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THE EFFECTS OF SOLO STATUS ON THE PERFORMANCE
OF MALE AND FEMALE SOLOS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy
in the Graduate School of the Ohio State University

by

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*****

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ABSTRACT

Individuals experience solo status when they find themselves to be the only member of their social category (e.g., gender) present in a group. Previous research on solo status has indicated that solos experience cognitive deficits relative to nonsolos. For example, solos remember less about a group discussion than nonsolo group members. Such effects are proposed to be mediated by increases in anxiety associated with solo status. We suggested that the effects of solo status may differ depending on the stereotypes associated with the solo. Because females are stereotyped as poorer academic performers than males, we predicted that solo status may have a greater impact on the performance of female solos over male solos. Two experiments tested whether a) solo status has a greater effect during the encoding or retrieval of information; and b) solo status has a differential impact on males and females, due to the different stereotypes associated with gender. Results of Experiment 1 suggested that solo status had a uniform effect on males and females when experienced during encoding, and a differential effect when experienced during retrieval: the performance of solo females was more profoundly impacted than the performance of solo males. In addition, females reported increases in anxiety levels as solos over nonsolos, and this anxiety predicted poor performance when solo status was experienced at retrieval. Experiment 2 assessed stereotype activation prior to encoding and retrieval, in order to test whether the activation of stereotypes mediates the effects of solo status on performance. Results showed a partial replication of the performance and anxiety patterns obtained in Experiment 1. Contrary to predictions, stereotype activation was related to
good performance as opposed to poor performance in females. It was suggested that future research focus on clarifying the role of stereotype activation in producing these effects, and more fully investigate the effect of anxiety on the performance of male and female solos.
ACKNOWLEDGMENTS

I would like to express my gratitude to Dr. William von Hippel for being my advisor and teacher as well as close friend. Without his guidance and patience, my work would have been much more difficult. With his endless encouragement and faith in my ability, my personal dreams and academic goals are being fulfilled. I would also like to express my appreciation to Dr. Marilynn Brewer for co-chairing my dissertation committee along with Bill von Hippel, and to thank her especially for her expertise in helping me conduct what has been a complex but quite compelling research project. I also extend thanks to John J. Skowronski, for his willingness to serve on my dissertation committee and for always providing numerous insightful comments in the development of this and many of my other research projects. I also thank Ryan Busci for devoting endless hours helping me conduct this project, and Larry Campbell for providing valuable technical support. My thanks are also extended to the members of the OSU Social Cognition Research Group for their helpful suggestions and constructive comments.
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CHAPTER 1

INTRODUCTION

"The Citadel says the lone wolf won't make it. I had no hope of being part of the pack... knowing my every move would be watched, that was hard."

Shannon Faulkner, on her decision to leave the Citadel, Ms. Magazine, January/February, 1996.

As much as we want to believe that our abilities and skills will manifest themselves in our performance in any given situation, our audience has a greater impact on us than we would like. A well-rehearsed concert pianist may find her fingers frozen in place during her debut recital, or a well-trained actor may find himself tongue-tied under the glare of the spotlights (see Zajonc, 1965, 1980, for a discussion of social inhibition effects; see also Martens & Landers, 1972). While some performances are impeded by the mere presence of an audience, however, it may often be the case that an actor's performance depends on the perceived expectancies held about the actor in the minds of the audience. For example, an "A" student may be expected to produce a stellar presentation in class, while a "D" student may be expected to give yet another dull performance; both may live up to these expectations (Rist, 1970; Rosenthal & Jacobson, 1968). Of course, a discrepancy in ability between "A" and "D" students could account for differences in their classroom performance. But what of the case in which the performance of highly capable people is hindered by the negative expectations of others? Consider Shannon Faulkner's plight. Her ability to succeed in a military academy was widely regarded as being comparable to that of the other
members of her class, yet she experienced great difficulty functioning in this hostile atmosphere. The question arises: Would Shannon have faltered in a co-ed or even all-female military school? More fundamentally, is there perhaps something special about being the only member of one's gender present in a group, and can this produce performance deficits? In this paper, we seek to answer this question, and to explore more fully the effects on performance of being the "odd man out," or a solo, in an otherwise homogenous group.

Solo status is defined here as being the only member of one's social category in an otherwise homogenous group (Lord & Saenz, 1985; Lord, Saenz, & Godfrey, 1987; Saenz & Lord, 1989). This includes being the only African-American in a group of Caucasians, the only 20-something in a group of senior citizens, and the only female in a group of males. As such, there can be race solos, age solos, and gender solos, among others (Fiske & Taylor, 1991). One of the key elements in defining solo status is context: While a female may not be a solo in the context of a mixed-gender English class, she may be a solo in the context of an all-male engineering class. Solo status, then, always occurs relative to a broader social context (Fiske & Taylor, 1991). As such, solo status should be understood as a situational condition, and not necessarily a chronic state, or stigma (Goffman, 1963; Frable, Blackstone, & Scherbaum, 1990; Crocker, Major, & Steele, in press).

The experience of being a solo may take on a special meaning when the solo is perceived as not worthy of being in the group, as in the case of tokenism (Morland, 1965; Lord & Saenz, 1985). Tokens are perceived as being present in the group due solely to their social category membership rather than their own merit, as when institutions hire one or two "token Blacks" in response to social pressure toward integration. The term "solo", on the other hand, does not imply that the solo was placed in the group by virtue of race or gender, but rather that the individual has simply
found him or herself to be the only member of the social category present. The experience of being a solo may be more common than being a token. Furthermore, token status is more likely to affect members of underrepresented groups, who are uniquely qualified to fulfill race or gender-based quotas, while members of majority and minority groups may experience solo status. In any case, the experience of being the "odd man out" in a given situation can have profound effects on the individual, regardless of perceptions of the person's worthiness or appropriateness in the group. Therefore, the focus of this paper will be on solo status as opposed to token status, with the implication that the reported effects may hold for tokens as well as solos.

Much of the previous work concerning solo status falls into two general categories: 1) how solos are perceived by observers; and 2) how solo status impacts the solo's cognitive functioning.

*How solos are perceived by others*

Work in both cognitive psychology and in social cognition suggests that when one object is distinct from others, it attracts a lot of attention. For example, perceivers pay more attention to moving points of light or brightly patterned objects among stationary and dull objects (McArthur & Post, 1977). In the area of person perception, it has been found that perceivers focus more on highly salient others (Taylor & Fiske, 1978; McArthur, 1981). This social salience may be induced by being figural in a particular context (e.g., rocking in a chair within a group of stationary sitters), by violating expectancies (e.g., sitting quietly during a funny comedy show) or by being relevant to the perceiver's outcome (e.g., a foreman walking across the shop floor) (see Taylor & Fiske, 1991). Important for this discussion, social salience is in general aroused by novelty, such as when a person is different from the others in a given context, or a solo. Indeed, much research has indicated that solos attract more attention than do nonsolos (Saenz & Lord, 1985; Taylor & Fiske, 1978; Taylor, Fiske, Etcoff, &
Ruderman, 1978). The increased scrutiny induced by social salience, in turn, has far-reaching consequences for how the solo is perceived and remembered. For example, observers tend to have better recall of what solos say over what nonsolos say in a group discussion, due to the extra attention allotted to solos over nonsolos (Lord & Saenz, 1985; Taylor & Fiske, 1978; Taylor, et al., 1978). Novel targets of all kinds tend to be noticed more and remembered better than common stimuli (Taylor & Fiske, 1991), as a result of the increased attention paid to them.

The increased attention to and memory for solos may have an influence on the judgments and attributions made about the solo. This may be especially true if the perceivers encode information about solos differently than about nonsolos. When perceivers show bias in the way they process information about an individual, their subsequent evaluations of that individual may be also biased (see von Hippel, Sekaquaptewa, & Vargas, in press). If observers process information about solos differently than information about nonsolos, then evaluations of solos may be biased as well. Indeed, research indicates that solos do tend to be judged more extremely than nonsolos (Taylor et al., 1978). For example, when a solo interjects to make a point, that is seen as more pushy or rude than if a nonsolo did it.

In general, biases in information processing occur in order to support an existing belief or attitude (Lord, Ross & Lepper, 1979; Sherif & Hovland, 1961), to enhance the self (Arkin, Cooper, & Kolditz, 1980), or simply due to the activation of a relevant schema (Markus & Zajonc, 1985). The resulting judgments tend to be assimilated toward or contrasted away from a reference point or anchor (Sherif & Hovland, 1961). In the case of socially salient targets, such as solos, these judgments tend to be anchored by prior knowledge of the solo. For example, when previous information portends that an individual will be unfriendly, that person is judged as being even more hostile in a solo situation. Likewise, a person expected to be friendly and pleasant will
be rated even more positively as a solo than when a nonsolo (Taylor, et al., 1978; Taylor, Fiske, Close, Anderson, & Ruderman, 1977). As such, judgments about solos tend to be assimilated toward the initial expectation held about the solo. Indeed, it may often be the case that stereotypes held about the target serve as the anchor for these judgments (Linville & Jones, 1980).

In support of this view, research suggests that solos are perceived in stereotypic terms (Taylor, et al., 1978). This occurs because perceivers tend to use the solo's social category (e.g., gender or race) in processing information about the solo (Carver & de la Garza, 1984). This information is seen as the defining feature of the solo, and is therefore highly accessible. People generally judge others in terms of their most accessible feature: a Black female in group of Whites is judged in terms of her race, while a Black female in group of males is judged in terms of her gender (Taylor et al, 1978; see also Zarate & Smith, 1990). Thus, the behavior of a solo female is seen not only as highly exaggerated, but also as highly related to her sex, or highly female. Therefore, female solos are seen as being more stereotypically female than nonsolo females (Taylor et al, 1978). Additionally, the behaviors of the solo are seen as evident of the person's disposition, as opposed to being situationally induced (Fiske, Kenny, & Taylor, 1982). Therefore, solo status likely evokes general stereotype-based expectancies about the behaviors and capabilities of the solo.

In sum, past research has suggested that solos attract attention, are seen as more extreme than non solos, and tend to be judged in terms of their social category, and often stereotypically. The second general area of research on solo status focuses on the experience of the solo him or herself.

How solo status impacts the solo

Research on the experiences of solos in the workplace has often indicated that solos chronically underperform. Solo women and racial minorities in the workplace show
lowered job proficiency and lowered involvement in a group task (Hall & Hall, 1976; Garland & Price, 1977; Kanter, 1977). One explanation of the poorer performance of solos suggests that minority group members are treated differently by majority group members. For example, Word, Zanna, and Cooper (1974) found that in a job interview situation, White interviewers behaved more negatively toward Black applicants than toward White applicants. Confederate interviewers were then trained to simulate the negative behaviors previously exhibited toward Blacks, and used this negative interviewing style while conducting interviews with White applicants. These White applicants suffered as a result; independent judges rated the interviewees as less personable and less competent than White applicants not interviewed in this negative manner. These and other experiments (for reviews see Hilton & Darley, 1991; Snyder, 1992) suggest that the underperformance exhibited by tokens may be due to the effects of self-fulfilling prophecies. Token minorities, who are typically placed in lower status positions (Kanter, 1977) are perceived and treated as though they were less capable than their majority group member counterparts, which in turn negatively affects their own behaviors.

Other laboratory experiments have indicated that poor performance of solos may be induced simply by the experience of solo status, even when the solo is not treated differently by the rest of the group. Lord and Saenz (1985) conducted a series of experiments in this area, in which they manipulated solo status in the context of a group discussion. In these studies using gender solos, male and female subjects were led to believe that they were part of a group of either same-gender or opposite-gender members. The group members, each situated in separate rooms, could see and hear each other using a video communication system. In actuality, the subject was alone in the experiment; the other group members were presented on videotape over a monitor as though they were being broadcast live from other rooms. In this way, Lord and
Saenz (1985) were able to create solo and nonsolo conditions, by either showing the subject footage of other "discussion group members" of the same or the opposite gender. After a group exchange of opinions, subjects reported their memory for what each other group member had said during the group discussion.

