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# Attention Allocation And The Variability Of The Stereotype Priming Effect

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ATTENTION ALLOCATION AND THE VARIABILITY OF THE  
STEREOTYPE PRIMING EFFECT

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## **Dedication**

To my mother, who has always been a constant source of support and encouragement.

ATTENTION ALLOCATION AND THE VARIABILITY OF THE  
STEREOTYPE PRIMING EFFECT

by

KATHERINE R. WHITE

THESIS

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## **Abstract**

The stereotype priming effect is assumed to be a rather uniform and robust effect. However, a closer look at the existing literature suggests that the ‘standard’ stereotype priming effect may be more susceptible to variability than originally believed. In the present study, we sought to demonstrate that the stereotype priming effect displays significant variability in strength depending upon the level of attention allocated to the stereotype feature of interest. Participants were assigned to 1 of 3 conditions: a lexical decision task (LDT) condition, a pre-primed LDT condition, and a gender categorization condition. It was predicted that the stereotype priming effect to be strongest in the gender categorization condition, absent in the LDT condition, and intermediate in the pre-primed LDT condition. Results revealed no evidence of priming in the LDT and pre-primed LDT conditions, and strong priming in the gender categorization condition. Implications for the current conceptualization of stereotype priming are discussed.

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## **Chapter 1: Introduction**

Stereotypes refer to semantic memory structures that reflect associations between social groups and certain attributes, behaviors, appearances, occupations and objects (Blair & Banaji, 1996; Judd & Park, 1993). The activation of these associations can lead to various forms of discrimination, particularly decisions related to instrumental behaviors (e.g., hiring decisions) (Amodio & Devine, 2006), and thus stereotype activation has garnered considerable research attention over the past several decades (Banaji & Hardin, 1996; Blair & Banaji, 1996; Gaertner & McLaughlin, 1983; Macrae, Bodenhausen, & Milne, 1995; Macrae, Bodenhausen, Milne, & Jetten, 1994; Macrae, Bodenhausen, Milne, Thorn, & Castelli, 1997). The results of this research have led to the conclusion that stereotype activation is a robust phenomenon, observable under numerous conditions (e.g., Bargh, Chaiken, & Trope, 1999; Bargh & Chartrand, 1999). Many researchers have therefore moved beyond studying ‘standard’ stereotype activation to investigate the conditions in which stereotype activation is malleable (for review, see Blair, 2002). For example, it has been demonstrated that stereotype activation is attenuated following a period of exposure to counter-stereotypic individuals (Blair, Ma, & Lenton, 2001). Examining the malleability of stereotype activation is important to deepen our understanding of stereotyping and how it can influence our behavior. However, a closer look at seminal studies on stereotype activation reveals that even ‘standard’ stereotype activation displays considerable variability. More specifically, what the literature has grouped together as ‘standard’ stereotype activation may belong to different categories of stereotype activation. In the present study therefore, we sought to examine the conditions under which ‘standard’ stereotype activation displays variability.

## **1.1 THE SEMANTIC PRIMING EFFECT**

One common way in which researchers examine stereotype activation is through the use of stereotype priming, which was adapted from the semantic priming paradigm. The most common paradigm used to examine semantic priming is the sequential priming paradigm with a lexical decision task (participants decide whether target stimuli are words or nonwords). In this paradigm, each trial consists of a prime-target stimulus pair; the prime word is presented first, followed quickly by a target letter string. Participants are instructed to pay attention to the first word (the prime) but to make their lexical decision only on the second stimulus (the target). A semantic priming effect is said to be present when participants make lexical decisions more quickly and accurately to a target word when displayed with, or immediately after, a semantically related priming word, relative to a semantically unrelated priming word (Neely, Keefe, & Ross, 1989). For example, participants would categorize the word CAT more quickly as a word when preceded by the semantically related word DOG than if it were preceded by the semantically unrelated word CHAIR. A traditional interpretation of this result is that the concepts CAT and DOG are more closely associated in semantic memory than are the concepts CAT and CHAIR.

