

Social Anxiety, Recall of Interpersonal Information, and Social Impact on Others

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This study sought to replicate and extend a previous study in which social anxiety was associated with poorer recall of the details of a social interaction as well as to test various hypotheses derived from Trower and Gilbert's (1989) psychobiological/ethological theory of social anxiety. Socially anxious and nonanxious undergraduate students participated in a heterosocial conversation with a confederate under the observation of a second subject. Consistent with the previous study, there was some evidence that social anxiety was associated with poorer recall of interaction details for women. Social anxiety and recall were unrelated for men. Men demonstrated poorer recall than women overall. The hypotheses derived from Trower and Gilbert's theory were largely supported, suggesting socially anxious individuals view social interactions as competitive endeavors in which they are ill equipped to challenge the other person. Rather, they adopt self-effacing strategies, but still doubt their success. Finally, the judgments of nonanxious individuals about their impact on others appeared to be positively biased. Implications for cognitive theories of social anxiety are discussed.

One of the primary ingredients in effective casual interpersonal interactions is the ability to track conversational topics and nuances (Becker, Heimberg, & Bellack, 1987; Liberman, DeRisi, & Mueser, 1989). This complex set of skills requires sophisticated analysis of the other person's verbal and nonverbal messages. For someone with elevated social anxiety, this aspect of social interaction may be

particularly difficult due to competing cognitive demands. Numerous studies have demonstrated that social anxiety (and its clinical variant—social phobia) is associated with a preponderance of negative self-statements (Glass, Merluzzi, Biever, & Larsen, 1982; Heimberg, Bruch, Hope, & Dombeck, 1990) and excessive self-monitoring about the potential visibility of somatic symptoms of anxiety (McEwan & Devins, 1983). Socially anxious people appear to misallocate limited attentional resources to social threat cues (Asmundson & Stein, 1994; Hope, Rapee, Heimberg, & Dombeck, 1990; McNeil et al., 1995; see Elting & Hope, 1995 for a review). Although this attentional bias may be “automatic” in the sense of being involuntary (Shiffrin & Schneider, 1977), McNally (1995) has argued it is not “capacity free.” Given these competing cognitive demands it seems likely that socially anxious individuals will have insufficient capacity to fully track the verbal and nonverbal content of their interaction partner’s conversation. Several years ago we conducted a pilot study to test this hypothesis.

Undergraduate women scoring in the first and fourth quartiles of a social anxiety screening measure were asked to participate in a highly structured exchange with a male confederate whom they believed to be another subject (Hope, Heimberg, & Klein, 1990). State social anxiety was manipulated by informing half of the sample that their performance would be videotaped and evaluated (Evaluation Condition). The other subjects were told the confederate was the focus of evaluation (Nonevaluation Condition). A surprise recall test after the interaction tested subjects’ ability to recall both the content of the conversation (“What type of music did he say he liked?”) and incidental details (“Describe the shirt he wore”). As expected, anxious women, regardless of whether they were to be evaluated, recalled less information and made more recall errors than nonanxious women. Thus, these data generally supported the notion that social anxiety interferes with processing of key information conveyed by a conversation partner. However, this pilot study had a number of limitations.

The first limitation was the artificial structure imposed on the interaction. In order to assure accurate measurement of recall, the subject and confederate took turns sharing information from a prepared outline. No spontaneous exchange of information, such as commenting on common experiences, could occur. It is possible that not allowing subjects to elaborate on topics of common interest and the disruption of the natural progression of topics limited depth of processing, and, consequently, limited recall.

The second limitation of the previous study was that the manipulation of state anxiety (presence or absence of video recording) was only partially successful. In general, subjects identified as socially anxious on the screening measure reported being more anxious during the interaction than low scorers on the screening measure, regardless of whether they were to be the focus of evaluation. Furthermore, even informing nonanxious subjects that they would be evaluated as to

whether they would “make a good first impression” on men failed to elicit anxiety. Thus, the failure of the manipulation to create differential state anxiety made it difficult to discern whether the experience of social anxiety per se disrupted recall of the interaction or whether some factor associated with presumably long-standing discomfort in a variety of social situations (e.g., concomitant social isolation making some of the topics less familiar) contributed to poor recall.

Finally, the third limitation of the Hope, Heimberg, and Klein (1990) study was that, due to limited resources, only women were recruited for the study. It is not known whether the findings generalize to men. In light of these three limitations, one purpose of the present study was to replicate and extend the 1990 study by including both women and men in a more naturalistic conversation and with a different manipulation of state social anxiety.

Trower and Gilbert’s Psychobiological/Ethological Theory

A second purpose of the present study was to test several hypotheses derived from the ethological portion of Trower and Gilbert’s (Trower & Gilbert, 1989; Trower, Gilbert, & Sherling, 1990) psychobiological/ethological theory of social anxiety. Trower and Gilbert postulated that humans are constantly appraising their internal and external environment and comparing the current status with an internal standard. If no discrepancy between the current status and internal standard is found, no other action occurs. However, if a discrepancy is found, this appraisal system activates the coping system. The coping system selects a response to reduce the discrepancy based on prediction of the likely effect of various behaviors (behavior-outcome expectancies) and the likelihood the behavior can be successfully executed (efficacy-outcome expectancies). Once the selected behavioral response (or nonresponse) is enacted, the appraisal system reevaluates the situation in a continuous feedback loop.

Trower and Gilbert further proposed that socially anxious and nonanxious individuals operate under different superordinant schema that guide the appraisal and coping systems; specifically socially anxious people use a competitive framework for social interaction and nonanxious people use a cooperative framework. These schema are linked to two different psychobiological systems—the defense system and the safety system—that help ensure survival in either a competitive, hierarchical social environment (defense system) or a more cooperative social environment (safety system). As will be seen below, the defense and safety systems guide interpretation of information from the environment and determine standards for the appraisal system and responses for the coping system.