Using this methodology, Lord and Saenz found that solos showed a memory deficit: Solos had poorer recall of who said what in the group discussion than nonsolos. In subsequent research it was demonstrated that deficits occur not only in memory but also in problem solving performance. Using the same video technique, subjects and videotaped confederates solved anagrams, and it was found that solos solved fewer anagrams than nonsolos (Saenz, 1994).

*Why do cognitive deficits occur in solos?*

Saenz's (1994) experiment suggested a mechanism by which this effect occurs: Solo subjects were more accurate than nonsolo subjects in reporting how many anagrams were solved by the other group members. This indicated that solos were using cognitive effort to monitor the performance of other group members relative to their own performance, an activity that distracted solos from their own task of solving anagrams (Saenz, 1994). This line of research demonstrates that solo status negatively affects the performance of solos even in the absence of differential treatment, through a primarily cognitive mechanism.

A related explanation for these cognitive deficits is that cognitive effort may be redirected from the task not only to monitor the performance of others, but also to monitor one's own projected self-image in the eyes of others. Solos may be simply highly self-aware, which distracts them from the task at hand. For example, Lord and Saenz (1985) suggest that solos "may be overly concerned with the image that they project to others, and may shift attention toward self-presentation and away from the ongoing exchange of information" (p. 923), resulting in later memory deficits. Such
concern over self-presentation may be rooted in objective self-awareness (Wicklund, 1975). Solos may be acutely focused on their own behavior to the exclusion of external concerns ("Why did I just say that?" "I don't know what to do with my hands."). Alternatively, solos may be more aware of themselves in the eyes of others ("They probably think I'm a boring person." "He keeps looking at my forehead; is there something there?"). Research on stigma suggests that the latter may more likely be the case, as people who are visibly deviant (such as solos) tend to have better recall of what other people do over what other people say (Frable, Blackstone, & Scherbaum, 1990). Indeed, Saenz and Lord showed that memory deficits occur for information presented while an individual's own image is shown on a TV monitor, as opposed to the information presented when another person's image is projected (Saenz & Lord, 1989). This indicates that solos may be more concerned about how they appear in the eyes of others as opposed to simply being more objectively aware of their own behavior.

Increased worry about one's performance relative to others (Saenz, 1994) or one's self-presentation (Saenz & Lord, 1989) may both be related to increased arousal (Ickes, 1984) or heightened general anxiety. Anxiety, in turn, may contribute to cognitive deficits in solos. Thus, some explanations for solo cognitive deficits focus more on general states of heightened anxiety in solos, and social anxiety in particular, as opposed to purely cognitive mechanisms such as distraction. An experiment by Saenz and Lord (1989, experiment 3) investigated social anxiety in relation to cognitive deficits. In this experiment, conversation partners discussed different topics in a room equipped with cameras and a TV monitor. The image of each partner was shown alternately on the TV monitor in view of both participants. Results indicated that each participant's recall for the topics discussed while their own image was being shown was worse than for the topics discussed while the other person's image was shown.
(Saenz & Lord, 1989, Experiment 3). Thus, the authors conclude that distraction from
the conversation involves concern about how one looks in view of others as opposed to
when one is not in view of others. Importantly, this effect occurred only for those
participant's identified as "social worriers". Although a "predisposition" to social
worry was necessary to produce memory effects in this dyadic situation, solo status in
a group situation "... may be powerful enough to impair the cognitive performance of
even those who are not predisposed to social worry." (Saenz & Lord, 1989, p. 514).
The role of general anxiety as a mediator of the cognitive deficit will be addressed in the
current experiments. We speculate that introducing solo status during performance may
be enough to arouse social anxiety which produces cognitive deficits in solos.

When do cognitive deficits occur: At encoding or retrieval?

A second question that arises from this work is when the effects occur. That is,
does solo status have its primary effect during the learning/encoding of information, or
does it play a greater role during the retrieval of that information? The evidence
provided by the research of Lord and Saenz clearly indicates that effects occur at
encoding. Solo status was introduced in these experiments only during the learning of
information, and cognitive deficits resulted. The potential effects of solo status on the
retrieval of previously learned information has yet to be investigated. What kind of
impact would we expect solo status to have when introduced during the testing of
information as opposed to the learning of information?

One may reasonably expect that a student who sleeps through a lecture will have a
tougher time during the exam than the student who listened attentively. Pieces of
information that never were properly encoded and stored in memory will of course not
be readily available for later retrieval. But as any student will attest who answered
incorrectly and then laments, "but I knew that one!", evidence indicates that the retrieval
of even well-learned information may be impeded. For example, research in workplace
settings indicates that solos often perform at a lower level than their nonsolo counterparts (Hall & Hall, 1976; Garland & Price, 1977; Kanter, 1977). Such an occurrence is intriguing in the case of tokenism, as the token chosen to be promoted or brought into a group heretofore closed to members of their category are often those most highly capable. When the performance of even the highly capable suffers in solo situations, it becomes apparent that solo status has important effects on performance as well as the intake of information. Therefore, solo status may have an impact during performance: the retrieval of previously-learned information before an opposite-gender group.

Goals of the current paper

Much of the previous research on solo status has documented that solos are stereotyped by observers according to their social category, and that solo status can inhibit the cognitive abilities of solos themselves. In the present paper, two issues related to these lines of work will be addressed. First, we investigate the role of stereotyping in the cognitive functioning of an individual in a solo situation. We suggest that the stereotypes associated with solos differ depending on the social category to which the solo belongs. For example, male solos have a different stereotype associated with them than female solos (Banaji, Hardin, & Rothman, 1993; Biernat, 1991). These differing stereotypes can change the nature of the solo experience, depending on whether the situation is one in which the solo is expected to excel or perform poorly.

Stereotypes about outgroup members typically convey information about the capabilities of the stereotyped individual. For example, women are stereotyped as having poor mathematical and spatial abilities, while men are stereotyped as being highly capable in these areas. Expectancies developing from these stereotypes have the potential to hinder performance in these areas, even when the material is well-learned.
Work by Claude Steele and his colleagues (Steele, 1992; Steele & Aronson, 1995) indicates that female students perform more poorly than male students on a difficult math test when they believe that the test shows gender differences. When the test is presented as a special version immune to gender differences, males and females perform equally. Women are aware of being stereotyped as poorer performers in math than men; therefore, when one's actions can be interpreted to be consistent with one's stereotype ("If I make one mistake, it will look like I really am bad at math."), a condition arises known as stereotype threat. It is important to note that the poor performance of females induced by stereotype threat conditions occurs even when the females' level of preparedness (as assessed by quantitative SAT scores) is equal to that of the male students. This research suggests that even when information is properly learned, conditions can arise that impede the expression of this knowledge in performance.

At a more general level, perceivers may simply hold the expectation that females will perform poorly and males will perform well in any given academic domain. This generalized expectation for success or failure may be based on the differences in status associated with men and women. Because females tend to be lower in status than men, a generalized expectancy for lower achievement may be present for females, while a generalized expectancy for higher achievement is present for males.

The second issue addressed in this paper is whether solo status has a greater impact at either the encoding or retrieval of information. While previous solo research supports an encoding explanation, we suggest that retrieval effects may also emerge, due to the nature of the stereotypes involved. Poor performance tends to be associated with the female stereotype, while good performance tends to be associated with the male stereotype. Because solo status may cause the solo to feel vulnerable to being stereotyped, the solo's salience in the group is likely to cause the stereotype associated
with the solo to become salient as well. Thus, any lowered performance expectancies associated with the female stereotype or female status should become highly salient for the only female present in the group. In turn, the elevated performance expectancies associated with the male stereotype should become highly salient for a male solo. Therefore, because gender stereotypes involve differential expectancies concerning performance, solo status may have a greater impact during performance as opposed to the learning of information, leading to poorer performance in females and better performance in males.

In sum, we predict that the performance deficits associated with solo status may depend on the stereotype-based expectancies associated with the solo: When the expectancy associated with the solo dictates a generally poor performance, as is the case with female solos, this may contribute to impeded performance evoked by solo status. When the solo is not so stereotyped, as is the case with male solos, performance may not be as affected by solo status. These differences in generalized performance expectancies suggest that solo status should have its greatest impact on females relative to males, and at performance rather than the learning of information.
CHAPTER 2

EXPERIMENT 1

Previous research on solo cognitive deficits (e.g., Lord & Saenz, 1985) and research in stereotype threat (e.g., Steele & Aronson, 1995) typically require the primary dependent measure to be reported in relative privacy, using a paper-and-pencil questionnaire format. In this paper, we are primarily interested in deficits that occur during the retrieval of information before a same-gender or opposite-gender audience. Therefore, this work is unique in requiring that participants provide the dependent measure by answering questions aloud in front of a group, as opposed to providing responses on paper, unobserved by others.

The current research is also unique in that solo status is manipulated during test as well as the learning of information. This manipulation provides the opportunity to discern whether solo status has a differential effect on the performance of males and females during testing, and a uniform effect on the performance of males and females during learning.

Predictions

We predicted that any solo experience should hinder performance (Lord & Saenz, 1985), but due to the nature of the gender-based expectancies involved, the effects may become differentiated for males and females at performance. An expectancy for poor academic performance may exist for females, while an expectancy for good performance may exist for males. Therefore, the performance of females experiencing
solo status during testing may be more negatively impacted by solo status than males. Performance is not predicted to differ for males and females who were solo only during learning.

**Method**

**Overview.** Using a procedure adapted from Lord and Saenz (1985), male and female participants were led to believe that they were exchanging information with other group members (actually videotaped confederates). These group members were either all of the subject’s own gender (the nonsolo condition) or all of the opposite gender (the solo condition). After this information learning stage, participants joined a new same-gender or opposite-gender group, and answered questions about the earlier learned information in front of this new group. Thus, the experiment used a 3(condition: solo at learning/nonsolo at performance; nonsolo at learning/solo at performance; nonsolo at learning/nonsolo at performance) x 2(subject gender) between-subjects design (see Table 1). Participants also reported their interest in the information presented, and their general feelings of anxiety and relaxation prior to learning and being tested over the information.

<table>
<thead>
<tr>
<th>Learning Stage</th>
<th>Performance Stage</th>
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<tr>
<td>NONSOLO</td>
<td>NONSOLO</td>
</tr>
<tr>
<td>2. NONSOLO</td>
<td>SOLO</td>
</tr>
<tr>
<td>3. SOLO</td>
<td>NONSOLO</td>
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Table 1. Experimental conditions used in Experiment 1.

**Subjects.** 40 male and 40 female Caucasian introductory psychology students participated in partial fulfillment of their course requirements. Within each gender, subjects were randomly assigned to one of the three conditions. 5 subjects (three males and two females) reported during debriefing that they did not believe the other group
members were being broadcast live from other rooms, and were thus omitted from the final analyses.1

Materials

Six videotapes were created, containing footage of confederates that appeared as though it were being broadcasted live from another room. Each confederate was filmed in a cubicle identical to the one occupied by the participant during the experiment. A different color background (i.e., green, blue and yellow) was used for each confederate, so that they would appear to the participant (whose background was red) to be broadcasted live from the other cubicles situated down the hall. Two "learning group introduction" videotapes were made, one showing three male and one showing three female confederates individually acknowledging the experimenter and affirming that they could hear the experimenter's instructions. Blank space was added between the footage of each confederate, so that during this blank space the tape could be stopped and live footage of the participant could be shown over the participant's monitor. In this way, live footage of the participant could be shown interleaved with taped footage of the confederates.

Two "lecture" videotapes were made showing these same male or female confederates in turn reading aloud passages of information concerning the general topic of monkeys and apes.2 Each confederate read a different passage: one on general classes of primates; one focusing on information about the gorilla; and one focusing on information about the orangutan. Each confederate's segment lasted between one minute, fifteen seconds, and one minute, thirty seconds. Finally, two "testing group introduction" videotapes were made, showing a new set of male and female

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1The participants omitted from the analyses consisted of two males in the nonsolo-learning/nonsolo-testing condition, one male in the nonsolo-learning/solo-testing condition, one female in the nonsolo-learning/solo-testing condition, and one female in the nonsolo-learning/solo-testing condition.

