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Role of Perceived Competence in the Behavior of Socially Anxious Persons in Problem-Solving Groups

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in General Psychology at Virginia Commonwealth University.

By

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Table of Contents

List of Tables

List of Figures

Abstract

ROLE OF PERCEIVED COMPETENCE IN THE BEHAVIOR OF SOCIALLY ANXIOUS PERSONS IN PROBLEM-SOLVING GROUPS

By Scott Dall Bradshaw, Ph.D.

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in General Psychology at Virginia Commonwealth University.

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Research finds high-shy persons participate minimally in interactions, withhold ideas from their groups, and negatively evaluate their performance. While commonly true, high-shy persons do not always interact less and it has been suggested (Efran & Korn, 1969) that high-shy persons may dominate a discussion if they can find a "safe" topic. The current study examined whether perceptions of perceived competence can produce this effect and increase the performance level of high-shy persons in a problem-solving group above the performance level of low-shy persons.

One hundred and four women, ages 18 to 24, at Virginia Commonwealth University participated.

Subjects completed a shyness measure and a simulated creative problem-solving ability measure. Subjects were then placed into nominal brainstorming groups of three to six persons and were asked to generate solutions to a problem. They were led to believe their solutions would be evaluated by their group in preparation for a discussion where the group would select the best solution. Before beginning, subjects were told creative problem-solving ability predicted their performance and that their ability was either significantly below average (low self-competence condition), average (average self-competence condition), or significantly above average (high self-competence condition). After brainstorming, subjects selected their best solution and made a brief tape recording describing their solution. Subjects were told the tape would be played for the group prior to the discussion (neither occurred).

Perceived competence did not significantly affect the qualities measured. The only effect consistent with the hypotheses of the study was that high-shy / high self-competence subjects used more words in their taped statement than all other subjects. The results

Introduction

What is shyness/social anxiety and how does it affect behavior? A person seeking an answer to these questions would find over 1,600 publications related to shyness/social anxiety (Van Der Molen, 1990), and that number does not include publications in the popular press. The reading of those publications would reveal that research has documented numerous differences between the behavior, affect, and cognitions of those high in shyness/social anxiety and those low in shyness/social anxiety with the vast majority of the effects of shyness/social anxiety negative in nature. After reading all there is to read, one would likely believe a person high in shyness/social anxiety would always interact less and have more negative outcomes than someone lower in shyness/social anxiety. However, this is far from the case, and there may be instances where persons higher in shyness/social anxiety actually participate more actively in an interaction than persons lower in shyness/social anxiety.

The present study addresses the general question

of when do persons high in shyness/social anxiety interact to the same extent as those lower in shyness/social anxiety? Specifically, the current study examines whether or not perceptions of perceived competence increase the performance level of persons high in shyness/social anxiety in the context of a problem-solving group. Before further discussion, it is necessary to define the terms "social anxiety" and "shyness" and to address the theoretical distinctions that have produced these different terms.

Clarification of Shyness and Social Anxiety

Shyness, social anxiety, and introversion (and its opposite, extraversion / sociability) are terms often taken to be synonymous. There are, however, conceptual and empirical differences between these terms. The conceptual distinctions are best seen by comparing the definitions of the three constructs. Social anxiety is defined as feelings of anxiety and discomfort produced by "...the prospect or presence of interpersonal evaluation in real or imagined social settings (Schlenker & Leary, 1982, p. 642)." Social anxiety can be either state social anxiety or dispositional social anxiety. State social anxiety

simply refers to the actual state of feeling anxiety; this momentary state is common for all persons when initially placed into evaluative situations. Dispositional social anxiety refers to someone who experiences state social anxiety in a more extreme manner and in more situations than the average person (Leary, 1983). Note that behavioral deficits are not necessary for one to be considered socially anxious. Shyness, by contrast, is defined as feelings of anxiety AND behavioral inhibition in social situations (Cheek & Melchior, 1990). Therefore, given these conceptual distinctions, one can see that is possible for a person to be socially anxious and not shy, but a shy person, by definition, also has to be socially anxious. Introversion describes someone who prefers solitary activities or activities with a few friends (Eysenck & Eysenck, 1969). This definition neither states nor implies that a person high in introversion would experience anxiety if required to interact with others. This is quite different from the expected experience of shy persons. Arkin, Lake, and Baumgardner (1986), Eysenck and Eysenck (1969), and Cheek and Melchior (1990) all argue that persons high in shyness or social

anxiety engage in solitary activities not out of preference, but rather because these are the situations which minimize anxiety.

Conceptually, the definitions provide a clear picture of each construct and the similarities and differences between them. Social anxiety refers to feelings of anxiety in some social setting, shyness to feelings of anxiety and behavioral inhibition, and introversion as a preference for interactions with a few or no persons. Many times it is easy to define a construct, but difficult to provide research supporting that construct. Fortunately, a number of studies have examined the relationship between shyness and introversion/sociability measures.

Cheek and Buss (1981), in their effort to establish shyness as independent of sociability, developed a measure of shyness and a separate measure of sociability. Factor analysis of the items revealed a two factor structure, one containing the shyness items and the second the sociability items. Although the correlation between the scales themselves, $r=-.30$, was statistically significant, the authors argued the correlation was small enough to demonstrate that

shyness and sociability were not the same construct. A confirmatory factor analysis on the two scales, also found the two factor model worked best in explaining the variance (Bruch, Gorsky, Collins, & Berger, 1989). Further support for this distinction between shyness and introversion can be seen in factor analytic research of the five-factor model of personality, where measures of shyness have been found to load on both the introversion and neuroticism factors of the five-factor model of personality (Bradshaw, 1991; Crozier, 1986). This pattern of loadings is consistent with shyness being a separate construct from introversion.

Unlike the empirical evidence for the difference between shyness and introversion, evidence for a difference between shyness and high social anxiety is minimal. While shyness and social anxiety clearly differ conceptually (Leary, 1986), the respective measures are highly correlated and appear to measure the same construct (Briggs & Smith, 1986). Whether this is a conceptual or measurement problem is not clear. The self-report measure used in the current

study was developed to measure shyness; therefore, the term 'shyness' will be used.

Effects of Shyness

What situations are most likely to create difficulties for those high in shyness? Research finds interactions with authority figures, with others considered more knowledgeable, with strangers, with those evaluating one's behavior, or situations requiring a person to take initiative as tending to promote the effects of shyness (Crozier, 1982; Zimbardo, 1977). Research on shyness has largely focused on placing persons high and low in shyness in unstructured, evaluative interactions with a stranger or strangers. The adverse effects of shyness in such situations has been widely documented.

Within dyadic interactions, persons higher in shyness (high-shy), as compared to those lower in shyness (low-shy), have been found to interact minimally, appear nervous, confine the majority of their talk to questions, acknowledgements ("uh-huh"), and confirmations ("I think so, too"), report more discomfort and anxiety, evaluate their performance negatively, and tend to be evaluated negatively by

their interaction partner (Cheek & Buss, 1981; Garcia, Stinson, Ickes, Bissonnette, & Briggs, 1991; Leary, Knight, & Johnson, 1987; Pilkonis, 1977). Related research has found high-shy persons tend to evaluate the same feedback from others more negatively than low-shy persons (Pozo, Carver, Wellens, & Scheier, 1991), and evaluate their own social abilities negatively (Cheek & Buss, 1981; DePaulo, Kenny, Hoover, Webb, & Oliver, 1987). Additionally, high-shy persons tend to view social interactions as inherently evaluative (Goldfried, Padawar, & Robbins, 1984).

Other research has found that high-shy persons experience more depression and loneliness, and report lower self-esteem than low-shy persons (Gough & Thorne, 1986). High-shy persons also report less available social support and fewer friends; although, the friendships they do have tend to be of longer duration (Jones & Carpenter, 1986). Persons high in shyness also tend to reverse the usual self-serving bias in causal attributions, and attribute the cause of social failures to internal, stable factors and success to

external factors, especially in social situations (Arkin, Appelman, & Burger, 1980; Teglasi & Hoffman, 1982). Generally, the pattern of attributions by high-shy persons has been found to be similar to the attributional pattern of depressed persons (Anderson & Arnoult, 1985).

The adverse effects of shyness have also been shown across the life-span. Caspi, Elder, and Bem (1988) found that high-shy males tended to start careers later, marry later, and, for high-shy males who started their careers later, to experience more marital instability. Females high in shyness were more likely than those low in shyness to follow stereotypical life-roles of wife, mother, and homemaker.

Research has recently begun to examine high-shy persons within groups, especially problem-solving groups. Zimbardo and Linsenmeier (1983) examined a number of group process variables that could affect interactive group problem-solving and found that, relative to low-shy subjects, high-shy subjects talked significantly less, expressed fewer emotions, offered fewer solutions, and, when they did offer solutions, did so less assertively. They also found groups

composed entirely of low-shy subjects made better decisions than groups composed of high-shy subjects. Other research examining problem-solving groups (Bradshaw & Stasson, 1993) found that high-shy individuals attributed group success to the group and external causes; minimizing personal responsibility. When the group failed, high-shy persons attributed the cause of failure to the group and not themselves or external factors. Low-shy individuals, in contrast, attributed group success equally to themselves, the group, and external factors and attributed the cause of failure primarily to external factors.

The effects of shyness in the context of brainstorming groups has also been examined. Camacho and Paulus (1993) compared the productivity of four-person brainstorming groups composed of all low-shy subjects, all high-shy subjects, and mixed groups with two subjects of each type. They found high-shy subjects experienced more nervousness and anxiety while interacting in the group, and, as a result, groups with all high-shy subjects generated fewer ideas than groups with all low-shy subjects. Additionally, the low-shy subjects in the mixed groups reduced their performance

to match the performance of the high-shy subjects which resulted in the mixed brainstorming groups generating fewer ideas than the all low-shy groups. Other research on brainstorming groups (Bradshaw, Alexander-Forti, & Stasson, 1992; Bradshaw, Stasson, & Alexander-Forti, 1993) has found high-shy persons generate fewer ideas (regardless of whether they are in nominal or interacting groups), report more evaluation apprehension, and report less satisfaction with their performance and the group's performance.

As seen from the research reviewed, high-shy persons in threatening situations participate minimally in the interaction, withhold ideas/thoughts from the group, and negatively evaluate their performance and contributions. In dyadic interactions this results in negative evaluations of the high-shy person by the interaction partner, and, in problem-solving groups, can hinder the performance of the group. This pattern of isolation and withdrawal appears to lead to deficits both in terms of mental and possible physical health, as well as hindering career development.

The Dynamics of Shyness

The picture this research paints of the high-shy

person is a bleak one; however, the picture is incomplete. Lost within the mass of findings is the realization that the high-shy person may experience a great deal of anxiety and negative affect when attempting to interact in a group or with a new acquaintance, but the high-shy person still makes the attempt. He/she enters the situation and tries to interact.

The most obvious example which demonstrates this point is participation in research. Despite the fact that agreeing to go to a strange location, meet with unfamiliar, often high status, persons and participate in a largely ambiguous 'activity' with a group of strangers is a highly anxiety-provoking situation, all of the studies conducted were able to recruit subjects high in shyness. Bruch, et al. (1989) recruited subjects by phone for a study examining social interactions with a new acquaintance. The authors reported volunteer rates (% of people contacted who agreed to volunteer) for the top, bottom, and middle 1/3's of the shyness distribution. Of those contacted scoring in the top 1/3 on the shyness scale, 84% agreed

to participate. This compares to 86% in the bottom 1/3 and 91% in the middle 1/3.

Another example of the effort made by persons high in shyness can be seen in a study by Garcia et al. (1991) examining the effects of shyness and physical attractiveness on opposite-sex dyadic interactions among new acquaintances. They found that high-shy men initiated just as many mutual-gazes with their interaction partner as low-shy men, but the gazes were significantly shorter in duration. The high-shy men were initiating gazes, but, when the women started to return the gaze, they looked away. Again, the high-shy persons, men in this particular instance, were attempting to interact despite the feelings of anxiety, negative affect, and negative cognitions.

