THE EFFECTS OF STEREOTYPE THREAT ON WOMEN’S AND MEN’S
ACADEMIC PERFORMANCE AND TEST-RELATED BEHAVIORS

A Thesis

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James Santiago

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Department of Psychology
Abstract

of

THE EFFECTS OF STEREOTYPE THREAT ON WOMEN’S AND MEN’S ACADEMIC PERFORMANCE AND TEST-RELATED BEHAVIORS

by

James Santiago

This study investigated the influence of stereotype threat and gender on test performance and test-taking behaviors. Effects of stereotype threat and gender on math and verbal assessments, time spent per item, work shown on math items, test anxiety, domain identification, and locus of control were examined. Participants consisted of 50 females ($M$ age = 19.92 years, $SD$ = 1.69 years) and 52 males ($M$ age = 21.50 years, $SD$ = 5.73). There were 24 White, 5 Black, 25 Asian, 31 Hispanic, 10 multi-racial and 7 classified as “other-race” participants. Before completing the computer-administered measures, participants were either told that previous research indicates gender influences performance on math and verbal assessments, or that it does not. Results of this study indicated stereotype threat and gender do not significantly influence test performance, testing behaviors or other measures. Possible limitations include an ineffective stereotype threat manipulation, the computer-based testing format, and item difficulty.

_______________________, Committee Chair
Lisa Harrison, Ph.D.

____________________________________
Date
Dedication

This thesis is dedicated to my loving family and my beautiful wife.

Thank you for all the love and support you have given me.
ACKNOWLEDGMENTS

I would like to sincerely thank Dr. Lisa Harrison for all of her guidance during the development and completion of my thesis; without you this thesis may not have been possible. I would also like to give a special thank you to my thesis committee, Dr. Greg Kim-Ju and Dr. Oriel Strickland, for supporting me during this process. Lastly, I would like to thank my family and friends for always believing in me.
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Despite the assimilation of gender roles and the narrowing in gender differences that have occurred over the last several decades, a gap persists in areas of academic ability testing. Specifically, gender differences continue to exist in the mathematical and verbal domains (Nguyen & Ryan, 2008). For example, while men tend to perform better than women on mathematical problem solving items, women continue to perform better on verbal problem solving items (Neuville & Croizet, 2007; Spencer, Steele, & Quinn, 1999; Williams, 2006). There have been several theories posited as to why gender differences such as these continue to exist in ability test scores. However stereotype threat theory provides a compelling explanation of the source of some gender differences in academic performance (Dar-Nmrod & Heine, 2006; Gonzales, Blanton, & Williams, 2002; Inzlicht & Ben-Zeev, 2000; Steele, 1997).

According to Steele and Aronson (1995), stereotype threat occurs when individuals belonging to a stereotyped group (e.g. Asian, African American, women, men etc.) are placed in situations where their actions or performance have the potential to confirm the negative stereotype associated with their social group. Research has shown that in these situations members of the negatively stereotyped group feel a heightened sense of test anxiety/arousal due to the evaluation apprehension that has now manifested
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from the threat (Blascovich, Spencer, Quinn, & Steele, 2001; O’Brien & Crandall, 2003; Steele, & Quinn, 1999). Once faced with this anxiety, the individuals affected will form an internalized or an externalized view of their ability to perform well. Previous research has shown that individuals who externalize their ability will be less susceptible to the anxiety accompanied by stereotype threat, if at all. However, individuals that internalize their ability will be particularly susceptible to the anxiety accompanied by stereotype threat (Steele, Spencer, & Aronson, 2002). Those with an internalized locus of control are already preoccupied with their performance, holding feelings of responsibility for their own success or failure. Now these individuals have the additional anxiety of possibly conforming to the stereotype in question, thus creating the perfect breeding ground for decreases in performance (Cadinu et al., 2003).

While research has shown that exposure to stereotype threat and the test anxiety that accompanies it can have significant effects on performance, it is believed that prolonged exposure to situations such as these can cause a situational avoidance for those affected. In fact, eventually this situational avoidance could lead to the disengagement and disidentification from the related academic domain altogether (Smith, Sansone, & White, 2007). Research has indicated that disidentification from an academic domain may be a strategy employed by those affected by stereotype threat to avoid encountering the anxiety they had previously experienced in situations that generated stereotype threat (Steele, Spencer, & Aronson, 2002).
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Steele and Aronson’s identification that individuals in a stereotype threat manipulated condition performed worse than individuals in a controlled condition has had a tremendous impact on the growth of stereotype threat theory research involving various domains and social groups (Campbell & Collaer, 2009; Lawrence, Marks, & Jackson, 2010; Marx, Brown, & Steele, 1999; Williams, 2006). The psychological mechanisms responsible for the effects of stereotype threat have continued to be researched extensively. However, whether there is a behavioral link between stereotype threat and outcomes in standardized testing has yet to be fully examined. Despite previous research by Steele and Aronson, test-taking behavior variables have only begun to gain some attention in the realm of stereotype threat and its subsequent effects on test scores. The little research within this area has shown impaired time management amongst minority participants in the presence of stereotype threat (McNulty, Sonntag, & Sinacore, 2007; Scherbaum, Blanshetyn, Marshall-Wolp, McCue, & Strauss, 2011).

Research on test-taking behaviors is important because these variables can affect every aspect of an individual’s overall test taking experience, including test taking skills, response time per item, item response changes, item response choices, and ultimately, test scores. In addition, test-taking behaviors may be the behavioral related outcomes of many psychological mechanisms that are related to stereotype threat, including test anxiety, locus of control and identification (Armenta, 2010; Cadinu, Maass, Lombardo & Frigerio, 2006).
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Previous research has sought to examine the differences in test taking behavior across ethnicities. This research found that stereotype threat influence did impact the frequency individuals changed their responses while testing. Stereotype threat significantly impact time related test-taking behavior, including response time at both the item and overall task level (Scherbaum et al., 2011). These results provide a promising starting point for the present research. Instead of examining ethnic differences in test-taking behaviors in the presence of stereotype threat, this research will examine whether stereotype threat influences gender differences in test taking behaviors. This research will also examine how these differences in test-taking behaviors affect test scores.

Specifically, this research will exam how stereotype threat influences average time spent per item, time spent between easy and difficult mathematical items, work shown per mathematical item, differences in number of items correct between easy and difficult mathematical items, verbal ability assessment score and overall test score. Lastly, this research will examine the link that stereotype threat has between test anxiety, locus of control and domain identification. The three goals of this study are as follows:

1) Examine whether stereotype threat influences gender differences in academic performance; 2) if these gender differences in academic performance do exist, determine whether there is a behavioral link between stereotype threat and academic performance; and 3) determine if the interaction between gender and stereotype threat influences individual’s test anxiety, locus of control and domain identification.
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Stereotype Threat Theory

Steele and Aronson’s visionary work suggests that stereotype threat occurs when individuals are placed into a situation where their performance may be evaluated in light of a negative stereotype of their social group (Steele & Aronson, 1995). In these situations the possibility of conforming to the negative stereotype redirects the valuable cognitive resources from the task at hand, causing a worse performance for members within that group (Steele & Aronson, 1995).

In their seminal study, Steele and Aronson sought to gain an understanding of stereotype threat and how this threat affected stereotyped group members. To gain this understanding, Steele and Aronson targeted the stereotype that Black individuals are not as intelligent as their White counterparts through four experiments. In Experiment 1, Black and White participants took a difficult test consisting of verbal items taken from the General Records Examination (GRE) in one of two conditions. In a stereotype threat manipulated condition, participants were told the test was diagnostic of their ability; thus making both the racial stereotype about intellectual ability salient and prompting the Black participants to underperform in fulfillment of the stereotype. Those participants in the non-stereotype threat condition were instructed that the test was simply a problem-solving task, not diagnostic of their ability. In an additional condition, participants were told that the test was difficult. This added instruction of difficulty was provided to evaluate any differences in performance due to stressing the test difficulty. Group
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performance was compared after being adjusted for individual differences in skill level (differences in participant’s verbal SAT skills). The results indicated that Black participants performed poorer than the White participants in the stereotype threat condition. However, in the controlled condition(s) where no threat was present, the performance of Black participants equaled that of the White participants.