2The information about monkeys and apes was taken from an upper-level undergraduate class on primatology. Because Introduction to Psychology was a prerequisite for this course, few of our Introduction to Psychology student participants were expected to have any pre-exposure to this information.
confederates different from the first. As in the learning group introduction videotape, these new confederates acknowledged the experimenter and assured him or her that they could hear. Again, blank space was added between the footage of the confederates on both the lecture and the testing group introduction tapes, such that live footage of the participant could be shown at any point before, after, or between taped footage of the confederates.

During the production of each tape, the confederates were allowed to read over the information that they would read aloud on camera for only two minutes prior to filming. This was done to approximate the time allotted for the actual participants to look over the material that they would read live during the experiment, and resulted in a relatively unrehearsed and authentic reading of the material by the confederates. Both sets of confederates were instructed to use the same words, tone of voice, and hand gestures in the learning group introduction and testing group introduction videotapes. In order to ensure comparable reading performances in both the male and female versions of each lecture videotape, the female confederates were allowed to watch the performances of their male confederate counterparts prior to filming their own versions. The female confederates then mimicked the performance of their male counterparts, using the same intonations and making the same type of speech errors. Thus, the performance of the confederates on the tapes was both realistic and held constant for the male and female versions of the learning group introduction, lecture, and testing group introduction videotapes.

A self-reported anxiety scale was created, using six items to assess general state anxiety levels. The items were: (I feel) anxious, tense, nervous, relaxed, calm, and self-confident (the last three reversed scored). Participants reported their responses to these items using a four-point Likert scale, anchored by "not at all" to "very much so". A series of 16 open-ended questions, four questions for each of the four topics
presented,-were used to assess subject’s recall of the information. All instruments are presented in Appendix A.

Procedure
Participants were met in a predesignated waiting area, where they were greeted by either a male or female experimenter (see discussion below). The participant was assigned to one of a row of eight cubicles. Four of these cubicle doors were labeled "computer" and four were labeled "video", although in actuality only one cubicle was equipped for the experiment. This cubicle contained three envelopes holding questionnaires and information for the participant, a color television monitor with headphones, a camera mounted on the wall and pointed at the participant, and a red backdrop behind the participant. After seating the participant in this "video" cubicle, the experimenter fitted the participant with headphones and instructed the participant to listen for further instructions.

The participant heard the cover story over the headphones. It was explained that while communication over computers already existed (in the form of e-mail, Internet chat rooms, etc.), a new system was being developed that allowed video communication between remotely located users. It was indicated that this experiment would test how well information is transmitted and received over a video communication system in comparison to a computer communication system. Participants were informed that they were part of the video system, as opposed to the computer system, testing group. The video system purportedly allowed group members located in separate cubicles to take turns speaking on camera, such that when one group member was speaking, everyone in the group would be able to see the person on their tv monitor and hear the person over the headphones.

It was explained that such video communication systems could be used by students taking the same courses at different universities to communicate with each other, to
"discuss and compare what they are learning in their courses." Thus, the topic of information to be transmitted and received over the video system involved academic subject matter taken from a college course on the study of monkeys and apes. The members of the group were to each present a section of information about monkeys and apes to the rest of the group.

At this point, the experimenter introduced the participant to the "other members" of the group, by saying that (s)he wanted to make sure the monitors were working properly. Participants were told to answer when they heard the experimenter call the color of their room, and when they saw themselves on their monitor. The experimenter at this point played the learning group introduction tape.

It is important to note that the gender of the experimenter always matched the gender of the confederates on the tape (s)he played. When a male experimenter played the male confederate version of the learning group introduction tape, and the participant was also male, this constituted a nonsolo at learning situation. If the participant was female, this constituted a solo at learning situation. Conversely, a female experimenter played the female confederate tapes; when the participant was male, this constituted a solo at learning situation, and when the participant was female, this constituted a nonsolo at learning situation. By holding the experimenter's gender constant with the gender of the taped confederates, no contamination of the solo or nonsolo experience occurred.

The tape showed the first confederate acknowledging the experimenter; then the experimenter stopped the tape and switched on the camera to show the participant. After the participant acknowledged the experimenter, the tape was started again, showing the last two confederates. In this way, the participant learned of his or her status, either as a solo or nonsolo at the learning stage. The participant was reminded that the group members would each take a turn reading a section of information to the
rest of the group. Before this happened, however, the participant was allowed one
minute to complete the Time 1 anxiety scale, and two minutes to read over the
information that (s)he would later present. When this was completed, the experimenter
played the lecture tape, showing all three confederates (in an order different from the
introduction tape) reading a section of information on monkeys and apes. This tape
was stopped after the confederates had each read their material, and the participant then
read his or her section aloud on camera.

Next, the participant rated (off camera) how well (s)he could see and hear the other
group members, how well each group member performed, how much the participant
thought (s)he learned about monkeys and apes from the session. Additionally, the
participant reported what (s)he recalled the main topic of information presented by each
person in the group to be (e.g., "The person in the blue room spoke about gorillas").
The participant also reported his/her major, GPA, level of interest in the topic of
monkeys and apes, and how much they thought they learned from the discussion.

After completing this questionnaire, the participant was told that Phase 2 of the
experiment was to begin. In Phase 2, it was explained that some members of the video
system would change places with some members of the computer system group. The
experimenter named the room colors of the group members that would be making this
switch, always calling all room colors except that of the actual participant. The
participant listened as the group members that were to make this switch were instructed
to vacate their rooms so that their computer system counterparts could occupy them.
The experimenter at this point added to the illusion that group members were changing

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3The order in which the videotaped confederates read their sections of information differed from that in
which they were introduced so that the participant would be unsure as to when he/she would be called
upon to read. In this way, any "next-in-line" effects (poor recall of information presented immediately
prior to one's own turn to speak; Brenner, 1973; Bond, 1985) would be held constant across all sections
of information presented by each confederate.
rooms by opening and closing the (unoccupied) cubicle doors and verbally addressing the "other subjects" within earshot of the participant's cubicle.\(^4\)

In this way, it was possible to present the participant with group members different from the first. In solo-learning/nonsolo-testing conditions, for example, a female participant who was first part of an all-male group would now be a part of an all-female group. In nonsolo-learning/solo-testing conditions, a female participant who was first part of an all-female group would now be a part of an all-male group. In nonsolo-learning/nonsolo-testing conditions, participants who were first part of an same-gender group again were part of a same-gender group, but with different group members, to control for effects of familiarity with the group.

A second experimenter\(^5\) explained to this "new group" that they would talk about what they learned earlier about monkeys and apes, "in order for us to assess how well information was transmitted and received over the video and computer systems." It was explained that the group members would take turns answering a series of questions about monkeys and apes, and that all members of this new group would be able to see and hear each other as they answered the questions. The experimenter then introduced the participant to the new group by showing the testing group introduction tape. As in the learning phase, solo status was manipulated by showing the participant footage of either same-gender confederates (nonsolo at test condition) or opposite gender confederates (solo at test condition). When being introduced to the testing group, the

\(^4\)It may seem that this migration of everyone except the actual participant from one group to another would arouse suspicion in the participant; however, during debriefing no participant expressed such suspicion. Instead, when asked to speculate why this event occurred, participants typically supposed that they were chosen to stay in the video group "by chance," or to serve as a "control." Many participants explained that they were convinced by the sounds of movement in the hallways that the other group members were indeed changing rooms at that time.

\(^5\)When participants changed from a solo to a nonsolo situation, or a nonsolo to a solo situation, they necessarily were assigned a different experimenter from their learning session to their testing session, such that the gender of the experimenter matched the gender of the group members during both sessions. In the nonsolo-nonsolo condition, however, the gender of the group members did not change from the learning to the testing session, so the same experimenter was able to conduct both the learning and testing sessions.

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participant was shown first, followed by footage of the three confederates. In this way, the participant learned his or status, either as a solo or nonsolo at the testing stage. Next, the participant was reminded that the group members would each take a turn answering questions about the earlier presented information before the rest of the group. Before the test, however, the participant was allowed one minute to complete the Time 2 anxiety scale. After this was completed, the experimenter announced that the questioning would begin, and that the participant would go first. The camera was switched on to show the participant, and the experimenter proceeded to ask sixteen questions about the information on monkeys and apes. Four questions were asked about each of the four areas covered by the confederates and by the participant (primates in general; gorillas; orangutans; and chimpanzees). Some questions used a forced-choice format (Do gorillas spend more time in the trees or on the ground?), while others called for more open-ended, detailed answers (Describe the chest-beating ritual of the male gorilla). The experimenter videotaped this question and answer period. Afterward, the experimental procedure was terminated, and the participant was probed for suspicion and fully debriefed.

Results

Scoring responses to the open-ended questions. Participants' answers to the sixteen open-ended questions about monkeys and apes were scored by two independent judges as to whether the responses accurately represented the information presented by group members during the learning phase of the experiment. Two different scoring methods were used. The first method assigned 0 points for incorrect or "I don't know" responses; 1 point for responses that contained material that was said during the discussion but was not the correct answer to the question; 2 points for correct answers to the question; 3 points for correct answers in high detail. This method captured participants' memory for anything said during the learning stage, even when the
participant was confusing information across topics (e.g., giving an answer pertaining to the habits of orangutans in response to a questions about gorillas). The second method assigned points based on the number of correct details provided in each answer. As mentioned earlier, some questions used a forced-choice format, and thus the answers to these questions were worth very few points (Do gorillas spend more time in the trees or on the ground? 1 point possible). Other questions called for more detailed answers and thus were worth many points (Describe the chest beating ritual of the gorilla? 9 points possible). This method awarded higher points for more detailed answers. Scores from both methods were converted to z-scores and found to be highly correlated ($r = .94$ to $.96$); therefore, the two scores were collapsed into one overall total performance score.

*Scoring Time 1 and Time 2 anxiety.* Self-reported anxiety was assessed at Time 1 (prior to learning) and Time 2 (prior to testing). Responses were scored such that higher scores indicated higher levels of self-reported anxiety. Scores on the Time 1 anxiety scale ranged from 5 to 20, as did the scores on the Time 2 anxiety scale. For some of the analyses, these scores were summed to form an overall measure of self-reported anxiety before learning and before testing (“overall anxiety score”). Both the Time 1 and Time 2 anxiety scales showed adequate internal reliability (Cronbach’s alpha = .83 and .90, respectively).

**Performance**

To test whether experiencing solo status does indeed result in performance deficits, the performance scores of the nonsolo-learning/solo-testing and solo-learning/nonsolo-testing conditions were combined and compared to the performance scores of nonsolo-learning/nonsolo-testing condition. A $2$ (gender) X $2$ (group: no solo experience or solo experience) ANCOVA was conducted, using their reported interest in the topic as a covariate [$F(1,72) = 2.02$, $p = .16$]. This analysis revealed that solo status did result in
lowered performance, $F(1,72) = 6.64$, $p < .05$. Subjects in the nonsolo-
learning/nonsolo-testing condition (the control condition) performed better ($\bar{M} = 22.54$)
than those in the solo-learning/nonsolo-testing and nonsolo-learning/solo-testing
(combined $\bar{M}s = 18.98$) conditions. This finding replicated the work of Lord and
Saenz (1985).

However, we were primarily interested in the effects of solo status introduced either
at learning or at test on the performance of males and females. Thus, the performance
scores were analyzed in a 2(gender) X 3(condition) ANCOVA, using reported interest
in the topic of monkeys and apes as a covariate $F(1,68) = 2.14$, $p = .15$. A main
effect of gender emerged, such that males had higher performance scores than females,$\ F(1, 68) = 4.58$, $p < .05$. In addition, a main effect of condition emerged, $F(2, 68) =
3.59$, $p < .05$. Performance scores in the nonsolo-learning/solo-testing condition were
significantly lower than in the other two conditions, while performance scores in the
nonsolo-learning/non-solo-testing and solo-learning/nonsolo testing conditions did not
differ significantly (see Figure 1). Although the overall two-way interaction was not
significant, $F(2, 68) = 1.94$, $p = .15$, simple effects analyses revealed that, as
predicted, the performance of females who were solo at performance (nonsolo-
learning/solo-testing condition) was significantly lower than males who were solo at
performance, $F(1, 68) = 7.13$, $p < .001$. The performance of males and females in the
nonsolo-learning/nonsolo-testing condition, and males and females in the solo-
learning/nonsolo-testing condition were not significantly different, all $F$s < 1.

