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Beating the threat: The setting of learning goals as a moderator of the effects of stereotype threat on performance

Sophia Sabiha Spiteri

BEATING THE THREAT: THE SETTING OF LEARNING GOALS AS A MODERATOR OF THE EFFECTS OF STEREOTYPE THREAT ON PERFORMANCE

A Thesis

Presented to the

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Sophia Sabiha Spiteri

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Approved by:

[redacted]
Dr. Janet Kottke, Chair, Psychology

2/23/2012
Date

[redacted]
Dr. Mark Agars

[redacted]
Dr. Matt Riggs

ABSTRACT

Research on stereotype threat has primarily focused on stereotype threat's effect on performance. It has been repeatedly, empirically proven that stereotype threat negatively impacts performance. The stereotype threat literature, however, has not focused much attention on variables that alter the relationship between stereotype threat and performance. Given its growing prevalence, it is important to assess ways in which stereotype threat effects can be reduced. In this study, I presented a model for stereotype threat that included mechanisms of stereotype threat and a proposed moderator of the stereotype threat-performance relationship. I examined the setting of specific, challenging learning goals as a moderator of the effects of stereotype threat on performance, as well as the effects of stereotype threat on self-efficacy. This moderator was tested on female undergraduate students at a mid-sized Southern California university. The results did not provide support for goal setting as a moderator of the stereotype threat-performance relationship. The results did demonstrate a relationship between anxiety and working memory, working memory and performance, and performance and self-efficacy. Limitations and implications of the study are discussed.

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CHAPTER ONE

INTRODUCTION

Society is becoming increasingly diverse, impacting a number of societal domains. This increasing diversity has considerable implications for the workforce domain. It has been predicted that the workplace of the 21st century will become more diverse, as it is continually evolving (Zunker, 2002). This assertion is becoming more than a mere prediction, as ongoing demographic trends, such as increasing percentages of African Americans, Hispanics, Asians, females, and an aging population, are contributing to an evolving workforce. On the positive side, these trends present organizations with the opportunity to become more creative and maintain a competitive advantage (Roberson & Kulik, 2007). However, with increasing diversity comes greater opportunity for conflict; therefore, the advantages that can result from increased diversity are not to be assumed. If diversity is left unmanaged in the workplace, it has the potential to damage morale, increase turnover, and cause communication problems and conflict within the organization (Roberson & Kulik, 2007). A significant portion of these issues is due to the phenomenon of stereotype threat—the fear of being

judged by or confirming a negative stereotype of a group with which one identifies (Steele & Aronson, 1995). Therefore, diversity managers in organizations must understand and address stereotype threat. Organizations that do not effectively manage diversity experience high costs, but these organizations can still redeem themselves through the effective implementation of diversity management programs (Agars & Kottke, 2004). Diversity management programs should address factors at the organizational level and at the individual level (Agars & Kottke, 2004). Addressing both levels is extremely important when managing stereotype threat since it has been shown to have a negative effect on employee feelings and behavior, and, ultimately, performance. Therefore, organizations can greatly benefit from learning how to mitigate the negative effects of stereotype threat (Roberson & Kulik, 2007). For this thesis, I addressed the individual level, but the intention was for organizations to benefit from the information. In order to effectively address stereotype threat, moderators of the relationship between stereotype threat and performance must be examined. Each component involved in the process of stereotype threat's effect on performance must be examined. Namely, this study examined working memory,

anxiety, goal setting, and self-efficacy as they relate to each other and to stereotype threat. These components are all integral parts of the stereotype threat-performance process, and pinpointing these components allows us to identify ways to address and ultimately diminish the effects of stereotype threat on performance.

Stereotype Threat

Stereotype threat is a social-psychological phenomenon that can occur in an individual when widely-known negative stereotypes exist about a group to which an individual belongs. Stereotype threat occurs when the individual faces the threat of possibly fulfilling a negative stereotype associated with his group. Stereotype threat does not necessarily mean that the individual believes the stereotype that others hold of his group; rather, he knows that others believe it to be true of him in situations where the stereotype is relevant (Steele & Aronson, 1995). Stereotype threat can be detrimental to the individual and to the organization. In regard to the individual level, stereotype threat is associated with increased blood pressure, which can contribute to chronic health problems in individuals with long-term exposure to the threat (Blascovich, Spencer, Quinn, & Steele, 2001).

It is also associated with increased anxiety, lower job satisfaction, turnover, and disidentification with the performance domain (Steele & Aronson, 1995; Niemann & Dovidio, 1998; Roberson et al., 2003; Hom, Roberson, & Ellis, 2007; Steele, 1997). The sense of unfairness that stereotype threat also brings about increases the likelihood of employee turnover (Collins, 2008). These factors, especially turnover, can be detrimental to the organization because they drain it of its resources (personnel, productivity, and financial). Clearly, it is imperative to study ways to reduce stereotype threat. I begin by addressing how stereotype threat operates.

Stereotype threat may interfere with individual performance by causing an arousal that reduces the range of cues people are able to use, by taking attention away from the task and putting it onto concerns that are irrelevant to the task, or by causing an interfering self-consciousness (Steele & Aronson, 1995). Steele and Aronson (1995) were the first to study and explicitly measure the relationship between stereotype threat and performance. Their study examined the role of stereotype threat on the intellectual test performance of African Americans. The reasoning behind this study was that whenever African Americans take part in an intellectual

task, they face the threat of confirming or being judged by a negative stereotype that exists in society; namely, the idea that African Americans are lacking in intellectual ability. This threat, in turn, interferes with the intellectual functioning of African Americans when taking standardized tests. Steele and Aronson found that stereotype threat lowered the intellectual test performance of black students and that removing stereotype threat improved performance. The stereotype threat experienced by the black diagnostic group created a strong apprehension, which took away from the cognitive resources that participants could have used for the standardized test (Steele & Aronson, 1995).

Stereotype threat affects more than members of racial groups. Gender stereotypes are strong elicitors of stereotype threat as well. In particular, when women undertake mathematical problem solving, they risk being judged by or confirming the negative stereotype that women are weaker at math than men. Spencer, Steele, and Quinn (1999) found differences in math performance between men and women that could be attributed to stereotype threat. The difference in performance could be eliminated when stereotype threat was lowered by telling the female subjects that the test did not produce gender differences.

On the other hand, when the test was described as producing gender differences, stereotype threat was high, which led to women performing significantly worse on the math test than equally qualified men (Spencer, Steele, & Quinn, 1999).

As is strongly apparent from the examples presented above, stereotype threat affects a large number and wide array of individuals and social groups. Stereotype threat has repeatedly affected the performance of many other groups as well, including various racial minorities, people of low socioeconomic status, older individuals (60 years and older), gay and bisexual men, people with a history of head injuries, and even members of high status groups (whites, men, and white men) (Steele & Aronson, 1995; Gonzales, Blanton, & Williams, 2002; Croize & Claire, 1998; Zunker, 2002; Suhr & Gunstad, 2002; Aronson, Lustina, Good, Keough, Steele, & Brown, 1999; Stone, Lynch, Sjomeling, & Darley, 1999). The goal of the present study was to identify mechanisms of stereotype threat and a factor aimed at said mechanisms that would reduce the negative effects of stereotype threat. In this study, I focus on stereotype threat's effect on anxiety, working memory efficiency, self-efficacy, and performance. Stereotype threat produces anxiety, which depletes

cognitive resources and leads to lowered performance. Stereotype threat also reduces self-efficacy, which has an effect on performance as well. This study proposed that the setting of high specific learning goals would moderate the effects of working memory deficiency on performance, as well as the effects of stereotype threat on self-efficacy. Each of these concepts is explained in further detail in the sections to follow.