In Experiment 2, Steele and Aronson examined whether performance was mediated by the participants apprehension of possibly conforming to the negative stereotype. The methodology used in Experiment 2 was a replication of that used in Experiment 1 with a couple of exceptions. In this experiment participants were asked to complete a version of the Spielberger State Anxiety Inventory (STAI). Time spent on each test item was also recorded to determine if increased anxiety was associated with more or less time spent per item. The results were similar to those found in Experiment 1, with Black participants in the diagnostic condition continuing to have higher rates of inaccuracy. However, this time the results also indicated that Black participants completed fewer items than the White participants. Overall no differences were found in anxiety levels.

In Experiment 3, Steele and Aronson had both Black and White participants complete a task in three different conditions (diagnostic, non-diagnostic, and control). In the diagnostic condition, the instructions described the measure as an accurate indicator of ability. The participants were instructed to try as hard as they could in the task. In the
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non-diagnostic condition, participants were told that even though ability was not being evaluated, all the participants should try their hardest. In the controlled condition the participants arrived to find a note on the door instructing them to complete the task left in an envelope. No mention of ability evaluation or encouragement to do their best was conveyed. What they discovered was that Black participants performed worse in the conditions where the activity was described as diagnostic. Along with this decrease in performance, Black participants also reported an increased sense of racial identity, higher levels of doubt regarding their ability and were least likely to report their ethnicity in comparison to the participants in the controlled condition.

At this point two tendencies were becoming evident, that presenting a test as difficult could undermine performance in Black individuals and that the belief in test difficulty can cause a sense of susceptibility of being judged under a particular racial stereotype. However even with the disclosure of these tendencies, there were still a couple of questions left to be addressed. The first question involved whether stereotype threat would affect performance even in the absence of presenting the test as diagnostic of ability. The second question involved whether the disruptive effect of the diagnostic description manipulation was in fact mediated by the stereotype threat it caused or some other variable.

In the last experiment Aronson and Steele replicated Experiments 1 and 2, except this time the test was not described as being diagnostic. This description addressed the
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first question of whether or not stereotype threat would have an impact on test performance despite the lack of the diagnostic description. To address the second question regarding whether the disruptive effect caused by the diagnostic description was in fact mediated by the stereotype threat caused, one of the dependent measures of stereotype threat (self-reported race) was manipulated as an independent measure. This time half of the participants were asked to provide their race prior to the test, whereas half were not. The results indicated that only the Black participants whose race was made salient prior to testing showed reduced overall performance, were marginally less accurate, and answered fewer items. However Black participants who didn’t disclose race prior to the test performed similar to the White participants, who showed no differences amongst themselves between both conditions.

The results from Steele and Aronson’s research suggest that stereotype threat can affect performance despite the presence of the diagnostic description. This research also provided data indicating that reduced performance was attributed to race being made salient prior to completing items in a domain where the targeted racial social group has been historically stereotyped as performing poorly. Similar findings involving the saliency of identity and stereotype have been conducted, including the examination of gender differences in domains that have been historically stereotyped (Crozet & Claire, 1998; Shih, Pittinsky, & Ambady, 1999).
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Gender Differences in Mathematical Ability Due to Stereotype Threat

There have been many reviews and large-scale studies examining gender differences across various sub-domains, including mathematics (Hedges & Nowell, 1995; Lindberg, Hyde, Petersen, & Linn, 2010). However, the examination of stereotype threat as a mediating variable of gender differences in mathematical abilities really began with the publication of research in the late 1990s (Spencer, Steele, & Quinn, 1999) when researchers examined the effects of stereotype threat on women’s math performance. This enabled researchers to understand the processes that undermine the performance of women in mathematical testing, as well as future participation in mathematical related areas.

The first experiment in this research examined gender performance differences on easy and difficult math items. A sample of men and women were administered both easy and difficult mathematical items taken from the Graduate Record Examination (commonly referred to as the GRE). The results indicated that there were no gender differences in the performance on the easier test items, however women performed significantly worse than men on the difficult test items. In the second experiment every participant was given the exam in two 15-minute periods. However the instructions provided between the two periods varied significantly. One of the two periods was described as including items that had historically shown gender differences. The items that were included during the other period were not described as historically having any
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gender differences. The goal was to determine if any performance differences existed when the results of the two periods were compared. The results indicated that the performance of women significantly decreased when told that gender differences had previously existed for the items in that group. It is also interesting to note that women in the non-threat conditions performed similarly to men during the period of the test that was not described as historically resulting in gender differences (Spencer et al., 1999).

The final experiment conducted within this research was very similar to both the first and second experiments. Except this time the goals were to determine if gender differences would continue to exist after reducing the gender relevance of the stereotype, as well as to determine the mediating role of stereotype threat upon performance. Men and women were given twenty minutes to complete the math items. In the non-threat condition, participants were told that there was no gender differences previously found in the test that they were about to take. The participants in the threat condition were not told anything regarding gender differences. The idea was the test takers would experience stereotype threat by default when encountering the math problems. The results confirmed this notion. The female participants in the threat condition performed worse than any of the other three groups (Spencer et al., 1999). The research conducted by Spencer, Steele and Quinn (1999) was not only able to replicate the findings of Steele and Aronson’s (1995) original research by confirming that stereotype does relate to gender differences in academic performance especially when looking at differences amongst item difficulty.
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This series of experiments also provided evidence supporting the notion that stereotype threat did not need to be prompted or made salient to have a significant impact on performance as previously believed.

For decades researchers have continued to explore the psychological mechanisms linked to stereotype threat and how they relate to the overall performance differences that continue to be seen. As research continues to explore these different psychological mechanisms, some within the world of academia cannot help but wonder if there is a better explanation to account for these differences. Maybe the answer to this question is an existing behavioral link between stereotype threat and academic performance in the form of test-taking behaviors.

The Effect of Stereotype Threat on Test-Taking Behaviors

Test-taking behaviors are the actions or responses to the environment of the test, as well as the test itself. These test-taking behaviors include test taking strategies, response time per item, response changing, and even item response choices. Previous research has indicated that test-taking behaviors can impact test performance, especially when it comes to the impact stereotype threat has on response changes to test items (McNulty et al., 2007). In Steele and Aronson’s original work, it was found that individuals exposed to stereotype threat completed fewer test items, did so with less accuracy and spent more time on each item. Steele and Aronson (1995) theorized that
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stereotype threat was causing arousal, attention diversion, interfering self-consciousness and effort withdrawal, which in return impacted these test-taking behaviors.

Although there is little published research related to the effects that stereotype threat has on test-taking behaviors, exploratory studies that have looked at test-taking behaviors have shown some interesting results. However only recently has research actually focused directly on studying the effects that stereotype threat has on test-taking behaviors and in turn test performance. In a study conducted by Scherbaum et al. (2011) researchers sought to fill this research gap by examining the effect that stereotype threat has on time-based observable behaviors (amount of time spent per item and time consistency), as well as choice-based behaviors (item answer changes and items answered).

This set of experiments included a sampling of 173 Black and White participants from Northeastern University, who were assigned to one of two conditions. In the stereotype threat manipulation, participants were instructed that the study was looking at different factors to help explain why White and minority participants performed differently on standardized tests of verbal ability. These participants were also instructed that this was a difficult test and should not expect to get many items correct. Participants in the controlled condition received instructions stating that the study was examining factors that predicted performance on verbal problem solving tasks. The participants in the controlled condition were also told that the tasks included in the study were free of
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bias, and performance among different social groups was equally distributed. Each of the participants was asked to complete 50 verbal items taken from the General Record Examination (GRE). The participants were instructed to complete the first 20 items, and then received one of the two sets of instructions (stereotype manipulated or controlled). Once they received their instructions, the participants completed the remaining 30 items.

The results of this study showed impaired time management among Black participants in the presence of stereotype threat. Specifically, Black participants tended to have a longer item response time than both their White counterparts and Black participants not exposed to stereotype threat. The results also indicated that Black participants when exposed to stereotype threat had a tendency to change their answer less frequently than their White counterparts as well as Black participants who were not exposed to stereotype threat. In the event that any of the Black participants changed a response, typically this change was from correct to incorrect.

Besides the research previously mentioned, very little research has looked into how observable test-taking behaviors are affected by stereotype threat, or the link that test-taking behaviors share with academic performance. Fewer studies have attempted to replicate the few findings within the realm of test-taking behavior that hold some promise within stereotype threat research. The research in this study will look exclusively at replicating some of the significant results regarding the effect that stereotype threat has
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on academic performance, as well as investigate the theorized behavior link between stereotype threat and academic performance.