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6 Adjusted performance means were 22.67 for the nonsolo-learning/nonsolo-testing group and 18.94 for
the solo-learning/nonsolo-testing and nonsolo-learning/solo-testing conditions combined.
7 Adjusted performance means in the nonsolo-learning/nonsolo-testing group were 21.49 for females and
23.87 for males; in the nonsolo-learning/solo-testing group 15.80 for females and 22.09 for males; and
in the solo-learning/nonsolo-testing group 18.91 for females and 18.74 for males.
While the predicted interaction between gender and condition did not reach significance, our primary prediction focuses on the effects of having a solo experience either at learning or at test rather than having no solo experience at all. Therefore, we conducted the same analysis omitting the nonsolo-learning/nonsolo-testing condition. In this analysis, the interaction between gender and solo condition did approach significance, $F(1, 44) = 3.93, p = .054$. Finally, the performance of females who were solo at performance (nonsolo-learning/solo-testing) was nonsignificantly lower than the performance of females who were nonsolo at performance (solo-learning/nonsolo-testing), $F(1, 44) = 1.80, p = .19$, and the performance of males who were solo at
performance (nonsolo-learning/solo-testing) was nonsignificantly higher than the performance of males who were nonsolo at performance (solo-learning/nonsolo-testing), $F(1,44) = 2.30, p = .14$.

**Self-reported Anxiety**

The Time 1, Time 2, and overall anxiety scores were analyzed in three separate 2(gender) X 3(condition) ANOVAs. The analysis of these variables revealed no significant main effects or interactions, all $F$s < 1.

Because we were interested in how feelings change when one moves from solo status to nonsolo status and vice versa, the Time 1 and Time 2 anxiety scores were analyzed in a 2(gender) X 3(condition) X 2(time) mixed model ANOVA, with time as a within-subjects factor. A significant two-way interaction between condition and time emerged, $F(2,66) = 5.16, p < .01$, such that participants reported higher anxiety at Time 2 in the nonsolo-learning/solo-testing condition, and at Time 1 in the solo-learning/nonsolo-testing condition (see Figure 2). No other significant main effects or interactions emerged, $F$s < 1.
These general anxiety scores were assessed across all six items of the self-reported anxiety scale. In order to further explore the potential relationship of any particular item to solo status, individual analyses of each of the six items were also conducted. Of the six items, one (self-reported feelings of relaxation) was related to gender and experimental conditions. Relaxation scores at Time 1 and at Time 2 were analyzed in a 2(gender) X 3(condition) X 2(time) mixed-model ANOVA. A significant three-way interaction between condition, gender, and time emerged, F(2,66) = 3.39, p < .05. Females report being more relaxed at Time 2 as nonsolos than as solos, while males do not show differences in reported relaxation at Time 2 as a function of solo status. No other significant main effects or interactions emerged, Fs < 1.

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8The relaxation item was correlated with the rest of the scale items for both Time 1 anxiety (r = .72) and Time 2 anxiety (r = .79).
In order to further explore whether anxiety levels change in males and females moving from a nonsolo to a solo situation, and vice versa, a difference score was computed by subtracting relaxation scores at Time 1 from relaxation scores at Time 2. Negative scores indicate lower relaxation (i.e., higher anxiety) at Time 2 over Time 1, while positive scores indicate greater relaxation at Time 2 over Time 1. Simple effects analyses of these relaxation difference scores revealed that females in the nonsolo-learning/solo-testing condition reported lower relaxation (i.e., higher anxiety) from Time 1 to Time 2 ($M = -5.45$) than males ($M = 3.33$), $F(1, 64) = 6.83$, $p < .05$. Relaxation difference scores of females and males did not differ in the solo-learning/nonsolo-testing condition or the control condition, $Fs < 1$. Thus, females became less relaxed moving from a nonsolo to a solo situation, while males became more relaxed moving from a nonsolo to a solo situation.

Finally, a significant correlation was found between performance scores and self-reported relaxation at Time 2, $r = -.51$, $p < .01$, among those in the nonsolo-learning/solo-testing condition. This correlation was not significant among those in the solo-learning/nonsolo-testing condition ($r = -.24$, $p = .25$) or the control condition ($r = .10$, $p = .63$). Thus, it appears that feelings of relaxation may be playing a role in the performance effects, albeit a small one.

Discussion

The performance results were supportive of predictions. Performance scores were lower for participants who experienced solo status at either performance or test. In addition, the performance of females was more profoundly impacted than the performance of males when solo status was introduced during test, while performance scores did not differ by gender when solo status was introduced during the learning stage. This pattern supported our hypothesis that due to the different generalized
expectancies concerning the abilities of men and women, the performance of females would be more impaired by solo status than the performance of males.

While the general pattern of the performance results reflected the predicted effect of solo status on performance, the effects obtained were somewhat weak. The predicted interaction emerged only when the control (nonsolo-learning/nonsolo-testing) condition was excluded, and even then the effect was marginal. While the problem of marginal results may be solved by increasing the number in the sample, it may also be the case that individual differences exist in sensitivity to the effects of solo status. Such individual differences may be rooted in the extent to which one feels identified in their sex role. Females who feel particularly identified with their femaleness may be more sensitive to solo status than are females who don't feel particularly female. These "non-gender identified" females may not show performance deficits under solo conditions, while "gender identified" females do. Conversely, non-gender identified males may not perform as well under solo conditions as do their gender identified counterparts. Therefore, level of identification with gender roles was assessed in Experiment 2, to test whether increases in gender identification exacerbate the effects of solo status on performance.

The role of anxiety as a potential mediator of the performance effects was only tentatively supported. Because people often inaccurately report their mental states (see Greenwald & Banaji, 1995), self-report is not always the best gauge of people's feelings. Nevertheless, this measure did provide some insight. The self-reported feeling of relaxation was positively correlated with performance scores for participants who were solo at test, while no relationship emerged between relaxation and performance scores for participants who were solo at learning or who were not solos. This suggests that feeling more anxious as a solo during test is related to poor performance. However, anxiety was unexpectedly high in the nonsolo-
learning/nonsolo testing condition (see Figure 2); thus, the relationship between anxiety and solo status and its effect on performance remains unclear. Because anxiety has been proposed as a potential mediator of solo memory deficits by several investigators (Ickes, 1984; Saenz & Lord, 1989), however, it seems worthy of further investigation in Experiment 2.

In addition, we have suggested that stereotype-related expectancies associated with the solo may have an impact on the performance of solos. We have hypothesized that different types of solos have different stereotypes associated with them, and that these stereotypes are activated when the individual enters a solo situation. In order to test the potential of stereotype activation as a mediator of solo performance deficits, the issue of stereotype activation and inhibition will be addressed in Experiment 2.
In Experiment 1 it was demonstrated that the effects of solo status differ at performance depending on the social category to which the solo belongs (i.e., male or female). The performance of females was more profoundly impacted by solo status than the performance of males. Experiment 2 was conducted to assess whether it is the activation of gender stereotypes or the arousal of anxiety that drives the differential impact of solo status on the performance of males and females.

Stereotype activation and inhibition

Allport (1954) suggested that stereotypes are activated as soon as a member of a stereotyped group is encountered. More recently, researchers have asserted that categories are automatically activated (Brewer, 1988; Fiske & Neuberg, 1990), and that the associated stereotype may be automatically activated as well (Devine, 1989; Klinger & Beall, 1992). Once an individual is categorized as a member of a group, the group stereotype tends to be activated and used in judgment of the individual, unless the perceiver is motivated and able to avoid stereotype use (Brewer, 1988; Fiske & Neuberg, 1990). Indeed, this motivation to shun stereotypes in favor of more egalitarian ideas has been proposed as the mechanism behind low prejudice (Devine, 1989).

One notable exception to the body of research supporting the automaticity of stereotype activation is the work of Gilbert and Hixon (1991). In this set of
experiments, it was shown that while categorization appears to be automatic, stereotype activation was dependent on the cognitive resources of the perceiver. Perceivers under cognitive load did not show evidence of automatic stereotype activation, while those not under load did show stereotype activation. Thus, this research indicated that stereotypes require a degree of conscious effort to be activated. Other researchers suggested that the whether stereotypes are automatically activated depends on the goals of the perceiver (Fein & Spencer, in press); when perceivers have a motivation to stereotype (e.g., having just received a threat to self-esteem), their stereotypes will be automatically activated even under conditions of cognitive load (Fein & Spencer, in press). Thus, the automaticity of stereotype activation appears to be goal-dependent as opposed to nonconditional (see Bargh, 1989; Logan, 1988, 1990).

While the question of whether stereotype activation is automatic has been widely investigated, the automaticity of category activation has gone largely undisputed. Interestingly, people can obviously be categorized as members of multiple categories (Black female lawyer; fat male Irish Roman Catholic priest; see Bodenhausen & Macrae, in press), yet we tend to focus on one category over another. How does one category become activated and used over other equally applicable categories? Some researchers suggest that particular categorizations are salient, and are used because they best distinguish the target person from the background (Biernat & Vescio, 1993; McGuire, McGuire, Child, & Fujioka, 1978; Taylor, et al., 1978). Other researchers suggest that certain categorizations are chronically accessible for certain people; for some people (e.g., cardiologists) a particular categorization (e.g., smokers vs nonsmokers) is used habitually in person perception (see Stangor, Lynch, Duan, & Glass, 1992). Finally, some researchers suggest that particular categorizations are acutely or situationally accessible, as in the case of priming (Higgins, Rholes, & Jones, 1977; Higgins, 1996).
While there are several explanations as to why some categories are activated over others, all imply that one category is activated to the exclusion of the others. That is, all other relevant categories are inhibited (Bodenhausen & Macrae, in press). For example, a Black female lawyer in the context of a group of White lawyers may be categorized in terms of her race, while the category of female is not attended to or used in responding to her (Taylor, et al., 1978). The ability to utilize some types of information while ignoring others is a skill that facilitates information processing (Houghton & Tipper, 1985), and is one that is well-learned by most perceivers (Hasher & Zacks, 1988; Zacks & Hasher, 1994). As suggested above, the ability to suppress stereotypic thoughts has been proposed as one way that we “break the prejudice habit” (Devine, 1989). Thus, stereotype inhibition as well as activation play important roles in how we respond to members of stereotyped groups.

While categories may be suppressed in order to avoid stereotyping others, it can also be the case that categories are suppressed in order to protect the self or support existing beliefs. For example, Sinclair and Kunda (1997) found that respondents to a word fragment completion (WFC) task were less likely (below baseline) to respond with stereotypic WFCs, (e.g., r a _ _ as race; w e l _ _ _ as welfare), after receiving a positive evaluation from an African-American, while they were more likely (above baseline) to respond with stereotypic WFCs after receiving a negative evaluation from an African-American. Thus stereotype inhibition can occur because one is motivated to avoid stereotyping others (Devine, 1989), or because one is reluctant to express stereotypes that are threatening to a self-relevant belief (“He just judged me positively; if I stereotype him negatively, he will no longer be credible as a good judge of people”;

9It has been argued that when multiple categories are applicable (e.g., females and lawyers), they can be both activated simultaneously and used in judgment. In this way, subtypes are created (“female lawyers” Brewer, Dull, & Lui, 1981) and used in the same way as stereotypes. We argue that once formed, subtype categories (“female lawyers”) tend to be activated to the exclusion of other potentially applicable categories (“females” or “lawyers”).
Sinclair & Kunda, 1997). In either case, the act of inhibiting stereotypes is regarded as a controlled process and thus requires a degree of cognitive effort (Bodenhausen & Macrae, in press).

Steele and Aronson (1995) have been successful using the WFC task to assess stereotype activation under conditions of stereotype threat, finding that African-Americans under threat conditions tend to complete more word fragments with stereotypic words than do African-Americans not under threat conditions. Sinclair and Kunda (1997) were also successful using this measure, finding that respondents completed word fragments differently, depending on both the race of their evaluator and the type of feedback provided. Thus, it appears that such measures are sensitive to changes in stereotype activation, and may be sensitive to changes in solo status as well.