Not surprisingly, given the pattern of behavior described in the Garcia et al. study, shyness has been characterized by a number of researchers as an approach-avoidance conflict (e.g. Arkin et al., 1986; Cheek & Melchior, 1990; Lewinsky, 1941; Schlenker & Leary, 1982). Motivation for approach could be to meet some Self need (self-enhancement, self-verification, self-expression, etc.) and/or some Instrumental needs

(required for the psychology class, have to talk to that person to get the loan, etc.). The motivation for avoidance is, obviously, the high expectancy of failure and subsequent loss of self-esteem. The attempt to reconcile these disparate motivations produces the behavior patterns seen as related to shyness.

Arkin et al. (1986) argue that one way in which high-shy persons reach a 'compromise' in this approach-avoidance conflict is by engaging in what they term protective self-presentation as opposed to acquisitive self-presentation. Acquisitive self-presentation (Arkin, 1981) refers to persons who, within a given social situation, attempt to present themselves in the most positive way possible. Instead of seeking to create this positive impression of the self by others, those engaged in protective self-presentation attempt to prevent a negative impression of the self from being formed. Therefore, the high-shy person interacts minimally, avoids taking a stand on potentially controversial issues, and, generally, defers to other persons.

Are there times when the avoidance is overridden; when the motivation to approach is very strong or the

expectancy of failure is low? This is discussed in the next section.

When is High-Shy Not High-Shy?

It is important to realize that high-shy persons do not show behavioral differences with low-shy persons when the social situation does not generate state social anxiety. For example, Cheek and Stahl (1986) had high-shy subjects write a poem. Half of the subjects were told their poems would be evaluated by a committee and a copy of the evaluations given to them. No mention of evaluation was made to the remaining subjects. When evaluation was made explicit, shyness was negatively correlated with creativity, -.57. This correlation dropped to -.13 when evaluation was not mentioned. Similar effects, or perhaps better stated as the 'removal of effects', have been caused in other research through interventions by others, by aspects of the interaction situation, and by the high-shy person's regulation and modification of her/his social situations.

Brodt and Zimbardo (1981), for example, found that behavioral differences between high-shy and low-shy

persons could be eliminated if one could get the high-shy persons to attribute their feelings of anxiety and arousal to aspects of the situation. Zimbardo also addressed this topic in a different context. Zimbardo and Linsenmeier (1983), in their research examining shyness in the context of group problem-solving, found that participation differences between high- and low-shy persons could be reduced if the high-shy persons were made aware of the amount of their participation relative to the other group members.

Research on self-handicapping has found that aspects of the interaction situation can have an effect. Leary (1986) had high- and low-shy subjects engage in dyadic interactions in the presence of distracting noise. Half of the subjects were told the noise would have no adverse effects, while the others were told the noise would prevent interaction partners from forming accurate impressions of the other. When told the noise had no adverse effects, high-shy subjects, consistent with previous research on shyness and social anxiety, thought they had made a more negative impression, and rated themselves more negatively than low-shy subjects. When subjects were

told the noise would interfere with impression formation, the differences between high- and low-shy subjects disappeared. A similar study (Arkin & Baumgardner, 1988, reported in Sheppard & Arkin, 1990) found when high-shy subjects were told the noise would interfere with impression formation, they were rated as less anxious by their interaction partners.

Sheppard and Arkin (1990) have suggested that high-shy persons, by regulating their environment, enter or construct situations that allow them to interact fully; indistinguishable from those low in shyness. Both Leary (1986) and Arkin and Baumgardner (1988) in their research on self-handicapping, for example, suggest high-shy persons may actively seek out situations in which it is difficult, because of environmental factors, to interact normally, such as loud bars or nightclubs so as to be able to fully interact and gain social approval. Research testing hypotheses related to this approach, however, is generally lacking. For example, it has been suggested (Arkin & Grove, 1990; Davis & Oathout, 1992) that high-shy persons may seek out friendships and romantic relationships with those who are more sociable than

they are; presumably for the "sociable friend" to somehow facilitate social interactions or engage in anxiety-provoking social interactions in the place of the high-shy person. No evidence, however, has been found to support this hypothesis (Jones & Carpenter, 1986).

Arkin and Grove (1990) did find evidence of how high-shy persons regulate their social environment in research on patterns of affiliation. Subjects completed a measure of shyness and, later in the semester, completed a survey concerning the person with whom they ate lunch with the day before. Regardless of their level of shyness, almost all of the subjects (215 of 231 subjects) had at least one lunch date in the previous two days. High-shy subjects tended to have known their lunch partner for a significantly longer time than had the low-shy subjects. This was expected of a high-shy person because, as noted before, strangers and unfamiliar situations create feelings of state social anxiety. Further, the high-shy subjects' lunch "date" tended to have been planned in advance by one of the parties, as opposed to being spontaneous, which was more likely for the low-shy subjects.

Planning such meetings in advance would likely provide a sense of control and reduce feelings of anxiety. This may be one of the reasons no significant differences were found between high- and low-shy subjects in ratings of how stressful or anxiety-provoking the interaction was. While their feelings of anxiety may have been reduced, high-shy persons still rated the interactions as less effective, less enjoyable, and less successful; although these differences were only marginally significant ($p<.10$). This study demonstrated that high-shy persons regulate their social environments, although it does not clearly demonstrate the efficacy of the regulation.

The studies discussed to this point regarding the reduction of shyness behaviors have shown the procedures, be they experimentally induced, situational, or self-regulated, to be generally effective in reducing or eliminating the differences between high- and low-shy persons. Interestingly, it has been suggested that high-shy persons might, in some circumstances, actually become more active in social interactions than low-shy persons. Efran and Korn (1969) suggested that while high-shy persons

participate minimally in group discussions, they may come to actually dominate the discussion if they can find a "safe" topic (i.e. topics that would not offend the other interactants or on which the interactants would agree). This intriguing idea, however, remains untested (Arkin et al., 1986). The idea is made more intriguing by a recent anomalous finding in research on dyadic interactions by Manning and Ray (1993).

Favored Topics

Manning and Ray (1993) examined conversational patterns of high- and low-shy persons in dyadic interactions. High-shy subjects, who were strangers to one another, were paired and asked to engage in a conversation so as to "get to know" one another. As expected, high-shy subjects' interactions were more awkward, with many silences and little actual conversation. Surprisingly, the researchers found a small group of high-shy subjects for which this pattern did not hold.

For these groups, the interaction was, at first, typical of high-shy subjects until a particular topic, which varied by dyad, was touched upon. Manning and Ray refer to these topics as "Favored Topics". In one

example described by the researchers, two interactants happened upon a shared interest in the nursing program. It appeared that one subject was a nursing major while the other was trying to get into the program. According to the researchers, at this point the participants began an enthusiastic discussion of the nursing program that was consistent with the conversational style of low-shy persons. Actually, the conversation was described as being more than simply "normal".

"...both participants displayed an exaggerated commitment to the topic, over and above the expected requirements for casual talk between strangers. It is as if too much personal identity can be detected... (Manning & Ray, 1993,pg. 187, emphasis in original)"

The enthusiastic conversation, however, only occurred when the participants were discussing the favored topic. When the conversation changed to some other topic, the conversation once again became awkward and consistent with the typical pattern of high-shy subjects. Manning and Ray (1993) suggest high-shy persons have favored topics they will discuss whenever possible, even in a state social anxiety-provoking

interaction with a stranger. It is interesting that the pattern of behavior found for high-shy persons discussing favored topics is consistent with what Efran and Korn (1969) suggested might occur for high-shy persons in discussion groups when discussing "safe" topics.

While the existence of favored topics would have a number of important implications for our understanding of shyness, the study by Manning and Ray (1993) does not demonstrate the existence of favored topics, either for high-shy persons in general or even for the high-shy persons who displayed the anomalous conversational behavior. What the study does suggest is that in certain situations the suggestion of Efran and Korn may be correct: High-shy persons may actually dominate the interaction. The present study was intended to determine if a similar effect as found for "favored topics" could be produced in the context of a group problem-solving situation.

There were several reasons for examining this potential effect within problem-solving groups. First, problem-solving groups are consistent with the situation originally suggested by Efran and Korn (1969)

in which this effect might occur. Second, the effects of shyness have been grossly understudied in the context of task-oriented group. Third, measures of shyness and similar individual difference variables are increasingly being used as a part of employment testing. If these measures are being used to make employment decisions, it is vitally important, both ethically and legally, that the relationship between shyness and group performance is fully understood. Finally, the examination of work groups is consistent with the American Psychological Society's call for research examining group performance issues (American Psychological Society, 1993).

Favored Topics and Perceived Competence

Previous research has demonstrated that High-SA persons fear negative evaluations by others. Therefore, they avoid interaction or interact minimally in situations where they are likely to be evaluated negatively. This pattern does not appear to hold for favored topics. Although in an evaluative interaction with a stranger, the high-shy persons risked negative evaluations by fully and actively discussing the favored topic. What is it about the favored topic

which allowed or caused the high-shy persons to behave as low-shy persons? It would appear the favored topic causes the high-shy persons to increase their expectancy of success, thereby reducing the avoidance component of the approach-avoidance conflict, or increases the motivation for approach causing them to risk the negative evaluation.

While there are many possible variables which could play a role in the effect found for favored topics, this proposal focuses on one: perceived competence. Perceived competence is considered here because the perceived lack of competence is one of the causes of the state of social anxiety (interactions with those considered more knowledgeable) and previous research has examined the effects of perceived competence, but not in relation to social anxiety.

Why would perceived competence produce the effect found for favored topics? If the high-shy person perceives her/himself as competent in a particular domain, then she/he would be unlikely to fear being found wrong when discussing information related to that domain. The high-shy person would feel more able to make her/his desired self-presentation successfully and

would experience a reduced fear of evaluation; therefore, there would be reduced feelings of state social anxiety (Schlenker & Leary, 1982).

Another perspective is offered by Trower, Gilbert, and Sherling (1990) in their conceptualization of shyness as related to dominance hierarchies. Essentially, social anxiety, according to this perspective, evolved in response to the need for animals to live in close proximity. Social anxiety provided, and provides, an evaluation of the degree of threat posed by the approach of another animal. If the animal posed a threat (higher in dominance) then social anxiety communicated to the threatened animal the need to be wary and to display submissiveness. The similarities to human shyness can be seen in the item "I have trouble looking someone right in the eye" from the Cheek and Buss (1981) Shyness Scale. Perceived competence is a source of social power (French & Raven, 1959). In this context, perceived competence would reduce the submissiveness of the person high in shyness.

Research has demonstrated that perceived competence affects a behaviors both of individuals

alone and in groups (see National Research Council, 1994, for a review). Brown and Garland (1971) found that subjects who were led to believe they were incompetent singers, as compared to those led to believe they were competent singers, sang for a significantly shorter period of time (subjects received more money the longer they sang) when they expected to be evaluated by their classmates. The withdrawal from the situation evidenced by those led to believe they were incompetent singers appears to be similar to the withdrawal of high-shy persons from social interactions. It is possible high-shy persons would not withdraw if they believed, or were led to believe, they were competent on some topic or task.

While one's own perceived competence is important, the perceived competence of the evaluating audience has also been shown to be important. Garland and Brown (1972), using the same paradigm as Brown and Garland (1971), found that females who felt they were incompetent singers sang for a significantly shorter time when they thought they were being evaluated by an audience of "excellent" singers as compared to an audience of "poor" singers. A similar effect has been

found for self-reported performance apprehension (Jackson & Latane', 1981). Collaros and Anderson (1969) also found that members of brainstorming groups generated fewer ideas and reported greater inhibition when told the other group members were experts on the particular topic. This would suggest that if high-shy persons felt they were more competent relative to their interaction partners, they would have less fear of evaluation and would interact more fully. No research has tested this possibility.

