysis revealed significant main effects of Video Type ($F[2, 70] = 142.9, p > .001$) and Group ($F[2, 70] = 6.0, p < .005$) that were modified by an interaction of Video type \times Group ($F[2, 70] = 2.6, p < .05$). To follow up this interaction we conducted simple effects analysis.

Simple effects of Group revealed that groups differed in their rating of ambiguous videos, $F(2, 70) = 6.5, p < .005$, but not of negative, $F(2, 70) = .50, p = .61$, or positive videos, $F(2, 70) = .90, p = .41$. SA individuals rated ambiguous videos as

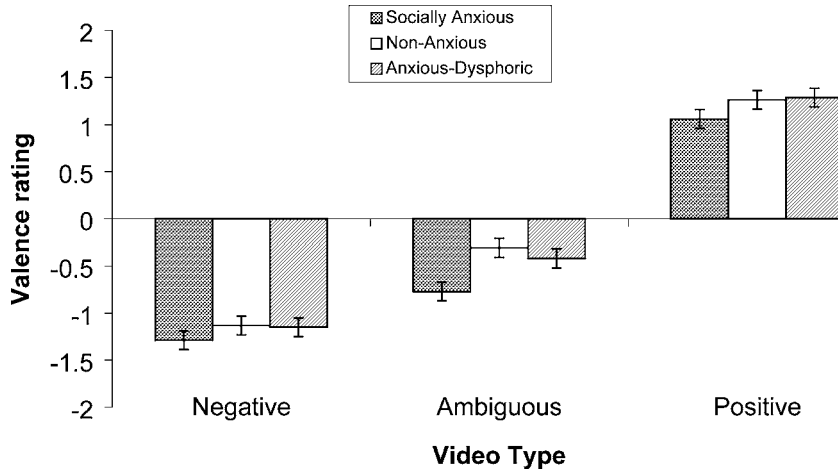


Fig. 2. Experiment 2: Emotionality ratings by group and video type.

more negative than controls and AD individuals. The latter two groups did not differ from each other.

Simple effects of Video Type revealed that the SA group, $F(2, 70) = 38.0$, $p < .001$, the control group $F(2, 70) = 78.8$, $p < .001$, and the AD group, $F(2, 70) = 95.8$, $p < .001$, differentiated among video types. All groups rated the positive videos as more positive than the ambiguous videos and the ambiguous videos as more positive than the negative videos.⁴

GENERAL DISCUSSION

Our results support the hypothesis that socially anxious individuals interpret ambiguous social information more negatively than do nonanxious controls and generally anxious, dysphoric individuals. From a theoretical perspective, these findings are informative because the majority of studies examining the role of information processing bias in anxiety have not established the specificity of these biases to level of social anxiety. As such this study is informative about the specific role of interpretation bias in social anxiety (Garber & Hollon, 1991). As pointed out by McNally (2001), there is a great similarity between various theories of anxiety and

⁴Follow-up analyses revealed that the SA individuals rated the negative videos are more negative than ambiguous videos, $t(27) = 5.46$, $p < .001$, the ambiguous videos as more negative than positive videos, $t(27) = 8.8$, $p < .001$, and the negative videos as more negative than positive videos, $t(27) = 8.7$, $p < .001$. Controls rated the negative videos as more negative than the ambiguous videos, $t(29) = 9.5$, $p < .001$, the ambiguous videos as more negative than the positive videos, $t(29) = 11.1$, $p < .001$, and the negative videos as more negative than the positive videos, $t(29) = 12.7$, $p < .001$. The AD group rated the negative videos as more negative than the ambiguous videos, $t(14) = 7.4$, $p < .001$, the ambiguous videos as more negative than the positive videos, $t(14) = 10.9$, $p < .001$, and the negative videos as more negative than positive videos, $t(14) = 14.3$, $p < .001$.

depression, and our identification of specific types of information processing biases may help differentiate these biases.