Predictions

In Experiment 2, we used similar measures of stereotype activation in order to investigate the relationships between stereotype activation (or suppression), solo status, and gender, and their effects on performance. While such relationships may emerge in a variety of ways, four possible relationships are discussed below. The first possibility involves patterns of stereotype activation in relation to solo status, and the remaining possibilities involve the relationship of stereotype activation to performance.

1) Gender-stereotype activation should be greater for solos than nonsolos. If, as a solo, one's own gender is salient, then the pattern of activation should indicate evidence of greater activation of own-gender stereotypes over opposite-gender stereotypes for solos. On the other hand, to the extent that negative stereotypes about one's own gender are threatening to the self, negative stereotypes may be suppressed for female solos, while the more positive male stereotypes persist in male solos (Sinclair & Kunda, 1997). In this case, the pattern of activation should indicate evidence of
suppression of own-gender stereotypes for female solos, and no suppression of own gender stereotypes for male solos.

2) Activation should be negatively correlated with performance for both males and females who experience solo status during test, while activation may not be related to performance for those who experience solo status while learning.

3) Because gender stereotypes indicates good performance for males and poor performance for females, different relationships may emerge between performance and stereotype activation for males and females. For males, the relation between own gender-stereotype activation and performance should be positive, such that activation of their (relatively) positive stereotype is related to good performance. For females, the relation between own gender-stereotype activation and performance should be negative, such that activation of this stereotype is related to poor performance.

4) However, to the degree that stereotypes are threatening (Sinclair & Kunda, 1997), they may be actively suppressed. Stereotype suppression requires cognitive effort which may interfere with the task at hand (Bodenhausen & Macrae, in press). Therefore, suppression of own-gender stereotypes should occur more for female than male solos, and should be negatively related to performance.

In Experiment 2, three general issues were addressed. First, individual differences in gender identification were assessed, to test whether increases in gender identification influence the effects of solo status on performance. We predicted that gender-identified females may be more sensitive to solo status and may show greater deficits in performance as solos than do non-gender identified females. On the other hand, non-gender identified males may not perform as well under solo conditions as gender identified males do. Second, we retested the relationship of general anxiety to solo status and subsequent performance, with the prediction that higher anxiety leads to poor
performance in solos. Third, we investigated the role of stereotype activation and suppression as a mechanism for the effects of solo status on performance.

**Method**

**Overview.** Experiment 2 was conducted similarly to Experiment 1, with three modifications. First, a short-form version of the Bern Sex Role Inventory (BSRI: Bem, 1974) was used to assess gender identity prior to the participant being exposed to any manipulation or dependent measures. Second, stereotype activation was assessed at two points in time: prior to learning and prior to testing over the information. Two different measures were used to assess stereotype activation. The order of administration of each measure (either prior to learning or prior to test) was counterbalanced. The short-form BSRI and the two stereotype activation measures are presented in Appendix B. Finally, because we are primarily interested in the effects of solo status experienced either at learning or at test, the control condition (nonsolo-learning/nonsolo-testing) was dropped in Experiment 2.

**Subjects.** 40 male and 41 female Caucasian introductory psychology students participated in partial fulfillment of their course requirements. Within each gender, subjects were randomly assigned to conditions (see discussion below). One subject (a male in the nonsolo-learning/solo-testing condition) reported during debriefing that he did not believe the other group members were being broadcast live from other rooms, and was thus omitted from the final analyses.

**Materials and Procedure**

Materials similar to those used in Experiment 2 were used in Experiment 1, with two exceptions. First, a short form of the BSRI was developed, containing 20 (ten male and ten female) items out of the original 60 BSRI items. The short form BSRI was administered at the onset of the experimental procedure as a "personality questionnaire" for the participants to complete while the "other subjects" were being seated in their
cubicles. Second, two measures of stereotype activation were developed for use in Experiment 2, and were given either prior to learning information (Time 1) or prior to being tested over the information (Time 2). Participants received both versions of the stereotype activation measures. Thus, the experiment used a 2(participant gender) X 2(condition) X 2(order of stereotype activation measure administration) design.

Assessment of stereotype activation

Stereotype activation measures typically operate implicitly, i.e., outside of awareness. In Experiment 2, two implicit measures of stereotype activation were used. One measure relied on the WFC task, which has been used successfully to measure the activation of recently primed words (Tulving, Schacter, & Stark, 1982) and the activation of stereotypes in particular (Gilbert & Hixon, 1991; Steele & Aronson, 1995; Sinclair & Kunda, 1997). Four word fragments could be completed to form male words: s t r _ _ _ (strong), m _ _ e (male), _ _ s s (boss), and l _ _ e r (leader).

Four word fragments could be completed to form female words: w _ k (weak), b a _ _ (baby), f e _ _ _ _ (female), _ r y n g (crying). To the extent that gender stereotypes are activated, respondents should complete more word fragments with stereotypic words (e.g., strong) than nonstereotypic words (e.g., string). 18 filler word fragments were included, forming a 26-item WFC scale.

A second measure of stereotype activation was developed, asking respondents to explain the behavior described in a sentence (see Smith & Branscombe, 1988). Three sentences were constructed such that they could be explained using male stereotypic characteristics (e.g., "grasped the other person's jacket as they spoke": aggressive). Three sentences could be explained using female stereotypic characteristics (e.g., "reached for something in the handbag at the end of the movie": crying and needing a tissue). Two sentences could be explained using either male or female stereotypic explanations ("tested the temperature of the formula before continuing": part of a
science experiment or testing a baby's formula; "poured the oil out of the pan into a separate container": changing motor oil or cooking). To the extent that gender stereotypes are activated, respondents should provide more stereotypic explanations than nonstereotypic explanations. Thirteen filler items were included, forming a 21-item category accessibility scale.

For half of the participants, the category accessibility measure was administered prior to learning and the WFC administered prior to test (Order 1). For the remaining participants, the WFC was administered prior to learning and the category accessibility measure administered prior to test (Order 2). Thus, all participants completed both stereotype activation measures.

**Results**

*Sex role identity.* Responses to each gender-related trait of the short form BSRI were scored from 1 (never or almost never true of me) to 7 (always or almost always true of me), for each of the ten masculine items and ten feminine items. Scores on the masculine items ranged from 28 to 68, and scores on the feminine items ranged from 34 to 70 (of a possible range of 10 to 70), with higher scores indicating higher sex role identity. A t-test of the feminine items showed that females (M = 57.07) scored significantly higher than males (M = 50.41), t(79) = -3.60, p < .01, while masculine scores did not differ for males (M = 50.77) and females (M = 49.19), t < 1.

Participants were divided by a median split of the masculine (median = 49) and feminine (median = 55) scores into low-masculine, high-masculine, low-feminine, and high feminine sex role identities. Participants were then classified as gender identified if their predominant sex role identity matched their gender (high-masculine males and high feminine females), and non-gender identified if their predominant sex role identity did not match their gender.10 This classification resulted in 49 participants (60.5%).

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10 It should be noted that this procedure ignores feminine scores for men, and masculine scores for women. Although this scoring procedure is atypical, it was used in order to avoid dropping too many
being classified as gender identified, and 32 participants (39.5%) being classified as non-gender identified. Of the 39 male participants, 21 were gender identified and 18 were non-gender identified; of the 42 female participants, 28 were gender identified as 14 were non-gender identified.

**Stereotype activation measures.** Two independent raters scored each category accessibility and WFC as to whether the response was relevant to the male stereotype or the female stereotype. Because the ratings of the two judges were highly correlated ($r = .77, p < .01$) and did not produce different results, they were collapsed across judges.

All WFCs completed with male stereotypic words were combined to form a WFC-male score. All WFCs completed with female stereotypic words were combined to form a WFC-female score. The WFC-male and WFC-female scores were combined to form a WFC-gender score, which indicted the degree to which participants completed the WFC with either a male or female completion.

All category accessibility items (CA) completed with male stereotypic explanations were combined to form a CA-male score. All sentence responses completed with female stereotypic explanations were combined to form a CA-female score. The CA-male and CA-female scores were combined to form a CA-gender score, which indicted the degree to which participants explained the sentence with either a male or female explanation.

**Performance**

The performance scores were analyzed in a 2(gender) X 2(condition: nonsolo-learning/solo-testing or solo-testing/nonsolo learning) X 2(order of stereotype activation measure administration: CA before learning and WFC before testing, or WFC before learning and CA before testing) ANCOVA, using participants self-
assessment of how much they thought they learned from the discussion as a covariate \( F(1, 71) = 3.27, p = .08 \). No significant main effects or interactions emerged, \( F_s < 1 \). However, the pattern of the means did suggest that females in the nonsolearning/solo-testing condition performed more poorly than the males in this condition (see Figure 3).

![Performance scores as a function of condition and gender, Experiment 2.](image)

When testing for factors that mediate a given effect, it is always possible that the process of measuring the mediator changes or eliminates the effect. Therefore, it is possible that receiving the CA measure of stereotype activation prior to testing changed the impact of solo status on performance; conversely, receiving the WFC measure of stereotype activation prior to testing could have altered the effect. Therefore, two separate 2(gender) X 2(condition) ANOVAs were conducted on the performance scores.
for the two orders of stereotype activation measure administration. When the CA measure was given before learning and the WFC measure given before testing (Order 1), the predicted 2-way interaction between gender and condition approached significance, $F(1, 41) = 3.62, p = .06$. Simple effects analyses revealed that as predicted, the performance of females who were solo at performance (nonsolo-learning/solo-testing condition) was significantly lower than the performance of males who were solo at performance, $F(1, 37) = 7.37, p < .01$. The performance of males and females in the solo-learning/nonsolo-testing condition did not differ significantly, $F < 1$ (see Table 2). When the WFC measure was given before learning and the CA measure given before testing (Order 2), no significant main effects or interactions emerged, $Fs < 1$. Thus, the predicted pattern of performance scores emerged only in Order 1, when WFC was given prior to test, and not in Order 2, when the CA measure was given prior to test. Therefore, the remaining analyses of performance scores focus on Order 1.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solo/NonSolo</td>
<td>13.88</td>
<td>13.95</td>
<td>13.91</td>
<td>15.18</td>
</tr>
<tr>
<td>NonSolo/Solo</td>
<td>16.35</td>
<td>11.40</td>
<td>13.64</td>
<td>15.30</td>
</tr>
<tr>
<td>CA-Learn, WFC-Test (Order 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WFC-Learn, CA-Test (Order 2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Performance scores as a function of gender, condition and order.\(^{11}\)

In order to test whether the effects of solo status on performance is greater for gender-identified participants, a 2(gender) X 2(condition) X 2(gender-identified or nongender-identified) ANCOVA of the performance scores in Order 1 was conducted, using participants self-assessment of how much they thought they learned from the discussion as a covariate $[F(1, 33) = 3.59, p = .08]$. While the predicted 3-way interaction between condition, gender, and gender identification did not emerge, simple effects analyses revealed that as predicted, the performance of gender-identified females who were solo at performance (nonsolo-learning/solo-testing condition) was marginally lower than the performance of males who were solo at performance, $F(1, 19) = 3.37, p = .08$, while the performance of gender identified females and males did not differ when they were nonsolo at performance, $F < 1$ (see Table 3). The performance of nongender-identified females did not differ from the performance of non-gender identified males in either condition, $F_s < 1$. The pattern of the means suggests that the performance of gender identified females was more profoundly affected by solo status ($\text{M} = 10.67$) than the performance of non-gender identified females ($\text{M} = 12.50$),

\(^{11}\) Adjusted performance means in the solo-learning/nonsolo-testing group were 14.27 for males and 14.20 for females in Order 1, and 14.40 for males and 15.07 for females in Order 2. Adjusted performance means in the nonsolo-learning/solo-testing group were 16.54 for males and 11.05 for females in Order 1, and 13.26 for males and 14.80 for females in Order 2.
hinting that the effects of solo status on performance are greater for females who are gender identified than for females who are not gender identified.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Condition</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Solo/NonSolo</td>
<td>13.36</td>
<td>14.86</td>
<td>14.60</td>
<td>11.83</td>
</tr>
<tr>
<td></td>
<td>NonSolo/Solo</td>
<td>16.50</td>
<td>10.67</td>
<td>16.25</td>
<td>12.50</td>
</tr>
</tbody>
</table>

Table 3. Performance scores as a function of condition, gender, and gender-identification within Order 1 (CA-Learn, WFC-test).