Decades of research have shown the semantic priming effect to be particularly robust, observed in a wide variety of experimental conditions (Hutchison, 2003; Lucas, 2000; Neely, Besner, & Humphreys, 1991). For example, as previously mentioned, the effect is observed even when a semantic-irrelevant task (e.g., lexical decision task) is required of participants (Meyer & Schvaneveldt, 1971; Neely et al., 1991). Moreover, significant semantic priming can be obtained when primes are presented parafoveally (e.g., Fuentes, Carmona, Agis, & Catena, 1994) and subliminally (e.g., Kiefer & Brendel, 2006). The strength of the semantic priming effect, in

combination with the belief that stereotypes are a specific form of semantic associations, made the semantic priming paradigm an attractive option for the study of stereotype priming.

## **1.2 THE STEREOTYPE PRIMING EFFECT**

A common conceptualization is that stereotypes exist as associations stored in semantic memory (Banaji & Hardin, 1996; Gaertner & McLaughlin, 1983). That is, people often associate particular groups with specific traits, occupations, activities, etc., and these associations are stored in the semantic memory system in the same manner as other associations. Operating under this assumption, stereotype researchers have adapted the semantic priming paradigm to examine stereotype priming, sometimes using a lexical decision task (e.g., Gaertner & McLaughlin, 1983; Macrae et al., 1995; Macrae et al., 1994) and sometimes using a categorization task (Banaji & Hardin, 1996; Blair & Banaji, 1996). A stereotype priming effect is present when the response to a target stimulus is faster when preceded by either a stereotypically congruent category label or exemplar than when preceded by a stereotypically incongruent category label or exemplar. For example, participants would respond more quickly to the word NURSE when it was preceded by the stereotypically related label WOMEN or name JENNIFER than if it were preceded by the stereotypically unrelated label MEN or the name MATTHEW. Because the semantic priming effect is so robust, it is possible that researchers expected that stereotype priming (as one form of semantic priming) would display similar properties. Early research supported this expectation.

## **1.3 EARLY STEREOTYPE PRIMING RESEARCH**

Gaertner and McLaughlin (1983) was one of the first studies to use the semantic priming paradigm to examine stereotypes. Concerned that explicit measures of stereotypes were not accurately detecting the presence and content of racial stereotypes in the general population,

Gaertner and McLaughlin had participants perform a lexical decision task while recording response times. Pairs of words were flashed centrally upon a projector screen to which participants had to decide whether both words were real words. For example, participants might see the word pair BLACKS:WELFARE and would respond that both were real words, as opposed to the word pair WHITES:MARB of which both are not real words. This was assumed to be a less reactive measure of stereotypes since participants were not asked whether they endorsed the presented word pairs. Predictions were based upon the assumption that stereotypes are a specific class of semantic associations in memory and thus interpretations of their findings would follow those of traditional semantic priming experiments. That is, if participants responded more quickly to stereotype congruent word pairs (e.g., BLACKS:WELFARE) than to stereotype incongruent words pairs (e.g., BLACKS:AMBITIOUS), it would be inferred that these concepts are more closely associated in semantic memory. Gaertner and McLaughlin (1983) did find faster response times to stereotype congruent word pairs, relative to incongruent, and concluded that positive characteristics were more highly associated with the category of Caucasians than with the category of African Americans.

The semantic priming paradigm has also been adapted to study the automatic activation of gender stereotypes (Banaji & Hardin, 1996; Blair & Banaji, 1996). Banaji and colleagues sought to test the extent to which gender stereotypes operate automatically through a series of experiments in which response times to word pairs were measured. Like Gaertner and McLaughlin's (1983) experiment, Banaji and colleagues' studies were premised on the assumption that stereotypes are a class of semantic associations. Thus concepts which are stereotypically related ought to facilitate responses in a word pair semantic priming paradigm. In their studies, Banaji and Hardin (1996) presented participants with gender related primes

followed by male or female pronouns serving as target words. Participants were instructed to indicate whether the pronoun was male or female (study 1) or whether or not the target was a pronoun (study 2). In both studies, response times to target words were facilitated when they followed a gender consistent prime. Because a stimulus onset asynchrony (SOA) of 300 ms was used and the priming effect persisted despite performance of a gender-irrelevant task, the effect was interpreted as evidence for automatic gender stereotyping.

