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The Role of Nonverbal Decoding Ability and Social Anxiety in Interpersonal Attraction During the Initial Stages of Relationship Formation

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Running head: THE ROLE OF NONVERBAL DECODING ABILITY

The Role of Nonverbal decoding Ability and Social Anxiety In Interpersonal Attraction During the Initial Stages of Relationship Formation

By

Michael T. Rothman

M.A., California State University, Long Beach, 2003

B.A., Emory University, 1996

Adviser: Stephen Nowicki, Ph.D.

An Abstract of

A thesis submitted to the Faculty of the Graduate School of Emory University

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Abstract

The Role of Nonverbal Decoding Ability and Social Anxiety in Interpersonal Attraction During the Initial Stages of Relationship Formation
By Michael T. Rothman

The present study investigated the role of nonverbal decoding ability and interpersonal attraction in the beginning relationships of undergraduate women and examined whether social anxiety affected the decoding ability-interpersonal attraction association. Women with poor decoding skills were predicted to be less well liked by fellow women. In addition, social anxiety was predicted to strengthen the decoding ability-interpersonal attraction relationship, such that women with poor decoding skills *and* high social anxiety would be even less well liked than those with poor decoding skills alone. Undergraduate women (n = 62), in small groups ranging in size from 3-5 students, met once per week for three consecutive weeks. Before engaging one another in the three sessions, they completed measures of nonverbal decoding ability and social anxiety. At the conclusion of each session, the women rated the interpersonal attractiveness of their fellow group members. Both nonverbal decoding ability and social anxiety were significantly associated with interpersonal attraction in the initial group session. Women who were less able to read sad and angry facial expressions *or* who endorsed higher social anxiety were less well liked by fellow group members. However, social anxiety did not moderate the decoding ability-interpersonal attraction association. Identifying emotion in facial expressions but not in paralanguage was important in the initial stages of women's relationships.

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The Role of Nonverbal Decoding Ability and Social Anxiety In Interpersonal Attraction during the Initial Stages of Relationship Formation

The purpose of the present study was to examine the role of nonverbal decoding ability and social anxiety during the initial phases of relationship formation in female college students. It was predicted that women with poor nonverbal decoding skills and high social anxiety would be perceived as less interpersonally attractive and thus have less relationship success than women with better decoding skills and lower social anxiety. A review of past research concerning nonverbal decoding ability, social anxiety, and relationship success provides the basis for this prediction.

Nonverbal communication

Communication takes place through verbal and nonverbal channels. While the verbal content of communication includes written, spoken, or signed words, most other communication methods, including facial expressions, tone of voice (paralanguage), proxemics (use of space), gestures, postures, fashion or objectics, rhythm, and chronemics (use of time), are nonverbal (Nowicki & Duke, 2002).

Just as verbal communication includes multiple areas of skill (e.g. vocabulary, spelling, sound pronunciation), nonverbal communication ability is also multi-faceted, including decoding, encoding, and regulation/control skills (Riggio, 1992). Decoding, or receptive skill, refers to the ability to identify the affective states of others. Encoding, or expressive skill, refers to the ability to

send emotional messages to others. Regulation refers to the ability to exert control over nonverbal expression.

The relatively greater role of nonverbal versus verbal communication in conveying emotional information has been documented in a number of investigations (e.g., Ekman, 1993; Nowicki & Duke, 2001; Philippot, Feldman, & Coats, 2003). Mehrabian (1972, 1987) was among the first to show that most of the emotional meaning conveyed during typical interpersonal interactions is communicated through nonverbal channels. Nowicki and Duke (2001) describe three characteristics upon which nonverbal and verbal communication differ: (1) continuity, (2) level of awareness, and (3) emotional impact of errors. They argue that the greater credibility of nonverbal behavior with respect to conveying emotional information is partially accounted for by the fact that nonverbal behavior is expressed more continuously than verbal behavior. Although one can stop speaking, messages communicated through nonverbal channels such as facial expressions and postures will continue to be expressed. The fact that a much greater proportion of nonverbal in comparison to verbal communication takes place automatically and out of conscious awareness also may contribute to its greater credibility as a reflection of one's true feelings (Philippot, Feldman, & Coats, 2003). Consistent with this idea, Ekman's (1993) research on the ability to deceive others regarding how you are feeling demonstrates the ease with which individuals' emotions can be misrepresented by their speech, which involves consciously chosen words.

Nowicki and Duke (2001) argue that nonverbal communication errors are likely to have more negative interpersonal consequences than mistakes in verbal communication. While poor word choice or incorrect pronunciation may result in others forming negative evaluations of one's intelligence or education, nonverbal mistakes such as the misinterpretation or incongruent expression of an emotional state, can produce feelings of discomfort, anxiety, or even fear in others (Nowicki & Duke, 2002).

Receptive nonverbal skill

Given the assumed importance of nonverbal communication in the interpersonal exchange of emotional information, the present study will examine the role of nonverbal communication in the formation of interpersonal relationships. Although nonverbal decoding, encoding, and regulation skills all play significant roles in social interaction, the present study focuses on decoding skill for several reasons. First, decoding ability appears to precede the development of both expressive and regulation skills (Boyatzis & Satyaprasad, 1994). Second, the more extensive literature base concerning nonverbal receptive skills relative to expressive and regulation ability, allows for more precise predictions regarding potential relationships between it and other variables of interest (e.g., social anxiety) in early relationship formation. Finally, although multiple measures of nonverbal ability have been devised (Bernieri, 2001), those measuring decoding skill have been used more often and been found to be the most reliable (Nowicki & Duke, 1989, 1992; Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979).

According to Riggio (1992), receptive nonverbal skills “play a critical role in all facets of social life, from first encounters with strangers, to the development and maintenance of long-term relationships” and are “important determinants of both the quality and quantity of interpersonal relationships” (p.10). Receptive skill is important to any given social interaction because it can facilitate a clearer understanding of the emotional experience of others (Feldman, Philippot, & Custrini, 1991).

In addition to nonverbal decoding ability, researchers have also found social anxiety to be associated with the success or failure of social interactions (Beidel, Turner, & Dancu, 1985; Daly, Vangelisti, & Lawrence, 1989; La Greca & Lopez, 1998). Individuals with higher levels of social anxiety tend to experience less social success. However, to this author’s knowledge, only one study (Kleinman, 2003) has investigated the role of social anxiety in the association between nonverbal decoding ability and success in new relationships.

The following sections will summarize evidence for the association between nonverbal decoding ability and social success, nonverbal decoding ability and social anxiety, and finally, social anxiety and social success. The research described below provides the basis for the present study.

Receptive nonverbal skill in clinical populations

The association of nonverbal decoding deficits with social functioning is especially apparent in members of clinical populations. Despite symptomatic differences, members of different diagnostic groups share low social competence. Past research has found that nonverbal decoding deficits are

associated with the diminished social competence of individuals with schizophrenia (Walker, 1981; Walker, Emory, & Marwit, 1980; Walker, McGuire, & Bettes, 1984), depression (Cooley & Nowicki, 1989; Hale, 1998; Walker et al., 1984), and traumatic brain injury (Spell & Frank, 2000).

Walker (1981) compared the nonverbal decoding abilities of schizophrenic, anxious-depressed, unsocialized-aggressive, and normal children. Using the cross-cultural test of emotion recognition (Izard, 1971), all participants were shown a series of 32 photographs displaying one of eight facial expressions (joy, anger, surprise, disgust, shame, fear, sadness, and interest) and asked to match each photograph with the appropriate emotion. Participants had up to four minutes to view each photograph. Schizophrenic children were found to make significantly more decoding errors than children in the other three groups. The authors interpreted this finding as consistent with previous indications that children with schizophrenia have increased interpersonal deficits as compared to children with other forms of psychopathology.

In a similar study employing the same nonverbal decoding paradigm, but using both adults and children, Walker, Emory, and Marwit (1980) compared the receptive nonverbal ability of a sample of hospitalized patients with schizophrenia to a sample of unhospitalized normal individuals. These authors examined participants of three different age groups: children aged 8-12 years, adolescents aged 13-19 years, and adults aged 20-50 years. Once again, schizophrenic patients made more errors overall than control individuals across age and gender.

Walker, McGuire, and Bettes (1984) compared the ability of schizophrenics, patients with affective disorders, and normal controls to decode happiness, anger, fear, sadness, surprise, and shame on three emotional decoding tasks involving emotional discrimination, emotional identification (labeling), and emotional identification (pointing), respectively. A third task was included in order to rule out the possibility that schizophrenics' low performance (relative to control participants and other groups) on emotion decoding tasks was due to their inability to attach verbal labels to facial expressions and not to their emotional decoding deficits. While schizophrenic patients performed significantly worse than the normal controls on emotional decoding tasks, they did not differ on the task requiring visual acuity skills. This finding provides additional evidence that schizophrenics have a specific nonverbal sensitivity deficit.

Besides schizophrenics, researchers also have examined nonverbal decoding deficits in depressed adults and those who have experienced traumatic brain injury (TBI). Cooley and Nowicki (1989) compared the receptive nonverbal ability of depressed participants, disturbed controls, and normal participants (age range: 17-46 years). Participants decoded the emotion in a series of photographs displaying happy, sad, angry, disgusted, surprised, fearful, and neutral facial expressions, derived from Ekman's Pictures of Facial Affect (Ekman, 1976). Although depressed individuals did not differ from others on the number of decoding errors made, they took significantly more time to identify facial expressions than normal participants. The authors suggest that depressed

individuals' slower speed of processing in emotion recognition may contribute to the documented interpersonal problems they experience.

In a similar study, Hale (1998) examined the nonverbal decoding ability of depressed and normal adults. Instead of using photographs of posed facial expressions, as in Cooley and Nowicki's (1989) investigation, Hale asked participants to identify the emotion in a series of schematic facial expressions depicting fear, happiness, anger, sadness, disgust, rejection, and invitation. Hale found a negative bias in depressed adults' facial expression interpretation. Specifically, depressed individuals were significantly more likely than normal controls to misidentify facial expressions as sad.

Similar to depressed adults, individuals with TBI have trouble identifying emotion in facial expressions. Spell and Frank (2000) compared adults with TBI with a non-injured adult control group, in their ability to identify emotion in photographs and voices using stimuli representing three different age groups: children, younger adults, and older adults. The child and young adult stimuli were from the Diagnostic Analysis of Nonverbal Accuracy-2 (DANVA-2; Nowicki & Duke, 1994) and the older adult stimuli composed the Carolina Older Adults Test of Nonverbal Communication (COAT-NC; Spell & Frank, 2000). Although no between-group differences were found in nonverbal decoding errors with respect to the child faces or voices, individuals with TBI made significantly more errors than normal controls in identifying emotion in younger and older adult faces and voices.

In the studies described above, the authors found that receptive nonverbal skill was poorer in adults with schizophrenia, depression, and traumatic brain injury. Since these clinically dissimilar groups have low self-esteem and low social competence, the findings are consistent with an association between receptive nonverbal skill and social success.