Self-reported Anxiety

The Time 1 and Time 2 anxiety scales both showed adequate internal reliability, alpha = .82 and .90, respectively. The Time 1, Time 2, and overall anxiety scores were analyzed in three separate 2(gender) X 3(condition) ANOVAs. The analysis of these variables revealed no significant main effects or interactions, all Fs < 1.

As in Experiment 1, the Time 1 and Time 2 anxiety scores for those who received the WFC measure before testing (Order 1) were analyzed in a 2(gender) X 3(condition) x 2(time 1 and time 2) mixed model ANOVA, with time as the within subjects factor. A significant 3-way interaction of gender, condition, and time emerged, F(1, 37) = 4.64, p < .05 (see Figure 4). Females report higher anxiety from Time 1 to Time 2 when they move from being nonsolos to solos, while males report lower anxiety from

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12 Adjusted performance score means in the solo-learning/nonsolo-testing group were 13.88 for gender identified males, and 14.86 for gender identified females, and 14.57 for non-gender identified males and 13.23 for non-gender identified females. Adjusted performance score means in the nonsolo-learning/solo-testing group were 16.18 for gender identified males and 10.47 for gender identified females, and 16.54 for non-gender identified males and 11.26 for non-gender identified females.
Time 1 to Time 2 when they move from being nonsolos to solos. No other significant main effects or interactions emerged, $F_s < 1$.

As in Experiment 1, relaxation scores at Time 1 and at Time 2 were analyzed in a 2(gender) X 3(condition) X 2(time) mixed-model ANOVA. Unlike Experiment 1, the three-way interaction between condition, gender, and time was not significant, $F(1, 75) = 2.16, p = .15$. 
Anxiety Scores at Time 1

Anxiety Scores at Time 2

Figure 4. Anxiety scores at Time 1 and Time 2 as a function of condition and gender.
Finally, performance scores in both orders were not significantly correlated with
time 1 anxiety \( r = -.21, p = .07 \), time 2 anxiety \( r = -.12, p = .31 \), or overall anxiety
\( r = -.17, p = .14 \). Performance scores in Order 1 were not correlated with either time
1 anxiety \( r = -.26, p = .11 \), time 2 anxiety \( r = -.21, p = .18 \), or overall anxiety \( r = -
.25, p = .13 \), and performance scores in Order 2 were not correlated with either time 1
anxiety \( r = -.17, p = .32 \), time 2 anxiety \( r = -.05, p = .76 \), or overall anxiety \( r = -
.11, p = .51 \).

**Stereotype Activation**

While the responses to the WFC and CA measures provide insight as to general
frequencies of stereotypic responding, it is unclear whether the measures indicate
stereotype activation (activation at a higher rate than baseline) or suppression (activation
at a lower rate than baseline). In order to provide a baseline measure of activation using
the WFC and category accessibility measures, these two measures were given, in a
counterbalanced order, to an independent sample of 20 males and 24 females. From
this sample, baseline levels of activation were computed for the two measures for both
males and females. The baseline averages are presented in each table, and can be used
as points of comparison to indicate whether stereotypes are being activated at a level
above baseline, or being suppressed to a level below baseline.

Alternatively, comparison to such a baseline may not be appropriate, as participants
in the experimental group and the independent sample completed the measures under
very different circumstances. The participants in the independent sample completed the
measures in relative isolation; however, participants in the nonsolo-learning/solo-testing
condition completed the measures at time 2 only after having a nonsolo experience at
time 1, and participants in the solo-learning/nonsolo testing condition completed the
measures at time 2 only after having a solo experience at time 1. While participants
may become more aware of their gender as solos, nonsolos, who are part of a group composed entirely of own-gender members, may experience heightened ingroup identity as well. It is possible that one's prior experience (either as a solo or a nonsolo) may change levels of stereotype activation from that reported under isolated circumstances. Gender stereotypes are predicted to be aroused by solo status, and perhaps by the nonsolo experience as well, as ingroup social identities may be aroused in this situation (Hogg & Abrams, 1988). Thus, it may be appropriate to compare activation levels from time 1 to time 2, as opposed to comparing to a baseline obtained from an independent sample. In the current experiment, such comparison is difficult as the measures of activation at Time 1 and Time 2 are different (either WFC or CA).

In order to assess whether stereotype activation or suppression is related to solo status at either learning or testing, the WFC-gender and CA-gender scores were analyzed using a 2(gender) X 2(condition) ANOVA. The analysis of the WFC-gender scores for those who received the WFC before testing (Order 1) revealed a 2-way interaction, $F(1,38) = 4.98, p < .05$. Simple effects analyses revealed that WFC-gender scores of solo males was marginally higher than the WFC-gender scores of nonsolo males, $F(1,38) = 3.50, p = .07$. However, the WFC-gender scores of solo females was nonsignificantly lower than the WFC-gender scores of nonsolo females, $F(1,38) = 1.69, p = .20$. Thus, males showed more activation of gender stereotypes on the WFC measures when they were solos than when they were nonsolos before testing, but females showed a nonsignificant reversal. In comparison to baseline ($M = 2.85$), males showed evidence of stereotype activation as solos ($M = 3.15$), but perhaps suppressions as nonsolos ($M = 2.00$). Females, on the other hand, showed evidence of stereotype activation as nonsolos ($M = 3.05$), but not as solos ($M = 2.23$), compared to baseline ($M = 2.23$). No significant main effects emerged from this analysis, $Fs <
1. An analysis of the WFC-gender scores for those who received it before learning (Order 2) revealed no significant main effects or interactions, $F < 1$ (see Table 4).

**Activation of Gender Stereotypes Overall**

**WFC-gender scores**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Baseline Males</th>
<th>Baseline Females</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males</strong></td>
<td>2.85</td>
<td><strong>Females</strong></td>
</tr>
</tbody>
</table>

**Gender**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solo/NonSolo</td>
<td>2.00</td>
<td>3.05</td>
<td>2.50</td>
<td>2.20</td>
</tr>
<tr>
<td>NonSolo/Solo</td>
<td>3.15</td>
<td>2.23</td>
<td>2.56</td>
<td>3.09</td>
</tr>
</tbody>
</table>

CA-Learn, WFC-Test (Order 1)

**CA-gender scores**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Baseline Males</th>
<th>Baseline Females</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Males</strong></td>
<td>3.42</td>
<td><strong>Females</strong></td>
</tr>
</tbody>
</table>

**Gender**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solo/NonSolo</td>
<td>2.50</td>
<td>3.35</td>
<td>4.00</td>
<td>3.45</td>
</tr>
<tr>
<td>NonSolo/Solo</td>
<td>3.25</td>
<td>3.64</td>
<td>2.78</td>
<td>3.50</td>
</tr>
</tbody>
</table>

CA-Learn, WFC-Test (Order 1)

Table 4. Gender-stereotype activation scores assessed using the WFC and CA measures by gender, condition and order, including baseline activation scores.
The analysis of the CA-gender scores for those who received the CA measures before learning (Order 1) revealed no significant main effects or interactions; in addition, an analysis of the CA-gender scores for those who received it before testing (Order 2) also showed no significant effects, all $F$s < 1 (See Table 4).\(^{13}\)

In order to assess whether the activation of own-gender stereotypes in particular (as opposed to activation of both male and female stereotypes) was related to solo status, the WFC-male and WFC-female scores, and the CA-male and CA-female scores, were analyzed separately. The analysis of the WFC-male scores in Order 1 revealed a significant 2-way interaction, $F(1, 38) = 4.46$, $p < .05$. Simple effects analyses revealed that WFC-male scores of solo males was significantly higher than the WFC-male scores of nonsolo males, $F(1, 38) = 3.92$, $p = .05$. The WFC-male scores of solo females did not differ from the WFC-male scores of nonsolo females, $F = 1$. Thus, males showed more activation of own gender-stereotypes on the WFC measures when they solos than when they were nonsolos before testing; indeed, in comparison to the baseline for males on this measure ($M = 1.08$) it appears that nonsolo males ($M = .46$) may even be suppressing own-gender stereotypes. Solo and nonsolo females, on the other hand, did not differ in their activation of the male stereotype. An analysis of the WFC-male scores of those who received it before learning (Order 2) revealed no significant main effects or interactions, $F < 1$ (see Table 5).

\(^{13}\)Significant differences in stereotype activation prior to testing emerged using the WFC measure while no significant differences in activation emerged using the CA measure. Neither the WFC nor the CA measures showed significant differences in activation prior to learning. Therefore, an analysis was conducted on the WFC scores prior to testing (Order 1), using CA scores prior to learning as a covariate, $F(1, 38) = 1.74$, $p = .20$. The analysis of the WFC-gender scores again revealed a significant two-way interaction, $F(1, 38) = 5.72$, $p < .05$; however, simple effects analyses revealed that the previously reported marginal difference between solo and nonsolo males was now significant, $F(1, 38) = 4.71$, $p < .05$. The WFC-gender scores of solo and nonsolo females did not differ, $F < 1$. 48
### Activation of the Male Stereotype

#### WFC-male scores

<table>
<thead>
<tr>
<th>Gender</th>
<th>Condition</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Solo/NonSolo</td>
<td>.46</td>
<td>.80</td>
<td>.88</td>
<td>.75</td>
</tr>
<tr>
<td></td>
<td>NonSolo/Solo</td>
<td>1.00</td>
<td>.50</td>
<td>.89</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>CA-Learn, WFC-Test (Order 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WFC-Learn, CA-Test (Order 2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### CA-male scores

<table>
<thead>
<tr>
<th>Gender</th>
<th>Condition</th>
<th>Male</th>
<th>Female</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Solo/NonSolo</td>
<td>1.75</td>
<td>1.80</td>
<td>2.56</td>
<td>1.50</td>
</tr>
<tr>
<td></td>
<td>NonSolo/Solo</td>
<td>1.65</td>
<td>1.77</td>
<td>1.83</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>CA-Learn, WFC-Test (Order 1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WFC-Learn, CA-Test (Order 2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Male-stereotype activation scores assessed using the WFC and CA measures by gender, condition and order, including baseline activation scores.

The analysis of the CA-male scores in Order 1 and in Order 2 revealed no significant main effects or interactions, all Fs < 1. Thus, males and females showed no difference
in their activation of the male stereotype activation on the CA measures when they solos than when they were nonsolos (See Table 5).

The analysis of the WFC-female scores in Order 1 revealed a significant 2-way interaction, $F(1, 38) = 4.12, p < .05$. However, simple effects analyses revealed that WFC-female scores of solo females was not significantly different than the WFC-female scores of nonsolo females, $F(1,38) = 2.75, p = .12^{14}$. The WFC-female scores of solo males was not significantly different from nonsolo males, $F(1,38) = 1.42, p = .24$. An analysis of the WFC-female scores of those who received it before learning (Order 2) revealed no significant main effects or interactions, $F < 1$ (see Table 6).