Project Description

The study reported here examined how perceived competence affected the performance of high- and low-shy subjects in brainstorming / problem-solving groups to determine if perceived competence could be one cause of the effect found for favored topics. Subjects completed a measure of shyness and what they were led to believe was a measure of creative problem-solving ability. Subjects were then placed into nominal brainstorming groups and were asked to generate solutions to a given problem; solutions which the subjects were led to believe would be evaluated by their other group members in preparation for a group

discussion where the group would select the best solution to the given problem. Before beginning, subjects were told that creative problem-solving ability predicted how well they would perform on the task and that their creative problem-solving ability was either significantly below average (low self-competence condition), average (average self-competence condition), or significantly above average (high self-competence). The number of ideas generated by each individual was assessed. After brainstorming, subjects were asked to select their best solution and make a brief tape recording describing and defending their solution. Subjects were told the tape would be played for the other group members prior to a group discussion (neither of these things actually occurred). The length of the statement and qualities of the taped statement were assessed.

Hypotheses

Previous research has indicated that high-shy persons, as compared to low-shy persons, generate significantly fewer ideas in brainstorming groups (i.e. Bradshaw, Stasson, & Alexander-Forti, 1993; Camacho & Paulus, 1993) and write less in defense of a decision

when facing the possibility of a negative evaluation (Arkin & Schumann, 1983, reported in Arkin et al., 1986). Further, it has been suggested (Schlenker & Leary, 1982) that high-shy persons will be more likely to use verbal disclaimers to avoid negative evaluations. It is expected that the effects of problem-solving on a topic one perceives oneself to be competent in will eliminate these differences. Therefore, the following hypotheses will be tested:

1. Subjects higher in shyness, overall, will generate fewer solutions, speak less in defense of their decisions, and use more disclaimers in the defense of their decision than subjects lower in shyness.

2. Subjects higher in shyness will generate more solutions and speak more in defense of their decisions in the high self-competence condition as compared to subjects in all of the other conditions, but subjects lower in shyness will generate more solutions and speak more than subjects higher in shyness in the remaining conditions.

3. Subjects higher in shyness in the high self-competence condition will use the same number of

disclaimers as subjects lower in shyness overall, but subjects higher in shyness in the average and low self-competence conditions will use significantly more disclaimers.

Method

Subjects

One hundred and four women who were students in psychology classes at Virginia Commonwealth University participated in exchange for credit towards psychology course requirements. So as to minimize extraneous variance, participation was limited to women who were white and between the ages of 18 and 24. Subjects were distributed in 27 groups ranging in size from three to six persons with an average group size of four. Thirty-four subjects were in the low self-competence condition, 33 in the average self-competence condition, and 36 in the high self-competence condition.

Procedure

Subjects were recruited for a study examining group and individual creative problem-solving through class announcements. Subjects were asked not to sign up for the same experimental session as a friend.

When signing up, subjects completed the simulated measure of creative problem-solving ability (described below). Subjects were told this would be scored and

feedback given during the group problem-solving portion of the study. Subjects also received a 29-item Group Attitude Inventory concerning their attitudes towards groups and feelings when interacting in groups to complete at home and bring with them to the group portion of the study. The inventory contained the measure of shyness (Cheek & Melchior, 1990) which is described below, as well as two filler measures: a 5-item measure of sociability (Cheek & Buss, 1981) and a 10-item measure of global self-esteem (Rosenberg, 1979).

When arriving for the group session, the Group Attitude Inventory was collected and subjects were placed individually into cubicles where they could see the experimenter but not other group members. The experimenter explained the study as examining the similarities and differences between working individually or in groups on creative problem-solving tasks, including the generation of creative solutions and decision making regarding the best solution. Subjects were told their participation would involve generating, individually, using brainstorming, as many solutions as possible for a "real world" problem. The individual solutions would then be exchanged and

evaluated by the other group members. The experimenter explained that the group would then meet face-to-face to discuss and further evaluate the solutions in order to select the best idea generated by the group. After being given a chance to ask questions, subjects completed the informed consent form.

After collecting the consent forms, the experimenter explained the procedure for brainstorming. The experimenter gave the subjects a sheet listing the rules of brainstorming with the problem to be solved on the other side. The experimenter told the subjects not to look at the problem itself until told to do so and then explained the process for writing solutions on the response sheets. The subjects and experimenter then read over the following rules of brainstorming (Osborn, 1957):

> 1. CRITICISM AND EVALUATION ARE RULED OUT. You should not worry about how good or bad a solution is - - all solutions are good. Do not criticize any solution you think of, write down every solution that comes to mind.

2. QUANTITY IS WANTED. Come up with as many solutions as possible! Your performance is determined by the number of solutions. The more solutions, the better.

3. FREEWHEELING IS ENCOURAGED. The wilder the idea the better. It is easier to take an extreme idea and make it workable than to take a simple idea and make it more complex. Also, building upon solutions you already generated is encouraged.

The experimenter stressed to the subjects that the number of solutions was important; indeed, the individuals and groups which performed best on the task tended to generate the most solutions.

Before continuing, the experimenter told the subjects it was necessary to provide them with feedback concerning their scores on the 'Diagnostic Inventory of Creative Problem-Solving Ability' and to discuss the nature of creative problem-solving ability. The complete statement by the experimenter is in Appendix A.

The experimenter then distributed to the subjects written feedback concerning their creative problem-

solving ability scores and the scores of their other group members. A sample feedback sheet is in Appendix B. Self-competence condition was randomly assigned, with the restriction that an approximately equal number of subjects be in each condition. For subjects in the low self-competence condition, the score indicated was an 80 (on a scale from 70 - 130) in a range described on the form as significantly below average. The indicated score as a 100, in a range described as average, for subjects in the average self-competence condition. High self-competence condition subjects received scores of 120 in a range described as significantly above average. The feedback about scores obtained by the other group members was held constant. For subjects in all three conditions, the remaining group members' scores were clustered in the average range such that the average of the scores equalled 100. Subjects were told that questions regarding the scoring of the creative problem-solving measure would be addressed at the end of the experimental session. The experimenter stated to all subjects the following:

"What's most important about the scores is their relationship to the brainstorming task you are about to

perform. Research has found that persons who score significantly above average on this measure tend to generate the most solutions, the most creative solutions, and their solutions tend to be of the highest quality. Those scoring average, tend to generate fewer solutions, the solutions are less creative, and tend to be lower in quality. Those who score significantly below average, tend to generate the fewest solutions. What few solutions they do generate, tend to be the least creative and the lowest in quality."

The experimenter then distributed to the subjects the pre-brainstorming questionnaire containing the manipulation check regarding the self-competence manipulation. Subjects were told the measure was concerned with their reactions to the feedback. The measure itself is shown in Appendix C and described below.

After completing the measure, subjects were told to turn over the sheet of paper to reveal the topic of generating as many ways as possible to reduce pollution and/or reduce energy consumption. The experimenter reminded the subjects that their solutions would be

seen and evaluated by the other group members. Subjects were told they would have a fixed amount of time to work, but the exact time would not be specified. The experimenter told them to begin and to continue until he told them to stop. Subjects were given ten minutes to brainstorm (a stopwatch was used).

After ten minutes, the experimenter told the subjects to stop and explained that there were actually two conditions in the study. In the first condition, the experimenter explained, the group members exchanged solutions, evaluated one another's solutions, and then discussed as a group all of the different solutions with the goal of selecting one solution as the best solution generated by the group. Subjects were told they were not in that condition, but, rather, were in the preferred solution condition.

The experimenter explained many businesses and organizations that use this method have the persons generate solutions individually, each person selects one of their solutions as their best solution, and, when they meet for the group discussion, the group only discusses each individual's best solution; selecting

the group's best solution from those individual best solutions. The experimenter told the subjects that they would be asked to look over their solutions to select their best solution. The experimenter further explained that in the groups using this method, group members typically made an opening statement concerning their solution, why it was their best solution, and why the group should adopt it. Subjects were told they would be doing something similar but that it would not be fair to ask them to make the statement in front of others, as they had no time to prepare. Therefore, the experimenter explained, subjects would make the statement individually, in another room, into a tape recorder. After all group members had made the taped statement, the group would meet for a face-to-face discussion, the tape would be played, and group discussion would follow with the group selecting the best solution from the individual best solutions. Subjects were given a piece of paper on which to write their best solution (Appendix D) and were told to alert the experimenter when ready to make the taped statement.

When the subjects were ready to make the tape, they were taken, individually, to the other room. The small room contained a chair and a desk with a tape recorder and microphone on top. The experimenter explained that he would start the tape, leave the room, and close the door. Subjects were asked to state their subject number, their best solution, why they thought it was their best solution, and why they thought the group should adopt it. After completing the statement, subjects were told to stop the tape recorder and return to the study room. Subjects were not told how long the statements should be. When the subjects returned, they sat at their individual cubicles and were given a pre-discussion questionnaire (Appendix E) to complete containing questions concerning their performance, the group's performance, and their feelings about the impending discussion.

After all questionnaires were complete, the experimenter debriefed the subjects. The importance of not discussing the study with others was stressed. One subject stated the hypothesis during the debriefing session and was subsequently excluded from all data analyses.

Materials

Shyness. The Cheek and Buss Revised Shyness Scale (Cheek & Melchior, 1990) was used to assess subjects' dispositional social anxiety. The Shyness Scale (Appendix F) consists of 14 items, such as "I feel inhibited in social situations", that subjects respond to using a 5-point Likert-type scale. Responses to the 14 items were summed and averaged, with higher scores indicating greater social anxiety. The measure has shown good convergent and criterion validity, as well as good internal consistency (Cheek & Buss, 1981; Crozier, 1986). Internal consistency for this sample, as assessed using Cronbach's alpha, was alpha=.90. The mean score, 2.45, and standard deviation, .76, are similar to those found in previous research (mean = 2.55; standard deviation = .66; Cheek & Melchior, 1990).

Creative Problem-Solving. The measure of creative problem-solving ability (Appendix G), packaged to appear to be a commercially produced measure, required subjects to generate five creative uses for a brick, complete a portion of the Conditions sub-test from the

Cattell Culture Fair Intelligence Test (Institute of Personality and Ability Testing, 1973), and construct an object from three geometric shapes (taken from a procedure for measuring creative visualization; Finke, 1990).

Pre-Brainstorming Questionnaire. This 16-item measure, shown in Appendix C, served as the manipulation check. To ascertain whether subjects saw and correctly identified the scores reported, they were asked to report their score and the estimated average of the other group members. Effectiveness of the manipulation itself was assessed through three questions and a series of semantic differentials. Subjects were asked how accurate they felt their score was, the number of solutions they would generate relative to their other group members, and the relative creativity of those solutions. Subjects responded using a five-point Likert-type scale. The semantic differentials were chosen to assess confidence, anxiety, and overall mood. Responses utilized a seven-point scale.

Pre-Discussion Questionnaire. This 15-item measure assessed the subjects' feelings and experiences

concerning the generation of ideas, the making of the tape, the impending discussion, and their evaluation of their work. Subjects responded to the items using a five-point Likert-type scale. The measure is shown in Appendix E.

The Rating Procedure and the Training of Raters

Rating was necessary for examining the chosen best solution, the tape recorded statement presenting the solution, and the use of disclaimers in the statement. Three pairs of independent raters, masked as to the conditions of the subjects, were used. The training of the raters and the procedures followed were the same for each task. Raters were presented with the rating scheme by the experimenter, including definitions of the appropriate variables and rating scales, and the raters discussed with the experimenter any questions concerning the rating scheme. The raters then independently rated a sample of 12 subjects from the study. In a meeting with the experimenter, the ratings were compared to determine whether the raters were in adequate agreement and to resolve any difficulties with the rating scales. Raters then independently rated all of the remaining subjects. After rating all material,

the raters met to resolve differences. For the numerical rating scales, differences greater than one were resolved by discussion, while differences of one were resolved by using the mean of the two values as the rating. All differences between the ratings of disclaimers were resolved through discussion.