Social Anxiety and the Defense System. Trower and Gilbert proposed that social anxiety occurs in the context of highly evolved strategies to handle intraspecies conflict and allow the development of complex social groups.

Hierarchically organized social groups evolved to permit members of the same species to share territory. Because greater access to resources is associated with a higher position in the hierarchy, group members are motivated to compete to move up in rank (or at least maintain their current rank). The defense system evolved in response to this type of environment and includes a hypervigilance to threat and behaviors designed to minimize that threat and stave off excessive fighting.

In such a competitive social environment, the initial goal is to be dominant in social interactions. This is the internal standard utilized by the appraisal system. Discrepancies between the dominance standard and the current social environment evoke the coping system to reduce the discrepancy. However, Trower and Gilbert hypothesized that socially anxious individuals have low expectancies that they will be able to achieve dominance, so they reduce the discrepancy by quickly adjusting the internal standard to the second-level goal—avoid harm and rejection but stay engaged in the interaction. The coping system then evokes strategies which signal a subordinate status in the social hierarchy. This requires that subordinates constantly remain alert and ready to engage in the appropriate submissive or appeasement-oriented behaviors lest they risk losing even more status or be forced from the group. If this strategy of submission fails, the third-level goal of avoiding perceived threat at all costs becomes predominant and escape or avoidance are likely coping strategies. Thus, according to Trower and Gilbert, socially anxious persons behave as if they are subordinates in a hierarchically organized social structure and utilize the defense system to handle perceived threat to their social status.

Cooperative Mode and the Safety System. Although social hierarchies are a factor in human interactions, Trower and Gilbert proposed that a more evolved cooperative mode of interaction has developed among some chimpanzees and humans in order to increase cohesion and avoid excessive intraspecies conflict. In contrast to the competitive mode and the defense system, this cooperative mode utilizes the safety system in which interdependent group members signal reassurance to one another. This then frees group members from maintaining a defensive posture and allows a broader range of behavior (i.e., exploratory and affiliative behaviors). Social anxiety does not play a large role in the safety system because cohesion is maintained by mutuality rather than threats. Because individuals low in social anxiety primarily view social situations as cooperative, not competitive, they engage the safety system in their appraisals and coping responses.

Summary. Trower and Gilbert proposed that individuals become socially anxious because they approach social interactions as competitions but doubt their ability to successfully compete for the top positions in the perceived social hierarchy. This leads to the use of the primitive defense system characterized primarily by attempts to communicate subordination in order to main-

tain a position near more dominant individuals. Social anxiety is a natural result. In contrast, individuals who are not socially anxious have a superordinate cooperative schemata regarding social interactions and are able to utilize the more recently evolved safety system that allows a broader range of social behavior and does not require constant monitoring of one's status in the hierarchy.

It should be noted that Trower and Gilbert's theory is similar to the self-presentational theory of social anxiety (Leary & Kowalski, 1995) in which Leary hypothesized that social anxiety occurs when one doubts his/her ability to create a desired impression on others. Trower and Gilbert's ideas are also consistent with Beck and Emery's (1985) theory that socially anxious individuals perceive themselves as vulnerable to social threat which then results in information-processing biases designed to defend against the perceived threat. However, Trower and Gilbert go beyond the other theorists by basing the notion of excessive perception of social threat in an evolutionary context and by describing the subsequent behaviors to cope with the threat.

Surprisingly, little research has directly tested hypotheses derived from the Trower and Gilbert theory. One exception is a recent study in which lower social rank was associated with greater discomfort in situations requiring assertiveness and with more self-reported submissive behaviors (Gilbert & Allan, 1994). The high correlation between fear of negative evaluation and social anxiety (Herbert, Bellack, & Hope, 1991; Mattick, Peters, & Clarke, 1989) also suggests that socially anxious individuals are overly concerned with their status relative to other people as would be predicted by the theory.

Hypotheses

In addition to attempting to replicate Hope, Heimberg, and Klein (1990), the current study sought to examine two specific hypotheses from Trower and Gilbert's psychobiological/ethological theory of social anxiety. First, it was hypothesized that a person who characteristically experiences high social anxiety would be more likely to view a moderately threatening social interaction as competitive in nature than a person who is generally not anxious in social situations. Second, despite the perceived competitive nature of the situation, a socially anxious person would be unlikely to attempt to dominate the other person, having quickly abandoned this goal as unattainable, but would be more likely to attempt to convey an attitude of submission or to appease the other person. It should be noted that Trower and Gilbert's theory is based on the socially anxious individual's *perceptions* of the situation and of his or her own behaviors. Although Trower and Gilbert cite evidence suggesting that social anxiety is associated with behaviors thought to indicate subordination (e.g., reduced eye contact), an individual's report that he or she believed they were conveying the hypothesized impression (objectively accurate or not) would support the theory.

METHOD

Subjects

Subjects were 53 women and 75 men enrolled in introductory psychology courses who participated in exchange for course credit. One hundred ten of these 128 subjects were selected from a larger pool of subjects because they scored one standard deviation above or below the mean for their gender on Leary's (1983) Interaction Anxiety Scale (IAS). Thus, 34 men (IAS $M = 56.6$, $SD = 6.5$) and 23 women (IAS $M = 55.8$, $SD = 6.7$) were classified as high in social anxiety and 32 men (IAS $M = 28.6$, $SD = 5.0$) and 21 women (IAS $M = 31.5$, $SD = 4.7$) were classified as low in social anxiety. Eighteen additional subjects from the middle of the IAS distribution were used in some analyses as described under "Results" (IAS men $n = 9$, $M = 40.8$, $SD = 4.1$; women $n = 9$, $M = 42.7$, $SD = 2.8$). The IAS was used to select subjects because it assesses anxiety in a range of social situations but does not include items of behavioral avoidance (Leary, 1983). Furthermore, the IAS is appropriate for use with a college sample (Leary, 1983). Subjects volunteered for the study by signing up on a bulletin board in same-sex pairs.