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14 The two-way interaction appears to be carried by a marginal difference between males and females who were nonsolo at test, $F(1,38) = 3.06, p = .09$. Females nonsolo at test showed higher female-stereotype activation than males who were nonsolo at test. No significant difference emerged between males and females who were solo at test, $F < 1$. 
Activation of the Female Stereotype

### WFC-female scores

<table>
<thead>
<tr>
<th>Condition</th>
<th>Males</th>
<th>Females</th>
<th>Males</th>
<th>Females</th>
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</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>1.77</td>
<td>1.62</td>
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<td></td>
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<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Condition</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solo/NonSolo</td>
<td>1.54</td>
<td>2.25</td>
<td>1.62</td>
<td>1.45</td>
</tr>
<tr>
<td>NonSolo/Solo</td>
<td>2.15</td>
<td>1.64</td>
<td>1.67</td>
<td>2.09</td>
</tr>
</tbody>
</table>

CA-Leam, WFC-Test (Order 1)

WFC-Leam, CA-Test (Order 2)

### CA-female scores

<table>
<thead>
<tr>
<th>Condition</th>
<th>Males</th>
<th>Females</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>.98</td>
<td>1.48</td>
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<tr>
<td><strong>Gender</strong></td>
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<tr>
<td><strong>Condition</strong></td>
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<td></td>
</tr>
<tr>
<td>Solo/NonSolo</td>
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<td>1.44</td>
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<tr>
<td>NonSolo/Solo</td>
<td>1.60</td>
<td>1.86</td>
<td>.94</td>
<td>1.50</td>
</tr>
</tbody>
</table>

CA-Leam, WFC-Test (Order 1)

WFC-Leam, CA-Test (Order 2)

Table 6. Female-stereotype activation scores assessed using the WFC and CA measures by gender, condition and order, including baseline activation scores.

The analysis of the CA-female scores in Order 1 and in Order 2 revealed no significant main effects or interactions, all Fs < 1. Thus, males and females showed no
difference in their activation of the female stereotype activation on the CA measures
when they solos or when they were nonsolos (See Table 6).

**Stereotype Activation and Performance**

Across both orders of stereotype activation administration, performance scores
were significantly correlated with WFC-gender scores, \( r = .27 \ p < .05 \). Performance
scores were significantly correlated with WFC-female scores, \( r = .35 \), \( p < .01 \), but
were not correlated with WFC-male scores, \( r = .02 \). Performance scores were not
significantly correlated with the CA-gender (\( r = .10 \)), CA-male (\( r = .07 \)), or CA-female
(\( r = .07 \)) scores.

The correlation between WFC-gender and WFC-female scores and performance
suggests that activation of gender stereotypes may have an important impact on the
performance of solos. Therefore, an analysis of the performance scores covarying out
the effects of stereotype activation (assessed using the WFC measure) should diminish
the effect of solo status on the performance of female solos. Indeed, a comparison of
the F-values obtained from the earlier reported simple effects of solo status on the
performance of female solos \( F(1, 37) = 7.37, p = .01 \), and a similar analysis using
WFC-gender scores as a covariate \( F(1, 37) = 3.24, p = .08 \) indicates that this effect is
diminished slightly when stereotype activation is taken into account. Thus, it appears
that gender stereotype activation may play a mediating role in producing these effects,
although only when assessed prior to testing using the WFC measure.

**Correlations within gender in Order 1.**

In order to test whether own-gender activation is related to performance,
performance scores in Order 1 were correlated with WFC-gender scores within each
gender. Performance scores were not correlated with WFC-gender scores for male
participants, \( r = .33 \), \( p = .13 \), and were marginally related for female participants, \( r =
.42 \), \( p = .06 \). Performance scores were not correlated with WFC-male scores for male
participants ($r = .01$), but were marginally correlated with WFC-male scores for female participants, $r = .38$, $p = .10$. Performance scores were significantly correlated with WFC-female scores for male participants, $r = .57$, $p < .01$, and were marginally correlated with WFC-female scores for female participants, $r = .34$, $p = .14$. Performance scores were not correlated with CA-male and CA-female scores for both male and female participants.

**Correlations within condition in Order 1.**

In order to test whether activation is related to performance when solo status is experienced at test rather than learning, performance scores in Order 1 were correlated with WFC-gender scores within each condition. For participants who were solo at test (nonsolo-learning/solo-testing), performance scores were significantly correlated with WFC-gender scores, $r = .58$, $p < .01$. Performance scores were significantly correlated with WFC-female scores, $r = .58$, $p < .01$, but were not correlated with WFC-male scores, $r = .23$, $p = .34$. For participants who were nonsolo at test (solo-learning/nonsolo-testing), performance scores were not correlated with WFC-gender scores ($r = .10$), with WFC-female scores ($r = .14$, nor with WFC-male scores ($r = -.04$).

**Correlations within gender in nonsolo-learning/solo-testing condition in Order 1.**

While the reported correlations indicate that this activation is related to good performance in males and females, it may be the case that the relationship is carried more by one gender than the other. Therefore, the performance scores were analyzed within each gender in the nonsolo-learning/solo-testing condition in Order 1. The pattern of correlations indicated that the relationship between gender stereotype activation and performance was indeed evident primarily in females who were nonsolo at learning and solo before test. For these participants, performance scores were positively correlated with activation of both male and female stereotypes (see Table 7).
Thus, it appears that the performance of females who are solos at test is related to stereotype activation, while the performance of female nonsolos, and male solos and nonsolos, is not related to stereotype activation. This relationship is in a positive direction, suggesting that for female solos, activation of gender stereotypes predicts good performance.

Discussion

Experiment 2 provided a partial replication of the results of Experiment 1. When the CA measure was given before learning and the WFC given before testing (Order 1), results mirrored the results of Experiment 1: performance scores of females were lower than the performance of males when solo status was introduced during test, while performance scores did not differ by gender when solo status was introduced during the learning stage. When the WFC measure was given before learning and the CA measures given before test (Order 2), this pattern of results did not emerge. The results obtained using Order 1 supported our hypothesis that the performance of females would be more impaired by solo status than the performance of males.

Although the question of why the predicted results emerged in Order 1 and not in Order 2 may have several possible answers, one explanation may focus on the nature of the WFC vs the CA task. The WFC task has been used successfully by a number of researchers (e.g., Gilbert & Hixon, 1991; Steele & Aronson, 1995), and thus it is widely regarded as an unobtrusive (implicit) method of assessing stereotype activation.

Table 7. Correlations of performance scores and gender stereotype activation.

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>NonSolo-learning/</td>
<td>WFC-gender: $r = .24$, ns</td>
<td>WFC-gender: $r = .73$, $p &lt; .05$</td>
</tr>
<tr>
<td>Solo-testing</td>
<td>WFC-male: $r = -.03$, ns</td>
<td>WFC-male: $r = .60$, $p = .07$</td>
</tr>
<tr>
<td>(Order 1)</td>
<td>WFC-female: $r = .33$, ns</td>
<td>WFC-female: $r = .68$, $p &lt; .05$</td>
</tr>
</tbody>
</table>
The CA measure, on the other hand, is modeled after other category accessibility measures (Smith & Branscombe, 1988), which by their nature call for more elaborative processing than does the WFC task. Thus, the cognitive effort required for participants to construct the explanation they will write in response to the behaviors may distract the individual from his/her solo status. This distraction can change how the individual perceives his/her solo status, and thus change the effect of solo status on performance.

While using the category accessibility measure to assess stereotype activation may have diminished the effect of solo status on performance, it may be that individual differences also influence the effect. In support of this suggestion, the predicted interaction between gender and the timing of solo status (at learning or testing) was marginally significant for female participants who identified with their gender, and not significant for those who did not identify with their gender. Thus, it appears that although the effect of solo status on performance may be a small one, individual differences in gender identification may impact the effect. The performance of females who identify strongly with their gender was more affected by solo status than the performance of females who do not identify strongly with their gender.

So it appears that several factors may have influenced results; yet two marginally significant effects did emerge in the predicted direction across two experiments. Therefore, an analysis of the effect sizes of these two findings (Rosenthal, 1978) may provide a clearer picture of the overall relationship. An analysis of the effect sizes obtained from the two-way interactions obtained in Experiment 1 (d = .57) and Experiment 2 (d = .60) was conducted, using the method of combined probabilities described by Edgington (1972). This analysis revealed that the combined effect size across the two experiments was significant, p = .0064. Thus, although the interaction between gender and solo status was marginally significant in both experiments, the overall effect does reach conventional significance.
The effects of solo status in producing cognitive deficits have been proposed to be mediated by general anxiety. Therefore, self-reported anxiety was measured before learning and before testing as in Experiment 1. Anxiety levels in males and females was found to be related to solo status, such that females became more anxious moving from a nonsolo to a solo condition, while males become less anxious moving from a nonsolo to a solo condition. These results map on to the results obtained using the "relaxation" scores in Experiment 1. Taken together, it appears that males become more relaxed when they perform in front of a opposite-gender group than a same-gender group. Females, on the other hand, become more anxious performing in front of an opposite-gender group then a same-gender group. However, anxiety was not found to be related to performance in Experiment 2. While the role of self-reported anxiety in solo effects is unclear in these experiments, it has shown potential as a mechanism for cognitive deficits in other experiments (Saenz & Lord, 1989). Thus, further work in this area should more fully investigate the role of anxiety, ideally assessing anxiety using less obtrusive techniques than self-report (e.g., galvanic skin response), in order to minimize the inaccuracies of self-reporting (Nisbett & Wilson, 1977).

In addition to anxiety, the activation of gender stereotypes was proposed to play a role in producing these effects. However, our predictions regarding the relationships between stereotype activation, solo status, and gender, and their effects on performance were largely unsupported. Although solo males did show more gender stereotype activation on the WFC measure than did nonsolo males (prediction 1), the opposite pattern emerged for females. In addition, males and females did not show more own-gender activation as solos than nonsolos on either the WFC or the CA measure.

Furthermore, it does not appear that female solos actively suppress own-gender stereotypes, as the number of female stereotypic responses to the measures did not fall
below baseline for female solos. This indicates that the female solos were not suppressing their own-gender stereotypes in order to protect the self from threatening negative stereotypes (Sinclair & Kunda, 1997). This finding may be rooted in the degree to which female solos feel identified with the domain of the information presented (monkeys and apes). Steele (1997) has suggested that stereotype threat occurs primarily for those who are invested and involved in the domain. For the "domain identified", good performance on the task is important and poor performance on the task is devastating. Because we could reasonably expect our participants to be domain-unidentified (see footnote 2), it is unlikely that any negative stereotypes were perceived as unduly threatening to female solos, and therefore they are unlikely to be actively suppressed.

Although stereotype activation was correlated with performance when solo status was experienced during testing as opposed to learning, contrary to predictions this relationship was positive. Stereotype activation (as assessed by the WFC measure) was related to good performance rather than poor performance.

While the evidence concerning stereotype activation is inconclusive, the evidence concerning the role of anxiety is stronger, and well-documented in previous research (Ickes, 1984; Saenz & Lord, 1989). The lack of support for the predicted role of stereotype activation on performance deficits in solos may be taken to indicate that stereotype activation/suppression does not play as large of a role in producing solo cognitive deficits as does general anxiety. Or, it may be the case that the performance expectancies associated with gender are due to differences in status as opposed to the content of stereotypes, such that the performance of lower status solos (i.e., females) is diminished by solo status, while the performance of higher status solos (i.e., males) is enhanced by solo status. However, there are several factors that may obscure the role of stereotype activation in producing performance deficits. First, it may be that solo
status may work not to activate one’s own stereotypes, but instead to activate stereotypes that are associated with the group to which one is exposed. The gender of the rest of the group may be more salient than the solo’s own gender. For example, to a male solo the femaleness of the group members he is faced with may be more salient than his own maleness. However, while male solos in this study did show more activation of the female stereotype than did nonsolos, female solos did not show more activation of the male stereotype than nonsolos. Rather, the pattern of activation suggests that being in an all-female group activates gender stereotypes, and female stereotypes in particular, regardless of the perceiver’s gender.

Although gender stereotypes are activated in both genders, the relationship of this activation to performance differs for males and females. The performance of females who were solos at test was related to stereotype activation, while the performance of males who were solo at test was not related to stereotype activation. Again, this activation is in a positive direction, suggesting that for female solos activation of gender stereotypes predicts good performance.