The Current Study

This study will expand on previous research and examine the effects of stereotype threat on the test taking behaviors of men and women. Previous research has yielded some interesting results in studying the effects that stereotype threat have on test-taking behaviors and overall academic performance across ethnicity. The current study expands the literature by examining whether gender and stereotype threat interact to influence test-taking practices. Specifically, this research will look at whether gender influences average time spent per item, average time spent working on easy and difficult mathematical items, the amount of work shown per mathematical item, performance on easy and difficult math items, verbal performance and overall performance. In addition the present research will attempt to replicate the results of previous research by examining whether the interaction of gender and stereotype threat influences psychological mechanisms that have been previously connected to academic performance. Specifically we will be looking at how the interaction between gender and stereotype threat effect differences in Test Anxiety, Locus of Control, and Domain Identification.
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There are six general hypotheses, and one research question concerning the effects of stereotype threat on test-taking behaviors across and between genders that this research pertains to. They are as follows:

**Hypothesis 1**

It is predicted that stereotype threat will influence the overall performance of women and men on test items related to domains where historical performance stereotypes regarding their gender have previously existed. Specifically, it is predicted that women in the threat condition will have an overall lower mathematical ability score than women in the control condition, or men in either condition. It is also predicted that men in the threat condition will have an overall lower verbal ability score than men in the control condition, or women in either condition. This prediction is based on previous studies (Spencer, Steele, & Quinn, 1999; Steele & Aronson, 1995) that have found decreases in performance when groups of individuals are asked to complete items from a domain they have been historically stereotyped, coupled with making this historical stereotype salient to the test takers.

**Hypothesis 2**

It is predicted that stereotype threat will have a greater negative influence on the performance of women on difficult mathematical items when compared to their performance on the easier mathematical items. This prediction falls in line with the results from Spencer, Steele and Aronson’s study (Spencer, Steele, & Quinn, 1999), in
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which they found that female test takers performed significantly worse on difficult mathematical items when compared with men.

Hypothesis 3

It is predicted that stereotype threat will influence the amount of work (leave written evidence of the process used to solve the problem) men and women show when solving mathematical ability items. Specifically, it is predicted that women completing math items under stereotype threat will show their work less frequently than women in the control condition, and less than men in either condition. Similar to the results discovered during Steele and Aronson’s research (Steele & Aronson, 1995), the more apprehensive the participants were of possibly being stereotyped, the more cautious they became and the fewer items they completed. It is predicted that this over-cautiousness due to evaluation apprehension will affect the student’s willingness to show their work in solving mathematical ability items due to the possibility of being evaluated negatively in accordance with the established stereotype of their group.

Hypothesis 4

It is predicted that stereotype threat will influence the amount of time women and men spend on test items related to domains where historical performance stereotypes regarding their gender have previously existed. Specifically, it is predicted that in the presence of stereotype threat, women will spend more time on mathematical test items, as opposed to the women in a controlled condition, as well as the test taking men in either
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condition. It is also anticipated that in the presence of stereotype threat, men will spend more time on verbal test items, as opposed to men in a controlled condition, as well as women in either condition. This predicted outcome is based on the findings from Steele and Aronson’s original study (Steele & Aronson, 1995), which showed that individuals whom belonged to a historically stereotyped group tended to spend more time on items when exposed to a threatened situation of being stereotyped.

**Hypothesis 5**

It is predicted that stereotype threat will influence the levels of test anxiety of women and men. Specifically, it is predicted that women and men exposed to stereotype threat will have higher levels of test anxiety than participants in the controlled condition. This prediction is based on previous studies that have found similar results in anxiety increases from individuals exposed to stereotype threat (Blascovich, Spencer, Quinn, & Steele, 2001; O’Brien & Crandall, 2003; Steele, & Quinn, 1999).

**Hypothesis 6**

It is predicted that exposure to stereotype threat will have a negative influence on the domain identification of men and women in relation to a domain where previous gender stereotype beliefs have been historically held. Specifically, it is predicted that women in the threat condition will hold lower levels of mathematical domain identification than women in the control condition, or men in either condition. It is also predicted that men in the threat condition will have lower verbal domain identification
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than men in the control condition, or women in either condition. This prediction is based on previous research regarding the link that stereotype threat has with lower levels of domain identification (Steele, Spencer, & Aronson, 2002).

Research Question 1

Exploratory research will be conducted to examine the link between stereotype threat and the locus of control of individuals that are exposed to it. The data will be examined to determine whether participant gender and stereotype threat influences internal and external locus of control following the completion of math and verbal assessments.
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Chapter 2

METHOD

Participants

Participants were 106 students from a northern California university, who volunteered to participate in order to fulfill a research requirement for their undergraduate psychology courses. Four of the participants had missing data; listwise deletion was utilized in these particular cases. Thus, the sample contained 102 participants (50 women, \( M \) age = 19.92 years, \( SD = 1.69 \) years; 52 men, \( M \) age = 21.50 years, \( SD = 5.73 \) years.) The sample contained 24 White, 5 Black, 25 Asian, 31 Hispanic, 10 multi-racial and 7 “other-race” participants. Of this sample there were 22 freshmen, 37 sophomore, 29 juniors, 9 seniors and 5 “others”. The participants’ G.P.A ranged from 2.00 to 3.90 with a mean of 3.14 and a SD of .46. In addition; there were 49 lower income, 35 middle income, and 17 upper income participants.

Materials

Mathematical and Verbal Ability Assessments

Each of the participants completed a 10-item mathematical ability assessment as well as a 10-item verbal ability assessment using MediaLab and DirectRT software via a computer. The math and verbal tests contained items taken from a SAT study guide that was published on the Internet (Official SAT Practice Guide, 2012). The SAT is a
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standardized test that is administered for college admissions in the United States, measuring an individual’s skill in critical reading, math and writing. These tests were counterbalanced between participants to reduce order effects. Using these tests, accuracy scores for Math Performance and Verbal Performance were calculated by adding the number of items participants answered correctly within each assessment. Before completing the test, participants read a set of instructions embedded within the assessment that included an explanation of the tests’ purpose.

Stereotype Manipulation Instructions

Participants were randomly assigned to either a stereotype threat (diagnostic) or a non-stereotype threat condition (non-diagnostic). Each group of participants received a set of instructions that were embedded in the assessment and varied by condition. The participants in the stereotype threat condition received instructions that were intended to make gender stereotype threat related to academic ability salient. Below are the instructions given to the diagnostic group.

“This study concerns factors that aid to explain why male and female individuals perform differently on standardized tests of math and verbal ability. Specifically, this research will investigate the various personal factors involved in performance on problems requiring mathematical and verbal ability. This is a genuine diagnostic test of your math/verbal abilities and limitations, as we are trying to understand the factors that are involved with both. This is a difficult test, so you shouldn’t expect to get many items
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correct however, please try your hardest to help us in our analysis of your mathematical/
verbal abilities. Feel free to use the blank pieces of scratch paper at your workstation if
you choose, however, this material will be collected at the conclusion of the test.”
These instructions are similar to those used in previous related research (Scherbaum,

Participants in the non-diagnostic condition received the following instructions,
which had the intention of avoiding activation of any kind of stereotype threat. These
instructions are similar to those used in previous related research (Scherbaum,

“This study concerns factors that predict performance on both mathematical
problem solving items and verbal ability items. To ensure that we examine these factors
without the contamination of biases, the items that you are about to complete have been
shown to be free of such biases, with male and female individuals performing equally
well on it. This is a difficult test, so you shouldn’t expect to get many items correct
however, please try your hardest to help us in our analysis of your mathematical and
verbal abilities. Feel free to use the blank pieces of scratch paper at your workstation to
show your work if you choose, however, this material will be collected at the conclusion
of the test.”

Dot Probe Task

Each participant completed a dot probe task consisting of 10 trials of two-word
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pairings. Each pair of words was displayed simultaneously followed by a black dot located in the same location of one of the two words. The participants were instructed to indicate the location of the dot for each set of words by pressing the arrow keys on the keyboard. This task was completed as a distracting activity between the ability assessments.

Test Anxiety Scale

All participants completed the Test Anxiety Scale (Sarason, 1978), which is a 37-item scale that assesses participants’ test anxiety. These 37 items were combined to form a Test Anxiety Index. The internal reliability index was acceptable (Cronbach’s alpha = .95). All of the items were measured using a 7-point scale, 1 = disagree strongly and 7 = agree strongly. Higher indices indicate a greater test anxiety for participants.