Measures

Recall Questionnaire. Following the 5-minute conversation with a confederate described below, subjects were tested over various aspects of the interaction using a questionnaire specifically designed for this study. Known as the Recall Questionnaire, this measure tested subjects' memory for information shared in the conversation ("How many brothers and sisters does he/she have?" "Does he/she live on or off campus?") as well as incidental information ("What color was his/her shirt?"). Because some questions requested information not shared by the confederate, all questions had a "not discussed" response option. The Recall Questionnaire requested 24 specific bits of information and was scored for Total Correct (total number of correct pieces of information), Recall Errors (inaccurate answers), and Omissions (answers subjects omitted or indicated they did not know). All variables were calculated as a percentage of the total possible correct. Total Correct, Recall Errors, and Omissions are not linearly dependent due to the "not discussed" response option.

State Anxiety. The state version of Spielberger's State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970) was used to assess subjects' experience of anxiety at two points during the experiment. The STAI is a commonly used measure that is sensitive to fluctuations in anxiety over brief time periods.

Impact Message Inventory. The Impact Message Inventory (IMI; Kiesler, 1987) is a 90-item scale designed to assess the nature of interpersonal transactions based on Lorr and McNair's (1965) interpersonal categories. As origi-

nally designed, the IMI measures the subjective experience—the “impact” (Kiesler, 1987)—one person has on another. For example, the first item is “When I am with this person he/she makes me feel bossed around.” Items are rated on a 1 (not at all) - 4 (very much so) scale. The IMI is comprised of 15 subscales of 6 items each. The five subscales most relevant to testing hypotheses derived from Trower and Gilbert’s theory were used in the primary analyses in the present study. These five subscales (and sample items) were: Dominant (“When I am with this person she makes me feel that I want to protect myself.”), Competitive (“When I am with this person she makes me feel defensive.”), Submissive (“When I am with this person she makes me feel superior to her.”), Succorance-Seeking (“When I am with this person it appears to me that she thinks she can’t do anything for herself.”), and Deferent (“When I am with this person she makes me feel admired.”). (Note that in these examples the “impact” described by the subscale name reflects the respondent’s experience of the interpersonal strategy being employed by a female interaction partner.) Three other subscales, Hostile (“When I am with this person she makes me feel that I want to stay away from her.”), Affiliative (“When I am with this person it appears to me that she enjoys being with people.”), and Detached (“When I am with this person it appears to me that she’d rather be left alone.”) were utilized in post-hoc secondary analyses to further explicate subjects’ behavior. The other seven subscales (Exhibitionistic, Mistrustful, Abusive, Agreeable, Nurturant, Inhibited, and Sociable) were not included in the analyses because examination of the items did not suggest that they would be relevant to the hypotheses being tested in this study. Kiesler (1987) reported adequate internal consistency for the subscales and summarized evidence of construct validity. For example, consistent with Coyne’s (1976) formulation of the interactional aspects of depression, a confederate enacting a depressed role elicited lower scores on subscales that suggest a positive response (Agreeable, Affiliative) and higher scores on subscales that suggest a negative response or rejection (Hostile, Detached) than did confederates enacting a physically ill or normal role (Howes & Hokanson, 1979). Also, therapists accurately discriminated between videotapes of actors portraying dominant or submissive client roles using a composite of IMI subscales (Swaney & Stone, 1990).

The IMI was completed from two perspectives in the present study by pairs of subjects as described under Procedure. Subjects who interacted with the confederate rated how they believed they impacted the confederate (e.g., “When I am with this person I make him feel bossed around.”). Subjects who observed the interaction rated how they believed the other subject impacted the confederate (e.g., “When she is with this person she makes him feel bossed around.”). Separate versions of the IMI were created using appropriate pronouns for the gender of the subjects and confederates.

Although the IMI was not specifically designed from a psychobiological or ethological perspective, it seemed particularly appropriate for this study because it focuses on the *interaction* between two people rather than on *traits* that character-

ized one or both of the people in the interaction. In fact, the IMI has often been used in studies of the interpersonal impact clients and therapists have on one another and studies of therapists' ability to discern their own reactions to clients (see Kiesler, 1987 for a review). Gilbert (1993) advocated use of the defense/safety systems as a framework for analyzing psychotherapeutic interactions. This suggests that the IMI offers an appropriate methodology to test hypotheses derived from Trower and Gilbert's (1989) theory of social anxiety.