Receptive Nonverbal Skill and Social Competence in Non-Clinical Populations

Research on nonverbal processing ability and social effectiveness has not been limited to clinical populations. The nonverbal decoding skill-interpersonal success relationship has been found in studies of preschool children (Nowicki & Mitchell, 1998), elementary school children (Nowicki & Duke, 1992), adult married couples (Gottman & Porterfield, 1981; Noller, 1980, 1981; Noller & Feeney, 1994; Sabetelli, Buck, & Kenny, 1986), and of particular relevance to the present study, college students (Carton, Kessler, & Pape, 1999; Funder & Harris, 1986, Hodgins & Zuckerman, 1990; Kleinman, 2003).

Receptive nonverbal skill and social competence in children. The skills necessary for success in adult relationships have their roots in childhood. The following is a selective survey of work with children that sets the stage for a more thorough review of studies with adults.

Nowicki and Mitchell (1998) investigated the association between nonverbal decoding ability and social competence of preschool children. In two studies, they used the child and adult versions of the DANVA-2 (Nowicki & Duke, 1994) to assess the ability of 86 children to decode emotion in facial expressions and tones of voice. In the first study, social competence was measured via

teacher ratings of the child's ability to form relationships with adults and with peers, while in the second study it was measured by teacher-reported problems and competencies as well as peers' ratings of popularity. Overall, decoding skills were found to be associated with social competence. However, the relationship manifested itself differently for boys and girls. Specifically, higher social competence (both peer- and teacher-rated) was related to boys' ability to decode the low-intensity facial expressions and voice tones of both adults and children. For girls, the social competence-nonverbal decoding ability association was dependent upon the type of social competence being measured. Whereas girls' ability to decode the high-intensity faces and voices of adults was related to their ability to form relationships with adults, their ability to decode high-intensity child faces and voices was related to their ability to form peer relationships as well as to peer ratings of popularity.

Nowicki and Duke (1992) also found evidence for the relationship between nonverbal decoding ability and sociometric status in a sample of elementary school aged children attending the 1st through the 5th grades. The children decoded emotion in a series of children's facial expressions and tones of voice presented in the Diagnostic Analysis of Nonverbal Accuracy (DANVA; Nowicki & Duke, 1989). In order to measure sociometric status, each child chose the names of three children whom they liked the most and three children whom they liked the least from a list of their classmates. Children more skilled at decoding emotion in faces and tones of voice were better liked by their classmates than

those who were poorer at these tasks. Gender differences were not analyzed in this study

Receptive nonverbal skill and social competence in married adults. The preceding studies support the importance of nonverbal decoding skill in the social functioning of children and adolescents. Studies have also examined the association between receptive nonverbal skill and social competence in groups of older participants such as college students (the group of primary importance to the present study) and adults. Whereas the studies of children's and adolescents' decoding skill reviewed above examined social competence in the context of peer relationships, research involving college students and adults has investigated social success with respect to both long-term romantic and marriage relationships. Prior to reviewing investigations of college students' nonverbal decoding skills investigations of adults will be discussed.

Some theorists (e.g., Sullivan, 1953) view long-term romantic relationships as the most important goal of adulthood. Research has consistently demonstrated that involvement in long-term relationships is associated with greater well-being across the lifespan, with individuals tending to be physically and mentally healthier to the extent that they have satisfying close relationships (Baumeister & Leary, 1995; Myers & Diener, 1995). If receptive skill is important to relationship success, it should be associated with successful marriages. This is, in fact, the case.

Gottman and Porterfield (1981) were among the first to investigate the relationship between marital satisfaction and nonverbal receptive ability in a

sample of married couples. They used a modified version of the Marital Communication Scale-II (Kahn, 1970). After completing a measure of relationship quality, each spouse decoded a series of nonverbal messages expressed through his or her partner's tone of voice. A stranger of the same sex as the spouse's partner also decoded these nonverbal messages. Marital satisfaction and nonverbal decoding ability were significantly related, but only for husbands. Specifically, husbands who were less adept at decoding the nonverbal messages of their wives not only had lower marital satisfaction, but also had wives who were less satisfied with their marriage. Additionally, husbands who were less able than a male stranger to decode their wives' nonverbal messages had wives with lower marital satisfaction.

Other authors have also found evidence for the association between poor nonverbal decoding ability and reduced marital satisfaction. Using the same nonverbal decoding paradigm in couples married for approximately ten years, Noller (1980, 1981) found that husbands making more errors decoding the nonverbal communication of their wives were less maritally satisfied than husbands making fewer nonverbal decoding errors. Interestingly, when husbands decoded the nonverbal messages of strangers of the opposite sex, the relationship between decoding errors and marital satisfaction was not found.

While Noller's (1980, 1981) studies found an association between receptive nonverbal communication and marital satisfaction in couples married for an extended period of time, Noller and Feeney (1994) focused on the first two years of marriage. Using the MCS-II (Kahn, 1970), they found that husbands

who were less skilled at decoding the nonverbal communication of their wives had lower pre-wedding relationship satisfaction. In addition, husbands who were less likely to predict that their wives would accurately decode their nonverbal messages were also less maritally satisfied; an effect that remained even after controlling for the wives' actual decoding accuracy. Wives who were less aware of their ability to accurately decode their husbands' nonverbal messages had lower overall marital satisfaction and expressed less confidence in their nonverbal decoding ability even in instances of accurate decoding. Of primary importance to the current study is the further evidence Noller and Feeney's work provides for the importance of nonverbal decoding skills in the success of interpersonal relationships in adults.

Results from previous studies provide evidence for the association between nonverbal decoding skills and relationship satisfaction in married couples. However, it was not always clear whether the nonverbal decoding deficits of spouses who were less able to decode the messages of their partners were general or specific in nature. In other words, did less nonverbally adept spouses have general difficulty decoding the nonverbal messages of others, or did their nonverbal deficits specifically emerge when decoding the messages of their partner?

In attempting to answer this question, Sabatelli, Buck, and Kenny (1986) found additional support for the relationship between nonverbal decoding ability and relationship quality in married couples. They examined the association between specific and general nonverbal decoding ability and marital complaints

in couples married for an average of 2.5 years (range = 1 to 4.5 years). Specific and general nonverbal decoding abilities were measured using the Communication of Affect Receiving Abilities Test (CARAT, Buck, 1976). Participants decoded the facial expressions of strangers (general decoding ability) and of their spouses (specific decoding ability) as they viewed slides depicting sexual, scenic, unpleasant, unusual, and child-related subjects. Although nonverbal receptive abilities explained relatively little variance with respect to couples' overall communication accuracy, wives' specific ability to decode the emotions of their husbands was negatively related to each spouse's number of marital complaints. In other words, wives who were more adept at reading the facial expressions of their husbands had fewer marital complaints as well as had husbands who indicated fewer marital complaints. The authors found this same pattern to exist for husbands, but only when viewing the sexual slides.

In sum, researchers have found consistent evidence for the relationship between receptive nonverbal decoding ability and marital satisfaction. Not only was this association found for couples in long-term marriages, but also for couples in the first years of marriage. Now we turn our attention to relationships involving same sex relationships in college students.

Receptive nonverbal skill and social competence in college students. Just as better nonverbal decoding skills have been found to be associated with social competence in children and adolescents, and with higher relationship quality in adult marital relationships, they also have been associated with higher

relationship satisfaction in college students. This association has been found in studies investigating the relationships of same-sex roommate pairs (Hodgins & Zuckerman, 1990), individual college students (Carton, Kessler, & Pape, 1999; Funder & Harris, 1986), and groups of same-sex strangers (Kleinman, 2003).

Hodgins and Zuckerman (1990) examined the association between relationship quality and receptive nonverbal ability in same-sex college student roommate pairs. Nonverbal receptive ability was measured using the Interpersonal Perception Task (IPT; Constanzo & Archer, 1989). For this assessment, respondents view actors engaged in a series of brief videotaped ambiguous interactions. The respondents must judge the relationship between the actors in each scene based primarily upon the nonverbal elements of their interaction. Roommates' relationship quality was assessed by means of an interaction record maintained by each roommate for a period of two weeks, in which they rated such aspects as quality, involvement, self-disclosure, support, and intimacy. The authors found that roommate pairs in which both individuals obtained high scores on nonverbal receptive ability (high-high pairs) had higher relationship quality than those roommate pairs in which either one (high-low) or both (low-low) individuals scored low in receptive ability. Specifically, high-high roommate pairs rated their relationships as containing more mutual disclosure and support than either high-low or low-low pairs.

While the previous study found evidence for the importance of nonverbal decoding ability among college roommate pairs, Funder and Harris (1986) examined the association between nonverbal decoding ability and relationship

quality among individual college students. They administered the Profile of Nonverbal Sensitivity (PONS; Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979) to a sample of undergraduates. The PONS consists of 220 filmed segments, in which participants must identify the emotional states expressed in visual and/or auditory channels. The authors also had friends of the participants perform a Q-sort procedure to evaluate how well a series of attributes described the participants. Individuals with higher nonverbal sensitivity scores were found to be more reassuring, warm, compassionate, sympathetic, considerate, protective of those close to them, genuinely dependable and responsible, and to have a greater capacity for close relationships than those with lower scores. Higher nonverbal insensitivity was related to hostility, guile and deceitfulness, manipulation, and being critical, skeptical, and not easily impressed. The relatively small sample sizes for male (n = 19) and female (n = 20) participants precluded the authors from drawing definitive conclusions regarding gender differences.

Carton, Kessler, and Pape (1999) also examined the association between facial expression and paralanguage decoding skill and relationship quality in individual college students. Students completed the adult faces and voices subtests of the DANVA-2 as well as measures of relationship quality and depression. In their analyses involving nonverbal decoding skill, the authors statistically controlled for participants' feelings of depression, citing the documented association between nonverbal decoding deficits and depression in previous research (Colussy & Zuroff, 1985; Feinberg, Rifkin, Schaffer, & Walker,

1986; Giannini, Folts, Melemis, Giannini, & Loiselle, 1995; Zuroff & Colussy, 1986, as cited in Carton, Kessler, & Pape, 1999). Poorer nonverbal receptive skill was associated with lower endorsement of relationship well-being. Subsequent analyses demonstrated that both measures of nonverbal receptive ability (faces and voices) significantly predicted relationship quality independent of depression score. The association between nonverbal decoding ability and relationship well-being applied to male and female students equally, and no significant gender differences emerged.

The research with non-clinical populations discussed to this point found evidence for the receptive nonverbal ability-social competence association in already existing relationships. Kleinman (2003) was among the first to examine when in the relationship process college students' nonverbal processing skills translated into relationship success or failure during initial social interactions with strangers. Using Nowicki and Duke's (2002) four-stage model, Kleinman organized students previously unknown to each other into gender homogeneous groups of 4-6 students who met once per week for three consecutive weeks. Before the initial meeting, participants completed measures of their skill in decoding emotional information in facial expressions and voices. During each meeting, members participated in a variety of group tasks and discussions. At the end of each session, participants rated one another on a number of indices, including interpersonal attraction.