While these results suggest that stereotype activation is related to performance for female solos, why this effect operates remains unclear. One possibility is that performance is not so much positively related to stereotype activation as it is negatively related to stereotype suppression. In this case, performance would be predicted to be diminished in those actively trying to suppress stereotypes (see Bodenhausen & Macrae, in press), while the performance of those not using cognitive resources for stereotype suppression (and thus who show activation) would be enhanced. However, this possibility is not supported by the comparison of stereotype activation in female solos to a baseline measure, which indicates that stereotypes were indeed activated not suppressed (but see earlier discussion of appropriate baseline measures). Nevertheless,
it seems a possibility worthy of further investigation, perhaps using better established measures of baseline activation, i.e., using larger and more numerous samples.15

15This suggestion is supported by the finding that in the control sample, baseline measures of WFC-female activation was lower for females ($M = 1.62$) than for males ($M = 1.77$). All other levels of activation in the control group coincide with the gender of the participant: males show more WFC-male ($M = 1.08$) and CA-male ($M = 2.45$) activation than females ($M = .60$ and 1.98, respectively), and females show more CA-female ($M = 1.48$) activation than males ($M = .98$). If the baseline measure of WFC-female is unusually low in the control sample, this would lead to a false indication of stereotype activation (above baseline) rather than stereotype suppression (below baseline) in solo females.
CHAPTER 4

GENERAL DISCUSSION

Overview of Findings

While previous work by Saenz and her colleagues (Lord & Saenz, 1985; Saenz, et al, 1987) has demonstrated that solo status has a negative impact on the encoding of information, the previous research on cognitive deficits in solos had not investigated the impact of solo status introduced at retrieval rather than the encoding of information. The current research introduced solo status at both learning and testing, and results across two experiments indicated that while solo status does impact the encoding of information, it has a greater impact during testing. In addition, performance was differentiated for males and females, such that females were more profoundly impacted by solo status experienced during testing than were males. Thus, it was demonstrated that the solo experience may differ depending on the social category to which the solo belongs: solos belonging to a social category associated with poor performance are more influenced by solo status that are solos belonging to a social category associated with good performance. It was suggested that these differences in performance emerged because stereotype-related expectancies associated with males and females became salient under solo conditions. Because these expectancies portend poorer performance for females relative to males, solo status diminishes the performance of females, while the performance of males is unaffected (Experiment 1) or even enhanced (Experiment 2) under solo conditions.
In order to investigate possible mechanisms behind these effects, the roles of general anxiety and stereotype activation were assessed. Across the two experiments, levels of general anxiety differed for male and female solos, such that females became more anxious, and males became more relaxed, moving from a nonsolo to a solo situation. In addition, performance scores were found to be negatively correlated with feelings of relaxation (Experiment 1), indicating that higher anxiety was related to poorer performance. Thus, the role of general anxiety was reliable across Experiments 1 and 2, and seems worthy of further investigation.

Experiment 2 tested the relationship of stereotype activation to solo status experienced by males and females, in order to assess whether female stereotypes are activated for females and male stereotypes are activated for males who are solo while testing over information. It was also predicted that stereotype activation would be negatively correlated with performance for females, such that activation of stereotypes predicts poor performance. However, results indicated that gender stereotypes (and female stereotypes in particular) are activated for male solos and female nonsolos. In other words, gender stereotypes are activated for both males and females who are part of an all-female group. Furthermore, this activation was positively related to performance for female nonsolos, such that activation of stereotypes was related to good performance. Thus, it seems that stereotype activation leads to good performance in female solos, although how and why this relationship operates remains an issue for further investigation.

Future Directions

The investigation of the role of stereotype activation (or inhibition) in relation to solo performance deficits is but one direction that this line of research may follow. Investigation of the mechanisms behind this effect may focus on the nature of the anxiety associated with solo status. It has been suggested that this anxiety is social,
being based on concern for how one appears in the eyes of others (see Saenz & Lord, 1989, Experiment 3). Such social anxiety may be rooted in worry about one's own performance. Saenz (1994) suggest that token memory deficits result from concern about one's performance relative to the performance of others. Such concern about performance could be investigated by giving solos the opportunity to self-handicap (Arkin & Baumgardner, 1985). We predict that to the extent solos are overly concerned about performance they should be willing to offer excuses for their expected poor performance, or even take actions that may impede their own performance, in order to "save face" (see Steele & Aronson, 1995, Experiment 3). Thus, if the anxiety reported by females moving from a nonsolo to a solo situation is indeed rooted in concern about performance, then female solos should engage in self-handicapping strategies to a greater extent prior to testing than do males.

However, it may not be concern about one's performance that causes performance deficits; perhaps such deficits are caused by general concerns about how one is being perceived by others. Anxiety aroused by performance-related concerns may be rooted in the belief that the stereotype is true ("I'm going to fail this class; girls can't do science"). Alternatively, anxiety may also arise from concern over one's actions being perceived as stereotypic by others ("They think I'll fail this class just because I'm female"). This concern about being perceived stereotypically may drive solo performance deficits, as cognitive resources become reallocated to denying or dissociating oneself from the stereotype ("If I speak loudly, I'll appear less feminine") (see also Steele & Aronson, 1995, Experiment 3). Thus, the locus of these effects is an open question: Are these effects internal, driven by the solo's own belief that stereotypes are accurate; or more external, driven by the solo's belief that others endorse stereotypes about them and that they may live up to them. Future research
should seek to address these issues as well as to identify mediators for solo performance deficits.

Conclusion

In sum, this line of research suggests that the notion of placing females (or a member of any stereotyped group) in a solo situation such as the one Shannon Faulkner found herself in, is likely to impede the performance of the solo. This is unfortunate, as the efforts to include individuals where they are traditionally underrepresented, such as the effort to include women in executive management, high ranking hospital staff, or at the Citadel are often quite sincere. If such efforts fail, it may support the view that these individuals did not belong in management, in medicine, or in the military in the first place. On the brighter side, solo research has discovered that by simply including more than one member of the underrepresented group, performance deficits diminish. Traditionally male academies such as the Citadel have, intentionally or not, heeded this advice, as their classes in subsequent years have included several women instead of just one, and these women have remained in the program. Of course, this inclusion of multiple members of underrepresented groups will not always be the case; people will often find themselves in solo situations. As work continues in this area, we expect to uncover the mechanisms behind solo performance deficits, perhaps to indicate how they can be thwarted in cases where solo status is inevitable.
APPENDIX A

MATERIALS USED IN EXPERIMENTS 1 AND 2
Please circle the appropriate number to indicate how you feel about Campus Link-Up so far.

How well could you hear the other people in your group?

1 2 3 4 5 6 7 8 9 10

could hear very poorly     could hear very well

How well could you see the other people in your group?

1 2 3 4 5 6 7 8 9 10

could see very poorly     could see very well

How well do you think you did in transmitting your information to the rest of the group?

1 2 3 4 5 6 7 8 9 10

did very poorly     did very well

How much did you learn from the information you received from the rest of the group?

1 2 3 4 5 6 7 8 9 10

learned very little     learned very much

How well did the person in the RED ROOM perform in this session overall?

1 2 3 4 5 6 7 8 9 10

did not do very well     did very well

How well did the person in the GREEN ROOM perform in this session overall?

1 2 3 4 5 6 7 8 9 10

did not do very well     did very well

How well did the person in the YELLOW ROOM perform in this session overall?

1 2 3 4 5 6 7 8 9 10

did not do very well     did very well

How well did the person in the BLUE ROOM perform in this session overall?

1 2 3 4 5 6 7 8 9 10

did not do very well     did very well
What year are you in school?
1  2  3  4  5+

Your major

Your overall GPA:
less than 1.0  1.0 to 1.4  1.5 to 1.9  2.0 to 2.4
2.5 to 2.9  3.0 to 3.4  3.5 to 3.9  4.0

Have you taken a course on Monkeys and Apes before?  Yes  No

How interesting do you find the topic of Monkeys and Apes?
1  2  3  4  5  6  7  8  9  10
not very interesting  very interesting

What was the MAIN TOPIC that the person in GREEN ROOM spoke about?

What was the MAIN TOPIC that the person in BLUE ROOM spoke about?

What was the MAIN TOPIC that the person in YELLOW ROOM spoke about?

What was the MAIN TOPIC that the person in RED ROOM spoke about?

66
Read each statement and circle the appropriate number to indicate how you feel right now, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement. Give the answer that seems to describe your present feelings best.

1. I feel calm.
   1. Not at all  
   2. Somewhat  
   3. Moderately so  
   4. Very much so

2. I feel anxious.
   1. Not at all  
   2. Somewhat  
   3. Moderately so  
   4. Very much so

3. I feel relaxed.
   1. Not at all  
   2. Somewhat  
   3. Moderately so  
   4. Very much so

4. I am tense.
   1. Not at all  
   2. Somewhat  
   3. Moderately so  
   4. Very much so

5. I feel self-confident.
   1. Not at all  
   2. Somewhat  
   3. Moderately so  
   4. Very much so

6. I feel nervous.
   1. Not at all  
   2. Somewhat  
   3. Moderately so  
   4. Very much so
Listed below are a number of personality characteristics. For each characteristic, place a number from 1 to 7 in the blank to the left, indicating how true of you that particular characteristic is. The scale is as follows:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never or almost not true</td>
<td>Usually not true</td>
<td>Sometimes but not frequently true</td>
<td>Occasionally true</td>
<td>Often true</td>
<td>Usually true</td>
<td>Always or almost always true</td>
</tr>
</tbody>
</table>

1. Defend my own beliefs
2. Affectionate
3. Independent
4. Sympathetic
5. Assertive
6. Sensitive to needs of others
7. Strong personality
8. Understanding
9. Forceful
10. Compassionate
11. Have leadership abilities
12. Eager to soothe hurt feelings
13. Willing to take risks
14. Warm
15. Dominant
16. Tender
17. Willing to take a stand
18. Love children
19. Act as a leader
20. Gentle
APPENDIX B

STEREOTYPE ACTIVATION MEASURES
This questionnaire is designed to serve as a "cognitive warm-up" task; that is, its purpose is to stimulate thinking, and get your mind active and ready to process information.

The following is a list of word fragments, that is, words with some of the letters left out. Please complete the following word fragments by adding letters to form the first English word that comes to mind.

For example: PSY ___ O ___ G Y could be completed as PSY C H O A O G Y

Each word fragment may be completed in a number of different ways, but try to use the first word that comes to your mind.

Do not spend more than 1.5 seconds on each word. If no word comes to mind in that time, just leave it blank and move on to the next word.

1. WH ___ ___
2. ___ END
3. E ___ Y
4. CH ___
5. D ___ B
6. ST ___ NG
7. IN ___
8. BA ___
9. S ___ KY
10. SHA ___
11. M ___ E
12. ___ CT V ___
13. W ___ K
14. C ___ V ___ R
15. FR ___ N ___ L Y
16. L E ___ R
17. ___ RE
18. V ___ G ___ E
19. ___ R Y ___ NG
20. ___ T E
21. S M ___
22. ___ K I N G
23. F E ___ E
24. LO ___
25. ___ S S
26. ___ E R I O R
This questionnaire is designed to serve as a "cognitive warm-up" task; that is, its purpose is to stimulate thinking, and get your mind active and ready to process information.

Please read the following sentences that describe someone else's behavior. After each sentence, write down an explanation for the behavior. That is, write why, or under what circumstances, you think someone would perform the behavior.

Do not spend too much time trying to think of many different answers. Instead, just write down the first response that comes to your mind. If no response comes to your mind after 15 seconds, just leave it blank and move on to the next sentence.

1. returned the library book on time
2. poured the oil out of the pan into a separate container
3. threw all the mail in the trash
4. tested the temperature of the formula before continuing
5. took two aspirin late in the afternoon and went to bed
6. ran out in the middle of the important business meeting
7. planted a tree in the front yard
8. stood up when the man bumped into him at the bar
9. was overjoyed when strangers came knocking at the door
10. talked quietly to the child after the game
11. put down the test, got up and left while others were working

12. put on a large leather belt, then bent over and picked something up from the floor

13. didn’t like rock-and-roll music

14. reached in the handbag for something at the end of the movie

15. always stopped to take pictures of waterfalls

16. offered a hand across the desk and said “congratulations”

17. didn’t lace up the sneakers

18. looked for a moment at the car jack, then closed the trunk and left

19. chose not to wear socks with the new shoes

20. grasped the other person’s jacket as they spoke

21. smiled while waiting to be called to the podium to speak
LIST OF REFERENCES


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Fein & Spencer, (in press).