Working Memory

Working memory is defined as the executive resource associated with efficient performance on social and cognitive tasks that require coordinated information processing. Working memory provides the ability to keep task-relevant information accessible while blocking out distracting information. It controls behavior in such a way that goals can be achieved in the presence of information that competes for attention (Schmader, Johns, & Forbes, 2008). For example, high working memory predicts the ability to maintain the accessibility of task goals (Kane & Engle, 2003).

Stereotype threat weakens working memory because it makes it harder to accurately direct attention during complex tasks where it is necessary to utilize

task-relevant information and ignore thoughts, feelings, and behaviors that are counterproductive to one's current goals. When individuals are in situations where self-relevant negative stereotypes are made salient, their working memory is less efficient. This reduction of efficiency of working memory is associated with lowered performance on cognitive and social tasks (Schmader et al., 2008). To understand the reasons behind this process, it is necessary to examine the construct of anxiety as it relates to stereotype threat, working memory, and performance.

Anxiety

Anxiety is a broad construct that refers to physiological and psychological tension and has been shown to affect a number of tasks and processes. Anxiety can either be in the context of a trait or a state. Trait anxiety refers to a long term, constant tendency to respond to potentially stressful situations with state anxiety. State anxiety refers to a short term condition of anxiety. This study is concerned with state anxiety. Liebert and Morris (1967) proposed two distinct components of state anxiety: *worry*, which includes cognitive reactions to the testing situation (i.e., concern over

performance), and *emotionality*, which includes physiological and affective reactions (i.e., accelerated heart rate and nervousness). Research has revealed that worry undermines performance in testing situations because it diverts attention from the task at hand (Brodish & Devine, 2008). Brodish and Devine (2008) take this finding a step further and speculate that worry undermines performance by reducing working memory resources. When individuals worry about their performance, there are fewer working memory resources available to put towards that performance. This proposed link between worry and performance is supported by existing research suggesting working memory deficits as an important mediator of stereotype threat (Brodish & Devine, 2008). I only tested for the worry component of anxiety (cognitive anxiety) in this study, but will provide a brief overview of both components of anxiety; examining both provides a deeper explanation as to how anxiety taxes working memory.

Emotionality

Although physiological stress reactions have the function of preparing individuals to meet demanding situations, they can also impair cognitive performance (Eysenck & Calvo, 1992). Emotionality, or stress, could have its biggest impact on cognitive processes that rely

on the hippocampus and prefrontal cortex because there is a large number of receptors in those areas that are sensitive to cortisol (Blair, 2006; Metcalfe & Jacobs, 1998). This would explain why stress can impair processes such as memory consolidation and spatial memory that are executed by the hippocampus and tasks involving executive function, attentional focus, and working memory that are carried out by the prefrontal cortex. These findings suggest that performance should be most impaired when stress levels are high and the task requires complex cognitive processing (Schmader et al., 2008).

Worry

Individuals under stereotype threat tend to worry about and monitor their performance more closely than individuals not under stereotype threat. For example, Beilock et al. (2007) found that women experiencing stereotype threat concerning their mathematical problem solving abilities reported worrying more about and monitoring their performance. This worry triggers a cycle because these thoughts enhance the effects of stereotype threat by causing working memory to become full of distracting information. This task-irrelevant information takes the individual's attention away from task-relevant information that is necessary for the individual to

perform well (Beilock, Rydell, & McConnell, 2007). Specifically, worry shifts cognitive resources needed for the task to monitoring processes and thought-suppression processes (Schmader, Johns, and Forbes, 2008).

Monitoring and thought-suppression processes occur in individuals under stereotype threat due to the state of imbalance that stereotype threat brings about. The imbalance occurs in concepts of self, group, and domain (Schmader et al., 2008). For example, perhaps an individual strongly identifies with the task domain, but the group she identifies with is stereotyped as not performing well in that domain, so the individual tries to separate herself from the group. Individuals under stereotype threat try to monitor their performance more closely in order to solve this imbalance. Their performance becomes more cautious and systematic because they are so focused on avoiding failure. In contrast, individuals who are positively stereotyped tend to have more energetic and creative performance (Seibt & Forster, 2004). Cautious and systematic performance can be detrimental because it prevents the individual from taking chances and from being able to react successfully to unexpected components of the task.

People experiencing stereotype threat also monitor emotionally arousing cues by trying to push them out of their mind. This process probably relies on the same working memory resources as efficient task performance relies on, and it drains these working memory resources due to the fact that it takes effort to suppress thoughts and emotions (Schmader et al., 2008). On top of that, the process of suppressing anxiety-related thoughts actually has the opposite effect of making these thoughts more salient (Wegner, Erber, & Zanakos, 1993). Therefore, stereotype threatened individuals' attempts to suppress their feelings of anxiety during a performance situation predict depleted working memory and ultimately lower performance (Schmader et al., 2008).

To increase performance, something must be done to redirect the working memory resources that have been diverted from the task as a result of increased anxiety. I present goal setting as a mechanism to redirect working memory resources away from the stress and worry processes that anxiety brings about and towards successful completion of a task. Goal setting has not been examined in the stereotype threat literature, and I set out to study it as a potential enhancer of performance in stereotype threat situations. The following section

provides an exploration of goal setting's effect on working memory efficiency and performance.

Goal Setting

Goals are designed to direct thought and action. Goals direct attention and effort toward goal-relevant actions and take attention away from actions that are not relevant to the goal. A learning goal is a goal to acquire the knowledge necessary to perform a task. It is believed that a learning goal facilitates or enhances meta-cognition because it allows the individual to plan, monitor, and evaluate progress toward goal attainment. Learning goals allow individuals to learn because the skills necessary to achieve the goal have not yet been attained. Learning goals allow individuals to discover specific ways to master the task at hand (Latham & Locke, 2006; Locke & Latham, 2006). An example of a learning goal would be to master a method of solving certain arithmetic problems. A performance goal, on the other hand, is a goal to achieve a certain outcome. Its focus is on the finished product rather than the process. Following the arithmetic example, a performance goal would be to correctly solve a certain number of arithmetic problems.

Generally, low, vague "do best" goals do not yield as high of a performance as specific, challenging goals (Locke & Latham, 1990). However, when people do not have the knowledge and skill to reach a performance goal, giving them a difficult goal sometimes leads to lower performance than telling them to do their best. A performance goal may misdirect cognitive resources to mere effort and persistence, which does not help in goal attainment if the person does not have the knowledge on how to attain it. In these cases, setting specific high *learning goals* to learn specific ways to master the task often leads to the highest performance (Latham & Locke, 2006). When under stereotype threat, it is as if individuals do not have the knowledge and skills to attain the goal due to the anxiety and working memory depletion that stereotype threat brings about. Therefore, I predicted that individuals under stereotype threat would be most successful when learning goals are set. Learning goals should allow the individual to stay focused on the task and direct his working memory resources toward performing the task, while not becoming preoccupied with performing at a certain level. This type of goal allows the individual to focus on learning the skills necessary to perform a task rather than reaching a specified

outcome, which ought to lead to subsequent higher performance.

A learning goal may keep people from acting too quickly and jumping to an incorrect judgment on how to be successful at a task. A learning goal increases the amount of options one has in terms of task strategies, which increases a person's chances of success (Latham et al., 2008). Since people under threat experience a depletion in cognitive resources, they may be more prone to making rash decisions that may not be the best options for successful task completion. I proposed that such individuals would benefit from learning goals that increase the number of task strategies available to them.