Though receptive nonverbal skill was associated with related attraction, the exact form of the association differed for men and women. For men,

although the ability to read emotions in both faces and voices was related to attraction in sessions 1 and 2, by the final session, only the relationship between the decoding of *facial expressions* and interpersonal attraction remained significant. Specifically, as the group sessions progressed, men who were worse at decoding facial expressions were less well liked, but their ability to decode emotion in voices was not related to their interpersonal attraction. For women, neither channel of receptive nonverbal skill was significantly related to interpersonal attraction in initial sessions. By the final group meeting, however, receptive *paralanguage* skill was significantly related to interpersonal attraction. Women with poorer ability to detect emotion in tones of voice were less well liked by their fellow female group members.

While finding that receptive nonverbal skill is associated with attraction within the initial phases of relationship formation, Kleinman's study leaves open the question as to what other factors might impact this association. Possible candidates are variables that previously have been found to be associated with relationship outcomes. One such candidate is social anxiety. What role might social anxiety play in the association between nonverbal decoding ability and relationship success? Before summarizing research supporting the association between social anxiety and social success, the social anxiety construct is briefly discussed.

Social Anxiety and Social Success

Social Anxiety: Definition and Explanation

As its name suggests, social anxiety refers to the experience of nervousness or worry related to interpersonal situations. Holt, Heimberg, Hope, and Liebowitz (1992, as cited in Abrams, 1998) describe four primary interpersonal contexts that give rise to social anxiety: formal speaking and interaction (e.g., acting, performing, or giving a talk to an audience), informal speaking and interaction (e.g., calling someone you don't know very well), assertive interactions (e.g., talking to people in authority), and observation of behavior (e.g., working while being observed). As other authors have noted, a important common element of such situations is the potential for evaluation by others (Abrams, 1998; Leary & Kowalski, 1995). According to Schlenker and Leary (1982, as cited in Abrams, 1998), *it is the fear of evaluation* that is central to the experience of social anxiety. The key diagnostic criterion for Social Phobia (Social Anxiety Disorder) echoes this characterization of social anxiety. The Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition-Text Revision (DSM-IV-TR; American Psychiatric Association, 2000), states that the primary feature of Social Phobia (Social Anxiety Disorder) is 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).

Research Supporting the Social Anxiety-Social Success Association

Like a lack of receptive nonverbal skill, social anxiety appears to be associated with relationship failure. Researchers have provided evidence of the social anxiety-social failure association in adolescents (La Greca & Lopez, 1998), adults (Beidel, Turner, & Dancu, 1985) and college students (Daly, Vangelisti, & Lawrence, 1989).

La Greca and Lopez (1998) found support for the existence of an association between social anxiety and relationship failure in a sample of adolescents. High school students aged 15-18 years completed measures of social anxiety, perceived social support, close friendships, and perceived social competency. High social anxiety was associated with less classmate social support and poorer self-perceptions of social competence. Gender differences in this association were also found. High social anxiety in females was associated with fewer best friends, poorer relationship competence, and the perception of less support, intimacy, and companionship in their friendships. Although the authors found a similar pattern of results for males, the association between social anxiety and friendships in males did not reach significance.

Using a performance-based, rather than a self-report measure of social success Beidel, Turner, and Dancu (1985) found evidence of an association between social anxiety and social failure in a group of adults aged 18 to 41 years. The authors administered a number of interpersonal tasks to a sample of clinically socially anxious and non-clinically socially anxious participants. The interpersonal tasks consisted of separate unstructured discussions with both an

opposite-sex and a same-sex confederate and the delivery of an impromptu speech. After completing all three interactions, participants rated their performance on each task. All three interactions were also videotaped and coded by observers who rated the participants' performance on each task. Although no significant group differences emerged with respect to participants' self ratings of performance for either the same-sex or impromptu speech tasks, the results indicated that socially anxious participants perceived their performance more negatively during the opposite-sex interaction than did control participants. With respect to observer ratings, the performance of socially anxious participants was rated as significantly worse than the control participants' performance for both the opposite-sex and same-sex interactions, and the anxious participants' lower-rated performance on the impromptu speech approached significance.

Whereas the authors of the two previous studies found support for a significant link between social anxiety and a lack of social competence in adolescent high school students and adults, Daly, Vangelisti, and Lawrence (1989) examined this association in college students. Students completed measures of social anxiety and were evaluated while delivering a brief impromptu speech to an audience of three people. Students also completed self-ratings of their public speaking. Not only did students reporting higher social anxiety evaluate their performances more negatively, but this negative evaluation was also echoed in the audience members' ratings. The audience rated more highly

socially anxious students as more nervous and as worse speakers than students lower in social anxiety.

Research Supporting the Nonverbal Decoding Ability-Social Anxiety Association

The research addressed thus far has provided compelling evidence for an association between a lack of nonverbal decoding ability and social failure and between social anxiety and social failure. Given the evidence for these associations, two questions arise: (1) what is the relationship between nonverbal decoding ability and social anxiety? And (2) how might social anxiety be associated with the role of receptive nonverbal processing ability in interpersonal relationships?

In attempting to answer these questions, the nonverbal decoding-social anxiety relationship will be addressed first. Several studies have found evidence of a negative association between poorer receptive nonverbal processing ability and higher social anxiety in college students (Abrams, 1998; Mullins & Duke, 2004; Schroeder, 1995).

Schroeder (1995) investigated the association between nonverbal decoding ability and indices of social anxiety and shyness in a sample of college students. The students' receptive nonverbal skill was measured using five nonverbal social cue domains of the Interpersonal Perception Task (IPT; Constanzo & Archer, 1989): kinship, deception, competition, status, and intimacy the Interpersonal Perception Task. Both shyness and social anxiety were associated with poorer nonverbal decoding. Specifically, shyness was related to

lower scores on the kinship, competition, and status domains, while social anxiety was related to lower scores on the kinship, intimacy, and status domains.

Whereas Schroeder's (1995) study measured multiple aspects of nonverbal decoding ability, Abrams' (1998) study concentrated on detection of specific emotion in facial expressions and voices. She assessed college students on multiple indices of social anxiety and measured their ability to identify emotion in adult facial expressions and tones of voice with the DANVA2 (Nowicki & Duke, 1994). Before engaging in the nonverbal decoding procedure, however, half of the participants were led to believe that they would be videotaped while answering questions about themselves in front of two graduate students, who would be evaluating the students' poise, sincerity, and interpersonal attraction. This social evaluative threat procedure was used to heighten participants' state anxiety.

Overall ability to decode emotion in faces and voices was not significantly associated with trait social anxiety, regardless of social evaluative threat status. However, in the presence of social evaluative threat, socially anxious participants made more errors in decoding low intensity faces, mislabeling fearful faces as sad or angry. This effect was not found for either low intensity voices or high intensity voices or faces. With respect to gender differences, social evaluative threat only led to greater nonverbal errors in socially anxious women.

Unlike the previous studies that included both male and female college students, Mullins and Duke (2004) investigated the relationship between nonverbal decoding ability and social anxiety in a sample of college women. The

authors limited their sample to females because of previous research findings demonstrating consistently superior nonverbal decoding performance in female participants (Constanzo & Archer, 1989; Hall, 1978, 1984; McClure, 2000). The authors reasoned that this would provide "a more stringent test of the effects of social anxiety on nonverbal decoding ability", (p. 8.) Participants completed measures of social anxiety and the adult facial expressions subtest of the DANVA2. The authors not only assessed nonverbal decoding errors, but decoding response time as well by recording the amount of time elapsed between the presentation of a facial stimulus and the participants' response.

All participants were assigned to one of four different anxiety induction conditions. In the "No Threat" condition, participants simply completed the DANVA2 alone. Those in the "Observer" condition completed the DANVA2 while being closely watched by the experimenter. "Speech condition" participants were led to believe that after the completion of the nonverbal decoding task, they would give a speech to two psychology department faculty members. In the fourth and final "Speech-Observer" condition, participants were both led to believe that they would be giving a speech as well as be closely watched while completing the nonverbal decoding task. The authors predicted that situational anxiety would be greatest in the "Speech" and "Speech-Observer" conditions.

Contrary to prediction, regardless of anxiety induction condition, decoding accuracy was not related to social anxiety. Analyses, however, did reveal a significant relationship between decoding response time and social anxiety that differed depending upon the intensity of the facial stimuli. For high intensity

faces, an inverted-U (curvilinear) relationship emerged, such that slower response times were related to social anxiety when situational anxiety (as induced by assignment to one of the four experimental conditions) was either low or very high. Under moderate conditions of situational anxiety, response times to facial stimuli were faster.

A similar pattern was found for low intensity faces. When situational anxiety was low, slower decoding response times were related to social anxiety. Response times quickened as situational anxiety increased, but only until high levels of situational anxiety were reached, at which time response times again became slower.

When taken together, results from the above studies indicate the existence of a significant negative relationship between nonverbal decoding ability and social anxiety, such that poorer nonverbal decoding performance is associated with higher social anxiety. Research has supported this relationship in studies in which anxiety was induced, as well as those in which it was not, when nonverbal decoding skills are more broadly or more narrowly defined, and when decoding deficits are measured in terms of identification errors or slower response times. Thus, the research described thus far has provided evidence of significant associations among receptive nonverbal decoding ability, social anxiety, and social success. Although numerous investigations have examined each of these relationships in isolation, associations among all three variables have rarely been studied simultaneously in ongoing relationships (Kleinman, 2003).

The Present Study

The present study was undertaken in order to examine the associations among nonverbal decoding ability, social anxiety, and social competence concurrently, in the context of ongoing relationships. The goal of the study was to investigate how nonverbal decoding ability and social anxiety relate to interpersonal attraction in the beginning phase of the relationship process. Three hypotheses were examined; two primary hypotheses and one exploratory hypothesis. The first hypothesis predicted that nonverbal decoding ability would be negatively associated with interpersonal attraction such that women with poorer decoding ability would be less well liked by their fellow group members. The second hypothesis predicted that social anxiety would correlate negatively with interpersonal attraction such that more socially anxious women would also be less well liked. The final hypothesis was exploratory and predicted that social anxiety would moderate the nonverbal decoding ability-interpersonal attraction relationship such that women with poor nonverbal decoding ability would be even less well liked if they were socially anxious.

Method

Participants

The present study included a sample of 62 undergraduate women taking an introductory psychology course at a small private university (n = 18) and a women's college (n = 44) in Atlanta, Georgia. The age range of the students was 17 to 29 years.

With respect to ethnicity, the sample was relatively diverse. Sixty-five percent (*n* = 40) of the sample was Caucasian, 13% (*n* = 8) was African-American, 11 % (*n* = 7) was Asian/Pacific Islander, 6% (*n* = 4) was other, 3% (*n*=2) was Latina and 2% (*n* = 1) was Middle Eastern. All students received class credit for their participation.