Blair and Banaji's (1996) series of experiments further built upon the work of Banaji and Hardin, to investigate the automatic processes underlying stereotyping. In these studies, however, an equal number of positive and negative traits and nontraits were used to avoid valence (e.g., prejudice priming) contamination (Bargh, Chaiken, Gendler, & Pratto, 1992; Fazio, Sanbonmatsu, Powell, & Kardes, 1986). Also, target words were male or female names rather than male or female pronouns, and participants were instructed to respond whether the name was male or female. Priming was observed in the form of faster responses to names which were gender consistent with the preceding prime. This was interpreted as automatic gender stereotype priming, due to the use of SOAs of 350 and 250 ms and a task which required no explicit linking between the prime trait or nontrait and target name.

Numerous other studies have relied upon variations of these priming paradigms as reliable measures of stereotype activation (Macrae et al., 1995; Macrae et al., 1994, study 3; Macrae et al., 1997, studies 1 & 2; Sassenberg & Moskowitz, 2005, study 1) with the majority of researchers concluding that automatic stereotype priming is a robust effect. This, however, may be a somewhat inaccurate conclusion. A closer review of the preexisting literature reveals that depending upon participant task and the procedures adopted by the researcher, even the 'standard' stereotype priming effect is subject to variation in strength. Differences in the

paradigms and procedures used by researchers may even make it inappropriate to group previous effects into a single category. While all these studies use a priming paradigm, some required participants to perform a lexical decision task (or some other task that is irrelevant to the stereotype dimension of interest), and others have asked participants to perform a categorization task. This is important because there appears to be significant variability in the stereotype priming effect depending upon the task implemented. For example, stereotype priming effects seem to be largest when a categorization task is used (Banaji & Hardin, 1996; Blair & Banaji, 1996). When a stereotype-irrelevant task (e.g., lexical decision task) is used some studies have found significant stereotype priming (Gaertner & McLaughlin, 1983; Macrae et al., 1995; Macrae et al., 1994) while others have not (Macrae et al., 1997; Sassenberg & Moskowitz, 2005). In short, the results from several foundational studies on stereotype priming appear to contradict the assumption that standard stereotype priming is a uniform, robust effect. While the literature tends to group the results of these studies into a single category of stereotype priming, we choose to review these studies broken down by the participant task used (i.e., stereotype-irrelevant tasks, categorization tasks).

#### **1.4 STEREOTYPE-IRRELEVANT PARTICIPANT TASKS**

*Significant stereotype priming:* Several studies have obtained significant stereotype priming effects when participants were asked to perform a stereotype-irrelevant task, such as a lexical decision task (Macrae et al., 1995; Macrae et al., 1994, study 3; Wittenbrink, Judd, & Park, 1997). To investigate priming of stereotypes associated with male skinheads, Macrae and colleagues (1994, study 3) provided participants with a picture of a male skinhead and asked participants to spend 5 minutes detailing their typical day. Participants then performed a lexical decision task on a series of words and nonwords (words were either stereotypically related or

unrelated to skinheads). The control group demonstrated significant stereotype priming. In another series of studies, Macrae and colleagues (1995) primed participants with the categories women and Chinese through the use of parafoveal priming and/or a video of a Chinese woman. After the priming procedure, participants performed a lexical decision task on a series of words and nonwords (words were either stereotypically related or unrelated to women or Chinese). Significant stereotype priming effects were observed across these studies. Lastly, Wittenbrink and colleagues (1997) asked participants to categorize a series of 20 names as Black or White prior to performing a lexical decision task on target words preceded by masked primes. Significant racial stereotype and prejudice priming effects were also observed in this study. However, stereotype priming is not uniform throughout the literature when a stereotype-irrelevant task is employed.

*Non-significant stereotype priming:* The stereotype priming effect has failed to manifest in several studies when participants performed a stereotype irrelevant task (Banaji & Hardin, 1996; Macrae et al., 1997; Sassenberg & Moskowitz, 2005). Macrae and colleagues (1997) instructed participants to indicate that they perceived each prime stimulus by pressing a button whenever a prime stimulus appeared (mere exposure to primes). They then made a lexical decision on the following target stimulus. There was no evidence of the stereotype priming effect for participants in this condition. Sassenberg and Moskowitz (2005) presented participants with black and white faces for primes and asked participants to perform a lexical decision task on target stimuli. They observed a significant prime by target, but all simple effects were nonsignificant. Lastly, Banaji and Hardin (1996, study 2) presented participants with male, female, or gender neutral word primes and participants were instructed to indicate whether target stimuli were pronouns or non-pronouns (another task that is stereotype irrelevant). Primes were