The finding that providing a task strategy to stereotype threatened individuals moderates the stereotype threat-performance relationship provides further support for examining learning goals as moderators. Since stereotype threat influences people only on difficult tasks, effort alone cannot enhance performance on the task. Trying harder on a difficult task does not necessarily lead to better performance; rather, an effective strategy is needed to enhance performance. Kray et al. (2001) provided stereotype threatened women with a strategy to successfully counteract the stereotype. The

study presented women with a negotiation task and explained to them the gender stereotype that women are less assertive than men and tend not to act in their own self-interest. They were told that these characteristics make them less effective when negotiating. The women in the study were able to counteract the stereotype by being particularly assertive when negotiating, which improved their performance. The women acted this way only when they were explicitly informed about the gender differences in negotiating. The women had the appropriate tools to effectively negotiate; they just needed to be told that these certain tools would allow them to perform successfully on the task (Kray, Thompson, & Galinksky, 2001; Roberson & Kulik, 2007). Basically, their efforts had to be directed toward the task in order for them to perform it successfully. Furthermore, of importance to my study, they employed the use of learning goals rather than performance goals.

In addition to performance, goal setting can also increase self-efficacy. Self-efficacy is an important aspect in the stereotype threat-performance process because it is weakened by stereotype threat, which in turn weakens performance (Zunker, 2002). The enhancement of self-efficacy can help performance to be enhanced as well.

The following section discusses stereotype threat's effect on self-efficacy and how goal setting can potentially enhance it.

Self-Efficacy

Self-efficacy is defined as an individual's belief in his ability (Bandura, 1989). As previously discussed, stereotype threat weakens self-efficacy, and weakened self-efficacy is associated with lowered performance (Zunker, 2002). For instance, despite a growing trend toward open discussion about the effects of sexual orientation in the workplace, lesbian, gay, bisexual, and transgender (LGBT) employees face a workforce that stereotypes the jobs people who are non-heterosexual hold. It is a stereotype that gay men work in the fashion industry, for example. A gay man working in an industry not stereotypical for gay men may feel threatened. Often, the heterosexual workforce feels fear, hatred, and intolerance toward people of diverse sexual orientations. These attitudes make sense given that the workplace exists within a society that is biased toward heterosexuality (Zunker, 2002). Zunker (2002) examined the effects of stereotype threat on the well-being of LGBT people in the workplace, specifically related to self-efficacy,

self-monitoring, concern for appropriateness, and job performance. The study found that stereotype threat could be confirmed in the employment experience of LGBT persons and that as stereotype threat increased, job performance decreased. Furthermore, as stereotype threat increased, self-efficacy decreased, but as self-efficacy increased, job performance increased. For instance, an employee feels anxiety due to perceived stereotype threat. As her perception of stereotype threat grows, her sense of self-efficacy weakens, and so does job performance. On the other hand, when an employee does not experience stereotype threat, her self-efficacy is allowed to flourish, which reinforces her job performance (Zunker, 2002).

Recently, research has turned to examining challenge-framing as a stereotype threat-reduction mechanism. Threat and challenge have historically been framed as opposing styles of appraising potentially stressful situations. Threat is viewed negatively because it implies that the situation is more than the individual can handle. On the other hand, challenge is viewed positively because it implies that the individual feels capable of overcoming stressors. While threat appraisal impairs the individual's performance, challenge appraisal

facilitates performance by preparing the individual to face the stress and employ adaptive stress responses, such as effective goal setting. Reframing the threat as a challenge is essentially referring to enhancing self-efficacy. By viewing a situation as a challenge rather than a threat, the individual is more confident in his or her ability to succeed at the task. This reframing should reduce the effects of stereotype threat. The results of a recent study (Alter, Aronson, Darley, Rodriguez, & Ruble, 2010) found that reframing a threatening task as a challenge eliminated the negative effects of stereotype threat. African American students were given an academic test and had to report their race either before or after the test. The test was framed either as a threat or a challenge by being described as either a useful learning experience (challenge) or a true measure of ability (threat). Students who reported their race before taking the test did not perform as well as students who reported their race after completing the test, but *only* when the test was framed as a threat rather than a challenge. People can potentially interpret the same task as a challenge or a threat depending on a variety of situational factors, so why not encourage them to interpret the task as a challenge and ultimately

enhance their self-efficacy? The manipulation in this study was subtle and not costly, which offers promise that this technique can be a useful stereotype threat-management intervention (Alter et al., 2010).

Challenge versus threat framing has been seen in the goal setting literature as well. The literature says that assigning hard goals may not be effective when people view those goals as threatening. Whether a person appraises a high goal as a challenge versus a threat makes a difference in that person's performance (Locke & Latham, 2006; Latham & Locke, 2006). Drach-Zahavy and Erez (2002) found that when a task was changed to introduce new challenges (with goal difficulty held constant), people who were made to view the situation as a threat (focus on failure) demonstrated significantly lower performance than those who were made to view the situation as a challenge (focus on success and the usefulness of effort). As explained in the *Goal Setting* section, simply setting more difficult goals can actually be detrimental to a stereotype threatened individual's performance. One way this can be remedied is by assigning a learning goal, which should be seen as more of a challenge than a threat, as opposed to a performance goal, which may be seen as more of a threat than a challenge.

Steele's (1997) six wise school strategies provide further support for the important role of self-efficacy. The six wise school strategies are:

Teachers making their confidence in their students explicit; 2) challenging, rather than remedial expectations and academic work, which builds on promise and potential, not failure; 3) stress on the expandability of intelligence, that skills can be learned and extended through education and experience; 4) affirmation of intellectual belongingness; 5) emphasis on the value of multiple perspectives; 6) and the presence of role models of people who have successfully overcome stereotype threat (Steele, 1997).

A qualitative study was conducted based on these six wise school strategies. The sample of the study consisted of twelve African American graduate students who experienced stereotype threat at their institution. The study tested the extent to which systematic institutional support demonstrated wise schooling and how this correlated to the stereotype threatened graduate students' decisions to pursue academic careers. Results showed that two or more categories of wise schooling being deficient lowered academic ambitions. For example, for a student who experienced three problematic categories, the decision to

avoid the academic career track was very strong (Taylor & Antony, 2000). This example illustrates the importance of having challenging expectations and believing that skills can be learned. In other words, it illustrates the importance of setting high learning goals. These findings provide further support for testing learning goals as a moderator in the stereotype threat-performance process.

Model

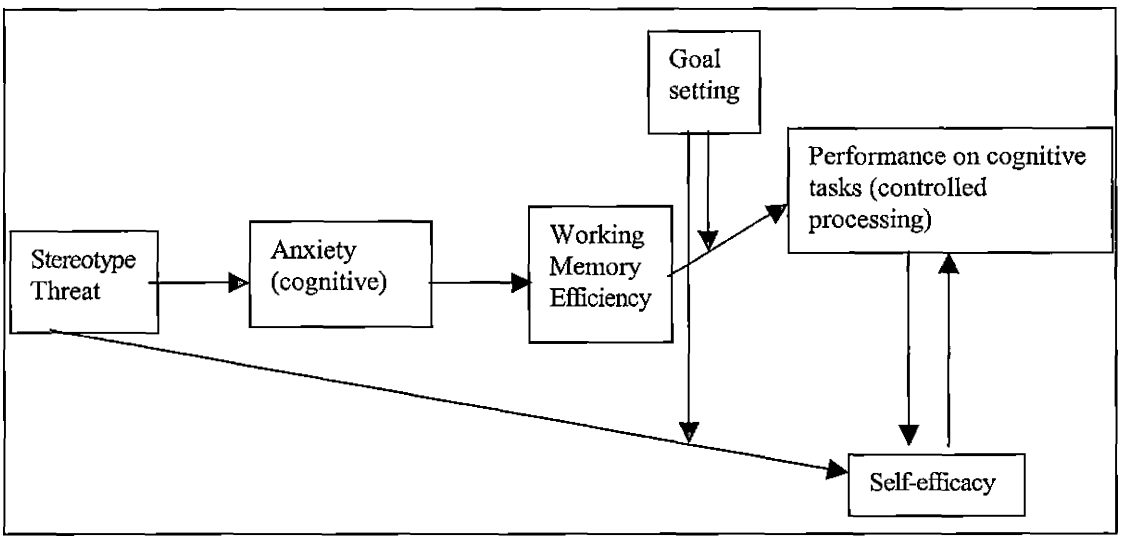


Figure 1. Linkages Model between Variables

In this study, I proposed the model diagramed above, of which I tested the linkages between variables. My model is based on the following reasoning:

Stereotype threat induces cognitive anxiety through worry, which is caused through monitoring and

thought-suppression processes. This increased anxiety drains working memory resources by causing working memory to become full of distracting, task-irrelevant information. Working memory deficiency then lowers performance on cognitive tasks because there are fewer working memory resources available to put towards the performance. Stereotype threat also decreases self-efficacy, which affects performance. Self-efficacy and performance should be positively correlated because an individual having high confidence in his ability to be successful at a task ought to lead to high performance, and more successful performance should increase an individual's confidence in his ability. Increased self-efficacy prepares the individual to face stressful situations with adaptive stress responses. In the present study, I proposed that learning goals would lead to increased self-efficacy and increased performance under stereotype threat. This type of goal was thought to moderate the relationship between working memory deficiency and performance in that it would redirect working memory resources from task-irrelevant cues to task-relevant information to help complete the task at hand. Performance goals aim to achieve a certain outcome and can be intimidating in stressful situations, which is

why I predicted that learning goals would lead to optimal success on tasks when under stereotype threat. Learning goals enhance meta-cognition by allowing the individual to plan, monitor, and evaluate progress toward goal attainment. Learning goals, as opposed to performance goals, allow individuals to discover specific ways to master the task at hand. I hypothesized that having this specific path to success would increase self-efficacy.

Table 1. Hypotheses

Hypothesis 1:	Stereotype threat induces cognitive anxiety.
Hypothesis 2:	Anxiety decreases working memory efficiency.
Hypothesis 3:	Working memory deficiency decreases performance on cognitive tasks.
Hypothesis 4:	Stereotype threat reduces self-efficacy.
Hypothesis 5:	The setting of high specific learning goals will moderate the effects of stereotype threat on self-efficacy.
Hypothesis 6:	The setting of high specific learning goals will moderate the effects of working memory deficiency on performance.
Hypothesis 7:	There will be a positive correlation between performance and self-efficacy.

CHAPTER TWO

METHOD

Sample and Design

Participants in this study included female undergraduate students at a mid-sized Southern California university. The majority of participants indicated that psychology was their major and English was their primary language. See Tables 2 - 4 for participants' demographic information. Participants received course credit for their participation. Participants were randomly assigned to one of 4 conditions: the threat/goal condition, the threat/no goal condition, the no threat/goal condition, or the no threat/no goal condition. The data set included a total of 85 participants. The threat/goal condition contained 21 participants, the threat/no goal condition contained 23 participants, the no threat/goal condition contained 20 participants, and the no threat/no goal condition contained 21 participants.

Experimental Task

Participants were required to complete mathematical and visual-spatial tasks. They were given 5 minutes to complete 2 practice problems. They were then given 15 minutes to complete 5 experimental problems. Each of the 4

conditions contained an instruction set explaining to participants that they had 15 minutes to complete as many of the 5 problems as possible. Beyond these instructions, the content of the instruction set was different for each condition. The threat/goal condition instruction set contained a prompt that was designed to re-instill stereotype threat in participants. The blurb reiterated what was relayed to participants at the very beginning in the threat conditions. The reason for this second prompt was to induce the feeling of threat at the time the participant began the actual experimental task. The instructions for this condition also contained a paragraph explaining the definition of a learning goal and the value of setting such a goal in completing tasks such as the ones participants were about to complete. The instruction set for the threat/no goal condition contained the stereotype threat prompt, as well as a paragraph pertaining to the history of logic problems. The no threat/goal condition's instruction set included only the learning goal paragraph. Finally, the no threat/no goal instruction set contained only the history of logic paragraph.

The mathematical and visual-spatial tasks were used because they possess an ideal level of complexity and

challenge. They meet the criterion for complexity according to Wood (1986) in that they cannot be completed more successfully solely through effort and persistence. Successful performance on these tasks requires learning and implementing effective task strategies. There is a specific strategy and process for each task. The tasks are challenging enough that they cannot be solved very easily or quickly by most people, yet they are not challenging to the point where they are impossible or take too long to solve.

Procedure

In the threat conditions, participants were read a blurb to instill stereotype threat. In summary, it stated that men outperform women in the mathematical and visual-spatial domains. Participants were then assessed in terms of their anxiety level and working memory capacity. Following these measures, participants were given the appropriate experimental task (outlined in the preceding section). Finally, participants' degree of self-efficacy was assessed. At the end of the experiment they were given a manipulation check. In the no threat conditions, the same procedure was followed except that no stereotype threat manipulation was given.

Measures

Stereotype Threat Manipulation

A paragraph was read to participants to trigger the threat. A manipulation check was given at the end of the experiment to help determine if participants did indeed experience stereotype threat. See *Appendix A* for the stereotype threat trigger and *Appendix F* for the manipulation check. Sample item: "As a female, I felt that I would not be as successful at solving the problems as males".

Anxiety

The state anxiety portion of the Spielberger State Trait Anxiety Inventory was used to measure anxiety. The scale has a Cronbach's alpha reliability score of 0.94. See Table 5 for the mean and standard deviation. See *Appendix B* for the scale. Sample item: "I feel tense".

Working Memory

A word list recall was used to measure working memory. See Table 5 for the mean and standard deviation. See *Appendix C* for the list of words.

Goal Setting

The goal setting prompt was used to expose participants to goal setting. The effects of goal setting were measured by comparing the goal and no goal

conditions. In the no goal condition, a paragraph explaining the history of logic was presented to participants. See *Appendix D* for the goal setting prompt and history of logic paragraph, as well as the content of all 4 experimental conditions.

Performance

Performance was measured by the number of tasks that were successfully completed within the given timeframe (a correct answer was obtained). All tasks were taken from the website, expandyourmind.com. The Spearman-Brown coefficient for the tasks was 0.55. See Table 5 for the mean and standard deviation. See *Appendix D* for the tasks. Sample item: In the following number series, what number comes next? 76, 123, 199, 322, 521, ___

Self-Efficacy

Self-efficacy was measured with the use of a 4-item questionnaire specifically designed for this study. The scale has a Cronbach's Alpha reliability score of 0.86. See Table 5 for the mean and standard deviation. See *Appendix E* for the scale. Sample item: "I can identify strategies to solve mathematical problems".

CHAPTER THREE

RESULTS

All analyses were conducted using SPSS software. Prior to analysis, the data were screened for missing data and outliers. To screen for missing data, frequencies were ran for each variable. No data were found to be missing in any of the variables. To check for outliers, a z-score analysis was conducted on all study variables. The distributions were examined and it was found that all z-scores were less than 3.3. As a result, no outliers were detected and no data were deleted (Tabachnick & Fidell, 2007).

To assess normality, residual plots, histograms, and scatter plots of the residuals were viewed. All residuals were centered around zero in the residual plots. The residuals were symmetric and no skewness was detected ($z \leq \pm 3.3$) in the histograms and scatter plots. Therefore, the data were normal and no transformations were required.

The data set included a total of 85 participants. The threat/goal condition contained 21 participants, the threat/no goal condition contained 23 participants, the no threat/goal condition contained 20 participants, and the no threat/no goal condition contained 21 participants.

Table 2 below indicates the mean and standard deviation for the age of the participants.

Table 2. Age

Measure	Mean	Standard Deviation
Age	22.73	4.77

Table 3 below indicates the percentage of participants that were in each of the reported years in college.

Table 3. Year in College

Measure	Response	Percentage
Year	1	7.06%
	2	20.00%
	3	22.35%
	4	49.41%
	5	1.18%

Table 4 below depicts the most common responses for primary language and major in school.