Procedure

Subjects arrived for the study entitled "First Impressions" in same-sex pairs. After obtaining informed consent and assuring that they were unacquainted, subjects completed the IAS and the first STAI. Subjects were then told that the purpose of the study was to examine the first impressions that women make on men (or men make on women for male subjects). The experimenter described that one subject (known as the "participant") would be randomly assigned to converse with an opposite-sexed undergraduate student (the confederate) and that this interaction would be videotaped and observed by the other subject (known as the "observer"). The ability of the participant to make a good first impression on the opposite sex would be rated by the observer and later by trained judges who viewed the videotape. The experimenter then flipped a coin in the presence of the subjects, randomly assigning them to participant or observer roles. After emphasizing which role each subject would play, subjects spent approximately 15 minutes completing a cognitive task not reported here. The participant was then taken to the video-recording area and seated in front of a video camera, parallel to a large one-way mirror. The video camera was clearly visible. The experimenter seated the observer behind the one-way mirror, briefly turning on the light to assure the participant knew the observer could view him/her clearly. After both subjects completed the second STAI, an opposite-sexed confederate was seated at approximately a 45-degree angle to the participant. Following introductions, the experimenter instructed them to have a brief conversation to get acquainted. Then the experimenter turned on the videocamera and exited. The confederate immediately initiated the conversation with a standard opening. After five minutes, the experimenter returned, excused the confederate, and asked both subjects to complete the Recall Questionnaire and IMI. The Recall Questionnaire was always completed first in order to maximize recall as the 90-item IMI required approximately 15 minutes to complete for most subjects. Subjects were then debriefed, thanked, and dismissed.

No attempt was made to match pairs of participants and observers on social anxiety. IAS scores for participants and observers were unrelated ($r = .13$, n.s.), indicating that social anxiety was randomly distributed across pairs of individuals who elected to participate in the study.

Confederates. The undergraduate research assistants (six women and three men) who served as confederates were carefully trained to present a moder-

ately friendly demeanor that was consistent across subjects and to work certain personal facts into the conversation that would be tested on the Recall Questionnaire. Each confederate presented his or her own personal information to assure the conversation was as naturalistic as possible. However, some items were altered to equate quantity of information across confederates. After each role play, confederates recorded the actual information shared during the conversation on a prepared form to facilitate accurate scoring of the Recall Questionnaire. Of the 9 confederates, four (two men and two women) served in this role for 78% of the subjects. The other five confederates completed 1-7 role plays each. The four primary confederates were each used for approximately equal numbers of high and low anxious subjects ($p > .70$). Ratings derived from a subset of videotapes revealed no difference in speaking time between the primary male and female confederates, (men $M = 143.3$ sec, $SD = 29.6$; women $M = 144.5$ sec, $SD = 31.4$; $t(45) < 1$, or between anxious versus nonanxious subjects, anxious $M = 144.9$ sec, $SD = 28.5$; nonanxious $M = 142.7$ sec, $SD = 33.8$; $t(45) < 1$.

RESULTS

Manipulation Check

Subjects' STAI scores before and after being assigned to participant or observer roles were entered into a 2 (gender) \times 2 (high vs. low trait social anxiety) \times 2 (participant vs. observer role) \times 2 (time of assessment—before or after assignment to roles) repeated-measures ANOVA in order to determine whether the manipulation was successful. This analysis yielded significant main effects for social anxiety, $F(1,101) = 58.3$, $p < .001$, and participant/observer role, $F(1,101) = 32.7$, $p < .001$, and 2 two-way interactions: social anxiety \times role, $F(1,101) = 10.2$, $p < .002$; role \times time of assessment, $F(1,101) = 82.8$, $p < .001$. As illustrated in Figure 1, these effects were moderated by the three-way interaction between social anxiety, role, and time of assessment, $F(1,101) = 8.2$, $p < .005$. Follow-up analyses indicated that, as expected, subjects randomly selected as participants reported increased anxiety after learning they would participate in the conversation (p 's $< .004$) and observers' anxiety decreased after learning they would only observe the conversation (p 's $< .001$), regardless of trait social anxiety level. However, socially anxious subjects demonstrated a larger response to the manipulation than nonanxious subjects. No other main effects or interactions approached significance.

Recall Analyses

The dependent variables from the Recall Questionnaire, total correct, omissions, and recall errors, were entered into a 2 (high vs. low social anxiety) \times 2 (participant vs. observer role) \times 2 (gender) MANOVA. Only the multivariate main effects for

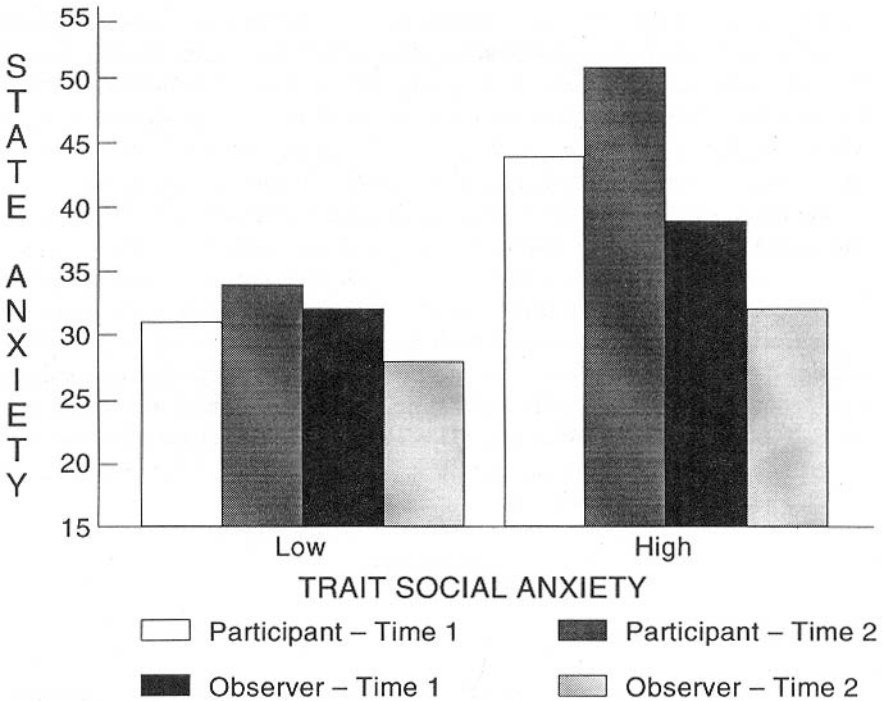


Figure 1. State Anxiety Scores by Trait Social Anxiety, Participant/Observer Role, and Time of Assessment (before versus after the manipulation).