Measures

The study included measures of three primary variables: receptive nonverbal communication skills, social anxiety, and interpersonal attraction and interpersonal attraction. The Diagnostic Analysis of Nonverbal Accuracy-2 (DANVA2; Nowicki & Duke, 1994) will be used to assess receptive nonverbal communication skills. In order to attain a comprehensive measurement of social anxiety, three different social anxiety scales will be used, including the Social Avoidance and Distress Scale (SADS; Watson & Friend, 1969), the Personal Report of Communication Apprehension (PRCA-24; McCroskey, 1982, as cited in Robinson, Shaver, & Wrightsman, 1991), and the Fear of Negative Evaluation Scale (FNE; Watson & Friend, 1969). Each of the three scales measures different aspects of the social anxiety construct. For instance, the SADS (Appendix D) measures both the subjective experience and behavioral manifestations of social anxiety. The PRCA (Appendix E) assesses social anxiety specific to group situations. The FNES (Appendix F) measures apprehension due to perceived negative judgment in social situations. Finally, Interpersonal Attraction and Interpersonal attraction will be measured using the

Interpersonal Judgment Scale (IJS; Byrne, 1961, as cited in Shiff, 1990, Appendix G).

Nonverbal Communication Skills. The Diagnostic Analysis of Nonverbal Accurary-2 (DANVA2; Nowicki & Duke, 1994) is composed of expressive and receptive subtests that measure individual differences in children and adults' ability to accurately produce and interpret affect communicated through facial expressions, body postures, gestures, and paralanguage (voice tone and volume). In the present study, only the adult receptive faces and voices subtests will be used.

The DANVA2 includes test stimuli representing four basic emotions: happiness, sadness, anger, and fear. Each subtest of the DANVA2 was constructed independently. The stimuli were chosen based on a preset level of inter-judge agreement, and judges ranged in age to insure a representative selection of stimuli. The participants in the present study were administered two of the DANVA2 subtests: Adult Facial Expressions and Adult Paralanguage.

The Diagnostic Analysis of Nonverbal Accuracy-2, Adult Facial Expressions (DANVA2-Faces) subtest includes 24 photographs (12 men and 12 women) portraying happiness, sadness, anger, and fear. There are six photographs of each emotion, including three low intensity and three high intensity stimuli. To create the stimuli, adult men and women read brief vignettes and were photographed portraying the particular facial expressions each vignette was intended to evoke. College students (n = 54), high school students (n = 34), and seventh grade (n = 34) and third grade students (n = 54) viewed and

evaluated the photographs. The final set of facial expression stimuli included only the photographs that received at least 80% agreement among the judges as to the emotion being portrayed (Kleinman, 2003). Participants in the present study will view the facial expression items as slides, presented for two seconds each. After viewing each slide, the participants will classify the facial expression presented by circling the word “happy”, “sad”, “angry”, or “fearful” on an answer sheet.

Over 200 investigations have provided evidence for the construct validity of the DANVA2-AF (Nowicki, 2002). Nowicki and Carton (1993) provided convergent validity data for the DANVA2-AF, whereby scores on this subtest were significantly related to scores on the original DANVA-AF in a sample of college students, $r = .54$, $n = 102$, fifth graders, $r = .48$, $n = 38$, and third graders, $r = .51$, $n = 31$. Scores on the DANVA2-AF were also found to be significantly related to scores on the Japanese and Caucasian Facial Expressions of Emotion Test (Matsumoto & Ekman, 1989), $r = .80$, $n = 106$ (McIntire, Danforth, & Schneider, 1997, as cited in Nowicki, 2002).

With respect to discriminant validity, studies have found the DANVA2-AF to be unrelated to indices of intelligence in samples of preschool children (Nowicki & Mitchell, 1997), elementary school children (McClanahan, 1996), adolescents (Baum, Logan, Walker, Tomlinson, & Schiffman, 1996), college students (Nowicki, 1995) and elderly adults (Roberts, Nowicki, & McClure, 1998). McIntire, Danforth, and Schneider (1997, as cited in Nowicki, 2002) provided evidence of internal consistency for the DANVA2-AF, $r = .90$, in a study of 154

college undergraduates. Previous studies employing the DANVA2-AF obtained internal consistency estimates ranging from .64 to .83. Test-retest reliability for the DANVA2-AF has been shown to be quite high. Nowicki and Carton (1993) reported a test-retest reliability value of .84 over a two-month period in a sample of 45 college students. In another college student sample (n = 154), MacIntire, Danforth, and Schneider (1997) obtained a test-retest reliability estimate of .81 for a period of four weeks. An even higher estimate was obtained by Spell (1997) in a study of normal adults (r = .90, n = 24) and adults with traumatic brain injury (r = .81, n = 24).

Two professional adult actors created the 24 voice tone stimuli for the Diagnostic Analysis of Nonverbal Accuracy-2, Adult Paralanguage (DANVA2-Voices) by reading the neutral sentence, “I’m going out of the room now, but I’ll be back later,” in high and low intensity happy, sad, angry, and fearful tones of voice. One hundred forty-seven college students and 57 fourth grade participants listened to each stimulus and made a judgment as to the specific emotion expressed and its intensity. With the exception of one stimulus, the authors selected the final 24 stimuli based upon an 80% or higher level of agreement among the judges. The 24 items include an equivalent number of male and female trials of high and low intensity adult voice tones for each of the four emotions. In the present study, the vocal stimuli will be played on a cassette recorder. For each item, participants will indicate which emotion they hear expressed in each sentence by circling the word “happy”, “sad”, “angry”, or “fearful” on their answer sheet.

Over 200 investigations have used the DANVA-2 AP and provide evidence for its construct validity. In a sample of 72 college students, Nowicki (1995) found the internal consistency of the subtest to be .78. Other authors have reported internal consistency coefficients of similar magnitude in preschool children, alpha = .71, *n* =34 (Verbeek, 1996, as cited in Nowicki, 2002), elementary school children, alpha = .70, *n* = 84 (Collins, 1996, as cited in Nowicki, 2002), middle-aged adults, alpha = .75, *n* = 20, mean age = 33.5 years (Baum, Diforio, Tomlinson, & Walker, 1995, as cited in Nowicki, 2002), and older adults, alpha = .77, *n* = 23, mean age = 71.3 years (Roberts, Nowicki, & McClure, 1997, as cited in Nowicki, 2002). Nowicki (1995) reports a test-retest reliability coefficient for the DANVA-2 AP of .83 over a six-week period in a sample of college students. Spell (1997, as cited in Nowicki, 2002) found a mean test-retest reliability ranging from .73 to .93 over a four week period in participants representing three different age groups: 16 to 30 years (*n* = 45), 31 to 45 years (*n* = 23), and 46 to 65 years (*n* = 25).

Studies also have provided evidence of convergent and discriminant validity. Nowicki (1995) found DANVA2-AP scores to significantly correlate with scores on the DANVA2-CP (child paralanguage), *r* = .31, in a sample of 72 college students. Baum (1997, as cited in Nowicki, 2002) found that scores on the DANVA2-AP were not significantly related to IQ, *r* = -.20, *p* > .05, *n* = 64. Roberts, McClure, and Nowicki (1998, as cited in Nowicki, 2002) found DANVA2-AP errors to be significantly related to satisfaction with social interactions and adjustment, *r* = .36, *p* < .05, *n* = 28. In a study of preschool children, Verbeek

(1996) found that children who made more errors on the DANVA2-AP were involved in more school conflict on the playground and in the classroom, $r = .33$, $p < .01$, $n = 64$, initiated more conflict, $r = 25$, $p < .05$, $n = 64$, and used less effective methods of conflict resolution, $r = 35$, $p < .01$, $n = 64$.

Social Anxiety. The Social Avoidance and Distress Scale (SADS; Watson & Friend, 1969) measures both social avoidance behavior and the subjective experience of social anxiety. The SADS consists of 28 items rated true or false, such as "I try to avoid situations that force me to be very sociable." The SADS consists of two subscales: anxiety and distress. In a sample of 205 college students, Watson and Friend (1969) found an internal consistency of .77 and a test-retest reliability of .68, over a 4-week period. In the present study, the SADS was found to have an internal consistency index of .89.

The Personal Report of Communication Apprehension (PRCA-24; McCroskey, 1982, as cited in Robinson, Shaver, & Wrightsman, 1991) was used to measure participants' social anxiety specific to group situations. It consists of 24 items assessing both subjective feelings of anxiety as well as actual behavior, such as "Generally, I am comfortable while participating in group discussions." Participants answer each item on a scale from *1* (Strongly Agree) to *5* (Strongly Disagree). The PRCA-24 consists of four subscales including Group Apprehension, Meeting Apprehension, Dyadic Apprehension, and Public Apprehension. In the current investigation, the PRCA was found to have high internal consistency reliability, with a Cronbach's Alpha of .94.

The intercorrelation of the subscales ranges between .40 and .69. Kleinman (2003) found an estimate of internal consistency reliability for the PRCA-24 of .75 for each subscale and of .90 for the total score. Jones, Briggs, and Smith (1986) found the PRCA-24 to significantly correlate with indices of social anxiety and shyness.

The Fear of Negative Evaluation Scale (FNES; Watson & Friend, 1969) is designed to assess the degree to which one expects and is concerned with negative evaluation in the context of social interactions. It consists of 30 true-false items such as "I am often afraid that I may look ridiculous or make a fool out of myself." Higher scores on this measure indicate greater expectation and concern with negative evaluation. In their original sample of 205 college students, Watson and Friend (1969) found the internal consistency of the FNES to be .92 and the test-retest reliability for a 4-week period to be .78. The internal consistency of the FNES in the present study was high (Cronbach's Alpha = .91).

Interpersonal Attraction. The original version of the Interpersonal Judgment Scale (IJS; Byrne, 1961, as cited in Shiff, 1990) included six items rated on a seven-point scale. Respondents were asked to rate the following characteristics of a target person: how much they like them, how much they would like to work with them, intelligence, knowledge of current events, morality, and adjustment. Ettinger, Nowicki, and Nelson (1970) revised the scale by adding an item assessing the degree to which the respondent would want to have the person for a roommate (an additional attraction item), and by deleting the morality item. Fiore (1975, as cited in Shiff, 1990) revised the scale further

by adding an additional attraction item assessing degree of comfort with the target person. The scale currently includes 7 subscales: Degree of Comfort, Knowledge of Current Events, Adjustment, Personal Feelings, Working Together in an Experiment, and Roommates. The measure is scored by adding the responses to the four attraction items. Ettinger et al. (1970) found an internal consistency reliability estimate for the revised IJS of .91.

Apparatus

The experimenter used a slide projector and screen to present the DANVA2 facial expression stimuli and a cassette player to administer the DANVA2 vocal stimuli.

Procedure

Participants attend one 60-minute session and two additional sessions lasting approximately 30 minutes each. All three sessions took place over a period of three weeks. Prior to the initial group session, the experimenter constructed groups of 3-5 members, and confirmed with each groups' members that they do not know each other well.

Initial Session. Group members met each other for the first time at the initial session. During the first part of the meeting, participants completed the faces and voices subtests of the DANVA2 as a group, before individual administration of the social anxiety measures. In the second part of the session, the group members engaged in the group task described below. After this task, each group member completed the measure of interpersonal attraction with respect to each her fellow group members.

Individual Sessions. During the first discussion session, the experimenter explained the goals of the group (e.g., that it is a study of group process), told the women that they must participate each week in the discussion or activity, and cautioned them against associating with each other outside of group time. Participants also read and signed the informed consent form at this time. They were given nametags to wear and will be asked to introduce themselves (e.g., name, where they live, major). The experimenter gave the group its discussion topic or task, left the room, and returned after the 20 minutes of discussion are over. After each session's group discussion, the experimenter had the participants fill out the IJS. When completing measures, participants were separated to avoid influencing each other's opinions. When finished, they placed the measures in a sealed envelope for the experimenter.