Table 4. Language and Major

Measure	Response	Percentage
Language	English	85.88%
	Spanish	11.76%
	Hmong	1.18%
	Korean	1.18%
Major	Psychology	54.12%
	Business	8.24%
	Biology	4.71%

Table 5 below depicts the descriptive statistics for each of the measures (anxiety, memory, performance, self-efficacy).

Table 5. Descriptive Statistics

Measure	Mean	Standard Deviation
Anxiety	37.39	11.27
Memory	4.52	1.31
Performance	2.22	1.33
Self-Efficacy	10.32	2.55

Manipulation Check

A t-test was performed to assess the impact of the stereotype threat manipulation. No significant mean difference was found in the manipulation check items between the "threat" and "no threat" groups. However, the item that stated "As a female, I felt that I would not be as successful at solving the problems as males" produced a nearly significant result, $t(83) = 2.23$, $p = 0.06$. The mean value for this item in the "threat" condition was 2.05, and the mean value for this item in the "no threat" condition was 1.46. This suggests that the stereotype threat manipulation may have had a modest impact but did not have enough of an impact to be significant. The effect size suggested a moderate effect, Cohen's $d = 0.48$.

Even though the manipulation was not effective as intended, the effect size indicated that analyzing the data according to the planned hypotheses had merit so the hypotheses involving stereotype threat were still tested.

Hypothesis 1

A t-test was conducted to determine whether stereotype threat increased anxiety. No significant mean difference was found in anxiety between the "threat" and "no threat" conditions, $t(82) = 0.54$, $p = 0.99$, which does not support hypothesis 1.

The mean value for anxiety in the "threat" condition was 38.0, while the mean value for anxiety in the "no threat" condition was 36.7. The means were in the expected directions but were not significantly different.

Hypothesis 2

A bivariate correlation was conducted to assess whether anxiety decreased working memory efficiency. There was a significant negative correlation, $r = -0.27$, $p < 0.05$, between anxiety and working memory, thus supporting hypothesis 2. The effect size was 0.08, indicating a small effect.

Hypothesis 3

A bivariate correlation was conducted to determine whether there was a relationship between memory and performance. There was a significant positive correlation, $r = 0.28$, $p < 0.05$, between working memory and performance, thus supporting hypothesis 3. The effect size was 0.08, indicating a small effect.

Hypothesis 4

A t-test was conducted to assess whether stereotype threat reduced self-efficacy. No significant mean difference was found in self-efficacy between the "threat" and "no threat" conditions, $t(83) = -1.02$, $p = 0.18$.

The mean value for self-efficacy in the "threat" condition was 10.05, while the mean value for self-efficacy in the "no threat" condition was 10.61.

Hypothesis 5

An ANOVA was performed to determine whether goal setting moderated the effects of stereotype threat on self-efficacy.

There was no significant interaction between goal setting and stereotype threat, $F(1,81) = 1.34$, $p = 0.25$.

Goal setting did not moderate the effects of stereotype threat on self-efficacy, which did not support hypothesis 5.

Hypothesis 6

A hierarchical regression was conducted to assess whether goal setting moderated the effects of working memory deficiency on performance. In the first step, memory and goal setting were entered, which resulted in a significant model, $R = 0.28$, $R^2 = 0.08$, $F(1,83) = 7.07$, $p < 0.05$.

Adding the interactive term for memory and goal setting was not significant, $R = 0.32$, $R^2 = 0.11$, R^2 change $= 0.03$, $F(1,82) = 2.41$, $p = 0.13$. The product of memory and goal setting did not contribute significantly to the prediction of performance from memory.

Goal setting did not moderate the effects of working memory deficiency on performance, not supporting hypothesis 6.

Hypothesis 7

A correlation analysis was conducted to determine whether there was a correlation between performance and self-efficacy. The results revealed a positive correlation between performance and self-efficacy, $r = 0.39$, $p < 0.05$, supporting hypothesis 7. The effect size was 0.15, indicating a small effect size.

CHAPTER FOUR

DISCUSSION

In the current study, I examined each component in the process of stereotype threat's effect on performance with the ultimate goal of identifying a variable that could moderate the effects of stereotype threat on performance. I proposed that the setting of learning goals would moderate the effects of stereotype threat on performance, as well as the effects of stereotype threat on self-efficacy. Studying a possible moderator of the relationship between stereotype threat and performance is a significant contribution to the literature because it could have useful practical implications for increasing performance in the workplace. Goal setting has never been examined as a moderator in the stereotype threat literature. Goal setting was chosen as the variable of interest in the current study because goals have been shown to direct thought and action toward performing a specific task. This section will discuss the study's findings associated with each component of the stereotype threat-performance process, as well as the limitations of the study that perhaps contributed to the lack of empirical support for some of the hypotheses.

Stereotype Threat, Anxiety, and Working Memory

Hypothesis 1 predicted that stereotype threat would be associated with increased anxiety. No significant difference was found in anxiety between the threat and no threat conditions. This finding is in contradiction with the literature, which has repeatedly found that stereotype threat leads to increased anxiety (Beilock et al., 2007). The reason for this insignificant result likely lies in the stereotype threat manipulation, which was not effective. The stereotype threat prompt did not have a significant impact on participants, thus not serving its intended purpose of instilling stereotype threat in participants. Therefore, it is not surprising that all hypotheses that included stereotype threat as a variable were not significant. However, anxiety did play a significant role elsewhere in the study.

The significant negative correlation between anxiety and working memory indicates that increased anxiety is associated with decreased working memory. This is supported by the literature. As Brodish and Devine (2008) assert, when individuals feel anxiety associated with their performance, fewer working memory resources are available to allocate toward their performance because those resources are being put toward the individual's

anxiety. Working memory has been shown to be a mediator of stereotype threat, which is why it is important to examine the relationship between working memory and performance.

The significant positive correlation between working memory and performance suggests that working memory is a key factor in achieving high performance. This finding is also supported by the literature (Kane & Engle, 2003), which defines working memory as the executive resource associated with efficient performance on social and cognitive tasks that require coordinated information processing. Working memory allows for goals to be achieved in the presence of distracting information (Schmader et al., 2008), thus making it an integral component of the stereotype threat process. Another factor that must be addressed in the stereotype threat process is self-efficacy. The lowering of an individual's self-efficacy can be a source of distracting information when working toward completing a task, while increased self-efficacy may help the individual to complete successfully the task.

Stereotype Threat, Self-efficacy, and Learning Goals

Contrary to what was hypothesized, the results did not indicate that stereotype threat reduced self-efficacy.

The reason for this insignificant result again most likely lies in the stereotype threat manipulation being ineffective. Further, perhaps the design of the study contributed to the insignificance of these results. The stereotype threat manipulation and the self-efficacy survey were administered relatively far apart from each other. The effects, if any, of the manipulation may not have been fresh in participants' minds by the time they completed the self-efficacy survey. However, the results did show that self-efficacy and performance were related. An individual's belief in her ability is related to her level of performance. This finding is important because it illustrates the importance of supporting and enhancing individuals' beliefs in their abilities in strengthening performance. Something must be done to cause individuals to believe that they have the capabilities to accomplish a task. This is where goal setting came into play in this study.

Specifically, I had proposed that learning goals would moderate the effects of stereotype threat on self-efficacy and the effects of working memory deficiency on performance. Learning goals provide direction and strategy. The intent of a learning goal is to allow individuals to discover specific ways to master the task

at hand (Latham & Locke, 2006; Locke & Latham, 2006). In terms of self-efficacy and performance, the current study proposed that learning goals would provide threatened individuals with an effective task strategy, thus making them feel that they have a stronger capability to complete successfully the task. With regard to working memory and performance, I proposed that goal setting would redirect working memory resources away from anxiety production and toward successful performance.