subject role, multivariate $F(3, 101) = 9.95, p < .001$, Wilks's lambda = .77, and gender, multivariate $F(3, 101) = 3.50, p < .018$, Wilks's lambda = .91, were significant. Women and participants demonstrated superior recall compared to men and observers, respectively. Contrary to prediction, there was no effect of social anxiety on recall and no other multivariate effects approached significance, all p 's $> .15$. Examination of the univariate analyses revealed that the multivariate effect for subject role was attributable to a main effect for total percentage correct (participants $M = 78.1, SD = 13.7$; observers $M = 68.6, SD = 16.5$; $F(1, 103) = 11.03, p < .001$), but participants and observers did not differ on percentage of omissions, $F(1, 103) < 1$, or percentage of recall errors, $F(1, 103) < 1$. Univariate follow-up analyses for the main effect for gender revealed that both total correct, $F(1, 103) = 9.57, p < .003$, and omissions, $F(1, 103) = 4.34, p < .04$, contributed to the multivariate effect. Women had a higher percentage correct ($M = 78.7, SD = 13.2$) and made fewer omission errors ($M = 3.0, SD = 4.6$) than men (total correct $M = 69.9, SD = 16.5$; omissions $M = 5.5, SD = 7.0$). Men and women did not differ on recall errors, $F(1, 103) < 1$ (see Table 1).

An examination of the women's means in Table 1 revealed that the pattern of means for all three recall variables was in the expected direction—socially anxious

Table 1. Means and Standard Deviations for Recall Questionnaire Variables by Trait Social Anxiety, Participant/Observer Role, and Gender

	Women		Men	
	High Social Anxiety	Low Social Anxiety	High Social Anxiety	Low Social Anxiety
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Total Correct				
Participant	80.8 (9.7) ^a	87.9 (4.6) ^b	76.3 (12.9)	71.1 (17.9)
Observer	74.2 (12.9)	72.0 (17.5)	66.1 (16.2)	65.6 (17.8)
Omissions				
Participant	2.6 (3.2)	1.7 (2.2)	7.5 (6.5)	6.0 (9.8)
Observer	2.9 (3.4)	4.9 (7.6)	5.3 (6.0)	3.5 (5.9)
Recall Errors				
Participant	12.2 (6.5)	9.6 (5.2)	9.2 (7.2)	15.8 (12.5)
Observer	7.9 (4.6)	11.7 (11.3)	12.5 (10.2)	10.7 (9.8)

Note. Women/High Anxiety/Participant $n = 13$; Women/High Anxiety/Observer $n = 10$; Women/Low Anxiety/Participant $n = 10$; Women/Low Anxiety/Observer $n = 11$; Men/High Anxiety/Participant $n = 19$; Men/High Anxiety/Observer $n = 15$; Men/Low Anxiety/Participant $n = 14$; Men/Low Anxiety/Observer $n = 18$. All recall variables are expressed as a percentage of total possible correct.

^{a,b} These two subgroups of high and low anxious women differed on Total Correct ($p < .023$).

women who participated in the interaction had a lower total percentage correct and higher percentages of omissions and recall errors compared to nonanxious women who were participants. The lack of statistical significance for the omnibus interaction effects could be attributable to insufficient statistical power (approximately .50 for some analyses). Given the planned hypothesis that these data would replicate Hope, Heimberg, and Klein's (1990) findings that poorer recall would be associated with greater social anxiety, a series of t -tests compared the pairs of means for high and low anxious subjects, divided into subgroups by subject role and gender as displayed in Table 1. These t -tests indicated that high anxious women who participated in the interaction had fewer totals correct than low anxious women who participated in the interaction, $t(18.1) = 2.48, p < .023$. These same women did not differ on recall errors, $t(20) = 1.11, n.s.$, or omissions, $t(20) < 1$. No other high and low anxious subgroup pairs (e.g., female observers, male participants or male observers) differed on any of the three recall measures (all p 's $> .11$). This one significant difference between high and low anxious female participants is consistent with Hope, Heimberg, and Klein. However, the lack of difference between high and low anxious subjects for omissions and recall errors of the other subgroups was surprising.

IMI Analyses¹

Primary Analyses. The five IMI subscales—Competitive, Submissive, Succorance-Seeking, Deference, and Dominant—were analyzed using 2 x 2 x 2 mixed factorial ANOVAs. Participants' level of social anxiety (high vs. low) and subject gender constituted the between-subjects factors. Perspective of the person completing the IMI (participants reporting their own experience of the interaction vs. observers reporting their experience of the respective participants' interaction) was analyzed as a within subjects factor because observer/participant pairs offered different points of view on a single event, e.g., the participant's impact on the confederate. Because participants and observers were not matched on social anxiety prior to the experiment, 12 anxious and 6 nonanxious participants were observed by subjects from the middle of the IAS distribution. By chance these 18 participants signed up for the experiment with individuals with moderate IAS scores. Thus, subjects identified as "observers" in the analyses of the Recall Questionnaire and IMI data represent separate but overlapping subgroups. For the participant-observer pairs in the IMI analyses, observers' IAS scores did not differ as a function of the participants' social anxiety, $t(52) = 1.04, p > .30$. In the interest of space, only main effects or interactions that achieve conventional levels of significance ($p < .05$) will be reported.