Rating of Tape the Recorded Statements. For the tape recorded statements, the raters listened to each statement and assessed the number of pauses during the statement, the number of flubs (or mistakes) made during the statement, how confident the speaker sounded, the nervousness/anxiousness of the speaker, how the speaker seemed to feel about the quality of their solution, and how interested the speaker appeared to be in the task. The attitude ratings were scored using a five-point Likert-type scale with higher numbers indicating greater amounts of each characteristic. A pause was defined as a noticeable delay before beginning the talk, during the talk, or use of delay phrases such as 'um', 'let's see', or 'OK'. 'You know' or 'OK' were not counted as pauses if they appeared to be a normal aspect of the person's speech. A flub was defined as any garbled or otherwise

incomplete word (incorrect grammar was not considered a flub). The remaining qualities were not expressly defined, as the rating was intended to be a measure of how a typical person listening to the statement would perceive the statement. Because of experimenter error in the use of the microphone, the statement's of 11 of the 104 subjects were not properly recorded, and, therefore, were not able to be used.

Table 1 shows the frequencies for agreement and degree of disagreement, as well as the interrater correlations. Although the correlations are low, this is less relevant in the current study as all differences greater than one were resolved.

Rating of the Chosen Best Solution. The two raters read each chosen best solution and rated those solutions on their creativity and controversialness. Controversialness was defined as the likelihood that the presentation of the solution would provoke disagreement or a negative emotional response from the audience. Creativity was defined as uniqueness, with a unique or unique variation rated as very creative and a common solution typically offered in society in general rated as not at all creative. Both characteristics

Table 1. Frequencies of differences in first round observer ratings.

Characteristic	Degree of Agreement 0	1	2	3	4	5	r
Number of Pauses	27	29	20	10	5	2	.88
Number of Flubs	55	32	6	0	0	-	.59
Confidence	37	50	6	0	0	-	.24
Anxiousness	29	45	18	1	0	-	.25
Perceived Quality	49	41	3	0	0	-	.42
Interest of Speaker	48	38	7	0	0	-	.48
Creativity	44	38	14	5	2	-	.64
Controversialness	51	24	16	5	7	-	.55

NOTE. All correlations significant, $p<.05$.

were rated using five-point Likert-type scales. See Table 1 for the frequencies of agreement and degree of disagreement, as well as the interrater correlations.

Rating of Disclaimers. The tape recorded statements were transcribed and the number words in each statement assessed. The transcripts were then scored on the use of disclaimers by two independent raters masked to the experimental condition of the subjects. Disclaimers are defined as statements used to avoid possible negative evaluations by others (Hewitt & Stokes, 1975). The five types of disclaimers assessed, as described by Hewitt and Stokes (1975), are discussed below:

Hedging. Hedging disclaimers indicate a lack of commitment to the particular statement being made, a willingness to examine other viewpoints, and to change one's opinion. Hedging also indicates uncertainty about the responses of others to the statement and the fear that the response may be negative. Examples of hedging would be: "I'm no expert, but...", "I really haven't thought this through, but...".

Credentialing. Credentialing indicates that the speaker realizes the response to their statement will

be negative, but is strongly committed to the statement. The speaker, through the use of this disclaimer, attempts to establish special qualifications for her/himself to allow the statement to be accepted. Examples of credentialing would be: "I know what this sounds like, but...", "I'm not prejudiced, some of my best friends are [some group], but...".

Sin Licenses. Use of this disclaimer indicates the speaker is committed to their statement, realizes it is likely to create a negative response, and does not wish to be seen as an irresponsible group member. The concern is not for the specific content of the statement, but the fact that some social rule is being broken. Examples of sin licenses would be: "I realize you might think this is the wrong thing to do, but...", "I know this is against the rules, but...".

Cognitive Disclaimers. Use of this disclaimer indicates the speaker is committed to their statement, but realizes it may be seen by others as not making sense or as out of touch with reality. The speaker attempts to make it clear s/he is rational by

demonstrating s/he realizes the statement may seem irrational. Examples of cognitive disclaimers would be: "This may seem strange to you...", "I know this sounds crazy, but...".

Appeals for the suspension of judgment. In this situation, the speaker realizes the statement could cause a negative response, but asks the listeners to withhold judgment until they have heard the full statement. Examples of cognitive disclaimers would be: "Don't get me wrong, but...", "Hear me out before you explode."

Results and Discussion

Manipulation Check

Results indicate the manipulation was successful. The effects of the perceived competence manipulation on expectations of the number and creativity of solutions generated relative to the other group members was examined using separate one-way ANOVA's. Perceived competence condition was found to affect both expected number of solutions, $F(2,100)=9.08$, $p<.001$, and the expected creativity of those solutions, $F(2,100)=8.68$, $p<.001$. Pairwise comparisons with the Newman-Keuls procedure revealed subjects expected to generate significantly fewer solutions in the low self-competence condition, 2.53, as compared to the average self-competence, 3.09, or high self-competence conditions, 3.22. Expectancies in the average and high self-competence conditions were not significantly different. Expectations of creativity were found to be significantly different between all three conditions with subjects reporting the least creative solutions in the low self-competence condition, 2.47, followed by

the average self-competence condition, 2.84, and high self-competence condition, 3.22.

To facilitate analysis of the semantic differentials, they were submitted to a principal factor analysis with communalities estimated using squared multiple correlations (Comrey, 1978). Three factors were retained on the basis of the proportion criterion (Comrey, 1973) and scree test (Cattell,1978) and rotated using varimax rotation. The rotated factors and their loadings are presented in Table 2. Loadings greater than .45 were considered significant. Factor 1, containing the differentials calm/anxious, nervous/at ease, pressured/not pressured, and comfortable/self-conscious, was labeled Anxiety. Factor 2, containing the differentials serious/cheerful, energetic/not energetic, and warm/cold, was labeled Negative Affect. Factor 3, containing confident/doubtful, dominant/submissive, and competent/incompetent, was labeled Doubt. Cronbach's alphas were satisfactory for all scales: Anxiety = .83, Negative Affect = .72, and Low Confidence = .70.

The effects of the manipulation on the constructed scales was analyzed using separate one-way ANOVA's.

Table 2. Rotated Factor Loadings of Semantic Differentials

Differentials	Factors 1	2	3
Calm / Anxious	.62	-.12	.02
Nervous / At Ease	-.73	-.06	-.35
Pressured / Not Pressured	-.70	-.26	-.22
Comfortable/ Self-Conscious	.72	.31	.35
Serious / Cheerful	-.10	-.68	-.13
Energetic / Not Energetic	-.13	.66	.25
Warm / Cold	.17	.63	.00
Confident / Doubtful	.26	.20	.58
Dominant / Submissive	.13	.01	.67
Competent/ Incompetent	.42	.22	.46
Agreeable/ Disagreeable	.37	.41	-.31

Significant effects for perceived competence condition were found for Anxiety, $F(2,100)=4.94$, $p<.01$, Negative Affect, $F(2,100)=3.86$, $p<.05$, and Doubt, $F(2,100)=4.22$, $p<.01$. Pair wise comparisons for Anxiety revealed subjects were significantly less anxious in the high self-competence condition, 2.55, than the average, 3.35, or low, 3.49, self-competence condition (Higher numbers indicate more anxiety, more negative affect, and less confidence, respectively). The average and low self-competence conditions were not significantly different. Subjects in the high self-competence condition reported significantly less negative affect, 3.29, than those in the low self-competence condition, 4.07. Neither condition was significantly different from the average self-competence condition, 3.79. Lastly, subjects in the low self-competence condition reported significantly more doubt, 3.84, than those in the high self-competence condition, 3.05. Again, these conditions did not differ from the average self-competence condition, 3.47.

The subjects' mean rating of the accuracy of their Creative Problem-Solving Ability score was 3.07; however, a one-way ANOVA revealed the rated accuracy

differed by perceived competence condition, $F(2,100)=9.30$, $p<.001$. Pair wise comparisons revealed that subjects in the low self-competence condition felt the feedback was significantly less accurate, 2.5, than those in the average, 3.3, or high, 3.3, self-competence conditions. While this appears to suggest the manipulation was not successful, the analyses of the other manipulation check items, as discussed previously, contradict that conclusion. The ratings of relative inaccuracy appear to be consistent with research examining the differences between cognitive and affective responses (Swann, 1992; Swann, Griffin, Predmore, & Gaines, 1987). When persons receive negative feedback, they tend to reject the negative feedback as false cognitively, but still experience negative emotions in response to that feedback. The subjects in the present study have responded in the same fashion. They indicated they did not believe the score indicating below average creative problem-solving ability was accurate, but the score still caused them to report experiencing more doubt, more anxiety, and more negative affect, as well as to expect to generate

fewer and less creative solutions than their other group members.

These findings support the effectiveness of the manipulation, at least the extremes of the manipulation. While the means are in the expected direction, the low and high self-competence conditions do not reliably differ from the average condition across all of the assessed characteristics.

Brainstorming

The number of solutions generated was analyzed using a 3 (Competence condition) X Shyness ANOVA with shyness as a continuous variable. Size of group was entered into the analysis as a covariate. This statistical model was used throughout unless otherwise noted. All means reported involving continuous variables are predictions derived from the regression equation using scores one standard deviation above and below the mean.

Contrary to the hypotheses of the study, analyses did not reveal either significant main effects or significant interactions for perceived competence on the number of solutions generated, $F(2,95)=1.06$, n.s.,

but did reveal a significant main effect for shyness, $F(1,95)=14.77$, $p<.05$. Subjects higher in shyness tended to generate fewer solutions, 10.71, as compared to those lower in shyness, 14.57. Examination of the means for perceived competence condition for the number of solutions generated showed subjects in the low self-competence condition generated fewer solutions, 11.15, than those in the average, 13.27, or high, 13.97, self-competence conditions. This pattern of means is consistent with the expected effect of the perceived competence manipulation; however, with a large degree of within-group variability (standard deviations range from 5.44 to 6.35) these differences are not significantly different.

A planned comparison was performed to test the hypothesis that subjects high in shyness in the high self-competence condition would generate significantly more solutions than subjects in all other conditions. The analysis of this planned comparison through orthogonal contrast, using a median split of shyness, revealed a significant effect, $F(1,95)=4.13$, $p<.05$; however, the effect was in the opposite direction. Examination of the means provides an explanation for

the reversal of this effect; there is no suggestion of an interaction between shyness and perceived competence, but rather the graph (shown in Figure 1) suggests two 'main effects'. While the high shyness / high self-competence subjects generated relatively more solutions than the high shyness / low self-competence subjects, their performance was still less than even the low shyness / low self-competence subjects and far less than the low shyness / high self-competence subjects.

A planned comparison was also specified for the number of words in the taped statement. The ANOVA test of the overall model revealed no significant effects for shyness or perceived competence condition on the number of words in the taped statement, F's>.15; however, the planned comparison of the high shyness / high self-competence with the remaining conditions was marginally significant, $F(1,85)=3.32$, $p<.10$ (If a one-tailed test is used, the effect is significant $p<.05$). Consistent with the hypotheses, subjects did use more words in their taped statement in the high shyness / high self-competence condition than in the remaining conditions. This effect is shown in Figure 2.