Contrary to these predictions, goal setting was not proven to moderate the effects of stereotype threat on self-efficacy or the effects of working memory deficiency on performance. This may be due to the manner in which the learning goal was presented to participants. Participants were not assigned a specific learning goal, nor were they given the opportunity to set their own learning goal. Rather, the experimenter explained the value of learning goals in achieving high performance. Participants were told that setting learning goals would help them to solve the logic problems involved in the study. They were given this information immediately preceding the logic problems and were expected to apply it to solving the problems. However, either they did not internalize this information, did not know how to apply it, or were unable to apply it

in the time allotted. In other words, merely explaining the importance of setting learning goals was perhaps not enough to be useful. An alternative strategy would have been to set the learning goal for the participants. For example, participants could have been instructed to identify and implement a certain number of strategies to solve the problems. This design models the experimental design used in Seijts and Crim's study (2009) in which participants were instructed to identify and implement 4 or more unique strategies to produce class schedules in a given timeframe. The learning goal was measured by the number of unique task-relevant strategies that participants identified and implemented. Taking this approach would ensure that the learning goal component is more directly addressed by participants. However, this approach could not have been successfully employed with the amount of time allotted for the task. Therefore, it is recommended that future researchers increase the allotted time if taking this approach.

Limitations

The major limitation of this study was the stereotype threat manipulation. The manipulation did not serve its intended purpose, which could be due to the manner in

which it was administered. Feedback received from participants in the pilot study indicated that the manipulation was in fact believable. Therefore, I do not believe that the problem lies in the believability of the manipulation prompt. Perhaps the problem lies in the manner in which the prompt was relayed to participants. Participants may have been more likely to internalize the threat if the prompt was more personalized and directed at them. For example, the key word "you", rather than the general term "females", when referring to visual-spatial and mathematical ability may have had more of a direct impact on participants. However, this speculation is in contradiction with the implications of Brown and Pinel (2003)'s study, which used a personalized stereotype threat prompt on participants as previously described and did not find expected results. The authors pointed out that perhaps they should have replicated Schmader (2002)'s stereotype threat prompt, which was effective. This study's prompt indicated to participants that their scores on the experimental test would be used to evaluate the abilities of women in general rather than their own personal abilities (Brown & Pinel, 2003). Schmader (2002)'s study put the emphasis on group identity rather than personal performance. Perhaps the focus of the

stereotype threat prompt should be based upon the nature of the task and the test group. Another tactic that could cause participants to internalize the threat would be a longer prompt. Dedicating more time and explanation to instilling the threat could increase the impact of the threat. These points ought to be considered in future stereotype threat research.

A few other possibilities exist, though only speculative. Contrary to the feedback received from participants of the pilot study, perhaps the women in the thesis study did not believe the stereotype threat prompt. Perhaps some women simply no longer believe that they cannot do math. Another possibility is that the women reacted to the prompt with the sentiment, "I'll show them that I can do math". Yet another possibility is that the females in my sample did not identify with the task domain. Perhaps they did not care enough about doing well on the mathematical and visual-spatial problems in the experimental task. This could be due to the fact that they were attending a university that did not have a focus on mathematics/engineering, or their major was not in mathematics/engineering or a related field. The literature has shown that domain identification is a necessary component in order for individuals to experience

stereotype threat (Aronson et al., 1999). If the participants in my study did not experience domain identification, this could be an explanation as to why they may not have experienced stereotype threat. These points ought to be addressed in future research as well. Perhaps future researchers should try using a different stereotype and/or stereotyped group as the focus as well as address the possibility of reactance in the experimental design.

CHAPTER FIVE

IMPLICATIONS

Although I did not find the expected results, practical implications still exist based on the findings of other studies. Stereotype threat is clearly alive in other research findings (i.e. Steele & Aronson, 1995), which is why it is important to discuss its implications in relation to the workplace. Stereotype threat can lower performance in the workplace, which is detrimental to workplace productivity and employee morale (Niemann & Dovidio, 1998; Roberson et al., 2003; Hom, Roberson, & Ellis, 2007; Steele, 1997). If organizations are aware of this, they can take measures to prevent it. I believe that the primary way to prevent stereotype threat from becoming detrimental to employees and workplace productivity is support. Essentially all methods to manage stereotype threat in the workplace fall under the umbrella of support.

Goal setting is one such method that falls under the umbrella of support. I believe that management setting or allowing the setting of learning goals for their employees is a form of support. Providing employees with the opportunity to go through the stages of knowledge and

skill acquisition allows them to discover specific ways to master a task without putting the focus on performance (Latham & Locke, 2006). Rather than pressuring employees to achieve a certain performance-based outcome, setting learning goals for employees allows them to learn by giving them the room to plan, monitor, and evaluate their progress toward task mastery (Latham & Locke, 2006; Locke & Latham, 2006). This should make employees feel supported rather than pressured. I hypothesized that goal setting would act as a moderator in the stereotype threat-performance process. Unfortunately, the results of the study did not support my hypotheses pertaining to goal setting. Yet, it is worthwhile to explore other methods by which to support employees in the workplace.

Namely, organizations ought to strive to create and foster an open, trusting work environment. This may sound simple and obvious, but not all organizations emphasize its importance enough. The reasoning for its importance is that stereotypes and differences are bound to exist, but if employees trust one another, they are more likely to open up about issues such as stereotypes and how to address them (Thomas & Gabarro, 1999). It has been suggested in existing research that common stereotypes should be explicitly discussed by managers with their

potentially threatened employees. However, since even people from the same group are aware of and handle stereotypes differently, this approach may produce undesirable outcomes. For example, employees may interpret their managers' stereotype acknowledgement as stereotype endorsement. An alternative approach is for organizations to foster a culture that houses a safe environment for open communication and trust. Management can achieve this through a number of ways, such as encouraging teamwork by making it beneficial to employees to help each other out, regularly holding staff meetings where co-workers are allowed the space to bounce ideas off each other, having an open-door policy, implementing staff development activities, and putting a wellness program in place in which employees can interact in a non work-related context, to name a few. The point is to create an environment in which employees can get to know each other on a professional level and a personal level. On a professional level, this type of environment provides employees with the comfort to go to each other for work-related advice (i.e., an effective way to complete a certain task). On a personal level, employees are given the chance to get to know each other on a level that goes deeper than stereotypes. In turn, those who hold

stereotypes are more likely to look beyond them; and those who feel stereotyped are less likely to experience stereotype threat. In other words, those who hold stereotypes may change their minds after they get to know people on a deeper level. As a result, those who feel stereotyped may feel less vulnerable to stereotype threat because those who previously held the stereotypes do not hold them anymore. This ultimately creates an environment in which all employees can succeed. This strategy is supported by the literature, which has shown that individuals who feel that they belong to a group that knows them are less likely to feel threatened than individuals who feel that they belong to a group that does not know them (Sherif, 1935).

CHAPTER SIX

CONCLUSION

As existing literature has demonstrated, stereotype threat has been repeatedly shown to impair performance. This is why, although I did not demonstrate the effects of stereotype threat in this study, it is still very important to properly address the phenomenon. Society is experiencing an evolving workforce, which is something to be celebrated but also has the potential to present more opportunity for stereotype threat. Therefore, it is becoming increasingly imperative for organizations to learn how to mitigate stereotype threat's negative effects. I attempted to do so by testing goal setting as a moderator, which was not successful. Future research should focus on examining moderators of the stereotype threat-performance relationship to identify ways to diminish the effects of stereotype threat on performance. The increasing diversity that we are experiencing in our workforce presents us with exciting advantages. To fully reap the benefits of our increasingly diverse, evolving workforce we must find ways to effectively manage the diversity. After all, with great power comes great responsibility.