The 2 x 2 x 2 ANOVA with the Competitive IMI subscale as the dependent variable revealed a significant main effect for perspective, $F(1,50) = 5.81, p < .02$, with observers rating the participants' impact as more competitive ($M = 1.8, SD = 0.42$) than participants rated themselves ($M = 1.7, SD = 0.48$). However, the social anxiety x perspective interaction was also significant, $F(1,50) = 6.69, p < .013$. Post hoc Tukey HSD Tests² ($\alpha = .05$) indicated that socially anxious participants and observers of both socially anxious and nonanxious participants viewed participants' impact as more competitive than nonanxious participants viewed their own impact on the confederate. A similar pattern emerged for the Submissive Subscale: there was a main effect for perspective, $F(1,50) = 5.55, p < .022$, and a social anxiety x perspective interaction, $F(1,50) = 4.84, p < .032$. Again, observers ($M = 1.4, SD = 0.35$) had higher scores than participants ($M = 1.3, SD = 0.40$) overall, but Tukey tests of the interaction effect indicated that nonanxious participants had lower scores than the other three groups who did not differ from one another (see Table 2).

The ANOVA with the Succorance-Seeking Subscale revealed a significant main effect for social anxiety, $F(1,50) = 4.33, p < .043$, with socially anxious subjects achieving higher scores ($M = 1.8, SD = 0.37$) than nonanxious subjects ($M = 1.6, SD = 0.37$), regardless of the rater's perspective. This was modified by a social anxiety x perspective interaction, $F(1,50) = 8.41, p < .006$. Tukey tests revealed that socially anxious participants and observers of the impact made by nonanxious participants reported more succorance-seeking than nonanxious participants. Observers of anxious participants failed to differ from the other three groups.

Table 2. Means and Standard Deviations for Impact Message Inventory (IMI) Subscales by Participant's Trait Social Anxiety and Participant/Observer Role

IMI Subscale	High Social Anxiety		Low Social Anxiety	
	Participant	Observer	Participant	Observer
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
	<i>N</i> = 32	<i>N</i> = 32	<i>N</i> = 22	<i>N</i> = 22
Competitive	1.8 (0.51) ^a	1.8 (0.46) ^a	1.5 (0.37) ^b	1.9 (0.37) ^a
Submissive	1.4 (0.48) ^a	1.4 (0.34) ^a	1.1 (0.16) ^b	1.5 (0.37) ^a
Succorance- Seeking	1.9 (0.56) ^a	1.7 (0.50) ^{ab}	1.4 (0.29) ^b	1.8 (0.63) ^a
Dominant	1.2 (0.27)	1.2 (0.25)	1.3 (0.37)	1.3 (0.39)
Deference	2.2 (0.39)	2.2 (0.46)	2.5 (0.37)	2.3 (0.37)
Hostile	1.9 (0.44) ^a	1.9 (0.39) ^a	1.5 (0.29) ^b	1.8 (0.41) ^a
Detached	1.9 (0.40)	1.9 (0.35)	2.3 (0.45)	2.0 (0.48)
Affiliative	1.8 (0.39) ^a	1.8 (0.42) ^a	1.5 (0.26) ^b	1.8 (0.38) ^a

Note. Means with differing subscripts within rows differ at $p < .05$.

Although the analyses on the three subscales just described support the hypotheses, findings for the Deference Subscale do not. Only the main effect for social anxiety was significant, $F(1,50) = 4.07$, $p < .049$, with *higher* Deference scores being associated with *lower* social anxiety, contrary to the hypothesis (anxious $M = 2.2$, $SD = 0.34$; nonanxious $M = 2.4$, $SD = 0.25$).

As discussed in the introduction, it was hypothesized that socially anxious subjects would not attempt to be dominant in the interaction. Furthermore, nonanxious subjects, who should be functioning in the safety system, would be expected to emphasize cooperation, not dominance. This hypothesis was supported indirectly. There were no significant main effects or interactions for the Dominant Subscale (all p 's $> .12$). An inspection of the means in Table 2 indicates that all subjects rarely endorsed items from this subscale, neither anxious nor nonanxious subjects believed the other person felt dominated. However, these data do not rule out the possibility that some subjects may have attempted to use such dominance strategies unsuccessfully.

Secondary Analyses. After examining the pattern of results for the IMI data, similar mixed factorial $2 \times 2 \times 2$ ANOVAs were conducted on three additional IMI subscales (Hostile, Detached, and Affiliative) to clarify the results. (See the lower portion of Table 2 for means and standard deviations.) For the Hostile Subscale there was a significant main effect for participants' level of social anxiety, $F(1,50) = 7.55$, $p < .008$, and perspective, $F(1,50) = 6.58$, $p < .013$.

Socially anxious subjects ($M = 1.9$, $SD = 0.30$) had higher scores than nonanxious subjects ($M = 1.6$, $SD = 0.24$). Observers of the impact on the confederate made by participants ($M = 1.9$, $SD = 0.40$) had higher scores than participants gave themselves ($M = 1.7$, $SD = 0.43$). These main effects were qualified by a social anxiety \times perspective interaction, $F(1,50) = 5.07$, $p < .029$. Post hoc Tukey tests revealed low anxious participants achieved lower scores on the Hostile Subscale than the other three groups (see Table 2).