Figure 1 - Predicted mean number of solutions generated for each shyness level in each competence condition

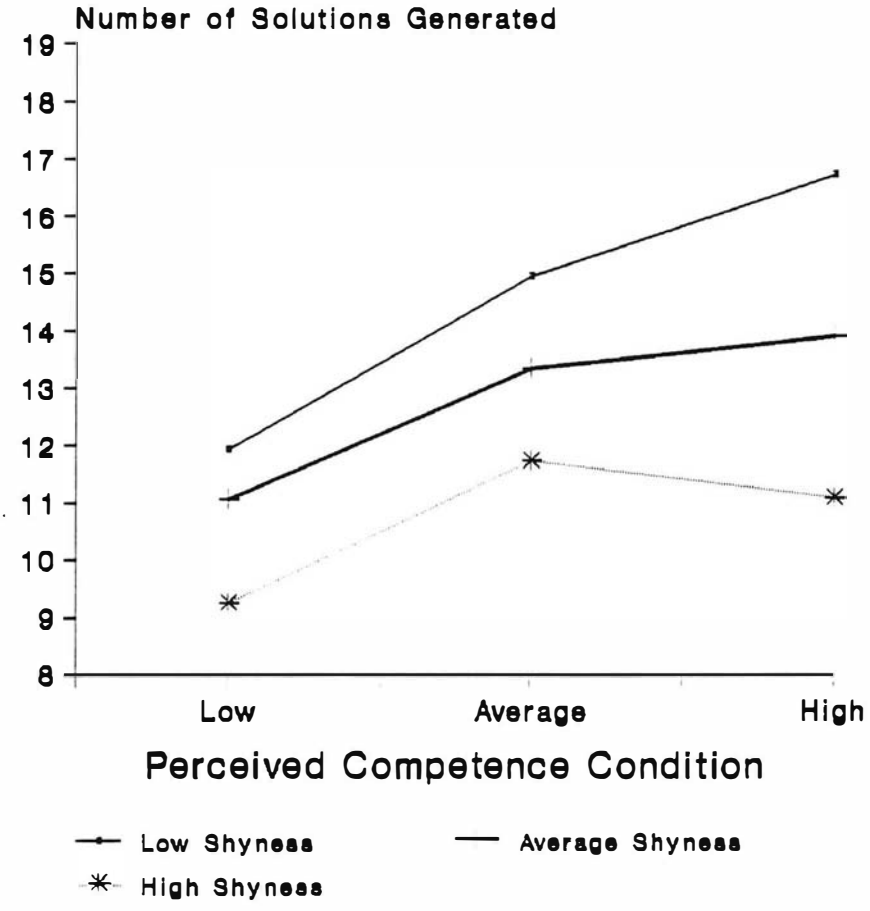
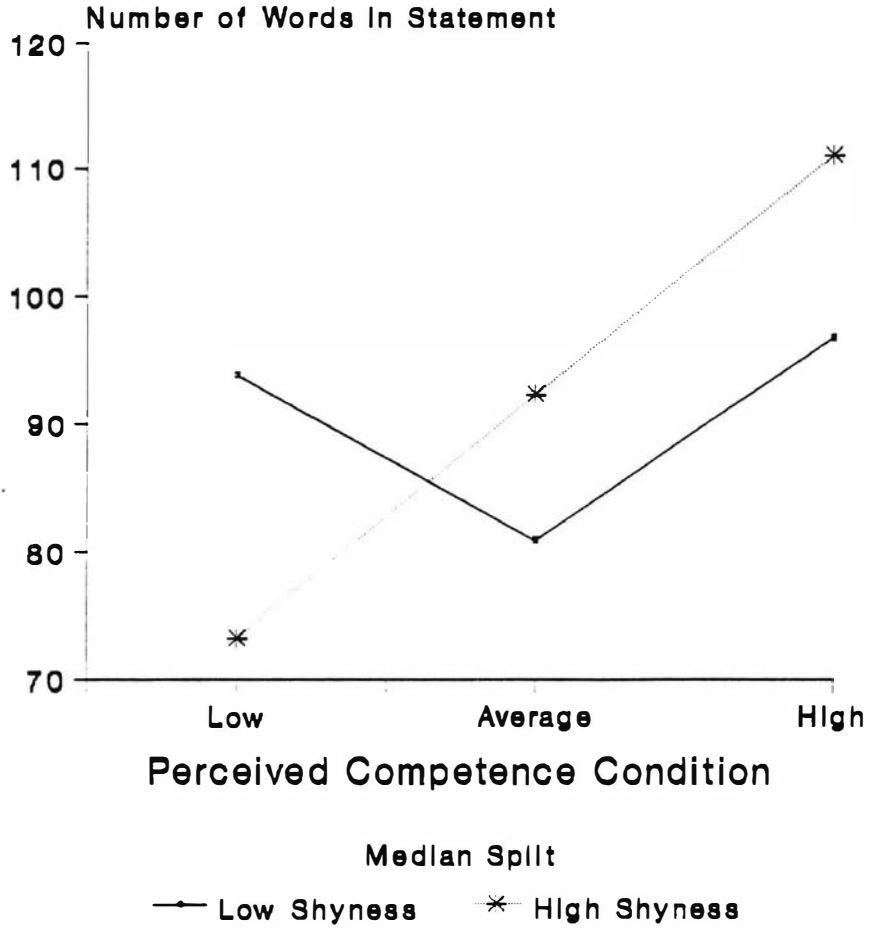


Figure 2 - Mean number of words in the taped statement for a median split of shyness in each competence condition



Perceived competence also did not significantly affect the responses to any of the self-reported measures of brainstorming performance, all *p*'s>.15. Consistent with the means for actual performance, the means for the subjects' self-reported evaluation of their brainstorming performance were consistent with the expected main effect of the perceived competence manipulation (Means for the self-report responses are in Table 3).

Unlike perceived competence, shyness was found to have a number of significant effects on the subjects' perceptions of their work and group. Consistent with the finding for actual number of solutions generated, subjects higher in shyness tended to report generating fewer solutions, 2.63, relative to their other group members, 3.05, $F(1,96)=8.09$, $p<.01$. Why was this the case? Based on self-reported responses to the pre-discussion questionnaire, those higher in shyness, as compared to those lower in shyness, were more likely to withhold solutions they felt others might disagree with, higher shyness M=1.74 vs. lower shyness M=1.26, $F(1,96)=10.25$, $p<.01$, and to leave the work of generating solutions to the other group members,

Table 3. Mean Self-Reported Evaluation of Brainstorming Performance for Each Perceived Competence Condition

Question	Perceived Competence Condition Low	Ave	High
How many solutions relative to group members?	2.65	2.79	3.08
Times I did not write an idea down because I thought it was dumb.	2.03	2.09	1.56
Withheld ideas others might disagree with.	1.53	1.61	1.36
How motivated to generate ideas?	3.24	3.03	3.81
Left most of the work to the other group members.	2.18	2.12	1.80
How satisfied with group?	3.58	3.42	3.49

higher shyness M=2.33 vs. lower shyness M=1.74, $F(1,94)=9.93$, $p<.01$. Subjects higher in shyness also tended to report less satisfaction with the performance of the group itself, higher shyness M=3.33 vs. lower shyness M=3.65, $F(1,92)=4.62$, $p<.05$. These findings are consistent with previous research examining shyness and brainstorming (Bradshaw et al., 1992).

Taped Statements

The process of making the taped statement required two different tasks from the subjects. First, the subjects had to select one solution as the 'best', taking into account that the solution would be seen by a group of relative strangers. Secondly, the subject must present the solution and argue for its merits. These two dimensions were addressed by analyzing the 'best solution' itself and the statement arguing for that solution.

Best Solution. The effects of shyness and perceived competence on the subjects' selection of their best solution was assessed by examining the creativity and potential controversiality of the chosen solution. Analysis of the chosen solution revealed no significant effects on the creativity of the chosen

solution, shyness $p=.11$ all other p's$>.90$, or the potential controversiality of the chosen solution, p's$>.85$.

It appears likely that individuals' evaluation of their solutions will affect how they present those solutions; therefore, subjects were also asked on the pre-discussion questionnaire to indicate their confidence in the quality of the chosen solution. Analysis of this self-report question again revealed a significant effect for shyness, $F(1,96)=5.39$, $p<.05$, but no effects for perceived competence. The shyness effect showed that subjects higher in shyness tended to be less confident in the quality of their solution, 3.21, than those lower in shyness, 3.67.

Evaluations of the Statement. The effects on the taped statement itself were assessed via the number of words, pauses, 'flubs', and disclaimers in the statement as well as through evaluation of the impressions conveyed by the speaker and length of time spoken. The subjects' experience and evaluation of the statement was also addressed by several questions on the pre-discussion questionnaire.

Quantitative Aspects. Analyses of the actual amount of time spoken did not reveal either significant main effects or interactions for shyness or perceived competence, F's>.65. The number of flubs and pauses a speaker makes will necessarily be related to the length of the speaker's statement. Therefore, the analyses of the number of flubs and number of pauses used the time of the taped statement as the covariate. Analysis of the number of pauses revealed a marginal effect for perceived competence, $F(2,85)=2.33$, $p=.10$. Subjects paused more in the high self-competence condition, 4.02, than the average, 2.18, or low, 2.85, self-competence conditions. This finding is contrary to what was expected. No significant differences were found for the number of flubs, p's>.55.

Disclaimers. While previous research had found persons higher in shyness tended to use more disclaimers in a written statement defending a given position (Arkin & Schumann, 1983), the current research found few examples of disclaimers in the taped statements. The scarcity of disclaimers makes statistical analysis impossible, nor is there any

distinguishable pattern allowing a descriptive analysis. The eight disclaimers are shown in Appendix H.

Qualitative Aspects. Analyses of the ratings of the taped statements revealed several effects for shyness, but no effects for perceived competence or interactions, p's>.35. Speakers were rated higher in confidence when they were low in shyness, 3.39, as compared to when higher in shyness, 3.13, $F(1,85)=4.41$, $p<.05$. The speakers were also rated as believing in the quality of their solution more when they were lower in shyness, 3.68, as compared to when they were higher in shyness, 3.44, $F(1,85)=3.90$, $p<.05$. The significant effect for shyness on the interest of the speaker, $F(1,85)=4.97$, $p<.05$, revealed those higher in shyness were rated as less interested in the task, 3.07, than those lower in shyness, 3.41.

Self-Reported Evaluations and Affect. These analyses did not reveal any significant main effects for perceived competence, all p's>.30, nor any significant interactions, all p's>.35. While not significant, examination of the means for perceived competence condition were consistent with the expected

main effect for perceived competence. The means, however, did not suggest any 'potential' interaction between shyness and perceived competence on these questions. Analyses did reveal that subjects higher in shyness, as compared to those lower in shyness, reported less comfort when making the tape, 2.67 vs. 3.39, $F(1,94)=7.18$, $p<.01$, expected to be more uncomfortable when the tape was played, 3.64 vs. 2.80, $F(1,94)=14.47$, $p<.001$, and believed their statement would be less effective in convincing the other group members to adopt their solution, 2.28 vs. 2.91, $F(1,96)=13.56$, $p<.001$.

Group Discussion

The pre-discussion questionnaire contained several questions pertaining to the impending discussion. One would expect that attitudes the subjects hold about the discussion and their expected performance in it would affect their behavior, if the discussion actually occurred. As in previous analyses, the effects for perceived competence were not significant but the means were in the expected direction. Table 4 contains the means by perceived competence condition for discussion related questions. Also as in previous analyses,

Table 4. Mean Self-Reported Expectations Regarding Group Discussion for Each Perceived Competence Condition

Question	Perceived Competence Condition Low	Ave	High
I am looking forward to the group discussion.	3.06	2.97	3.43
How active do you think you will be in discussion?	3.36	3.27	3.86
How strongly will you argue for your solution?	2.94	2.97	3.56
How effective in influencing the other group members?	2.97	3.06	3.40
How likely your group to select your solution?	2.35	2.30	2.89

several significant main effects for shyness were found. Not surprisingly, analyses revealed subjects higher in shyness reported looking forward to the discussion less, 2.66, than subjects lower in shyness, 3.65, $F(1,94)=29.80$, $p<.001$. Subjects higher in shyness also reported expecting to be less active in the discussion, 3.01, as compared to those lower in shyness, 3.97, $F(1,94)=34.23$, $p<.001$, to argue less strongly for their solution, 2.81 vs. 3.53, $F(1,96)=13.17$, $p<.001$, and, when they did participate, to be less effective in influencing others, 2.85 vs. 3.41, $F(1,94)=25.70$, $p<.001$. Given these expectations regarding participation and effectiveness, it is understandable that those higher in shyness reported that they expected their group to be less likely to select their solution, 2.30, as compared to those lower in shyness, 2.73, $F(1,96)=6.36$, $p<.01$.

Summary

Perceived competence did not significantly affect the qualities measured. The only effect consistent with the hypotheses of the study regarding the interaction between perceived competence and shyness was the high in shyness / high self-competence subjects

using more words in their taped statement than all other subjects. However, the results of the analyses did generally demonstrate the negative effects of shyness on brainstorming performance, self-evaluation of that performance, confidence in presenting ideas, and expectations regarding participation in group discussions.