Discussion Topics and Activities. The experimenter presented a different discussion topic or activity at each group session. The Lost at Sea Task (Nemiroff & Pasmore, 1975 as cited in Shiff, 1990, Appendix H) will be used in the first session. For this task, participants were asked to imagine they are lost at sea, and ranked 15 items in terms of survival value as a group. At the second meeting, participants were given a basket of wooden blocks of many shapes and sizes and asked to build a tower with the blocks. The women were also instructed to work as a group and to use all of the blocks in the basket. For the final meeting, the groups were asked to discuss the question: "What do you think the greatest invention of the 20th century was?" All of these activities were

intended to encourage discussion and to build acquaintanceship among the group members.

Debriefing. After completion of the group task at the final session, the experimenter explained the purpose of the study, answered any questions that the women had, and asked them not to discuss the details of the study with anyone else. The women were also given the opportunity to receive a copy of the study findings when they became available.

Results

The present study included three hypotheses. The first hypothesis was that nonverbal decoding ability would be negatively related to interpersonal attraction, such that individuals with poorer nonverbal decoding skills (more DANVA2 errors) would be less well liked. The second hypothesis was that social anxiety would also be negatively related to interpersonal attraction, such that individuals with higher social anxiety would be less well liked. The third hypothesis was that social anxiety would moderate the nonverbal decoding ability-interpersonal interpersonal attraction relationship.

Hypothesis 1: The Association between Decoding Ability and Interpersonal Attraction

Correlational analyses were used to evaluate the significance of the relationship between nonverbal decoding ability and interpersonal attraction. Due to the non-normally distributed nature of the DANVA-2 variables, Spearman correlations were used to evaluate the associations amongst the nonverbal decoding and interpersonal attraction data. In order to provide some control for

the accumulation of type I error due to the relatively large number of analyses conducted, an alpha value of .035 was used for all analyses to follow.

Overall, nonverbal decoding ability was related to interpersonal attraction. However, two qualifications exist: (1) the strength of the decoding-interpersonal attraction relationship was dependent upon session number and (2) the decoding-interpersonal attraction relationship was significant for face but not voice modalities. Correlations between decoding ability and interpersonal attraction for errors on the four major emotions and total errors are presented in Table 1 for faces and in Table 2 for voices.

Time 1

Facial Expressions. As shown in Table 1, consistent with the hypothesis, significant negative correlations were obtained between IJS score at time 1 and DANVA2 error scores for sad and angry faces. In order to determine the specific source of the significant sad and angry error associations, additional correlations were computed to see if errors were made systematically. A significant correlation was found between the tendency to interpret angry faces as sad, $r_s = -.23$, $p < .035$ but no significant misattribution errors were found for sad faces. Thus, women who made *more* errors on sad and angry faces were *less well liked* by their fellow group members at the first group session. Specifically, women misinterpreting angry faces as sad were less well liked by their fellow group members.

Paralanguage. No significant correlations were found between error scores for any of the four basic emotions and interpersonal attraction.

Time 2

Facial Expressions. As shown in Table 1, consistent with the first hypothesis, significant negative correlations were found between interpersonal attraction scores and errors on sad faces. Analysis of specific misattributions did not find interpersonal attraction to be associated with any specific systematic misattributions for sad faces. Thus, making more decoding errors on sad faces was associated with being *less well liked* at the second group session.

Paralanguage. No significant associations were found between interpersonal attraction and errors on any of the four basic emotions or total voices errors. As in Time 1, there was no support for the first hypothesis.

Time 3

Facial Expressions. No significant correlations were found between the four basic emotions and interpersonal attraction at time 3. Unlike times 1 and 2, there is no support for the first hypothesis.

Paralanguage. IJS scores at time 3 of the study were not significantly related any of the four basic emotions. There was no support for the first hypothesis at any of the study time points.

Hypothesis 2: The Relationship between Social Anxiety and Interpersonal Attraction

Pearson correlations were conducted between all three social anxiety variables and interpersonal attraction at each time point. As in the evaluation of hypothesis 1, an alpha value of .035 was used for the following analyses. As predicted, SADS total score was significantly related to interpersonal attraction at

time 1, $r = -.24$, $p < .035$, indicating that higher anxiety scores were related to less interpersonal attraction at the first group meeting. No other significant relationships were found between the remaining anxiety variables and interpersonal attraction at the three study time points.

Hypothesis 3: Social Anxiety's Moderation of the Decoding Ability-Interpersonal attraction Relationship

The evaluation of social anxiety as a moderator of the nonverbal decoding ability-interpersonal attraction relationship was conducted separately for facial stimuli. An alpha value of .035 was used for the following analyses. As no vocal indices were significantly correlated with interpersonal attraction at any time point, no hierarchical regression analyses were conducted for the DANVA2 vocal stimuli. Because the ability to decode both sad and angry facial expressions, respectively, was significantly related to interpersonal attraction at times 1 and 2, preliminary analyses were conducted to determine which facial index was a unique predictor. For both time 1 (Adjusted R-square = .047, $p < .035$) and time 2 (Adjusted R-square = .092, $p < .035$) *sad* faces emerged as a unique predictor of interpersonal attraction, while angry faces errors did not improve the model. In order to evaluate social anxiety's hypothesized moderation of the decoding ability-interpersonal attraction relationship, three hierarchical multiple regression analyses were conducted (one for each of the three social anxiety variable total scores). For these analyses, significant decoding ability-social anxiety interactions would provide evidence of social anxiety's role as a moderator in the decoding ability-interpersonal attraction relationship. In order to reduce

multicollinearity (i.e., correlated predictors), all decoding ability and social anxiety variables were statistically centered prior to their entry in the analyses.

Time 1

Facial Expressions. None of the three decoding ability-social anxiety interaction terms were found to be significant predictors of time 1 interpersonal attraction.

Time 2

Facial Expressions. As with time 1, no evidence of moderation emerged for any of the social anxiety variables.

In summary, no evidence was found to suggest that any of the three social anxiety variables moderated the relationship between nonverbal decoding ability (either facial expression or paralanguage) and interpersonal attraction.

The Relationship between Nonverbal Decoding Ability and Social Anxiety

Supplementary analyses were also conducted in order to examine the association between nonverbal decoding ability and social anxiety. The results and relevant correlation tables are displayed in Appendix A, B, and C, respectively.

Discussion

The present study investigated the role of nonverbal decoding ability and social anxiety in the beginning relationships of female undergraduates. Groups of three to five students who didn't know each other well, met three times. Before their initial session, participants completed measures of nonverbal decoding ability and social anxiety and then participated in a group task. The

second and third meetings consisted solely of different group tasks. At the end of each group session, members completed attraction ratings on other group participants. Three hypotheses were examined: (1) that women with poorer nonverbal decoding ability would be rated as less interpersonally attractive, (2) that more socially anxious women would also be rated as less interpersonally attractive, and (3) that social anxiety would moderate the nonverbal decoding ability-interpersonal attraction association.

Nonverbal Decoding Ability

Facial Expressions. Analysis of the facial expression data provided some support for the first hypothesis. Women with difficulty interpreting sad and angry facial expressions were less well liked by their fellow group members. Specifically, more errors in identifying sad and angry facial expressions were related to less interpersonal attraction after the initial session. Further analyses revealed that angry facial expressions were systematically misinterpreted as sad. This misattribution suggests one specific way that the misinterpretation of angry facial expressions may lead some women to be less well liked.

For instance, a woman communicating anger (or annoyance) may expect (and desire) other women to respond by leaving her alone and keeping their distance from her. However, if another woman misperceives her anger as sadness then, instead of leaving her alone, the other woman may actually react quite differently by acting empathically and attempting to console her, potentially further angering the woman. Thus, it is clear that not only might sad and angry emotions be associated with different expectations for the behavioral responses

of others, but that violations of these expectations could lead to frustration, confusion, or other negative reactions on the part of the woman experiencing sadness or anger. This might be especially important at the initial steps of womens' relationships.

In contrast to the systematic misattribution found for angry facial expressions, none was found for missing sad facial expressions. It appeared that just the error of misreading a sad facial expression was enough to be associated with less interpersonal attractiveness. Perhaps sadness is such an important emotion to detect in the initial stages of relating to relative strangers that missing it leads to attractiveness consequences no matter how it is missed. While this discussion has addressed the various explanations for why there are associations between the ability to identify sad and angry facial expressions and interpersonal attraction, it has not addressed why this ability would be important earlier, rather than later in the new relationship process. One possible reason may be found in what is required, in terms of information and social skills, at different stages of a relationship.

Nowicki and Duke (2002) proposed a model of interpersonal relationships consisting of four stages. Individuals in the *choice stage* decide with whom they would like to begin a relationship. This process occurs primarily via nonverbal communication. According to Nowicki and Duke, initial impressions can be formed within seconds, which suggests that one's initial judgments are based largely on nonverbal cues. In the *beginning* or *acquaintance* stage, individuals chose with whom to begin to interact. In this stage begins the process of

learning about others, although a strong emotional bond has not yet been formed. It takes additional skills to move past the beginning into the deepening stage where individuals become close or intimate with another. In this stage, individuals form a more significant emotional bond. The final stage of the model, called *ending*, may refer to the actual end of a relationship or simply the end of one cycle of the relationship process. The primary significance of this stage lies in the fact that it is the only relationship stage that allows individuals to examine their relationships to fully identify what they might have done that was right or wrong. This information is valuable because it can be applied to future relationships.

Applying Nowicki and Duke's relationship model to the findings of the present study, it may be that women formed impressions of their fellow group members in the initial moments of the first group meeting. Thus, the lack of familiarity may have played an important role in the finding that women less able to interpret sad and angry facial expressions were less well liked by peers. In the initial group session, because the women were not familiar with each other, they had no factual, biographical information or shared experiences upon which to base their feelings for each other. Thus, their opinions of other women may have been based primarily on nonverbal information gleaned from their interactions. One such piece of nonverbal information is their perception of how well the other women are interpreting and responding to their own nonverbal cues. If a woman's fellow group members appear 'off' in reading her nonverbal cues, and that's the only information she has about her, she may not like this group

member initially. Accurate interpretation of nonverbal cues may have mattered most in the first session because by later sessions, the women in each group had had more experience with each other (bonding over tasks, maybe learning some facts about each other) that provided other reasons for liking or disliking each other. In short, missed or incorrectly identified emotional cues by people we are evaluating as potential friends may be likely to result in a more negative evaluation at first, but are replaced by information from other sources if they are forced to continue interacting with them.

This appeared to be the case. Over time, the association between the ability to interpret sad and angry facial expressions and interpersonal attraction became less important. Although the correlation for misinterpreting anger and interpersonal attraction remained negative, it did not reach significance in the second or third sessions. For misinterpretation of sad expressions, the association was again significant at the second but not at the third session. This indicates that the ability to interpret sad and angry facial expressions was important early but if women are forced to continue to interact with one another over time, this association disappeared.