For the Detached Subscale, the main effects for social anxiety, $F(1,50) = 5.29$, $p < .026$, and perspective were significant, $F(1,50) = 4.30$, $p < .043$, with anxious subjects ($M = 1.9$, $SD = 0.30$) and observers of the interactions ($M = 1.9$, $SD = 0.40$) having lower scores than nonanxious subjects ($M = 2.1$, $SD = 0.34$) and participants ($M = 2.1$, $SD = 0.44$), respectively. The perspective \times gender interaction, $F(1,50) = 5.58$, $p < .022$, and Tukey tests revealed that male participants ($M = 2.2$, $SD = 0.48$) achieved higher scores than they received from the men who observed them ($M = 1.9$, $SD = 0.35$) with women's scores falling between the two male groups, not significantly different from either (female participants $M = 2.0$, $SD = 0.37$; female observers $M = 2.0$, $SD = 0.47$).

The ANOVA for the Affiliative subscale had a significant main effect for perspective, $F(1,50) = 7.77$, $p < .007$, and a social anxiety \times perspective interaction, $F(1,50) = 6.43$, $p < .014$. However, there was a nearly significant social anxiety \times perspective \times gender interaction, $F(1,50) = 3.96$, $p < .052$. Although participants ($M = 1.7$, $SD = 0.37$) reported lower Affiliative Subscale scores than observers overall ($M = 1.8$, $SD = 0.40$), as seen in Table 2, nonanxious participants had lower scores than anxious participants or all observers. The three-way interaction trend was attributable to particularly low scores for male participants, relative to the other subgroups.

DISCUSSION

Recall of Interpersonal Information

Socially anxious and nonanxious women and men either observed or participated in a 5-minute conversation with an opposite-sexed confederate. In general, men had poorer recall of details of the interaction than women. Those who participated in the conversation recalled a greater percentage of information shared by the confederate than those who simply observed. The relationship between trait social anxiety and recall was mixed.

As noted in the results, Hope, Heimberg, and Klein's (1990) finding that socially anxious women recall fewer interaction details than nonanxious women was not replicated in the MANOVA. However, an examination of the women's means in Table 1 revealed that the pattern of means for all three recall variables was in the expected direction—socially anxious women who participated in the interaction had a lower total percentage correct and higher percentages of omissions and recall

errors compared to nonanxious women who were participants. Further *t*-tests revealed that higher trait social anxiety was associated with fewer total correct recall items as hypothesized. However, this relationship was found only for women who actually participated in the interaction. Omissions and recall errors did not differ by social anxiety classification for any of the subject groups. It should be noted that Hope, Heimberg, and Klein included only female participants and only women partially replicated their findings in the present study.

No gender differences were hypothesized in the present study. In fact, gender was included as an independent variable as a standard practice to avoid unwarranted assumptions of similarities between men and women and because the previous study included only women. The overall gender differences in the recall of interpersonal information were unexpected as well. However, women and men also perform differently in numerous other aspects of interpersonal communication. For example, in their review of meta-analyses on gender differences, Hyde and Frost (1993) concluded that women are better at decoding nonverbal cues and smile more at their conversation partners compared to men. The relationship between gender and interpersonal communication may also interact with various psychopathological variables. For example, among schizophrenics, memory deficits appear to be associated with poor social skills for women but not for men (Mueser, Blanchard, & Bellack, 1995). Future research should explore whether gender differences in recall are found with other types of conversation topics and in same-sex interactions in various subpopulations.

Interpersonal Impact

The second set of hypotheses were drawn from Trower and Gilbert's theory that socially anxious individuals behave as if social discourse operates in a competitive mode (defense system) found among many nonhuman animals rather than the cooperative mode (safety system) that underlies casual human social interactions. First, we will examine this hypothesis from the participant's point of view. Socially anxious participants described their impact on others as more competitive than nonanxious participants, as expected. However, it appears that socially anxious individuals did *not* attempt to compete by dominating the confederate, e.g., by trying to take the center of attention or putting him/her on the defensive. Surprisingly, neither did socially anxious subjects attempt to appease the confederate by offering admiration or by making him or her feel important. In fact, low socially anxious subjects reported *more* deference than high anxious subjects. Rather, socially anxious participants believed they came across as inferior, inadequate (Submissive Subscale) and as needing help and reassurance (Succorance Seeking Subscale) relative to nonanxious participants. Interestingly, a post hoc analysis of an additional IMI subscale—Hostility—suggested that the socially anxious participants were more likely to believe the confederate found them annoying and desired to escape compared to nonanxious participants. Thus, using Trower and Gilbert's

language, socially anxious participants viewed the interaction as competitive but abandoned the “first level goal”—achieving the dominant position—in favor of the “second level goal”—avoiding rejection while maintaining the interaction. It appears anxious subjects sought to maintain the interaction by emphasizing their subordinate status rather than highlighting the other person’s superior status. The data from the Hostility subscale suggest they believed they were unsuccessful at achieving the second level goal. The elevated state anxiety supports this notion per Leary’s theory (Leary & Kowalski, 1995) that social anxiety occurs when a person believes he or she is failing to meet self-presentational goals.

If nonanxious participants did not describe their impact on the confederate as competitive or dominating (almost all subjects, regardless of experimental group reported low scores on the Dominant Subscale), how did they describe their impact on the confederate? Again, exploratory analyses of additional IMI subscales not included in the original hypotheses offer some clues. Nonanxious participants reported less desire to affiliate with the confederate compared to socially anxious participants (Affiliation Subscale). Nonanxious participants (and the observers concurred) displayed greater detachment from the interaction (Detachment Subscale) than anxious subjects. Thus, nonanxious participants did not appear to be highly motivated to develop a relationship with the other person, perhaps because of the contrived nature of the interaction.