Domain Identification Scale

All participants completed the Domain Identification Measure (Smith & White, 2001), which is a 20-item scaled questionnaire designed to measure the strength of participants’ academic domain identification. All items were measured using a 5-point Likert-type scale, with higher scores indicating high identification with academic success. Ten of the items from the Domain Identification scale were combined to form a Math Identification index. The internal reliability for the Math Identification index was acceptable (Cronbach’s alpha = .88). Seven of these items were combined to form a
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Verbal Identification index. The internal reliability for the Verbal Identification index was acceptable (Cronbach’s alpha = .73).

Locus of Control Scale

All of the participants completed the Locus of Control Measure (Rotter, 1954), which is a 29–item scaled questionnaire designed to measure an individual’s locus of control. Out of these 29 items, 23 of these items were combined to form a Locus of Control index. The internal reliability index was acceptable (Cronbach’s alpha = .69).

All of the items were measured using a dichotomous scale, with higher scores indicating an external locus of control and lower scores indicating an internal locus of control.

Manipulation check

All the participants completed a manipulation check measure, which is a single item designed to measure the participant’s awareness of the true nature of the experiment. They were asked to choose the descriptor that identified the purpose of the experiment. This item was used in previous research (Steele & Aronson, 1995). This item is below.

“The purpose of this experiment was to: (a) provide a genuine test of my abilities in order to examine personal factors involved in mathematical and verbal ability; (b) provide a challenging test in order to examine factors involved in solving mathematical and verbal problems; (c) present you with unfamiliar ability problems to measure mathematical and verbal learning.”
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Demographic Questionnaire

Each one of the participants completed a demographic questionnaire that was used to identify participants’ gender, ethnicity, age, GPA and socioeconomic status. In order to measure socioeconomic status, participants were given six income categories and asked to indicate which category was the most accurate representative of their family’s income.

Procedure

Each measure was recorded in a computer laboratory on the campus of a Northern California University. All instructions measurements and questionnaires were administered via two computer programs termed, “MediaLab” and “DirectRT”; the only other material(s) provided to the participants included a single ballpoint pen and 5 pages of scratch paper.

Each session was approximately 1 hour long and had 1 – 2 participants. Each of the participants was tested in separate computer labs. Upon entering the computer lab, a female experimenter asked each of the participants to take a seat and sign-in using their 4-digit research code provided by the Psychology Department Research website. This research code is used instead of their identification information as an increased precaution to maintain the anonymity and confidentiality of each participant. After signing in, the experimenter provided verbal instructions concerning the experiment and reminded participants of the importance of the research. Each participant was also
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provided with a consent form to read and sign.

After the consent forms were collected, participants were separated into their own computer lab to begin the research experiment. Each participant was initially provided with one of two sets of instructions (either including the stereotype threat manipulation or without the stereotype threat manipulation). After instructions were provided, each participant completed one of the two ability tests (mathematics or verbal). Once the ability test was completed, the participants participated in a dot-probe task as a distracting activity to counter the possibility of stereotype threat effect lingering over from the first assessment during the research session. After the dot probe task the participants completed the second of the two ability tests (Mathematics or Verbal). Once both of the assessments were finished, each participant was instructed to complete the following tasks: a test anxiety scale, a domain identification scale, a locus of control scale, a manipulation check item asking them to indicate the perceived purpose of the research and lastly five demographic questions. All instructions, measurements and questionnaires were administered in the same order with the exception of the ability assessments, whose sequence was counterbalanced within the participant pool to avoid any confounding effects of order. At the end of the experiment participants were verbally debriefed. Additionally each participant was provided with important contact information for both any additional questions and available psychological services. Lastly each participant was thanked for their participation and dismissed.
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Chapter 3

RESULTS

Factorial ANOVAs were performed to examine whether test condition (diagnostic vs. non-diagnostic), test order (math then verbal vs. verbal then math) and participant gender (men vs. women) influenced performance on mathematical and verbal test performance. Additional factorial ANOVAs were conducted to determine whether test condition, test order, and participant gender influenced time spent on math and verbal items, amount of work shown when completing math items, identification with English and Math domains, test anxiety, and locus of control.

Performance on Math and Verbal Assessments

Hypotheses 1 predicted that stereotype threat would hinder women’s performance on the math assessment and hinder men’s performance on the verbal assessment. In order to test these predictions and determine whether test order influenced test performance 2 (test condition) x 2 (test order) x 2 (gender) ANOVAs were performed on the math and verbal accuracy scores.

First, the analyses revealed that test order did not significantly influence math or verbal performance or significantly interact with other variables, $p_s > .13$. Second, the expected test condition x gender interaction was not significant for performance on the math test, $F(1, 94) = .12, p = .72, MSE = .002, \eta^2_p = .001$ or the verbal test, $F(1, 94) =$
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.46, \( p = .49 \), \( MSE = .016 \), \( \eta^2_p = .005 \). These findings do not support the hypothesis and suggest stereotype threat did not significantly influence men’s and women’s performance on measures of math and verbal performance. See Tables 1 and 2.

Table 1

*Math Accuracy Scores as a Function of Gender and Test Condition*

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
</tr>
<tr>
<td>Diagnostic</td>
<td>2.07</td>
</tr>
<tr>
<td></td>
<td>(1.39)</td>
</tr>
<tr>
<td>Non-Diagnostic</td>
<td>2.13</td>
</tr>
<tr>
<td></td>
<td>(1.29)</td>
</tr>
</tbody>
</table>

*Note.* Higher scores indicate greater accuracy. Numbers in parentheses are standard deviations.
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Table 2

*Verbal Accuracy Scores as a Function of Gender and Test Condition*

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Gender</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic</td>
<td></td>
<td>6.60</td>
<td>6.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.76)</td>
<td>(1.83)</td>
</tr>
<tr>
<td>Non-Diagnostic</td>
<td></td>
<td>6.70</td>
<td>5.92</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.87)</td>
<td>(1.87)</td>
</tr>
</tbody>
</table>

*Note.* Higher scores indicate greater accuracy. Numbers in parentheses are standard deviations.

**Women’s Accuracy Scores on Easy and Difficult Math Items**

Hypothesis 2 predicted that stereotype threat would have a greater negative impact on the performance of women when completing difficult mathematical items in comparison to their performance on easier mathematical items. In order to test this prediction and determine whether test order influenced test performance a 2 (test condition) x 2 (test order) x 2 (gender) repeated measures test was performed.

First, the analyses revealed that test order did not significantly influence math or verbal performance or significantly interact with other variables, *ps > .49*. In addition, the analysis revealed that test condition and gender did not significantly interact to influence accuracy differences between easy and difficult math items, *F*(1, 94) = 2.58, *p* = .11,
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$MSE = .08$, $\eta_p^2 = .02$. These findings do not support the hypothesis and suggest stereotype threat did not significantly influence differences in performance amongst women when completing easy and difficult items. See Table 3.

Table 3

*Women’s Math Accuracy Scores as a Function of Item Difficulty and Test Condition*

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Item Difficulty</th>
<th>Easy</th>
<th>Hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic</td>
<td></td>
<td>.84</td>
<td>1.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.89)</td>
<td>(.81)</td>
</tr>
<tr>
<td>Non-Diagnostic</td>
<td></td>
<td>1.08</td>
<td>.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(.86)</td>
<td>(.72)</td>
</tr>
</tbody>
</table>

*Note.* Numbers in parentheses are standard deviations.

*Amount of Work Shown on Math Items*

Hypothesis 3 predicted that stereotype threat would influence women to show their work less frequently than men when completing math items. In order to test this prediction and determine whether test order influenced the amount of work shown a 2 (test condition) x 2 (test order) x 2 (gender) ANOVA was performed on the amount of work shown when completing math items.

First, the analyses revealed that test order did not significantly influence the amount of work shown on math items or significantly interact with other variables, $ps >$
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.22. Second, the expected test condition x gender interaction was not significant for amount of work shown, $F(1, 94) = .25, p = .61, MSE = .018, \eta^2_p = .003$. These findings do not support the hypothesis and suggest stereotype threat did not significantly influence the amount of work shown when completing math items. See Table 4.

Table 4

*Amount of Work Shown on Math Items as a Function of Gender and Test Condition*

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic</td>
<td>Male</td>
<td>3.41</td>
<td>4.28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.03)</td>
<td>(2.65)</td>
</tr>
<tr>
<td>Non-Diagnostic</td>
<td>Male</td>
<td>3.48</td>
<td>4.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.71)</td>
<td>(2.89)</td>
</tr>
</tbody>
</table>

*Note.* Numbers in parentheses are standard deviations.