APPENDIX A

STEREOTYPE THREAT PROMPT

STEREOTYPE THREAT PROMPT

It is common to see men occupy positions in the professions of science, engineering, and mathematics. It is not nearly as common to see women occupy these same positions. This is largely due to the numerous research findings that have shown that males outperform females on mathematical/logical problem solving and visual-spatial tasks. This study aims to examine the root of these differences.

APPENDIX B

ANXIETY

ANXIETY

Spielberger State Trait Anxiety Inventory

(Responses are on a 4-point Likert type scale where 1 = not at all and 4 = very much so)

Directions: A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate rating to the right of the statement to indicate how you feel *right now*, that is, *at this moment.* There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

1. I feel calm
2. I feel secure
3. I am tense
4. I feel strained
5. I feel at ease
6. I feel upset
7. I am presently worrying over possible misfortunes
8. I feel satisfied
9. I feel frightened
10. I feel comfortable
11. I feel self-confident
12. I feel nervous
13. I am jittery
14. I feel indecisive
15. I am relaxed
16. I feel content
17. I am worried
18. I feel confused
19. I feel steady
20. I feel pleasant

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., Jacobs, G. A. (1970). *Stait-trait anxiety inventory.* Menlo Park, CA: Mind Garden Inc.

APPENDIX C

WORKING MEMORY

WORKING MEMORY

Word List Recall

Subjects were presented with a list of 10 words, presented to them at a constant rate of 1 word per second. After all words were presented, subjects were asked to recall the list of words by writing them down on a piece of paper. The more words recalled, the stronger the subjects' working memory. The word list consisted of: butter, arm, corner, letter, queen, ticket, grass, stone, book and stick. This word recall task was modeled after a recall task taken from: http://www.wpic.pitt.edu/research/dementia_epidemiology/IndoUS/Instruments/Word%20List%20Memory%20Task%20English.doc

APPENDIX D

EXPERIMENTAL CONDITIONS

EXPERIMENTAL CONDITIONS

Condition: Stereotype threat/goal

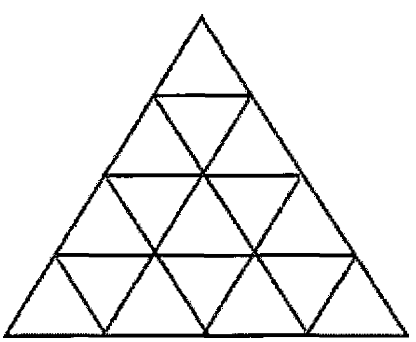
Research has repeatedly shown that males outperform females on visual-spatial tasks and mathematical/logical problem solving. This is due to an innate biological difference in the way in which males and females function cognitively. This is why it is much more common for men, rather than women, to be engineers, scientists, and mathematicians. This study aims to evaluate your ability to successfully perform visual-spatial and mathematical problem solving tasks.

Goals are designed to direct thought and action. Goals direct attention and effort toward goal-relevant actions and take attention away from actions that are not relevant to the goal. A learning goal is a goal to acquire the knowledge necessary to perform a task. It is believed that a learning goal facilitates or enhances meta-cognition because it allows the individual to plan, monitor, and evaluate progress toward goal attainment. Learning goals allow individuals to discover specific ways to master the task at hand (Latham & Locke, 2006; Locke & Latham, 2006). An example of a learning goal would be to master a method of solving certain arithmetic problems. A performance goal, on the other hand, is a goal to achieve a certain outcome. Its focus is on the finished product rather than the process. A performance goal would be to correctly solve a certain number of arithmetic problems. For the problems you are about to work on, it would be most beneficial to set learning goals.

Practice problems: 5 minutes

1. In the following number series, what number comes next? 4, 7, 11, 18, 29, __

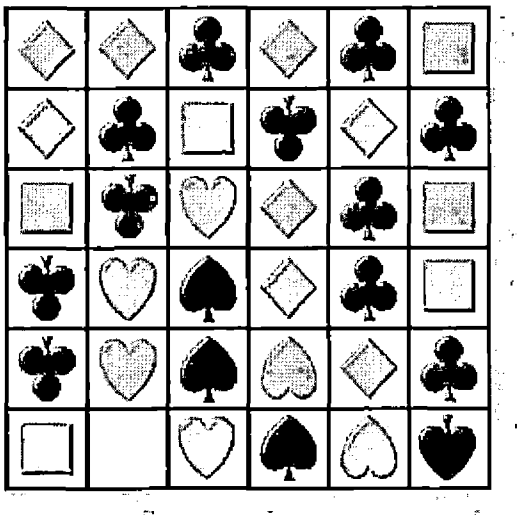
2. How many triangles are located in the image below?



Complete as many of the following exercises as possible. You have 15 minutes.

1. In the following number series, what number comes next? 76, 123, 199, 322, 521, ___
2. In the following alphanumeric series, what letter comes next? Z, W, X, U, V, ___

3. There are three playing cards lying face up, side by side. A five is just to the right of a two. A five is just to the left of a two. A spade is just to the left of a club, and a spade is just to the right of a spade. What are the three cards?
4. What is the four-digit number in which the first digit is one-third the second, the third is the sum of the first and second, and the last is three times the second?
5. Complete the square logically.



Condition: Stereotype threat/no goal

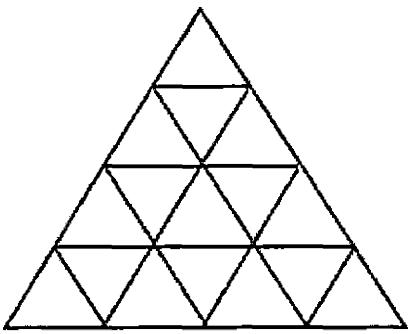
Research has repeatedly shown that males outperform females on visual-spatial tasks and mathematical/logical problem solving. This is due to an innate biological difference in the way in which males and females function cognitively. This is why it is much more common for men, rather than women, to be engineers, scientists, and mathematicians. This study aims to evaluate your ability to successfully perform visual-spatial and mathematical problem solving tasks.

The history of logic documents the development of logic as it occurs in various cultures and traditions in history. While many cultures have employed intricate systems of reasoning, logic as an explicit analysis of the methods of reasoning received sustained development originally only in three traditions: China, India and Greece. Although exact dates are uncertain, especially in the case of India, it is possible that logic emerged in all three societies in the fourth century B.C.E. The notions of *systems of reasoning* and *logic,* however, are sufficiently imprecise that various answers to the questions of what they are and how they are to be understood have been given. The formally sophisticated treatment of modern logic descends from the Greek tradition, but comes not wholly through Europe, but instead comes from the transmission of Aristotelian logic and commentary upon it by Islamic philosophers to logicians in Medieval Europe (New World Encyclopedia).

Practice problems: 5 minutes

1. In the following number series, what number comes next? 4, 7, 11, 18, 29, __

2. How many triangles are located in the image below?



Complete as many of the following exercises as possible. You have 15 minutes.
1. In the following number series, what number comes next? 76, 123, 199, 322, 521, ___
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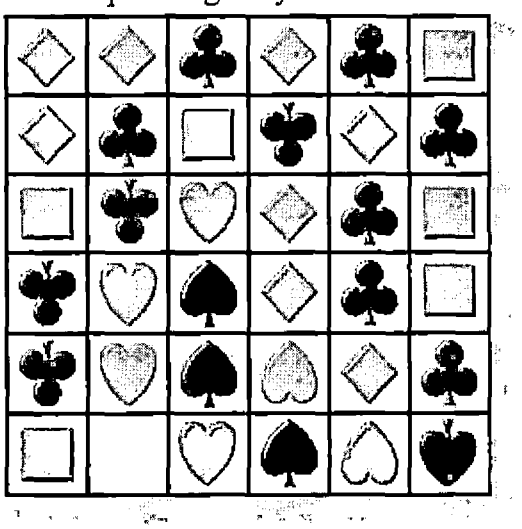
5. Complete the square logically.