Paralanguage. Unlike facial expressions, which appeared to be important early in the relationship process, errors in identifying emotion in paralanguage did not support the hypothesis. No significant associations were found between the ability to interpret emotion in tone of voice at any study time point.

There are several potential explanations for why the ability to interpret emotion in voices was not associated with interpersonal attraction. One

possibility is that generally speaking, emotion in voices is more easily identified than emotion in faces (i.e., identifying emotion in voices is a more basic skill than facial recognition ability). Infants learn as early as three days after birth to discriminate mothers' voices from others. In contrast, because of the slower development of the visual system, infants will not be able to discriminate mothers' facial expressions until they are 4 to 6 months of age (Saarni & Weber, 1999). It may be that the assessment of basic emotions paralinguistically was too easy for the women and that other more complex social emotion such as guilt, contempt, disgust, jealousy and embarrassment may have been more useful.

In addition to or perhaps in concert with assessing more social emotions, it also could be that the ability to interpret emotion in faces rather than voices may be more important earlier in the beginning phases of relationships among women. In the present study, participants only met three times. Had the groups met more than three times, perhaps errors in voices would have come to be associated with less attraction as relationships attempted to deepen.

Not only the length of interaction, but the nature of the tasks may have played some role in the association of attraction to the disappearance of facial processing performance over time and the errors made in identifying voices. While each of the tasks required the women to converse with each other, their conversations were focused upon the tasks themselves and were probably not the typical conversations women may have when they are first getting to know each other. For instance, when people are interacting for the first time, they are

probably most likely to ask questions about one another and to tell others a little bit about themselves. In contrast, the only time the women were specifically instructed to tell each other about themselves is at the very beginning of the first session, when each woman introduced herself to her fellow group members. In the present study, participants were asked to briefly introduce themselves to each other at the beginning of the first session. After completing the questionnaires, they went right into the tasks, without any further interaction. In order to address this concern, future investigations could include tasks requiring interactions that more closely approximate the initial social interactions women have when first meeting and getting to know each other. One way to do this might be to have group members interview each other either at the first session or for a specified amount of time at each group session. The interview questions would be supplied by the experimenter and could include basic questions students typically ask each other when first meeting, such as “where are you from?”, “what is your major?”, “what do you like to do for fun?”. Another possibility would be to provide participants with the opportunity to interact naturally in an unstructured way prior to beginning the tasks. Participants could be given 10 minutes alone, in which they are simply instructed to talk amongst themselves for a little while. A possible variation on this idea could be a scenario in which the participants are forced to sit a room together without any specific task, while they are waiting for the experimenter to prepare the first task. In reality, this period of waiting could actually be part of the experiment and would be done in order to allow the group members time an opportunity to interact in an

unstructured and unscripted manner. This would allow the possibility for these interactions to be observed by the experimenter or coders.

Although the lower interpersonal attraction of women making more errors reading sad and angry faces may be due to their fellow group members *spontaneously* noticing the nonverbal errors of poor decoders, this may not necessarily be the case. It is possible that the series of facial expressions viewed by each participant as part of the DANVA2 administration at the beginning of the first session may have served to *prime* the women to pay special attention to the facial expressions (or the errors in interpreting the facial expressions) of fellow group members.

While it is not possible to know whether or not such a priming effect did occur, there may be valid reasons for either case. On the one hand, since (after brief introductions) the facial expression subtest of the DANVA2 was the very *first* part of the experimental procedure for all participants, this experience could have likely remained salient in their memory due to the effects of primacy. In addition, such a priming effect could help explain why the decoding ability-interpersonal attraction association for facial expressions was only significant at the first and second group sessions. For instance, it could be the case that the association did not remain significant at the third session simply because of the passage of time since the original facial expression prime at the first session.

On the other hand, however, while the women completed the facial expressions subtest very early in the first session, they did not participate in the group activity until approximately 45 minutes later. Thus, because the women

completed the facial expressions subtest relatively long before engaging in the group task (i.e., the primary situations they had for making impressions on one another), any possible priming effects may likely have disappeared by that time. Also providing evidence against the role of a priming effect is the fact that although the participants listened to voices expressing different emotions during the paralanguage subtest of the DANVA2, there were no significant associations between vocal decoding ability and interpersonal attraction.

One potential way of examining whether or not such a priming influence was operating in future investigations would be to vary the order of tasks at the initial group session, such that half of the groups complete the emotion recognition task at the beginning of the session, while the other half completes this task at the *end* of the session, *after* the group activity. Alternatively, to eliminate a priming effect all together, one could simply have all the groups complete the emotion recognition task at the end of the session, after the group interaction was complete. Since the groups would not meet again for one week, any priming effect that exposure to the facial and vocal stimuli produced would almost certainly expire before the next meeting.

Social Anxiety

Besides investigating the possible role of receptive nonverbal skill in new relationships, the second hypothesis of the study was that women with higher social anxiety would be less well liked. As predicted, women reporting higher social anxiety on both the overall and Social Avoidance subscale of the Social Avoidance and Distress Scale (Watson & Friend, 1969) were rated as less

attractive by their fellow group members. As with the nonverbal decoding ability-attraction association, the social anxiety and interpersonal attraction association was significant for the initial study session only. Although nonsignificant at the second and third group meetings, the association remained in the predicted direction. Women indicating more social avoidance behaviors were rated as less interpersonally attractive by their group members.

One reason this result is meaningful is because it provides additional evidence for the importance of initial impression formation in the interpersonal attractiveness of female undergraduates. Women who initially scored high on the SADS may have also behaved in a socially anxious manner in the presence of their fellow group members. For instance, as the evidence just described, they may have had difficulty reading the nonverbal cues of their group members. Initially socially anxious women may also have exhibited other behavioral indicators of their anxiety such as less eye contact or they may have tended to be fairly quiet during the group tasks. Over the course of the study, these women may have experienced less social anxiety in the presence of their group members. As they became more comfortable and less anxious, their interpersonal attractiveness may have increased. This could explain why the magnitude of the social anxiety-interpersonal attraction association decreased but remained in the same direction with the second and third sessions.

Other social anxiety scores from the PRCA and the FNES were not related to interpersonal attraction. The lack of association between attraction and the PRCA and FNES, respectively, seems surprising given the fact that they

were designed to measure social anxiety. Specifically, while the PRCA is more general measure of the experience of anxiety in social situations, the FNES assesses the degree to which one expects and is specifically concerned with negative evaluation in the context of social interactions. Given the significant association between the social avoidance scale of the SAD and interpersonal attraction at the first session, it appears that women's actual social avoidance *behavior* played a more important role in the initial impression formation taking place in the beginning of the study.

One reason why women's actual behavior may have been important is because it is so visible to the other women in the group. If a woman is nervous, her nonverbal skills may be impaired both receptively and expressively, making her less able to accurately express and interpret nonverbal cues. This result may have been different if groups were all men or if mixed gender groups. For instance, for male groups, there might have been less pressure on individual group members to make a favorable impression on other men. In contrast, social anxiety might have led to greater impairment in nonverbal skills on average, due to the additional pressure introduced from opposite-sex interaction.

The fact that social anxiety appeared to be most important only during the first group session also deserves comment. This finding could have to do with the nature of the group tasks that the women took part in. While the tasks were designed to facilitate conversation and interpersonal interaction amongst the group members, the tasks were not specifically designed to be very anxiety provoking. Even if the tasks were ones that the women might have found anxiety

provoking in contexts with more “real” consequences, the fact that the anxiety generated by them. One simple way to assess how anxiety producing the tasks were would have been to have each woman rate how anxious they found a particular task to be. These ratings could have been collected as part of the true study and factored into the analyses or during a pilot study, in order to aid in task selection.

While the group tasks may not have been very anxiety provoking, a very likely possibility is that the women simply habituated to the social context of the experiment by the second and third group sessions. Thus, when the women actually completed the anxiety measures in the first session, they may have been more anxious not knowing exactly what to expect. Further, anxious women may have been more likely to engage in “anxious” behaviors or their anxiety may have been more likely to impair their nonverbal abilities. However, by the second and third group meetings, women who were initially fairly anxious might have begun to feel fairly comfortable, now that they knew what to expect and with whom they’d be interacting. At the end of the first session the experimenter informed each group that the remaining sessions would be exactly the same, except for the specific group tasks, which could have contributed to the habituation process.

Social anxiety’s importance in the initial session and not at subsequent sessions may also be related to the fact that the sample consisted solely of women as opposed to a mixed gender sample. Had the groups been composed of both men and women, it is possible that social anxiety may have played a larger role throughout the course of the study, rather than just at the initial

session. In a mixed gender sample, heightened anxiety might have stemmed from group members' concerns about how they were being perceived by other member of the opposite sex. Although, similar concerns could certainly have arisen in gender-homogeneous groups, this effect would probably be stronger in gender-heterogeneous groups.

Limitations

Although it was found that the ability to identify sad and angry facial expressions and the report of higher social avoidance feelings were related to attraction initially, the results need to be viewed cautiously. First, participants in this study were women. Thus the findings cannot be generalized to men. Given that women have been consistently found to be better than men at interpreting nonverbal cues (Hall, 1978), a different pattern of results may have emerged for all-male groups. Thus, future studies examining the role of nonverbal decoding ability and social anxiety in the beginning relationships of college students should focus on males as well.

On a related note, constructing both gender homogeneous and gender *heterogeneous* groups may also yield different results. The role of decoding ability and social anxiety in mixed-gender groups may be very different from same-gender groups. Having men and women in the same group may alter the respective associations between nonverbal decoding ability and social anxiety with interpersonal attraction over time. While the ability to interpret facial expressions was important in the present study, both faces and voices may be associated with attraction in mixed-gender groups. When men and women who

do not know each other well are put together in the same group, they might tend to pay closer attention to each other's facial expressions and vocal tone, because nonverbal communication may be even more important in opposite-sex interactions due to the possibility of sexual attraction operating in such instances. A similar possibility may arise for social anxiety. Because many indications of social anxiety may be nonverbal (e.g., looking away while speaking to another, a soft or unsure-sounding tone of voice, etc…), social anxiety may have a greater impact in opposite-sex interactions, and thus more strongly related to attraction. For example, In the presence of opposite-sex peers, group members (especially socially anxious ones) may experience increased social anxiety over what they might have experienced in same-sex groups because the possibility of being evaluated by possible dating partners may be more anxiety provoking than simply being evaluated by potential friends or acquaintances.

Having mixed-sex groups may also yield other differences with respect to the beginning and deepening phases of relationships. For instance, as was mentioned earlier, nonverbal communication ability may be even more strongly related to interpersonal attraction. In addition, the length of the beginning phase may be different when mixed-sex individuals are interacting. While groups of women may move more quickly through the beginning phase, groups of men and women may generally progress more slowly to the deepening phase as they take more time to evaluate each other's dating potential.