In contrast to the different interpersonal strategies that anxious and nonanxious participants described on the IMI, observers failed to distinguish between anxious and nonanxious participants. There are two possible explanations of the observers’ pattern of results. First, perhaps the types of judgments required by the IMI are too subtle to be made by novice raters, hence they were unable to detect differences between anxious and nonanxious participants. However, as discussed below, observers consistently matched self-ratings of anxious participants. An inability to appropriately apply the measure would likely yield a more random pattern. Second, perhaps observers gave similar ratings for anxious and nonanxious participants because the observable behavior of the two groups did not differ and participants’ self-ratings reflected biased perceptions.

An examination of the means for the IMI subscale reveals that ratings of anxious participants and their respective observers were similar, suggesting that socially anxious subjects were able to make accurate judgments about their behavior and the confederate’s visible reaction to it. In contrast, the ratings of nonanxious subjects were inconsistent with ratings of observers on every IMI subscale in which perspective and social anxiety interacted—Competitive, Submissive, Succorance-Seeking, Hostile, and Affiliative, but not Dominant, Deference or Detached. The pattern of the means indicates that nonanxious subjects generally gave more positive ratings than they received from observers, with the exception of the Affiliative Subscale in which nonanxious subjects were less affiliative than observers believed them to be. Thus, these data differ sharply from studies such as those by Rapee and Lim (1992) in which both socially anxious and nonanxious subjects

underestimated the quality of their performance in a public speaking task but the anxious subjects did so to a greater degree. It appears that the present findings are more consistent with Taylor and Brown's (1988, 1994) "positive illusions" (unrealistic positive self-perceptions are associated with well-being) than the negative bias generally seen in social anxiety.

Limitations

There are a number of limitations of the present study that should be mentioned. First, the use of an analogue sample limits generalizability to clinical populations. Research using the IMI with social phobics is currently under way but there are no known studies of naturalistic recall in clinical samples. This is surprising given that clinical experience shows that social phobics often complain of difficulty meshing topics with their conversation partner. Second, the number of subjects per cell was unequal and some of the cell sizes for female subjects were smaller than ideal ($N = 10$). Although the statistics that were used are robust to unequal N (Hays, 1981), statistical power was limited for some comparisons. Finally, the design prohibited the collection of IMI data from confederates. Because trained confederates were required for the recall portion of the study, it was thought that their familiarity with IMI items prior to the interaction would invalidate the measure. It is unknown whether the reaction of confederates to participants matches either participant or observer ratings. The private reactions of confederates may not have been manifest in their overt behavior and, consequently, would not have influenced ratings in the present design. Research is currently under way to compare the perspectives of both interaction partners on the IMI for social phobics and nondisordered subjects.

Conclusions

In summary, even though the replication of Hope, Heimberg, and Klein (1990) was quite modest with differences for high and low anxious women on only one of three memory variables, these data are quite encouraging nonetheless. There is the limited evidence of memory deficits or biases in social anxiety (Rapee, McCullum, Melville, Ravenscroft, & Rodney, 1994). One exception is the memory biases for personally relevant adjectives found in social phobics by Hope and associates (1997). Perhaps social anxiety impacts memory only for personally relevant information as in Hope and colleagues (1997) and the present study but not memory for more neutral information as in Rapee and associates (1994). It should be noted that the results of the current study could also be attributable to attentional biases that limited the comprehension of the interpersonal information and, consequently, lead to poorer recall. In fact, Hope, Heimberg, and Klein reported that poorer recall was associated with heightened self-awareness which would be consistent with an attentional mechanism for apparent memory deficits. Future research should

explore further the mechanism that may underlie memory deficits or biases among socially anxious individuals.

The overall poorer recall of men and their pattern of means was unexpected but, in retrospect, may be consistent with other differences between women's and men's communication styles. Gender differences in studies of social anxiety and social phobia are rare, so future research should further explore this issue.

This is one of the first known studies to specifically test hypotheses derived from the ethological portion of Trower and Gilbert's (1989) theory. These data offered reasonably strong support for the theory. If future studies continue to be supportive, clinicians who treat social phobia may be able to include strategies that encourage clients to view social situations as cooperative, not competitive, and to promote utilization of the safety system rather than the defense system. Studies of the etiology of social phobia should examine environmental, biological, and developmental variables that promote excessive reliance on the defense system.

Although this study examined the safety and defense systems in relation to social anxiety, the systems are thought to be "*fundamental*, basic psychobiological organizing systems" (Gilbert, 1993, p. 132, italics in the original) with relevance to a broad spectrum of human behavior. Thus, future research should also explore other circumstances in which the defense/safety conceptualization could provide a framework for understanding other dysfunctional behavior. (See Gilbert, 1993, for further discussion of this point.)

Finally, this study raises the intriguing hypothesis that, although socially anxious individuals underestimate the *quality* of their interpersonal behavior (Alden & Wallace, 1995; Rapee & Lim, 1992), they may be more accurate about the overall impression they convey to others. The apparent positive bias seen among nonanxious subjects should be explored further in light of the controversial literature on the association between the so-called "rose-colored glasses" phenomenon and well-being (Ackerman & DeRubeis, 1991; Colvin & Block, 1994; Taylor & Brown, 1988; 1994).

NOTES

¹Because observers' IAS scores correlated with some IMI scales, suggesting that one's own social anxiety may influence judgments about another person's interpersonal behavior, parallel analyses were conducted with observer's IAS score serving as a covariate. These analyses yielded essentially the same pattern of results.

²Post hoc Tukey tests were utilized instead of standard simple effects analyses because of the need to compare socially anxious and nonanxious subjects (to test hypotheses related to Trower and Gilbert's theory) and to compare participants and observers (to test hypotheses regarding accuracy of self-perception). Multiple simple effects tests would have exceeded the degrees of freedom available, therefore, Tukey tests offer a more conservative approach to help control alpha inflation.

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