**Amount of Time Spent Per Item**

Hypothesis 4 predicted that stereotype threat would lead to increases in the amount of time spent per item by women on the math assessment, and increases in the amount of time spent per item by men on the verbal assessment. In order to test these predictions and determine whether test order influenced time spent per item 2 (test condition) x 2 (test order) x 2 (gender) ANOVAs were performed on the amount of time spent (measured in minutes) by men and women on math and verbal items.
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First, the analyses revealed that test order did not significantly influence the amount of time spent per math or verbal items or significantly interact with other variables, *ps > .26*. Second, the expected test condition x gender interaction was not significant for time spent per easy math item, $F(1, 94) = 2.14, p = .14, MSE = 432, \eta^2_p = .022$, per difficult math item $F(1, 94) = .90, p = .34, MSE = .504, \eta^2_p = .010$, or per verbal item $F(1, 94) = .08, p = .77, MSE = .737, \eta_p^2 = .001$. These findings do not support the hypothesis and suggest stereotype threat did not significantly influence the amount of time spent per item by men and women on measures of math and verbal performance. See Tables 5, 6, and 7.

Table 5

*Amount of Time Spent Per Easy Math Item as a Function of Gender and Test Condition*

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Diagnostic</td>
<td>1.41 (0.60)</td>
</tr>
<tr>
<td>Non-Diagnostic</td>
<td>1.73 (0.62)</td>
</tr>
</tbody>
</table>

*Note.* Numbers in parentheses are standard deviations. The means and the standard deviations are measured in minutes.
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Table 6

Amount of Time Spent Per Difficult Math Item as a Function of Gender and Test Condition

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic</td>
<td>Male</td>
<td>1.49</td>
<td>1.13</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>(.97)</td>
<td>(.60)</td>
</tr>
<tr>
<td>Non-Diagnostic</td>
<td>Male</td>
<td>1.50</td>
<td>1.39</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>(.70)</td>
<td>(.75)</td>
</tr>
</tbody>
</table>

*Note.* Numbers in parentheses are standard deviations. The means and the standard deviations are measured in minutes.

Table 7

Amount of Time Spent Per Verbal Item as a Function of Gender and Test Condition

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic</td>
<td>Male</td>
<td>.52</td>
<td>.40</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>(.19)</td>
<td>(.11)</td>
</tr>
<tr>
<td>Non-Diagnostic</td>
<td>Male</td>
<td>.52</td>
<td>.41</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>(.15)</td>
<td>(.10)</td>
</tr>
</tbody>
</table>

*Note.* Numbers in parentheses are standard deviations. The means and the standard deviations are measured in minutes.
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Differences in Test Anxiety

Hypotheses 5 predicted that stereotype threat would lead to increases in test anxiety levels for both men and women. In order to test this prediction and determine whether test order influenced levels of test anxiety a 2 (test condition) x 2 (test order) x 2 (gender) ANOVAs was performed on the Test Anxiety Index.

First, the analyses revealed that test order did not significantly influence levels of test anxiety or significantly interact with other variables, $p > .12$. Second, the expected test condition x gender interaction was not significant for the Test Anxiety Index, $F (1, 94) = .001, p = .98, MSE = .000, \eta^2_p = .000$. These findings do not support the hypothesis and suggest stereotype threat did not significantly influence levels of test anxiety. See Table 8.
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Table 8

Test Anxiety as a Function of Gender and Test Condition

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic</td>
<td>3.84</td>
<td>4.77</td>
</tr>
<tr>
<td></td>
<td>(1.16)</td>
<td>(.89)</td>
</tr>
<tr>
<td>Non-Diagnostic</td>
<td>3.54</td>
<td>4.60</td>
</tr>
<tr>
<td></td>
<td>(1.06)</td>
<td>(.89)</td>
</tr>
</tbody>
</table>

*Note.* Higher means indicate greater test anxiety. Numbers in parentheses are standard deviations.

Differences in Domain Identification

Hypotheses 6 predicted that stereotype threat would lead to lower levels of math domain identification for women and lower levels of verbal domain identification for men. In order to test this prediction and determine whether test order influenced math and verbal domain identification 2 (test condition) x 2 (test order) x 2 (gender) ANOVAs were performed on the Math Identification and Verbal Identification indices.

First, the analyses revealed that test order did not significantly influence levels of math and verbal identification or significantly interact with other variables, *p* > .18. Second, the expected test condition x gender interaction was not significant for the Math Identification Index, *F* (1, 94) = .07, *p* = .78, *MSE* = .000, *η*² = .001, or the Verbal...
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Identification Index $F(1, 94) = .22, p = .63$ $MSE = .001, \eta_p^2 = .002$. These findings do not support the hypothesis and suggest stereotype threat did not significantly influence levels of math and verbal domain identification. See Tables 9 and 10.

Table 9

*Math Domain Identification as a Function of Gender and Test Condition*

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
</tr>
<tr>
<td>Diagnostic</td>
<td>3.58</td>
</tr>
<tr>
<td></td>
<td>(.90)</td>
</tr>
<tr>
<td>Non-Diagnostic</td>
<td>3.72</td>
</tr>
<tr>
<td></td>
<td>(.87)</td>
</tr>
</tbody>
</table>

*Note.* Higher means indicate greater domain identification. Numbers in parentheses are standard deviations.
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Table 10

*English Domain Identification as a Function of Gender and Test Condition*

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnostic</td>
<td>3.54 (.78)</td>
<td>3.66 (.73)</td>
</tr>
<tr>
<td>Non-Diagnostic</td>
<td>3.90 (.72)</td>
<td>3.84 (.72)</td>
</tr>
</tbody>
</table>

*Note.* Higher means indicate greater domain identification. Numbers in parentheses are standard deviations.

**Differences in Locus of Control**

Research question 1 explored the role that stereotype threat has on locus of control. An exploratory 2 (test condition) x 2 (test order) x 2 (gender) ANOVA was performed on the Locus of Control Index.

First, the analyses revealed that test order did not significantly influence locus of control or significantly interact with other variables, *p* > .05. Second, the analyses revealed that there were no significant main effects of gender or test condition, *p* > .61. Third, there were no significant gender x test condition interaction, *F* (1, 94) = 2.35, *p* = .12, *MSE* = 30.82, *η_p^2* = .02. See Table 11.
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Table 11

*Locus of Control as a Function of Gender and Test Condition*

<table>
<thead>
<tr>
<th>Gender</th>
<th>Test Condition</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Diagnostic</td>
<td>12.93</td>
<td>10.48</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.06)</td>
<td>(4.10)</td>
</tr>
<tr>
<td></td>
<td>Non-Diagnostic</td>
<td>13.00</td>
<td>12.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(4.31)</td>
<td>(3.02)</td>
</tr>
</tbody>
</table>

*Note.* Higher scores indicating an external locus of control. Numbers in parentheses are standard deviations.
This research examined the influence of stereotype threat on test performance differences between men and women. In addition, I investigated whether there exists a behavior link in the form of test-taking behaviors that contributes to the influence stereotype threat has on these gender differences in test performance. Lastly I examined the influence stereotype threat has on individual’s levels of test anxiety, domain identification and locus of control. Contrary to the hypotheses, results unexpectedly revealed that stereotype threat had no influence on gender differences for any of the test performance and test-taking-behavior measures. The results also revealed that stereotype threat did not significantly impact differences in levels of test anxiety, domain identification and locus of control for any of the participants in this research.

While many studies have dedicated the majority of attention to examining the influence stereotype threat has on gender differences in performance (Hyde et al., 1990; Spencer, Steele, & Quinn, 1999; Williams, 2006) considerably less observation has been committed to investigating whether stereotype threat concurrently influences on test performance and test-taking behaviors. The aim of this study was to examine key aspects of this area of research. Not only did I strive to replicate past research regarding the negative influence stereotype threat has on test performance (Spencer, Steele, & Quinn,
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1999; Hedges & Nowell, 1995; Lindberg, Hyde, Petersen, & Linn, 2010) this study also expanded on previous research that examined whether differences in test-taking behaviors play a contributing factor to the influence stereotype threat has on test performance (Scherbaum et al., 2011).

I examined the influence of stereotype threat on gender differences in mathematical and verbal ability testing. It was predicted that under the influence of stereotype threat there would be higher accuracy scores amongst men on the mathematical ability assessment in comparison to women. It was also predicted that under the influence of stereotype threat there would be higher accuracy scores amongst women on the verbal ability assessment in comparison to men. Surprisingly, there were no significant differences found between men and women’s accuracy scores on mathematical and verbal assessments. In general most participants performed very poorly on the mathematical items, with accuracy scores no greater than 40% correct overall. While the verbal accuracy scores were significantly better than the math accuracy scores, around 60% for most groups, there were still no significant differences found when looking at gender differences caused by the stereotype threat manipulation.