Besides having tasks that may have induced only limited anxiety, other potential limitations exist with respect to social anxiety. In the present study, the

social anxiety of participants was assessed via self-report measures. Despite evidence that more socially anxious women were found to be less interpersonally attractive initially, the social anxiety-attraction relationship was only found when social anxiety was measured with the SAD. This measure assesses both social avoidance and the subjective experience of distress in social situations. This result raises the possibility that a stronger effect of social anxiety might have been found if alternative indices of social anxiety had been included. While each of the social anxiety measures included in the study do assess important aspects of social anxiety, each of them measures it *generally*, as opposed to the specific situation in which the participants were involved. In other words, another way of assessing social anxiety in this study might have been to include an additional questionnaire asking participants to make ratings of their subjective anxiety with respect to this particular experiment. Including such a measure could have yielded quite different results for social anxiety. For example, while one's general social anxiety may be quite low, their specific anxiety experienced in the context of meeting and interacting with new people be much higher. Alternatively, while some participants may have endorsed a relatively high level of *general* social anxiety on the SAD, FNES and the PRCA, their actual level of social anxiety experienced in study may have been quite low, due to the somewhat contrived nature of the interpersonal situation.

An alternative way to measure social anxiety in the present study would be to measure social anxiety behaviorally. Including such a measure may have provided further evidence of the social anxiety-interpersonal attraction

association. One way such additional behavioral measures could have been collected would have been to have observers rate behavioral indicators of social anxiety in each of the participants such as lack of eye contact or speaking very softly or very little. Recording such behavioral indicators of social anxiety would make it possible to assign anxiety scores to each participant for each group session. These anxiety scores could then be analyzed separately or in conjunction with each participant's self-reported anxiety score, in order to discover how anxiety was related to interpersonal attraction or nonverbal decoding ability.

Other social anxiety-related limitations may exist besides the specific way in which social anxiety was measured. One possibility may be that the interpersonal nature of the study by itself may not have been sufficiently anxiety provoking enough to produce a truly strong effect of social anxiety and have an impact on ratings of interpersonal attraction. One way to increase participants' subjective experience of social anxiety would be to include an anxiety induction condition in half of the groups. Such an induction procedure might have consisted of informing participants at each group session that their group interactions would either be videotaped for later analysis or observed live by a panel of judges in order to evaluate each participant's relative contributions to the group. One difficulty with such a procedure is that despite participants' initial anxious response to being videotaped or observed, we would expect their anxiety at subsequent group sessions to diminish as a result of their habituation to the procedure. However, it is also possible that even an anxiety induction task

such as those described above might not have sufficiently induced enough anxiety to give rise to a different pattern of results, given the obvious artificial nature of the laboratory experiment environment. One important way of assessing beforehand whether or not a given anxiety induction procedure is effective would be to have conducted a pilot study to compare the effects of different induction procedures. Although evaluating the effects of anxiety induction conditions with a pilot study would not have eliminated the potential problem of habituation, it would have allowed for the selection of an induction method with a reasonable chance of producing the desired level of anxiety.

Not only may the interpersonal aspects of the study not been anxiety provoking enough, but the anxiety produced by the individual sessions may not have been consistent from one session to the next. For example, because the first and second session tasks tended to require more effort from the participants, these tasks may have produced more anxiety than the third session task. If this were true, participants could have experienced less anxiety from the third task simply because the group members had gotten more used to interacting with each other. However, the participants also could have experienced less anxiety at the third session because the third task may have been actually less anxiety provoking than the previous group tasks. For the first session task, participants were asked to pretend that they were shipwrecked at sea to rank-order a list of 15 items aboard the ship in terms of the items' relevance to their survival. What may have made this particular task more anxiety provoking is that after explaining the task to the women, the experimenter told them that there was in

fact a correct answer to the problem. In the second session task, participants were given a basket of many different-sized blocks that they were to use to build a tower. This task was made difficult by the sheer number and shape of the blocks included in the basket and by certain restrictions the participants needed to observe, such as needing to use each of the blocks included in the basket. Accordingly, the experimenter noticed that each groups' degree of success constructing the tower was highly variable; some groups constructed the tower relatively easily, while some completely failed at the task. In contrast, for the final task, the participants were asked to decide what the most important invention of the 20th century was. As there is no one correct answer to this question, the women were simply asked to provide the best answer they could to the question. Thus, while each of the tasks involved performing a particular task in a limited amount of time (i.e., 10 minutes), it seems likely that the relative level of difficulty was not consistent across tasks. One way of addressing this concern would have been to conduct a pilot test of different tasks to be used in the study and afterwards have participants make ratings with respect to task difficulty and how anxious the tasks made them feel. However, a pilot study evaluating individual task difficulty was not conducted in this case because the present study was specifically designed to replicate the procedure used by Kleinman (2003).

Beside the potential limitations of focusing on an all-female sample and the alternative ways in which social anxiety could have been assessed and increased during the sessions, group members' level of familiarity could have been greater than originally thought. In forming the groups, the women were

asked not to sign up with friends or other women they knew well. When the initial contact was made with each potential participant, they were provided with the names of the other women who also signed up for their group, in order to confirm that no group member knew any other group member well. Despite such precautions, the relatively small size of the subject pools at Agnes Scott College and Emory University could have resulted in group members who knew each other better than the experimenter had intended. It seems likely that greater familiarity amongst the participants might lead to different ratings of attraction. In order to help increase the possibility that participants' were not too familiar with each other, the participants could have been asked to make a rating of how well they knew each fellow group member at the very beginning of the first group session.

While the measurement of social anxiety is a potential concern, another potential measurement limitation is that no direct measure of nonverbal ability was made within the context of the actual groups. In the emotion recognition task completed by the participants, they interpreted the facial expressions and tones of voice of pre-selected stimuli, rather than of their fellow group members. Thus, it is not possible to know the exact degree of correspondence between a participants' nonverbal decoding performance on the DANVA2 and how well they interpreted the emotions of their group members. However, the use of college students in the original construction of the DANVA2 may make this criticism irrelevant. Not only was the Facial Expression subtest of the DANVA2 constructed using photos of college students' faces, but college students also

served as one of the original samples upon which the measure was normed. Thus, because the college students played such a large role in the construction and standardization of the DANVA2, a high degree of confidence can most likely be placed in the validity of its' measurements within the present college student sample.

Perhaps a more implicit limitation is that the present study did not measure expressive (encoding) nonverbal ability. There is an expressive component to the DANVA2 that assesses the ability to express happy, sad, angry and fearful emotions. Respondents are given a series of scenarios describing situations in which a person would feel happy, sad, angry and fearful, asked to imagine how they would feel in that situation and then to produce a corresponding facial expression (Facial Expression subtest) or a tone of voice (Paralanguage subtest). The responses are then judged on a scale from 1 to 5 with respect to how closely they represented each for the four emotions. Although additional time would have been required, this procedure could have been used in the first session, in order to assess facial expression and paralanguage nonverbal expressive ability. Given the finding that nonverbal expressive and receptive ability are not highly correlated (Hall & Halberstadt, 1986), a very different relationship may have emerged between expressive nonverbal ability and interpersonal attraction which may have accounted for more of the variance in attention. Perhaps in the future, expressive nonverbal ability could be assessed beforehand or ratings made of the ongoing expressive behavior shown during group interactions.

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Table 1

Spearman Correlations between the Diagnostic Analysis of Nonverbal Accuracy – II (DANVA2) Faces Indices and Interpersonal Attraction at Times 1, 2 and 3 (*N* = 62)

	Interpersonal Attraction		
DANVA2 Faces Index	Time 1	Time 2	Time 3
Happy	-.151	.025	.008
Sad	-.280*	-.342**	-.119
Angry	-.243*	.000	.129
Fearful	-.127	-.038	-.028

**$p < .01$, *$p < .035$

Table 2

Spearman Correlations between the Diagnostic Analysis of Nonverbal Accuracy – II (DANVA2) Voices Indices and Interpersonal Attraction at Times 1, 2 and 3 (*N* = 62)

	Interpersonal Attraction		
DANVA2 Voices Index	Time 1	Time 2	Time 3
Happy	.036	-.095	.079
Sad	.150	.014	.174
Angry	.174	.190	.151
Fearful	-.072	.045	.058

**$p < .01$, *$p < .035$

Table 3

Pearson Correlations between Social Anxiety Variables and Interpersonal Attraction at Times 1, 2 and 3 ($N = 62$)

	Interpersonal Attraction		
Social Anxiety Variable	Time 1	Time 2	Time 3
FNES	.012	.118	.002
SADS	-.239*	-.100	-.177
PRCA	-.046	.063	-.086

Note. FNES = Fear of Negative Evaluation Scale, SADS = Social Avoidance and Distress Scale, and PRCA = Personal Report of Communication Apprehension.
**$p < .01$, *$p < .035$

Appendix A

The Relationship between Nonverbal Decoding Ability and Social Anxiety

Facial Expressions

As series of Spearman correlations were conducted in order to examine the relationship between nonverbal decoding ability and social anxiety. An alpha value of .05 was used for the following analyses. As shown in Appendix B, significant correlations were found between the ability to read basic facial expressions and several of the social anxiety indices. Specifically, women making more errors in happy faces endorsed higher social anxiety on the FNES (r_s = .241, p < .05) while those with more errors for sad faces indicated higher social anxiety on their overall (r_s = .216, p < .05) and Anxiety subscale SADS scores (r_s = .223, p < .05) and their Dyadic subscale of the PRCA (r_s = .217, p < .05). Subsequent misattribution analyses revealed significant correlations between *happy* faces misinterpreted as *fearful* and FNES score (r_s = .270, p < .017) and *sad* faces misinterpreted as *angry* and the Dyadic subscale of the PRCA (r_s = .236, p < .05).

Paralanguage

Significant decoding ability-social anxiety correlations were also found for several vocal indices (please refer to Appendix C). Unlike the significant associations found for basic facial indices, however, all of the correlations were negative, except those for fearful voices. Women making more errors reading emotion in happy voices indicated *less* social anxiety on their Meeting (r_s = -.273, p < .05), Public (r_s = -.335, p < .05) and overall scores on the PRCA, while those

making more errors in reading sad voices also indicated *less* social anxiety on the Meeting subscale of the PRCA (r_s = -.228, p < .05). In contrast, women misreading fearful voices indicated *more* social anxiety on their Meeting (r_s = .231, p < .05) and overall (r_s = .214, p < .05) PRCA scores and their Anxiety (r_s = .255, p < .05) and overall (r_s = .279, p < .05) SADS scores. Misattribution analyses found significant associations for happy, sad and fearful voices errors. For happy voices, angry misattributions were related to the Meeting (r_s = -.248, p < .026), Public (r_s =-.317, p < .05) and overall (r_s = -.275, p < .05) PRCA scores. Misattributing sad voices as fearful was associated with the Anxiety subscale of the SADS (r_s = -.221, p < .05). Fearful voice misattributions, on the other hand, were significantly related to the Meeting subscale of the PRCA (r_s = .255, p < .05).