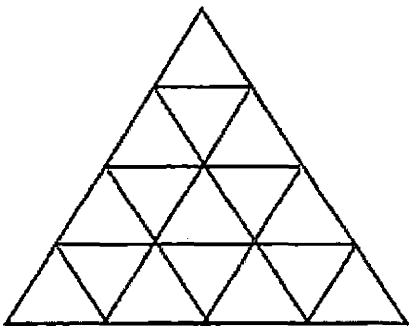
Condition: No stereotype threat/goal

Goals are designed to direct thought and action. Goals direct attention and effort toward goal-relevant actions and take attention away from actions that are not relevant to the goal. A learning goal is a goal to acquire the knowledge necessary to perform a task. It is believed that a learning goal facilitates or enhances meta-cognition because it allows the individual to plan, monitor, and evaluate progress toward goal attainment. Learning goals allow individuals to discover specific ways to master the task at hand (Latham & Locke, 2006; Locke & Latham, 2006). An example of a learning goal would be to master a method of solving certain arithmetic problems. A performance goal, on the other hand, is a goal to achieve a certain outcome. Its focus is on the finished product rather than the process. A performance goal would be to correctly solve a certain number of arithmetic problems. For the problems you are about to work on, it would be most beneficial to set learning goals.

Practice problems: 5 minutes

1. In the following number series, what number comes next? 4, 7, 11, 18, 29, __

2. How many triangles are located in the image below?



Complete as many of the following exercises as possible. You have 15 minutes.

1. In the following number series, what number comes next? 76, 123, 199, 322, 521, ___
2. In the following alphanumeric series, what letter comes next? Z, W, X, U, V, ___
3. There are three playing cards lying face up, side by side. A five is just to the right of a two. A five is just to the left of a two. A spade is just to the left of a club, and a spade is just to the right of a spade. What are the three cards?
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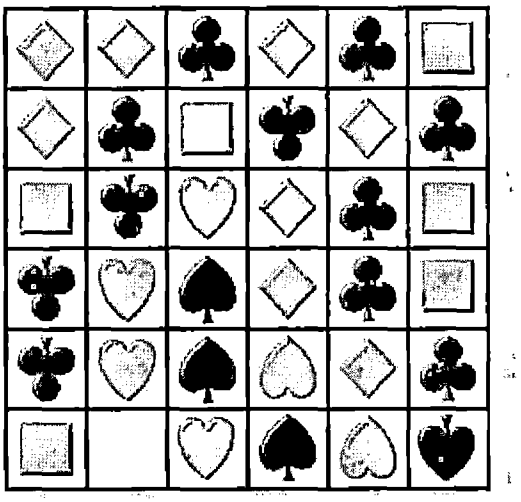
5. Complete the square logically.



Condition: No stereotype threat/no goal:

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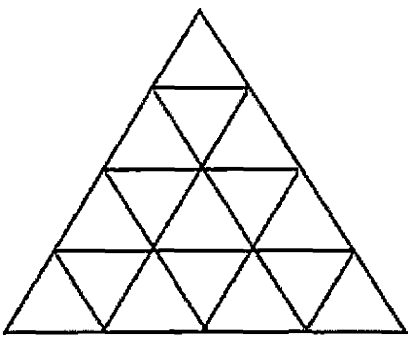
Practice problems: 5 minutes

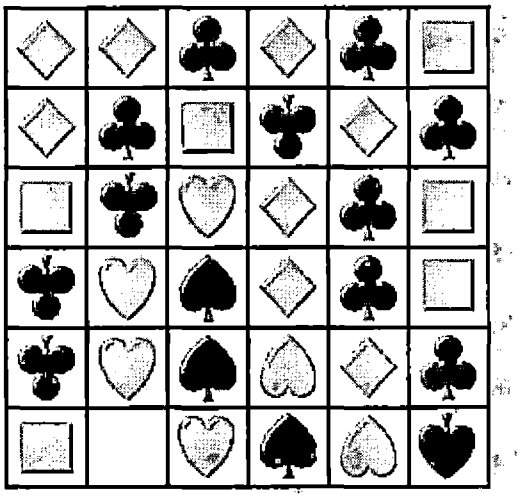
1. In the following number series, what number comes next? 4, 7, 11, 18, 29, __

2. How many triangles are located in the image below?



Complete as many of the following exercises as possible. You have 15 minutes.

1. In the following number series, what number comes next? 76, 123, 199, 322, 521, ___
2. In the following alphanumeric series, what letter comes next? Z, W, X, U, V, ___
3. There are three playing cards lying face up, side by side. A five is just to the right of a two. A five is just to the left of a two. A spade is just to the left of a club, and a spade is just to the right of a spade. What are the three cards?
4. What is the four-digit number in which the first digit is one-third the second, the third is the sum of the first and second, and the last is three times the second?
5. Complete the square logically.



Solutions:

Practice problems:

1. 47
2. 27

Experimental problems:

1. 843
2. S
3. 5 of spades, 2 of spades, 5 of clubs or 2 of spades, 5 of spades, 2 of clubs
4. 1349
5. upside-down club

Adapted from Expand Your Mind. (n.d.). *Homepage*. Retrieved from http://expandyourmind.com/

APPENDIX E

SELF-EFFICACY

SELF-EFFICACY

(Responses are on a 4-point Likert type scale where 1 = not at all and 4 = very much so)

1. I can identify strategies to solve mathematical problems.
2. I can identify strategies to solve visual-spatial problems.
3. I can apply these strategies to successfully solve mathematical problems.
4. I can apply these strategies to successfully solve visual-spatial problems.

Developed by Sophia Spiteri

APPENDIX F

MANIPULATION CHECK

MANIPULATION CHECK

(Responses are on a 5-point Likert type scale. Values for each item are indicated next to each item below.)

1. How much pressure did you feel? (1 = none, 5 = extreme)
2. How much effort did you expend on the tasks? (1 = none, 5 = a lot)
3. How difficult did you find the tasks? (1 = not at all, 5 = extremely)
4. How confident were you in your answers? (1 = not at all, 5 = extremely)
5. How many tasks were you able to complete? (1 = 1, 5 = 5)
6. How many tasks do you think you completed successfully? (1 = 1, 5 = 5)
7. As a female, I felt I was not going to be successful at solving the problems. (1 = strongly disagree, 5 = strongly agree)
8. As a female, I felt that I would not be as successful at solving the problems as males. (1 = strongly disagree, 5 = strongly agree)

Developed by Sophia Spiteri

APPENDIX G

DEBRIEFING STATEMENT

DEBRIEFING STATEMENT

The study you have just completed was designed to investigate the process through which stereotype threat affects performance. Stereotype threat is a psychosocial phenomenon which involves the fear of being judged by and/or confirming a negative stereotype that exists about a group to which an individual belongs. It has been repeatedly, empirically shown to lower performance in a wide array of situations. Therefore, it is important to discover ways to lower the effects of stereotype threat on performance. This study examined goal setting as a way to achieve this. It is important to note that this study involved a manipulation. There is little evidence to support that males consistently outperform females on mathematical/logical problem solving or visual-spatial tasks, nor is there evidence to support that there is an innate biological difference in the way in which males and females function cognitively. In addition, the limited differences that exist do not explain the differences in numbers of women and men in scientific professions (i.e., engineers, scientists, and mathematicians) as was indicated in the prompt that was read to participants in the stereotype threat conditions.

Thank you for your participation and for not discussing the contents of the decision question with other students. If you have any questions about the study, please feel free to contact Sophia Spiteri or Professor Janet Kottke at (909) 537-5585. If you would like to obtain a copy of the group results of this study, please contact Professor Janet Kottke at SB-538 at the end of Summer Quarter of 2011.

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