These results contradict those found in previous research, where data showed significant gender differences in accuracy scores when completing items that belong to a domain in which historical performance stereotypes regarding gender have previously existed. These results are especially prominent in the case of mathematical ability
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performance, where men typically achieve a higher performance and women typically suffer from a lower performance when exposed to stereotype threat (Dar-Nmrod & Heine, 2006; Neuville & Croizet, 2007; Williams, 2006). A possible explanation for this discrepancy in results could stem from the manipulation method used. It is possible that the manipulation instructions used in this study were not read thoroughly due to the computer-based delivery utilized. Because each participant had control of the keyboard used to navigate through the experiment, including the instructions, it is plausible to assume that in some instances little attention was given to the instructions, and thus the manipulation did not influence the participant as intended.

This research also examined whether or not the influence of stereotype threat led to significant differences in the performance of women when completing easy and difficult math assessment items. It was predicted that under the influence of stereotype threat, women would have higher accuracy scores when completing easy mathematical assessment items, and in turn, there would be lower accuracy scores for women when completing difficult mathematical assessment items. However the data indicated that there were no significant differences in women’s accuracy scores between easy and difficult mathematical items.

These results are contradictory to previous research conducted by Spencer, Steele and Quinn (1999), where results indicated that women’s accuracy scores on easier math items were significantly better than their accuracy scores on difficult items. A possible
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Explanation for this discrepancy in results could be due to the overall difficulty of the mathematical items used. Because performance on all the math items was pretty low across groups, despite the level of difficulty, it can be assumed that either the math ability of the sample as a whole was coincidently low, or the math items were too difficult altogether regardless of their classification. It is important to keep in mind that these items were taken straight from a SAT test guide and therefore each participant should have been able to answer such items. However, it should not be assumed that these items are true markers of easy and hard items based upon the true ability of this sample. Future research that examines the influence stereotype threat on performance differences related to item difficulty could benefit from field-testing all assessment items prior to collecting data.

This research also examined how stereotype threat influenced gender differences in the amount of work shown when completing math assessment items. It was predicted that in line with the evaluation apprehension model of stereotype threat theory, women would show their work less frequently than men due to the anxiety they experience from the threat of being evaluated. The data did not support this prediction. The results suggest that although women showed their work more than men on average, there were no significant differences between women under the influence of stereotype threat in comparison to their male counterparts. A possible explanation for the lack of significant
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findings can be attributed to the lack of an effective stereotype threat manipulation as previous mentioned.

Related research regarding test-taking behavior led me to examine gender differences in time spent per item while under the influence of stereotype threat (Scherbaum et al., 2011). It was predicted that under stereotype threat women would spend a greater amount of time per item when completing math items in comparison to men; while men would spend a greater amount of time on verbal items in comparison to women under threat. However, findings from the present research contradict what previous studies that have found significant gender differences in the amount of time spent completing individual items in assessments related to domains where the participant’s group has been historically linked to performance stereotypes (Scherbaum et al., 2011; Steele & Aronson, 1995). The lack of gender differences in time spent per item in this research may be attributed to the item difficulty issue posed previously. If all of the items were difficult with respect to the sample’s ability in general, it is not beyond expectation that gender differences in time spent per item would be minimal.

This research also examined the influence of stereotype threat on levels of test anxiety. It was anticipated that there would be higher levels of test anxiety in those participants under the influence of stereotype threat. However there were no gender differences in test anxiety levels between those under the influence of stereotype threat in comparison to those not exposed to the threat. The results of this study did not support
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the hypothesis and contradict past research that has shown increased levels in test anxiety when under the influence of stereotype threat (Blascovich, Spencer, Quinn, & Steele, 2001; O’Brien & Crandall, 2003; Spencer, Steele & Quinn, 1999). The unexpected results may be due to the speculated ineffective manipulation method used in this study. Because the stereotype threat manipulation was not effective, it is only logical that there would be no significant differences in test anxiety between participants in both conditions.

This research also examined the influence of stereotype threat on gender differences in domain identification. It was anticipated that stereotype threat would have a negative influence on the math identification of women, and a negative influence on the English identification of men. However the results did not support the prediction. These results are contradictory to those found in previous studies examining differences in domain identification under the influence of stereotype threat (Steele, Spencer, & Aronson, 2002). The lack of differences in results may be attributed to the lack of manipulation found in this study, which in turn led to no gender differences influenced by stereotype threat.

Limitations

Although there were no significant results found supporting the hypotheses in this research, the experimental design of this study did uncover some potential limitations that could provide some explanation as to why the results of this study were inconsistent with
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those found in previous research. Limitations in the manipulation used, the difficulty level of the assessment items and the computer-based delivery, all contributed to the lack of gender differences found in both test performance and test-taking behaviors.

The most significant potential limitation in this study relates to the particular experimental manipulation employed in this research. Stereotype threat manipulation in the method of instruction has been used in previous research with great success (Scherbaum et al., 2011; Spencer, Steele & Quinn, 1999; Steele & Aronson, 1995). However this research failed to reproduce this same manipulation. It could be the case that this previously established stereotype threat manipulation method was not effective at producing the effects intended within this sample due to the computerized delivery of the manipulation used. Perhaps the computerized delivery contributed to a lack of attention by participants to the manipulation instructions, and thus the manipulation was not effective as intended. Because each participant was in charge of the keyboard that controlled their own progression through the experiment, there is a possibility that the instructions were not given the attention needed for the intended manipulation to be effective. Perhaps in the future, researchers should account for this potential issue if they contemplate the utilization of a computer-based delivery in their research. One suggestion would be to investigate the average time it takes to read through the instructions, and then once the data is collected compare the time taken by each participant to the average time previously recorded. If the time taken by participants is significantly lower, then it can be
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assumed that adequate attention was not paid to the manipulation instructions. Another suggestion to avoid this manipulation method limitation in future research would be to utilize a more interactive manipulation that forces the participant to pay closer attention to the manipulation used, thus leading the desired effect. Currently, various methods are used to induce stereotype threat, including but not limited to, having participants mark their gender prior to testing, asking participants gender related questions prior to testing, and having participants watch gender stereotype threat induced videos. Future research could systematically test different types of stereotype threat activation methods in the same sample to determine which activation methods work best at inducing stereotype threat for the sample they plan on using.

Another related limitation to this research that potentially led to the lack of gender differences is the computer-based delivery method used. As I briefly mentioned, the idea can be easily entertained due to the participant’s ability to control both the progression as well as the speed of the advancement through the experiment, a sub-sample of the participants might not have paid the attention needed for the manipulation to be effective. This same argument could be made for the lack of differences of the other measurements as well.

A third limitation to this study exists in the possible lack of motivation displayed by participants during the research experiment. Taking into account the insignificant differences found, and the very poor performance on the accuracy assessments overall, it
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can be argued that participants might have not been motivated to complete the experiment with all their effort. Future studies should either try to provide an incentive that will effectively motivate their particular sample, if able, or measure the Achievement Goal Orientation of the participants. Individual levels of Achievement Goal Orientation have been used in past research as a successful measure of motivation in events such as performance appraisal (Elliot & Harackiewicz, 1994).

The last limitation of this study is the difficulty of the assessment items used to measure ability in this research. The mathematical and verbal ability test items were adapted from a practice SAT test guide, and therefore each participant should have had the knowledge and ability to complete each item. However the results tell a completely different account. All participants answered less than 40% of the mathematical assessment items correctly and there were no differences in accuracy found between easy and difficult items. One very likely explanation for the undesirable performance is that the items were too difficult overall for the sample used. It is quite possible that a sub-sample of the participants used in this study had never been exposed to the SAT examination, unlike previous stereotype threat research, which utilized samples from prestigious colleges who realistically were exposed to the SAT examination. Perhaps in future studies, greater precaution should be taken when selecting the ability assessment items to utilize in research. This precaution is especially important when accuracy differences are being used to interpret the effects of other variables. A suggestion for
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future research would be to field-test the ability items prior to them being used in the actual study. Obtaining data from field-testing will enable researchers to select items that are accurate representations of easy and difficult items in relation to the ability of the sample being used.