What of Perceived Competence?

The lack of support found for the hypotheses concerning the interaction between shyness and perceived competence is troubling, but not as troubling as the lack of significant main effects for perceived competence. If the effect for perceived competence was not significant, then it suggests the shyness and perceived competence interaction was not adequately tested. Previous research on brainstorming (Collaros & Anderson, 1969) had found that members of brainstorming groups generated fewer ideas and reported greater inhibition when told the other group members were experts on the particular topic. Similar effects had been found for competence in other tasks (Brown & Garland, 1971; Garland & Brown, 1972; Jackson & Latane', 1981). Based on these findings, subjects in

the low self-competence condition, regardless of their level of shyness, should have generated significantly fewer solutions, but no significant differences were found. Why?

One important point to note is that all of the means were in the direction expected for the perceived competence manipulation. This includes the number of solutions generated, as well as all of the self-report responses. In a research project, one isolated not-significantly-different pattern of results suggests nothing. However, a consistent pattern shown across different dependent variables, collected at different points in time, and measuring actual behavior in addition to self-report responses, does suggest something. In this instance, it suggests the perceived competence manipulation did produce the results expected, but, for some reason or reasons, those differences did not reach significance. There are a number of possible reasons why this might be the case.

Was the manipulation itself ineffective? The manipulation check, at least in term of affective responses and predicted performance, supports the efficacy of the manipulation as do the pattern of mean

differences discussed above. However, it seems likely the manipulation was not effective enough. Referring back to the manipulation check, the differences between the extreme conditions, typically, were significant but the average condition tended to not be significantly different from the two extreme conditions. A stronger manipulation which distinguishes more clearly between the conditions is needed.

Another shortcoming highlighted by the manipulation check were the differentially low reports of belief in the accuracy of the low self-competence feedback relative to the other two feedback conditions. Perhaps more importantly, the overall mean across the feedback conditions for the rated accuracy of the feedback was 3.04 on a 5-point scale. While the manipulation altered the subjects' affective responses, it may be the case that the feedback must be perceived as accurate so as to alter the subjects' behavior. To test this, additional analyses were performed with only the subjects rating the accuracy of the feedback as '4' or '5' (High belief subjects).

High Belief Subjects. Approximately one-third of the subjects were 'high belief' subjects: 17 in the

high self-competence condition, 13 in the average self-competence condition, and 4 in the low self-competence condition. Given the small number of subjects in the low self-competence condition, that condition was dropped from these analyses. Shyness has been found to be correlated with low self-esteem and perceptions of lower academic ability (Cheek, Melchior, & Carpentieri, 1986; although no actual differences are found in academic ability, Traub, 1983), so it is possible that shyness may not be equally represented in this smaller sample because those higher in shyness rejected the above average feedback as inaccurate. Therefore, a one-way analysis of variance with perceived competence condition on shyness was performed which revealed no significant difference between shyness in the two groups, $p>.20$. All previously reported dependent variables were then reanalyzed using a 2 (average vs. high self-competence condition) X Shyness ANOVA with group size as a covariate.

The analysis of the number of solutions generated revealed a marginal effect for perceived competence condition, $F(1,25)=3.34$, $p<.10$, and a significant effect for shyness, $F(1,25)=9.33$, $p<.01$. No other

effects involving perceived competence were found, and only two other significant effects for shyness were found. Taking into account the low power in the current statistical test, the results suggest belief in the accuracy of the feedback likely played some role in the failure to find a significant main effect for perceived competence; however, other factors must also have been present.

Within-Group Variance. Another problem, especially in terms of the number of solutions generated, was the large within-group variability. Although efforts were made to limit the variability of the characteristics of the subjects themselves, the within-group variance for the number of solutions generated was still as large as that reported in other brainstorming research using different topics and groups where no special restrictions were placed on the subjects (for example, Dzindolet & Paulus, 1994; Paulus, Dzindolet, Poletes, & Camacho, 1993). Additional factors were also present in the current study which added to the within-group variance, including the time of day the sessions were conducted, the time during the semester when data was collected

(end of spring semester and beginning of fall semester), the level of academic ability of the subjects, and the size of the group. Although the effects of group size were controlled statistically, the effects cannot be completely removed (Group size was only significantly related to the number of solutions generated and satisfaction with group performance. Analyses including group size into the full model revealed no new significant effects). Another reason for the large within-group variance might be the presence of an unaccounted for moderating variable. At this point it is not possible to measure the dependent variables more precisely, but the presence of a moderating variable may be considered.

Shyness and Sociability. Sociability refers to an individual's preference for activities involving other persons or a need to be with others (Cheek & Buss, 1981). Cheek and Buss (1981) found shyness to have the most negative effects on ratings of dyadic interactions when the person high in shyness was also high in sociability. The authors suggested that being high in shyness and high in sociability maximizes the approach-avoidance conflict involved with shyness. While other

researchers have not found this pattern (Arkin & Grove, 1990; Bruch et al., 1989), the moderating effects of sociability may exist in the present study where the perceived competence manipulation attempts to reduce the avoidance aspect of shyness; making those who want to approach able to do so. It is possible the effect hypothesized for perceived competence on the behavior of persons high in shyness, may only be present for those high in both shyness and sociability.

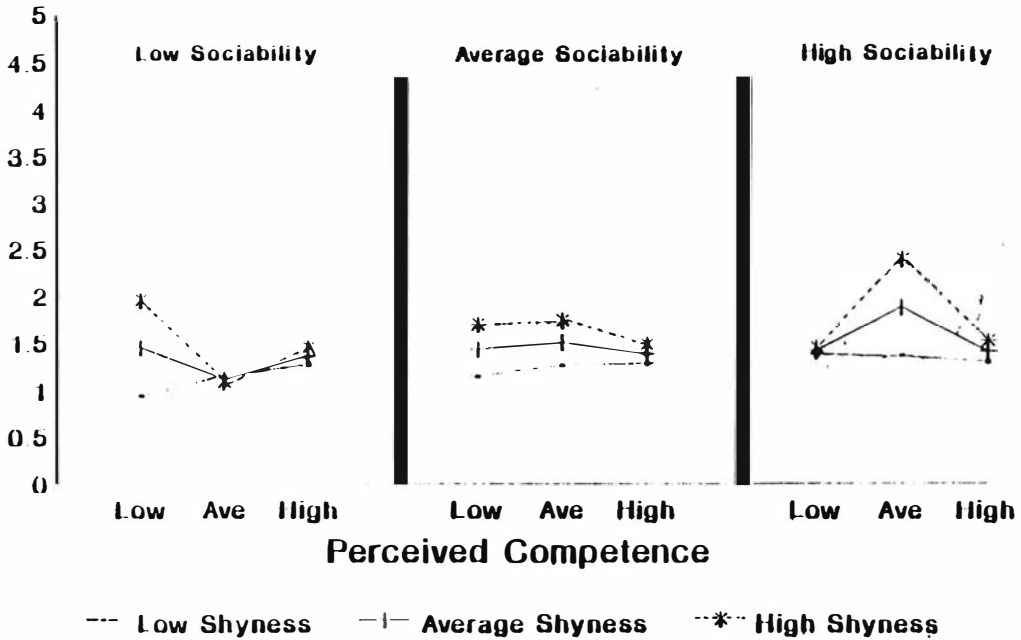
Sociability had been assessed using a 5-item measure developed by Cheek and Buss (1981) which was included as a part of the Group Attitude Inventory. The complete measure is shown in Appendix I. The mean and standard deviation for the current sample was 3.81 and 0.75 respectively. These values appear similar to those found in previous research: M= 3.78, s= .68 (Cheek & Buss, 1981). Internal consistency with the current sample, as measured using Cronbach's alpha, was .74. Again, almost the same value as in previous research: alpha = .70 (Cheek & Buss, 1981). All previous analyses of the dependent variables were repeated with the inclusion of sociability into the model. The analyses including sociability did not

reveal any support for a perceived competence X shyness X sociability interaction for the number of ideas generated, the qualitative or quantitative ratings of the taped statements, or the ratings of the creativity and controversiality of the best solution. Significant two- and three-way interactions involving perceived competence were found for two self-report questions on the pre-discussion questionnaire. These are discussed below.

Analysis of the subjects' self-reported withholding of solutions revealed a marginally significant main effect for perceived competence condition, $F(2,90)=2.84$, $p<.10$, a marginally significant interaction between perceived competence and sociability, $F(2,90)=2.79$, $p<.10$, a significant interaction between shyness and perceived competence, $F(2,90)=6.48$, $p<.01$, and a significant three-way interaction, $F(2,90)=6.41$, $p<.01$. See Figure 3.

The analysis of subjects' self-reported nervousness/discomfort when making the taped statement revealed a significant main effect for perceived competence, $F(2,88)=4.13$, $p<.01$, significant two-way

Figure 3 - Predicted means of three-way interaction for reports of withholding solutions others might disagree with.

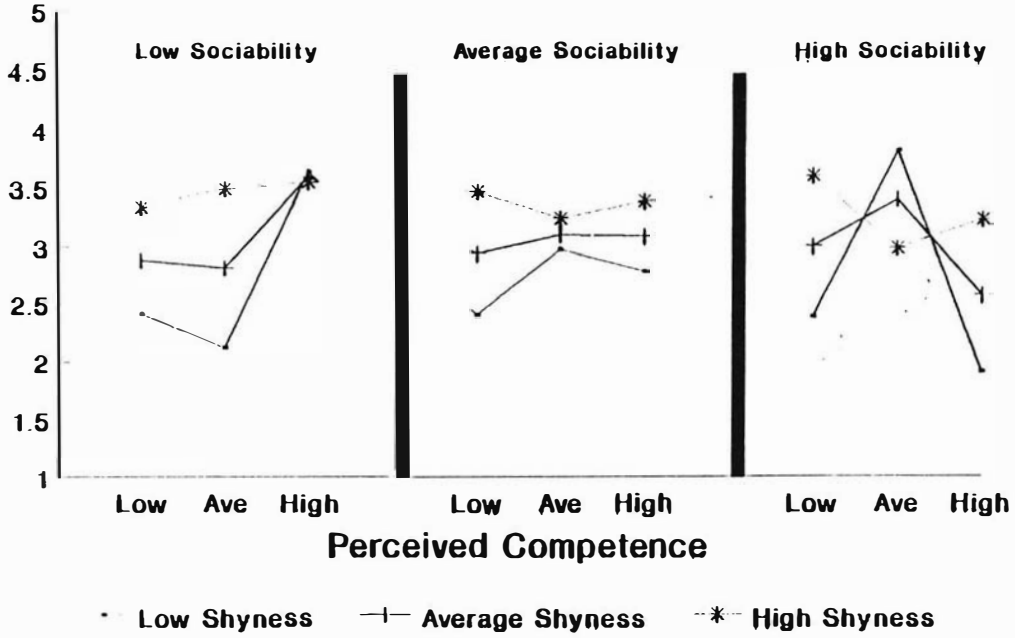


interactions between shyness and perceived competence, $F(2,88)=3.53$, $p<.05$, and sociability and perceived competence, $F(2,88)=5.04$, $p<.01$, and, finally, a significant three-way interaction, $F(2,88)=4.32$, $p<.01$ (The three-way interaction is graphed in Figure 4).

Neither of these interactions support the main hypothesis of the study, but they do demonstrate significant effects for the perceived competence manipulation. These analyses provide evidence that the large within-group variability plays a role in preventing significant main effects for perceived competence.

Incorrect Hypothesis? Research on clinical/counseling treatment interventions has begun to consider aptitude (characteristic of the subject/client) X treatment interactions because of the difficulty in finding significant main effects for treatments (Smith & Sechrest, 1991). Smith and Sechrest report researchers in this area experiencing many of the same problems encountered in the current study, including large within-group variance and the lack of significant main effects for treatments.