Appendix B

Spearman Correlations between the Diagnostic Analysis of Nonverbal Accuracy – II (DANVA2) Faces Indices and Social Anxiety ($N = 62$)

	Social Anxiety Variable				
DANVA2 Faces Index	FNES	SADS	SADS (An.)	PRCA	PRCA (D)
Happy	.241*	.141	.176	.116	.116
Sad	.180	.216*	.223*	.080	.217*
Angry	.041	.131	.085	.002	.074
Fearful	-.005	.121	.045	-.003	-.009
Happy as Fearful	.270	.036	.066	-.019	.001
Sad as Angry	.192	.167	.158	.187	.236*

Note. FNES = Fear of Negative Evaluation Scale, SADS = Social Avoidance and Distress Scale, SADS (An.) = Anxiety subscale of the Social Avoidance and Distress Scale, PRCA = Personal Report of Communication Apprehension, and PRCA (D) = Dyadic subscale of the Personal Report of Communication Apprehension.
**$p < .01$, *$p < .05$

Appendix C

Spearman Correlations between DANVA2 Voices Indices and Social Anxiety (*N* = 62)

	Social Anxiety Variable				
DANVA2 Voices Index	FNES	SADS	SADS (An)	PRCA	PRCA (M)
Happy	-.089	-.145	-.145	-.287*	-.273*
Sad	-.191	-.038	-.150	-.168	-.228*
Angry	-.081	.066	.024	.045	.004
Fearful	.157	.279*	.255*	.214*	.231*

Note. FNES = Fear of Negative Evaluation Scale, SADS = Social Avoidance and Distress Scale, SADS (An) = Anxiety subscale of the Social Avoidance and Distress Scale, PRCA = Personal Report of Communication Apprehension, and PRCA (M) = the Meeting subscale of the Personal Report of Communication Apprehension.
**$p < .01$, *$p < .05$.

Appendix D

Social Avoidance and Distress Scale

Instructions: Read the following statements carefully. Circle the response that reflects your reaction. If the statement is true of you, circle **T** for **TRUE**. If the statement is not true of you, circle **F** for **FALSE**.

1. I feel relaxed even in unfamiliar social situations……..T F
2. I try to avoid situations that force me to be very sociable…….....T F
3. It is easy for me to relax when I am with strangers…….. T F
4. I have no particular desire to avoid people…….T F
5. I often find social occasions upsetting…….T F
6. I usually feel calm and comfortable at social occasions……...T F
7. I am usually at ease when talking to someone of the opposite sex……T F
8. I try to avoid talking to people unless I know then well…….T F
9. If the chance comes to meet new people, I often take it……..T F
10. I often feel nervous or tense in casual get-togethers in which both sexes are present…….T F
11. I am usually nervous with people unless I know them well…….T F
12. I usually feel relaxed when I am with a group of people…….…….T F
13. I often want to get away from people…….T F
14. I usually feel uncomfortable when I am in a group of people I don't know……..…….T F
15. I usually feel relaxed when I meet someone for the first time……..T F
16. Being introduced to people makes me tense and nervous……...T F
17. Even though a room is full of strangers, I may enter it anyway……T F
18. I would avoid walking up and joining a large group of people……..T F

19. When my superiors want to talk with me, I talk willingly……T F

20. I often feel on edge when I am in a group of people……....T F

21. I tend to withdraw from people……T F

22. I don't mind talking to people at parties or social gatherings……T F

23. I am seldom at ease in a large group of people……...T F

24. I often think up excuses in order to avoid social engagements……T F

25. I sometimes take the responsibility for introducing people to each other…T F

26. I try to avoid formal social occasions……T F

27. I usually go to whatever social engagements I have……..…T F

28. I find it easy to relax with other people……..T F

Appendix E

Personal Report of Communication Apprehension

Directions: This instrument is composed of 24 statements concerning your feelings about communications with other people. Please indicate in the space provided the degree to which each statement applies to you by marking whether you (1) Strongly Agree, (2) Agree, (3) Are Undecided, (4) Disagree, or (5) Strongly Disagree with each statement. There are no right or wrong answers. Many of the statements are similar to other statements. Do not be concerned about this. Work quickly, just record your first impression.

____ 1. I dislike participating in group discussions.

____ 2. Generally, I am comfortable while participating in group discussions.

____ 3. I am tense and nervous while participating in group discussions.

____ 4. I like to get involved in group discussions.

____ 5. Engaging in a group discussion with new people makes me tense and nervous.

____ 6. I am calm and relaxed while participating in group discussions.

____ 7. Generally, I am nervous when I have to participate in a meeting.

____ 8. Usually I am calm and relaxed while participating in meetings.

____ 9. I am very calm and relaxed when I am called upon to express an opinion at a meeting.

____ 10. I am afraid to express myself at meetings.

____ 11. Communicating at meetings usually makes me uncomfortable.

____ 12. I am very relaxed when answering questions at a meeting.

____ 13. While participating in a conversation with a new acquaintance, I feel very nervous.

____ 14. I have no fear of speaking up in conversations.

____ 15. Ordinarily I am very tense and nervous in conversations.

____ 16. Ordinarily I am very calm and relaxed in conversations.

____ 17. While conversing with a new acquaintance, I feel very relaxed.

____ 18. I'm afraid to speak up in conversations.

____ 19. I have no fear of giving a speech.

____ 20. Certain parts of my body feel very tense and rigid while giving a speech.

____ 21. I feel very relaxed while giving a speech.

____ 22. My thoughts become confused and jumbled when I am giving a speech.

____ 23. I face the prospect of giving a speech with confidence.

____ 24. While giving a speech, I get so nervous, I forget facts I really know.

Appendix F

Fear of Negative Evaluation Scale

Instructions: Read the following statements carefully. Circle the response that reflects your reaction. If the statement is true of you, circle **T** for **True**. If the statement is not true of you, circle **F** for **False.**

1. I rarely worry about seeming foolish to others. ……..T F

2. I worry about what people will think of me even when I know it doesn't make any difference. ……T F

3. I become tense and jittery if I know someone is sizing me up. ..……..……T F

4. I am unconcerned even if I know people are forming an unfavorable impression of me. ……..……..T F

5. I feel very upset when I commit some social error. ……T F

6. The opinions that important people have of me cause me little concern….T F

7. I am often afraid that I may look ridiculous or make a fool out of myself. ..T F

8. I react very little when other people disapprove of me. ……T F

9. I am frequently afraid of other people noting my shortcomings. ……..T F

10. The disapproval of others would have little effect on me. ……...T F

11. If someone is evaluating me, I tend to expect the worst. ……T F

12. I rarely worry about what kind of impression I am making on someone. .T F

13. I am afraid that others will not approve of me. ..……...T F

14. I am afraid that people will find fault with me. ……T F

15. Other people's opinions of me do not bother me. ……T F

16. I am not necessarily upset if I don't please someone. ……T F

17. When I am talking to someone, I worry about what they may be thinking about me. ……T F

18. I feel that you can't help making social errors, so why worry about it. …..T F

19. I am usually worried about what kind of impression I make. ……T F

20. I worry a lot about what my superiors think of me. ……T F

21. If I know someone is judging me, it has little effect on me. ……..T F

22. I worry that others will think I am not worthwhile. ……..T F

23. I worry very little about what others may think of me.……...T F

24. Sometimes I think I am too concerned with what other people think of me……T F

25. I often worry that I will say or do the wrong things.……T F

26. I am often indifferent to the opinions others have of me. ……..T F

27. I am usually confident that others will have a favorable impression of me. ……..…. T F

28. I often worry that people who are important to me won't think very much of me. …..……T F

29. I brood about the opinions my friends have about me. ……T F

30. I become tense and jittery if I know I am being judged by my superiors…T F

Appendix G

Interpersonal Judgment Scale

Number of person to be evaluated: ____
Number of evaluator: ____

1. Intelligence (circle one)

I believe that this person is…

a) very much above average in intelligence.
b) above average in intelligence.
c) slightly above average in intelligence.
d) average in intelligence.
e) slightly below average in intelligence.
f) below average in intelligence.
g) much below average in intelligence.

2. Degree of Comfort (circle one)

I believe that I would probably feel…

a) very comfortable with this person.
b) comfortable with this person.
c) comfortable with this person to a slight degree.
d) neither particularly comfortable nor uncomfortable with this person.
e) uncomfortable with this person to a slight degree.
f) uncomfortable with this person.
g) very comfortable with this person.

3. Knowledge of Current Events (circle one)

I believe that this person is…

a) very much below average in his knowledge of current events.
b) below average in his knowledge of current events.
c) slightly below average in his knowledge of current events.
d) average in his knowledge of current events.
e) slightly above average in his knowledge of current events.
f) above average in his knowledge of current events.
g) very much above average in his knowledge of current events.

4. Personal Feelings (circle one)

I feel that I would probably…

a) like this person very much.
b) like this person.
c) like this person to a slight degree.
d) neither particularly like nor particularly dislike this person.
e) dislike this person to a slight degree.
f) dislike this person.
g) dislike this person very much.

5. Working Together in an Experiment (circle one)

I believe that I would…

a) very much dislike working with this person in an experiment.
b) dislike working with this person in an experiment.
c) dislike working with this person in an experiment to a slight degree.
d) neither particularly dislike nor particularly enjoy working with this person in an experiment.
e) enjoy working with this person in an experiment to a slight degree.
f) enjoy working with this person in an experiment.
g) very much enjoy working with this person in an experiment.

6. Adjustment (circle one).

I believe that this person is…

a) extremely maladjusted.
b) maladjusted.
c) maladjusted to a slight degree.
d) neither particularly maladjusted nor particularly well-adjusted.
e) well-adjusted to a slight degree.
f) well-adjusted.
g) extremely well-adjusted.

7. Roommates (circle one)

   I feel that I would…

   a) very much enjoy having this person as a roommate.
   b) enjoy having this person as a roommate.
   c) enjoy having this person as a roommate to a slight degree.
   d) neither particularly enjoy nor dislike having this person as a roommate.
   e) dislike having this person as a roommate to a slight degree.
   f) dislike having this person as a roommate.
   g) very much dislike having this person as a roommate.

Appendix H

LOST AT SEA INDIVIDUAL WORKSHEET

Instructions: You are adrift on a private yacht in the South Pacific. As a consequence of a fire of unknown origin, much of the yacht and its contents have been destroyed. The yacht is now slowly sinking. Your location is unclear because of the destruction of critical navigational equipment and because you and the crew were distracted trying to bring the fire under control. Your best estimate is that you are approximately one thousand miles south-southwest of the nearest land.

Below is a list of fifteen items that are intact and undamaged after the fire. In addition to these articles, you have a serviceable, rubber life raft with oars large enough to carry yourself, the crew, and all the items listed below. The total contents of all survivors' pockets are a package of cigarettes, several books of matches, and five one-dollar bills.

Your task is to rank the fifteen items below in terms of their importance to your survival. Place the number *1* by the most important item, the number *2* by the second most important, and so on through number *15*, the least important.

____ Sextant

____ Shaving mirror

____ Five-gallon can of water

____ Mosquito netting

____ One case of U.S. Army C rations

____ Maps of the Pacific Ocean

_____ Seat cushion (flotation device approved by the Coast Guard)

_____ Two-gallon can of oil-gas mixture

_____ Small transistor radio

_____ Shark repellent

_____ Twenty square feet of opaque plastic

_____ One quart of 160-proof Puerto Rican rum

_____ Fifteen feet of nylon rope

_____ Two boxes of chocolate bars

_____ Fishing kit