Implications

Despite the lack of significant results, this research does provide a bridge for the progression of stereotype threat research in relation to the role that test-taking behaviors have on gender differences. First, like all research across the various fields of psychology, it is important that we not only replicate past research to be certain the data, and the findings obtained from that data are accurate and reliable. It is also important to determine if the findings identified are true representations of existing phenomena that are valid across multiple groups and situations. In the case of this study I looked to extend previous research by determining if the influence that stereotype threat has on test performance is affected by differences in the test-taking behavior of men and women. Secondly, although the results were not significant, this research did identify possible limitations in methodology that should be addressed as research examining this phenomenon is continued. Future studies should systematically test different manipulation methods to identify which ones are truly effective at creating the manipulation intended. This is especially important if researchers plan on utilizing a computer-based delivery because the possible lack of attention by the participants can
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lead to the ineffectiveness of the stereotype threat manipulation intended. Additionally
studies in this line of research should field test their performance items prior to the actual
collection of data to ensure that the items utilized are accurate representations of the
sample’s ability.

Looking at the bigger picture, this research examining the role that test-taking
behaviors has on gender differences under stereotype threat is important because these
variables can affect every aspect of an individual’s overall test taking experience,
including the test taking skills used, response time per item, item response changes, item
response choices, and ultimately, test scores. As long as group differences continue to
exist, it is important to continue to strive to identify potential variables responsible for
these differences, including test-taking behaviors.

Conclusion

The results of this study provided no evidence to support the hypothesis that test-
taking behavior provides an essential link between stereotype threat and differences in
test performance. In addition, the results of this study failed to confirm previous findings
concerning stereotype threat. The lack of significant findings can be attributed to various
possible limitations to this study, including the manipulation mechanism used, the
computer-based delivery of data collection, and the unpredicted difficulty of the
ability items utilized to measure differences in accuracy scores. However, it is the
identification of these possible limitations that provides the true contribution to this field
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of research. Now that these potential limitations have been identified, researchers can take them into consideration when contemplating future research designs to further explore the role that test-takers behaviors play in that the influence stereotype threat has on gender differences in academic performance.
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APPENDIX A

Directions: For this section, solve each problem and decide which is the best of the choices given.

#1 A band wants to distribute its music on compact discs (CDs). The equipment to produce the CDs costs $250, and blank CDs cost $5.90 for a package of 10. Which of the following represents the total cost, in dollars, to produce \( n \) CDs, where \( n \) is a multiple of 10?

(A) \((250 + 0.59)n\)
(B) \(250 + 0.59n\)
(C) \((250 + 5.90)n\)
(D) \(250 + 05.90n\)
(E) \(250n + 05.90\)
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#2 In the figure above, \( AB \) and \( CD \) are parallel. What is \( x \) in terms of \( y \) and \( z \)?

\[
\begin{align*}
(A) \quad & y + z \\
(B) \quad & 2y + z \\
(C) \quad & 2y - z \\
(D) \quad & 180 - y - z \\
(E) \quad & 180 + y - z
\end{align*}
\]

#3 A number \( n \) is increased by 8. If the cube root of that result equals -0.5, what is the value of \( n \)?

\[
\begin{align*}
(A) \quad & -15.625 \\
(B) \quad & -8.794 \\
(C) \quad & -8.125 \\
(D) \quad & -7.875 \\
(E) \quad & 421.875
\end{align*}
\]
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#4 What are all values of x for which \(4 - x - 2\)?

(A) \(x - 2\)

(B) \(-5 < x < 0\)

(C) \(-3 < x < 2\)

(D) \(x < -3\) or \(x > 2\)

(E) \(-2 < x < 3\)

#5 The front, side, and bottom faces of a rectangle solid have areas of 24 square centimeters, 8 square centimeters, and 3 square centimeters, respectively. What is the volume of the solid, in cubic centimeters?

(A) 24

(B) 96

(C) 192

(D) 288

(E) 576
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#6 What is the distance in space between the points with coordinates (-3, 6, 7) and (2, -1, 4)?

(A) 4.36
(B) 5.92
(C) 7.91
(D) 9.11
(E) 22.25

#7 In January 1990 the world’s population was 5.3 billion. Assuming a growth rate of 2 percent per year, the world’s population, in billions, for \( t \) years after 1990 can be modeled by the equation \( P = 5.3 \). According to the model, the population growth from January 1995 to January 1996 was

(A) 106,000,000
(B) 114,700,000
(C) 117,000,000
(D) 445,600,000
(E) 562,700,000
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#8 In a group of 10 people, 60 percent have brown eyes. Two people are to be selected at random from the group. What is the probability that neither person selected will have brown eyes?

(A) 0.13

(B) 0.16

(C) 0.25

(D) 0.36

(E) 0.64

#9 If \(x - 2\) is a factor of \(x^2 + 12x - 8\), then \(k =\)

(A) -6

(B) -3

(C) 2

(D) 3

(E) 6
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#10 A line has parametric equations \( x = 5 + t \) and \( y = 7 + t \), where \( t \) is the parameter.

The slope of the line is

(A) 8

(B) 1

(C) 3

(D) 5

(E) 7
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APPENDIX B

Directions: Each sentence below has one or two blanks, each blank indicating that something has been omitted. Beneath the sentence are five words or sets of words labeled A through E. Choose the word or set of words that, when inserted in the sentence, best fits the meaning of the sentence as a whole.

1. Many private universities depend heavily on __________, the wealthy individuals who support them with gifts and bequests.
   
   (A) Instructors
   (B) Administrators
   (C) Mentors
   (D) Accountants
   (E) benefactors
EFFECTS OF STEREOTYPE

2. Many economists believe that since resources are scarce and since human desires cannot all be ________, a method of ___________ is needed.

(A) indulged..apportionment

(B) Verified…distribution

(C) Unsurped.. expropriation

(D) Expressed.. reparation

(E) Anticipation..advertising

3. The range of colors that homeowners could use on the exterior of their houses was ________ by the community’s stringent rules regarding upkeep of property.

(A) Circumscribed

(B) Bolstered

(C) Embellished

(D) Insinuated

(E) Cultivated
EFFECTS OF STEREOTYPE

Directions: The following sentences test correctness and effectiveness of expression. Part of each sentence is underlined; beneath each sentence are five ways of phrasing the underlined material. Choice A repeats the original phrasing; the other four choices are different. If you think the original phrasing produces a better sentence than any of the alternatives, select choice A; if not, select one of the other choices.

In making your selection, follow the requirements of standard written English; that is, pay attention to grammar, choice of words, sentence construction, and punctuation. Your selection should result in the most effective sentence—clear and precise, without awkwardness or ambiguity.

4. Since last September Patricia has been working at the convenience store down the road.

   (A) Has been working
   (B) Works
   (C) Is working
   (D) Will be working
   (E) Worked
EFFECTS OF STEREOTYPE

5. To help freshmen and sophomores in selecting their courses, *candid reviews of courses and instructors compiled by juniors and seniors*.

   (A) Candid reviews of course and instructors complied by juniors and seniors
   (B) Candid reviews of course and instructors being complied by juniors and seniors
   (C) And to compile candid reviews of courses and instructors by juniors and seniors
   (D) Juniors and seniors have compiled candid reviews of courses and instructors
   (E) With juniors and seniors compiling candid reviews if courses and instructors

6. In *areas where deer roam freely*, residents must dress to protect themselves against deer ticks that might transmit diseases.

   (A) Areas where deer roam freely
   (B) Areas roamed by deer freely
   (C) Areas, freely roamed by deer
   (D) Areas, in which there are deer that roam freely
   (E) Areas which deer roam freely
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7. The article featured the Sea Islands because many were known there to live much as their ancestors of a century ago had lived.

   (A) many were known there to live
   (B) they were known there for living
   (C) many of the people there were known to live
   (D) of the many people they were there living
   (E) of knowing that many people lived there

#8 Intimacy, love, and marriage are three different, if interrelated, subjects.

   (A) Different, it interrelated, subjects
   (B) Interrelated subjects, being, however, different
   (C) Different subjects, whereas they are interrelated
   (D) Different subjects when interrelated
   (E) Subjects that are different although being interrelated
EFFECTS OF STEREOTYPE

Directions: The following sentences test your ability to recognize grammar and usage errors. Each sentence contains either a single error or no error at all. No sentence contains more than one error. The error, if there is one, is underlined and lettered. If the sentence contains an error, select the one underlined part that must be changed to make the sentence correct. If the sentence is correct, select choice E. In choosing answers, follow the requirements of standard written English.

#9 According to last week’s survey, most voters inability key issues.

   key issues.