Figure 4 - Predicted means of three-way interaction for reports of discomfort experienced while making the tape



While Smith and Sechrest call for many of the same steps discussed here (more extreme manipulations, reducing variability, etc.), they also suggest considering that the hypothesis itself is incorrect. Dispositional characteristics are, by definition, relatively enduring and stable across situations. In the current situation, the robustness of shyness was clearly demonstrated by the repeated significant effects for shyness despite the large within-group variance. It may very well be that a situational manipulation, unless extreme, will not significantly alter behavior. However, as Smith and Sechrest point out, in such aptitude X treatment analyses one cannot expect a significant interaction with treatment when there is not a significant main effect for treatment. The issue of correctness of the hypothesis must wait for a stronger manipulation with a better control of error variance.

Conclusion

> "As someone who was a 'shy student' throughout my undergrad (sic) days and even well into grad (sic) school....an approach that helped a little bit was to have a teacher read to the class from something I had written....and to acknowledge me as the source - without asking me to make any verbal comment to the class. This let me know that the teacher valued my work and increased my confidence a bit. But I need to add that nothing worked very well for me except simply growing in the field and becoming more confident with time, experience, etc....I'm really pretty chatty now, in meetings with colleagues and even on Internet discussion groups, so the shyness was not a permanent condition (N. Evans, personal communication, February 1, 1994)."

The knowledge that one's work is valued and worthy of merit, as well as the concept of 'growing in the field', are apt descriptions of the meaning of

perceived competence. In many ways, the manipulation in the present research let subjects in the study know whether their contributions to the group brainstorming activity would be especially valued, equivalent to the contributions of others, or woefully inadequate. As stated in the quote above, it appears from the results of the study that the manipulation "helped a little bit."

Consistent with the hypothesis regarding the interaction between shyness and perceived competence, subjects high in shyness in the high self-competence condition did speak more in defense of their solution when making the taped statement than subjects in any other condition. However, subjects higher in shyness in the high self-competence condition did not generate more solutions overall, rather they generated approximately the same number of solutions as subjects lower in shyness in the low self-competence condition. The data revealed no evidence of this hypothesized interaction for the number of solutions generated, rather it suggested two separate main effects for shyness and perceived competence (although the effect for perceived competence was not significant).

Consistent with the hypothesis regarding shyness itself, subjects higher in shyness generated significantly fewer solutions as compared to those lower in shyness. This lower performance was also reflected in the self-reported evaluation of brainstorming performance, where subjects higher in shyness, as compared to subjects lower in shyness, expected to have generated fewer solutions than others in their group, withheld solutions others might have disagreed with, left most of the work to others in the group, and were less satisfied with the performance of the group. Inconsistent with the hypotheses regarding shyness itself, there were no differences due to level of shyness for the amount spoken in defense of the solution in the taped statement. Unfortunately, too few disclaimers were used in any of the statements to allow an analysis of the effect of shyness. While shyness did not relate to the length of the taped statement, it did affect self-reports regarding the taped statement where subjects higher in shyness, as compared to those lower in shyness, were less confident in the quality of their solution, felt the tape would be less effective in influencing the other group

members, were more uncomfortable making the tape, and expected to be more uncomfortable when the tape was played. The high shyness subjects' concerns about the tapes appeared to be justified, as speakers higher in shyness were rated as sounding less confident, less interested, and less convinced of the quality of their own solution than those lower in shyness. Expectations regarding the group discussion were also affected by shyness where subjects higher in shyness reported expecting to participate less in the discussion, be less effective, argue less strongly for their solution, and expected their solution to be less likely selected by the group. These findings are consistent with the hypotheses and consistent with previous research (Bradshaw & Stasson, 1993; Bradshaw et al., 1992).

Null findings always create a problem of interpretation. Is the failure to reject the null hypothesis caused by an inadequate manipulation of the independent variable(s), an imprecisely measured dependent variable(s), the presence of a moderating variable not controlled/included, or is the alternative hypothesis simply wrong? The effort to untangle the findings typically includes examining manipulation

checks, examinations of means, the reading and rereading of journal articles, and the trying of alternative approaches to data analysis. In the present study, the results of the reexamination pointed out a number of shortcomings in the current study which need to be addressed. The manipulation check revealed subjects tended to not be convinced of the accuracy of the feedback, and analysis of just the believers of the feedback suggested this may be important to create the desired effect. Similarly, the manipulation did alter the self-reported affect of the subjects, but not reliably so between all three feedback conditions. Efforts to find significant effects were also hampered by large amounts of within-group variance, particularly for actual brainstorming performance. Outside of the research on shyness and social anxiety discussed within this paper, there has been little research on what produces this large within group variability in brainstorming performance (Mullen, Johnson, & Salas, 1991). Further studies on shyness and perceived competence in the context of brainstorming (not to mention research on brainstorming) need to address this issue. Specific to the present study, within-group

variability was likely increased by factors such as group size, the academic ability of subjects, and the time when data was collected. Future research should address these issues. Also, moderating variables, such as sociability, need to be examined.

Favored Topics

Where does this study leave the concept of favored topics and the dominance of the group discussion by those high in shyness? While a true test of the hypothesis must await a more effective manipulation, the effects which were seen and the pattern of means, taking into account perceptions of accuracy of the feedback and any moderating effects of sociability, did not provide a encouraging view of the correctness of the hypothesis. The only evidence reported to support the hypothesis that persons high in shyness will dominant the conversation when led to believe they are high in perceived competence on the particular task was a planned comparison examining the number of words in the tape recorded statement; an effect which was significant with a one-tailed test, but only marginally significant when using a two-tailed test. There were a number of instances reported where those high in

shyness and low in shyness do not differ when they were led to believe they were high in self-competence, but this is not what was stated by the original hypothesis, and, indeed, creates the problem of asserting the null hypothesis. Of course, the finding of the possibility of favored topics by Manning and Ray (1993) was essentially the description of a pattern amongst several outliers in a larger sample. Consideration of this prompted an examination of the outliers within the current study.

The most words used in the taped statement in this study was 253, almost 30 words more than the next nearest subject and almost three and a half standard deviations above the mean of 92 words. Examination of the shyness scale score of this subject revealed her mean score, 3.07, to be at approximately the 80th percentile in the distribution. This score would classify the subject as 'shy', but despite this and despite being in the low self-competence condition, she used the most words in her statement. This statement appears to be an example of a 'favored topic'. The subject's complete statement is shown in Appendix J. Reading the statement does not convey as clearly the

commitment and anxiety in the subject's voice as does listening to the statement, although these qualities are reflected in the ratings of the statement (Confidence=4, Nervousness=3, Quality=4, Interest=4), but it is still useful for suggesting what produced this particular outlier and possibly for suggesting the direction of further research on favored topics.

It is clear from reading or listening to the statement that the subject believed what she was saying. This particular topic, at least to the extent that it relates to the 'power structure', was something she had thought a great deal about. This would suggest that personal relevance and commitment to the topic would be important for producing this effect.

The speaker was also very confident that her position was correct. Indeed, there was almost a sense of self-righteousness in her statement: "...because this is the way it ought to be..." It may be that for a high-shy person to risk openly interacting, the person must be convinced what they will say is correct.

There also appeared to be a great deal of emotion in her statement, specifically negative emotion directed towards the polluters and those in power.

This might in some way be similar to the effects found for the misattribution, to some aspect of the situation, of the arousal caused by shyness (Brodt & Zimbardo, 1981). A person high in shyness will experience a great deal of arousal when placed in a situation requiring social interaction. If the topic being discussed is one that the person typically associates with emotional arousal, be it positive or negative, and the topic was somehow made salient, it would certainly seem possible that the reason for the arousal would be attributed to the topic and not the social interaction. This would also be consistent with Manning and Ray's report of the interaction as 'enthusiastic' and 'exaggerated'.

Final Words

Although heavily researched, there are many unanswered questions regarding the dynamics of shyness. The present study has contributed to our understanding of these dynamics and pointed the direction for further research. Future research on the effect referred to as 'favored topics' may produce results consistent with the original hypothesis and add a new dimension to our understanding of shyness.

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Appendix A

Experimenter's description of the Diagnostic Inventory of Creative Problem-Solving Ability and the nature of creative problem-solving:

"There are abilities that people have that they are very good judges of. Athletic ability is a good example. We all have an idea of whether we are a good or bad athletes, and we tend to be pretty accurate. Other abilities or characteristics, we are not particularly good judges of. Humor, for example. We have all known people who thought they were funny, who weren't, and people who didn't think they were funny, who were quite funny. Creative problem-solving ability seems to be one of those abilities we are not particularly good judges of. To give you an example, Thomas Edison, Albert Einstein, and others like them have all said at one time or another, in writings or interviews, that they didn't think of themselves as particularly good creative problem-solvers. But we look at the things they did, their accomplishments, and we say 'wait a minute, these are brilliant people, they're great creative problem-solvers.' Why do we

tend not to be good judges of this ability?

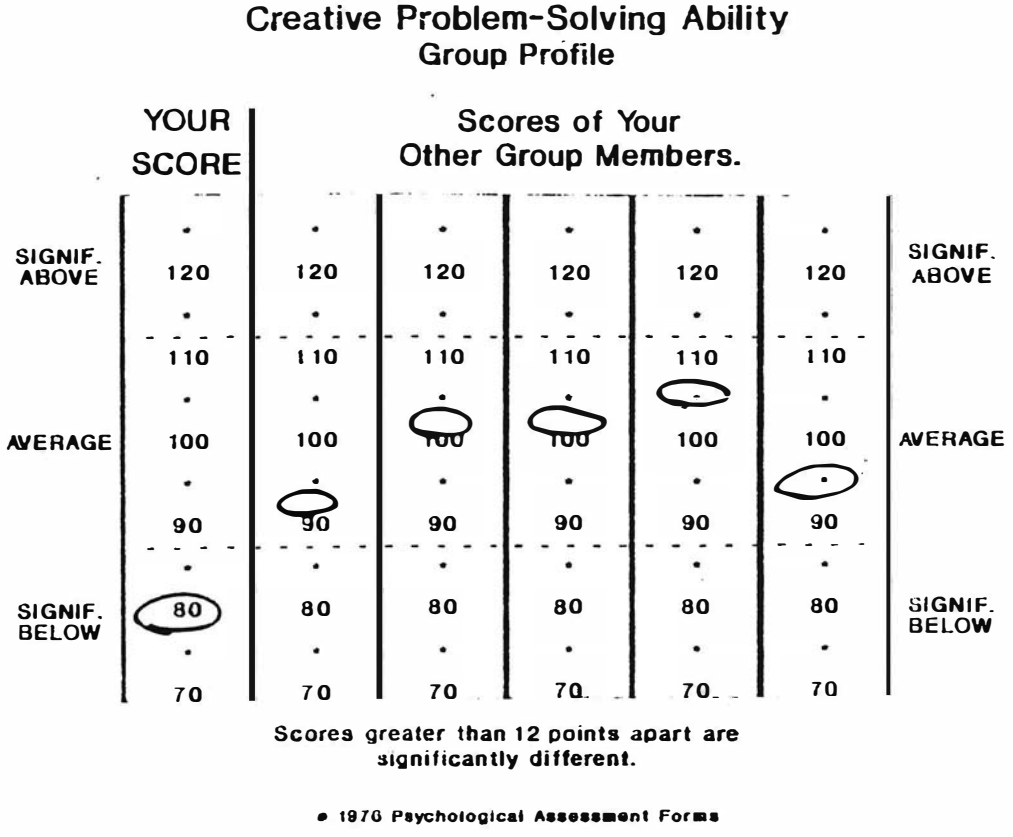
One of the reasons we are not good judges of our creative problem-solving ability is that we tend to think of creative problem-solving in terms of specific domains, or areas, of knowledge. Let me give you an example; its a silly example but it makes the point. Do you remember the old TV show Macgyver? In every episode there was always some cliffhanger. For example, he'd be at the bottom of a cliff and a boulder would be falling on him. Oh, no, he's going to be killed. But wait, I can take this inkpen I have and this drink can - take the spring out of the pen, combine these chemicals, put them in the can and make a bomb. He does and, of course, blows up the boulder. And you watch that and think to yourself: Wow! What a great creative problem-solver. I never would have thought of that; I must not be a good creative problem-solver. But it's not so much creative problem-solving ability as it is knowledge. You very well may have come up with the solution if you had the knowledge of chemistry and physics - that the contents of a inkpen could make an explosive.