From a practical perspective, identification of particular mechanisms that may be involved in social anxiety may help identify more effective types of treatment for addressing social anxiety. For example, in social anxiety, exposure-therapy based on evaluations of ambiguity (e.g., neutral feedback: "That's an interesting shirt") may be more directly relevant than exposure-therapy focusing on negative social events (e.g., negative feedback: "That's an ugly shirt"). Thus, using exposure to guide SA individuals to interpret ambiguity more positively may make therapy more effective.

Groups also differed in their ratings of negative scenarios, but only in the first experiment. This finding may suggest that differences in rating of negative social interactions may not be as robust as those of interpretation of ambiguous events. However, the differences observed in the first experiment support previous research suggesting a second mechanism involved in social anxiety: a tendency to exaggerate the consequences of negative social interactions. For example, Stopa and Clark (2000) found that SA individuals tend to interpret unambiguous but mildly negative social events catastrophically and assume that the event would have disastrous long-term consequences for them (e.g., losing all of one's friends, being rejected, losing one's job). These authors suggested that negative interpretations are likely to have an anxiety-inducing effect by increasing the perceived danger in social situations that may in turn lead to safety-seeking behaviors. Such behaviors may adversely affect other people's response to them. Similarly, Foa, Franklin, Perry, and Herbert (1996) found that individuals with generalized social phobia rated negative social events as more costly than did nonanxious controls. Thus, the differences observed in the current study may reflect a tendency for SA individuals to exaggerate the costs of negative social events, thus rating these videos more negatively than controls. Future research should further examine this interpretation bias for negative social events using a clinical sample.

The majority of studies of interpretation bias in individuals with social anxiety have relied on written material (e.g., threat-related and neutral words). The current study shows that in the presence of verbal and nonverbal cues, socially anxious individuals tend to interpret ambiguous information as more negative than do generally anxious, dysphoric individuals and nonanxious individuals. Thus, this study suggests that findings of an interpretation bias using written material may generalize to more ecologically valid stimuli.

Do these findings reflect socially anxious individuals' tendency to interpret ambiguous social information as negative, or a tendency in generally anxious, dysphoric individuals and nonanxious individuals to interpret ambiguous social information as neutral or positive? Because of the inherent ambiguity in social interactions, it is difficult to answer this question. Social situations do not involve an objective (and accurate) referent. Therefore, it is difficult to disentangle the direction of this bias. The results of the current study show that the perceptions of individuals with social anxiety differ from the perceptions of generally anxious, dysphoric individuals and nonanxious individuals. It is plausible that the interpretations of the socially anxious individuals are more "accurate" than those of others. Indeed, some studies suggest

that individuals with major depression are more accurate than nondepressed individuals in their evaluation of events (Alloy & Abramson, 1988). Likewise, when receiving social information, nonsocially anxious people may have a slight positive or optimistic bias, favoring interpretation consistent with a positive self-view. Indeed such a bias may be associated with mental health benefits (Taylor & Brown, 1988). Regardless, if we assume that nonsocially anxious individuals' interpretations are adaptive, then the differing interpretations of the socially anxious individuals may be viewed as maladaptive, and possibly serve to maintain anxiety.

Our study has several limitations. First, the differences observed in an undergraduate sample may not generalize to a clinical sample of individuals with social phobia. Second, the FNE may not be the best measure for selecting individuals with social anxiety because it assesses general level of distress in addition to social anxiety (Turner & Beidel, 1988). We attempted to increase the ecological validity of the FNE by including a measure of social impairment (i.e., ISI). Finally, although the current study attempted to increase ecological validity by using videos of social interactions instead of written material, it is possible that videos do not reflect how individuals would actually rate a real social interaction. Future studies should examine interpretation using a clinical sample and more specific measures of social anxiety.

The results of the present study are consistent with studies implicating cognitive biases in the maintenance of social phobia. Our findings lend support to the presence of an interpretation bias in socially anxious individuals. According to our findings this bias most prominently exists in socially anxious individuals' perception of "more negativity" in ambiguous social interactions. As such, these perceptions should be addressed specifically during treatment.

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