#10 America’s first roller coaster ride, which 1884 at Coney Island, Brooklyn, of six miles per hour.
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APPENDIX C

Please indicate the number that best describes how much you agree with each of the statements below:

1 – Strongly disagree
2 – Disagree
3 – Somewhat disagree
4 – Neither agree or disagree
5 – Somewhat agree
6 – Agree
7 – Strongly agree

1. While taking an important exam, I find myself thinking of how much brighter the other students are than I.
2. If I were to take an intelligence test, I would worry a great deal before taking it.
3. If I knew I was going to take an intelligence test, I would feel confident and relaxed.
4. While taking an important exam, I perspire a great deal.
5. During class examinations, I find myself thinking of things unrelated to the actual course material.
6. I get to feeling very panicky when I have to take a surprise exam.
7. During a test, I find myself thinking of the consequences of failing.
8. After important tests, I am frequently so tense my stomach gets upset.
9. I freeze up on things like intelligence tests and final exams.
EFFECTS OF STEREOTYPE

10. Getting good grades on one test doesn’t seem to increase my confidence on the second.

11. I sometimes feel my heart beating very fast during important exams.

12. After taking a test, I always feel I could have done better than I actually did.

13. I usually get depressed after taking a test.

14. I have an uneasy, upset feeling before taking a final examination.

15. When taking a test, my emotional feelings do not interfere with my performance.

16. During a course examination, I frequently get so nervous I forget facts I really know.

17. I seem to defeat myself while working on important tests.

18. The harder I work at taking a test or studying for one, the more confused I get.

19. As soon as an exam is over, I try to stop worrying about it, but I just can’t.

20. During exams, I sometimes wonder if I’ll ever get through school.

21. I would rather write a paper than take an examination for my grade in a course.

22. I wish examinations did not bother me so much.

23. I think I could do much better on tests if I could take them alone and not feel pressured by time limits.

24. Thinking about the grade I may get in a course interferes with my studying and performance on tests.

25. If examinations could be done away with, I think I would actually learn more.
26. On exams I take the attitude, “If I don’t know it now, there’s no point in worrying about it.”

27. I really don’t see why some people get so upset about tests.

28. Thoughts of doing poorly interfere with my performance on tests.

29. I don’t study any harder for final exams than for the rest of my coursework.

30. Even when I’m well prepared for a test, I feel very anxious about it.

31. I don’t enjoy eating before an important test.

32. Before an important examination, I find my hands or arms trembling.

33. I seldom feel the need for “cramming” before an exam.

34. The university should recognize that some students are more nervous than others about tests and that this affects their performance.

35. It seems to me that examination periods should not be made such intense situations.

36. I started feeling very uneasy just before getting a test paper back.

37. I dread courses where the instructor has the habit of giving “pop” quizzes.
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APPENDIX D

Using the following scale, please indicate the number that best describes how much you agree with each of the statements below.

1. Strongly Disagree
2. Moderately Disagree
3. Neither Disagree nor Agree
4. Moderately Agree
5. Strongly Agree

1. I learn things quickly in English classes.
2. Mathematics is one of my best subjects.
3. English is one of my best subjects.
4. I get good grades in English.
5. I have always done well in Math.
6. I’m hopeless in English classes.
7. I get good grades in Math.
8. I do badly in tests of Mathematics.

Please indicate the number that best describes you for each of the statements below.

1. Not at all
2. Somewhat
3. Very much
4. Very much
5. Very much

9. How much do you value being a college student?
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10. Do you think that academics are an important and/or necessary part of your life?

11. How important is it to you to do well on standardized math tests like the S.A.T.?

12. How much do you enjoy math-related subjects?

13. How much do you enjoy English-related subject?

14. How likely would you be to take a job in a math related field?

15. How important is Math to your sense of who you are?

16. How important is being a student to you?

17. How important is it to you to be good at Math?

18. How important is it to you to be good at English?

Please indicate the number that best describes you for each of the statements below.

1 Very poor   2 Poor     3 About the same 4 Better than average 5 Excellent

19. Compared to other students, how good are you at math?

20. Compared to other students, how good are you at English?
EFFECTS OF STEREOTYPE

APPENDIX E

For each question select the statement that you agree with the most:

1. a. Children get into trouble because their parents punish them too much.
   b. The trouble with most children nowadays is that their parents are too easy with them.
2. a. Many of the unhappy things in people's lives are partly due to bad luck.
   b. People's misfortunes result from the mistakes they make.
3. a. One of the major reasons why we have wars is because people don't take enough interest in politics.
   b. There will always be wars, no matter how hard people try to prevent them.
4. a. In the long run people get the respect they deserve in this world
   b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries
5. a. The idea that teachers are unfair to students is nonsense.
   b. Most students don't realize the extent to which their grades are influenced by accidental happenings.
6. a. Without the right breaks one cannot be an effective leader.
   b. Capable people who fail to become leaders hive not taken advantage of their opportunities.
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7. a. No matter how hard you try some people just don't like you.

b. People who can't get others to like them don't understand how to get along with others.

8. a. Heredity plays the major role in determining one's personality

b. It is one's experiences in life which determine what they're like.

9. a. I have often found that what is going to happen will happen.

b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

10. a. In the case of the well prepared student there is rarely if ever such a thing as an unfair test.

b. Many times exam questions tend to be so unrelated to course work that studying in really useless.

11. a. Becoming a success is a matter of hard work, luck has little or nothing to do with it.

b. Getting a good job depends mainly on being in the right place at the right time.

12. a. The average citizen can have an influence in government decisions.

b. This world is run by the few people in power, and there is not much the little guy can do about it.

13. a. When I make plans, I am almost certain that I can make them work.

b. It is not always wise to plan too far ahead because many things turn out to-be a matter of good or bad fortune anyhow.

14. a. There are certain people who are just no good.
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b. There is some good in everybody.

15. a. In my case getting what I want has little or nothing to do with luck.

b. Many times we might just as well decide what to do by flipping a coin.

16. a. Who gets to be the boss often depends on who was lucky enough to be in the right place first.

b. Getting people to do the right thing depends upon ability. Luck has little or nothing to do with it.

17. a. As far as world affairs are concerned, most of us are the victims of forces we can neither understand, nor control.

b. By taking an active part in political and social affairs the people can control world events.

18. a. Most people don't realize the extent to which their lives are controlled by accidental happenings.

b. There really is no such thing as "luck."

19. a. One should always be willing to admit mistakes.

b. It is usually best to cover up one's mistakes.

20. a. It is hard to know whether or not a person really likes you.

b. How many friends you have depends upon how nice a person you are.

21. a. In the long run the bad things that happen to us are balanced by the good ones.
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b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three. 22. a. With enough effort we can wipe out political corruption.

b. It is difficult for people to have much control over the things politicians do in office. 

23. a. Sometimes I can't understand how teachers arrive at the grades they give.

b. There is a direct connection between how hard I study and the grades I get.

24. a. A good leader expects people to decide for themselves what they should do.

b. A good leader makes it clear to everybody what their jobs are.

25. a. Many times I feel that I have little influence over the things that happen to me.

b. It is impossible for me to believe that chance or luck plays an important role in my life.

26. a. People are lonely because they don't try to be friendly.

b. There's not much use in trying too hard to please people, if they like you, they like you.

27. a. There is too much emphasis on athletics in high school.

b. Team sports are an excellent way to build character.

28. a. What happens to me is my own doing.

b. Sometimes I feel that I don't have enough control over the direction my life is taking.

29. a. Most of the time I can't understand why politicians behave the way they do.

b. In the long run the people are responsible for bad government on a national as well as on a local level.
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APPENDIX F

The purpose of this experiment was to: (a) provide a genuine test of my abilities in order to examine personal factors involved in verbal and mathematical ability; (b) provide a challenging test in order to examine factors involved in solving verbal and mathematical problems; (c) present you with unfamiliar verbal and mathematical problems to measure verbal and mathematical learning.
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APPENDIX G

1. What is your gender?
   a) Female
   b) Male

2. How old are you________?

3. What is your ethnicity__________________.

4. Please report an estimate of your family’s combined annual income:
   a) Under $20,000
   b) Between $20,000 and $40,000
   c) Between $40,000 and $70,000
   d) Between $70,000 and $100,000
   e) Between $100,000 and $150,000
   f) Greater than $150,000

5. What is your cumulative (overall) GPA__________________________?

6. What year of college are you currently in?
   a) 1\textsuperscript{st} year or Freshmen
   b) 2\textsuperscript{nd} year or Sophomore
   c) 3\textsuperscript{rd} year or Junior
   d) 4\textsuperscript{th} year or Senior
   e) other________________
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