These two reasons, that we are not particularly good

judges of our creative problem-solving ability, and we tend to think of creative problem-solving in terms of specific domains or areas of knowledge, are the reasons why the Diagnostic Inventory of Creative Problem-Solving Ability was developed. As you probably noticed, the measure was very general, it did not ask you for specific knowledge on subjects - it measured creative problem-solving independent of specific domains of knowledge.

I should also say that this measure is the most commonly used measure of creative problem-solving ability; its used by colleges, universities, and high schools, and used by a number of businesses and organizations as part of applicant screening. For example, Nintendo uses this measure as part of their application process. So, if you apply for a job with Nintendo you will see this measure again."

Appendix B


Creative Problem-Solving Ability
Group Profile
YOUR SCORE
Scores of Your Other Group Members.
SIGNIF. ABOVE
AVERAGE
SIGNIF. BELOW
120
110
100
90
80
70
Scores greater than 12 points apart are significantly different.
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Appendix C

Pre-Brainstorming Questionnaire

SUBJECT NUMBER: _____

1. Circle the number which is closest to YOUR Creative Problem-Solving Ability (CPSA) Score.

75 80 85 90 95 100 105 110 115 120 125 130

2. What would you estimate is the AVERAGE CPSA-Score of your other group members?

75 80 85 90 95 100 105 110 115 120 125 130

3. How accurate do you think your CPSA Score is?

1	2	3	4	5
Not at all Accurate				Very Accurate

4. How many solutions do you think you will generate relative to your other group members?

1	2	3	4	5
Many Fewer Solutions				Many More Solutions

5. How creative do you think your solutions will be as compared to your other group members?

1	2	3	4	5
Much Less Creative				Much More Creative

For numbers 6-17, circle the number on the continuum between the two adjectives which best describes how you feel at this moment.

6.	Serious	1	2	3	4	5	6	7	Cheerful
7.	Calm	1	2	3	4	5	6	7	Anxious
8.	Confident	1	2	3	4	5	6	7	Doubtful
9.	Energetic	1	2	3	4	5	6	7	Not Energetic
10.	Nervous	1	2	3	4	5	6	7	At Ease
11.	Dominant	1	2	3	4	5	6	7	Submissive
12.	Warm	1	2	3	4	5	6	7	Cold
13.	Pressured	1	2	3	4	5	6	7	Not Pressured
14.	Competent	1	2	3	4	5	6	7	Incompetent
15.	Comfortable	1	2	3	4	5	6	7	Self-Conscious
16.	Agreeable	1	2	3	4	5	6	7	Dis-agreeable

Appendix D

Form provided to subjects for the purpose of recording their best solution.

Directions: Read over the solution you generated, select your one best solution, and record that solution below. Be thinking about why you feel your solution is the best and how to communicate those reasons to your group in the tape recorded statement.

Subject Number: _____

Your Best Idea: _____

_____

_____

_____

_____

Appendix E

Pre-Discussion Questionnaire

1. How confident are you that your chosen solution is a good one?

1	2	3	4	5
Not at all Confident				Very Confident

2. How effective do you think your tape recorded statement will be in convincing the other group members to select your solution?

1	2	3	4	5
Not at all Effective				Very Effective

3. How many ideas do you think you generated relative to the other group members?

1	2	3	4	5
Many Fewer Ideas				Many More Ideas

4. There were times I didn't write an idea down because I thought it was dumb.

1	2	3	4	5
Strongly Disagree				Strongly Agree

5. I withheld some ideas because I thought others in the group might disagree with them.

1	2	3	4	5
Strongly Disagree				Strongly Agree

6. How motivated were you to generate ideas?

1	2	3	4	5
Not at all Motivated				Very Motivated

7. How likely is it that your group will select your solution as the best?

1	2	3	4	5
Not at all Likely				Very Likely

8. How strongly do you think will you argue for your solution?

1	2	3	4	5
Not at all Strongly				Very Strongly

9. How active do you think you will be in participating in the group discussion?

1	2	3	4	5
Not at all Active				Very Active

10. I was not uncomfortable or nervous when making the tape.

1	2	3	4	5
Strongly Disagree				Strongly Agree

11. Having the tape played in front of the other group members will make me feel uncomfortable.

1	2	3	4	5
Strongly Disagree				Strongly Agree

12. I am looking forward to the group discussion.

1	2	3	4	5
Strongly Disagree				Strongly Agree

13. I left most of the work of generating ideas to the other group members.

1	2	3	4	5
Strongly Disagree				Strongly Agree

14. How satisfied are you with your group's performance so far?

1	2	3	4	5
Not at all Satisfied				Very Satisfied

15. How effective do you think you will be during the group discussion in influencing the other group members?

1	2	3	4	5
Not at all Effective				Very Effective

16. Did you know as a friend any of your other group members prior to this experiment? [CIRCLE ONE]

YES NO NOT SURE

Appendix F

Shyness Scale

Instructions: Indicate, using the scale below, to what extent you agree or disagree with each of the following items.

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

1. I feel tense when I'm with people I don't know well. ___
2. I am socially somewhat awkward. ___
3. I do not find it difficult to ask other people for information. ___
4. I am often uncomfortable at parties and other social functions. ___
5. When in a group of people, I have trouble thinking of the right things to talk about. ___
6. It does not take me long to overcome my shyness in new situations. ___
7. It is hard for me to act natural when I am meeting new people. ___
8. I feel nervous when speaking to someone in authority. ___
9. I have no doubts about my social competence. ___
10. I have trouble looking someone right in the eye. ___
11. I feel inhibited in social situations. ___
12. I do not find it hard to talk to strangers. ___

13. I am more shy with members of the opposite sex. ___

14. During conversations with new acquaintances, I worry about saying something dumb. ___

Appendix G

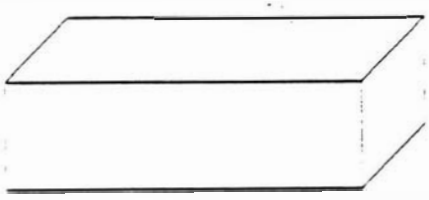
Diagnostic Inventory of Creative Problem-Solving Ability

Pancoast and David
Harvard University

PART ONE

INSTRUCTIONS: In the space provided below, list 5 uses for the following object. Try to make the uses as creative and original as you can. The uses do not have to be practical.

A BRICK

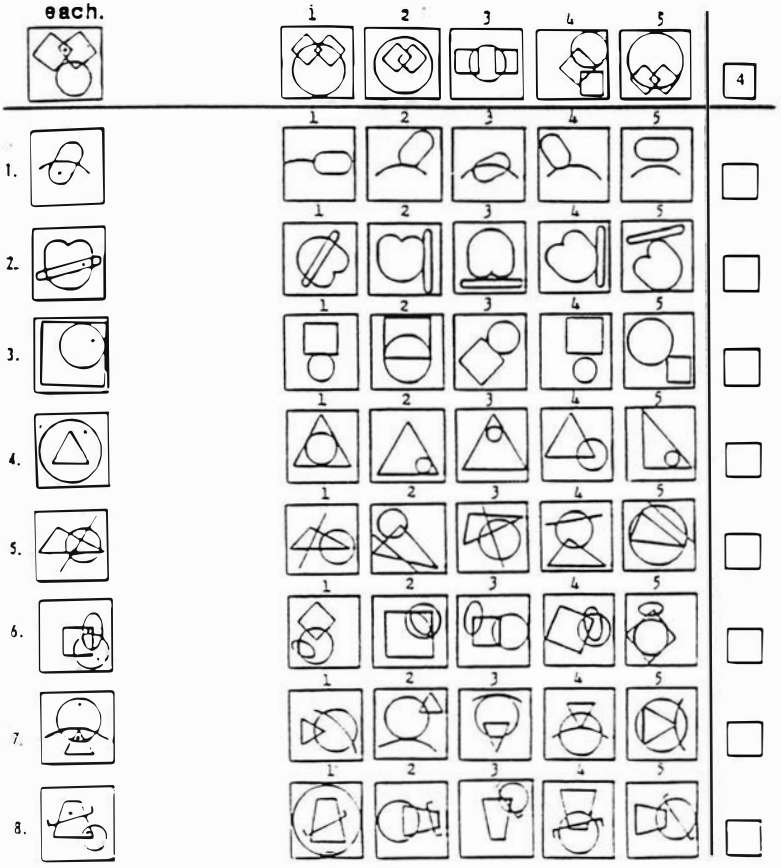


Below, Write Your 5 Creative Uses for a Brick:

Continue to Next Page

PART TWO

INSTRUCTIONS: Select the figure from the 5 boxes on the right which best satisfies the conditions for placement of the dot as shown in the target box. For example, in the sample problem the dot is placed within the two squares but outside of the circle. Which of the five satisfies those conditions? Write your answers in the box to the right. There is only one correct answer for each.



continue to next page

PART THREE

INSTRUCTIONS: Combine the three objects below into a single recognizable shape or pattern. Draw the new object and label what it is in the space provided.

End of the Inventory

Appendix H

Sin Licenses

Subject 684, High Self-Competence, Shyness = 2.50

"People don't really like to tax things, but I think that by having like a kind of money..."

Subject 714, Average Self-Competence, Shyness = 2.42

"It may be a little bit inconvenient at first; however, in the end, it will only benefit our world..."

Subject 718, High Self-Competence, Shyness = 2.14

"It might not be the most humane way, but that's just the way I see it.

Cognitive Disclaimers

Subject 637, Low Self-Competence, Shyness = 2.00

"It seems crazy, but it can work."

Subject 682, Low Self-Competence, Shyness = 1.14

"Although my solution may not be extremely realistic, I think it would be fun and creative.

Hedging

Subject 653, High Self-Competence, Shyness = 1.14

"I'm not sure what research has been done on this, but I believe there are ways to harness the power during the night..."

Subject 742, High Self-Competence, Shyness = 2.79

"My best solution, or what I think is my best solution, is you could have every person who is consuming energy..."

Subject 900, Average Self-Competence, Shyness = 2.93

"I just thought it was an interesting concept, because I've heard about it talked about on the news and stuff like that, so I just thought it would be interesting to do something like that."

Appendix I

Sociability Scale

Instructions: Indicate, using the scale below, to what extent you agree or disagree with each of the following items.

1	2	3	4	5
Strongly Disagree		Neutral		Strongly Agree

1. I like to be with people. ___

2. I welcome the opportunity to mix socially with people. ___

3. I prefer working with others rather than alone. ___

4. I find people more stimulating than anything else. ___

5. I'd be unhappy if I were prevented from making many social contacts. ___

Appendix J

Subject 910's 253-Word Statement in Defense of Her Solution (Low Self-Competence Condition, Shyness Mean=3.07):

"My best solution is to enact laws requiring corporate executives to be exposed to the containments which their companies' release and I feel it's the best solution because the sheer urge for self-preservation and for fear of being harmed will keep these executives, you know, making sure that their company's are in the forefront of not polluting. And that a lot of times people, who the containments are released to...communities normally that are politically weak, like those inhabited by lower socioeconomic groups, and I feel that if these wealthy and powerful people are running the same risks there would be more action taken by them because they're the ones who have the power and if their trying to save their own neck they'll make sure we're not at risk either. Basically, they're just going to have to run the same risks as everybody else because of the things their company's are doing. And I think you'll just see the research and development of safety for like, filtering out pollutants in the air etc., to just skyrocket and we will just have

the....virtually an end to pollution. The only problem is, to enact something like this in our kind of current...the way politics run right now, it really wouldn't work but I'm speaking as if those problems were taken away - the corruption and the power structure - because this is the way it ought to be and it's a more equal form. Well, and it would be very effective, too. Very effective."

Vita

[redacted]