related to gender either by stereotype norms (e.g., the occupation nurse is related to women by norms) or by definition (e.g., the role of mother is related to women by definition). Overall, response time differences between gender congruent and incongruent trials were significant. However, this effect was carried by response time differences following primes related to gender by definition; when trials using a prime related to gender by definition were excluded from the analysis, the priming effect was non-significant. Banaji and Hardin (1996, study 2) note that the automatic gender stereotype priming effect may be limited when the task does not require participants to focus attention on the dimension of gender.

In addition to the above research, our lab has conducted several studies in which participants performed a lexical decision task and the stereotype priming effect was not observed. In these studies, primes were either gender category labels (e.g., Women, Men) or male/female names (e.g., Michael, Elizabeth) and target stimuli were words stereotypically related to men or women, or nonwords. As previously stated, the gender stereotype priming effect was not found ( $F_s < 1$ ). Together with the published literature, these studies suggest that when a stereotype-irrelevant task is required of participants, the stereotype priming effect can display considerable variability. There is a task, however, that seems to elicit consistently strong stereotype priming effects.

## **1.5 STEREOTYPE-RELEVANT PARTICIPANT TASKS**

Other seminal studies have obtained strongly significant stereotype priming when using a task other than the lexical decision task, such as categorizing targets as male or female (Banaji & Hardin, 1996, study 1; Blair & Banaji, 1996, studies 1 & 2). For example, Banaji and Hardin (1996, study 1) required participants to categorize pronouns as male or female to investigate the automatic activation of gender stereotypes. They found significant facilitation for targets that

were preceded by a gender stereotypically congruent prime versus those preceded by an incongruent prime. Similarly, Blair and Banaji (1996) required participants to categorize names as male or female. Significant gender stereotype priming was observed both in studies 1 and 2. We are not aware of any existing studies in which a categorization task was required and significant stereotype priming effects were not obtained. This differentiates priming paradigms that use categorization tasks from those that use stereotype-irrelevant tasks (e.g., lexical decision task) in that more consistent priming effects are obtained when a categorization task is used. We turn to recent literature in the field of semantic priming for a potential explanation for these inconsistencies.

## **1.6 THE GENERALIZED CONTEXT MODEL OF CLASSIFICATION**

It has been noted that even the extremely robust semantic priming effect is subject to variability, depending upon variables such as participant task and other subtle contextual influences (e.g., Henik, Friedrich, & Kellogg, 1983; Henik, Friedrich, Tzelgov, & Tramer, 1994; Smith, Bentin, & Spalek, 2001; Smith, Theodor, & Franklin, 1983). Recent research proposes that the variability in semantic priming may be due to feature-specific attention allocation (Spruyt, Houwer, & Hermans, 2009). This hypothesis is based upon the generalized context model (GCM) of classification, developed by Nosofsky (1986; 1987). The GCM of classification states that for multi-dimensional stimuli, selectively attending to one perceptual dimension enlarges that dimension in psychological space, while simultaneously shrinking unattended dimensions (see also Nosofsky & Palmeri, 1997). Applying the model to semantic priming, Spruyt and colleagues (2009) demonstrated that for task-irrelevant stimuli, semantic analysis is much more likely to happen along attended dimensions than unattended dimensions, and that attention allocation can be influenced by (sometimes subtle) elements of the experimental

context. In their studies, the semantic priming effect emerged in the condition where a majority of the experimental trials (75%) required a semantic categorization task to be performed on target stimuli, but there was no semantic priming effect in the condition where a minority of the experimental trials (25%) required a semantic categorization task (Spruyt et al., 2009). They contend that attention was drawn to the semantic dimension in the 75% condition by the high percentage of trials requiring semantic categorization of target stimuli. Thus, the allocation of attention to semantics in the 75% condition allowed for significant semantic priming. The lower percentage of semantic categorization trials in the 25% condition, however, did not orient attention to the semantic dimension, essentially eliminating the semantic priming effect in that condition. While they do not argue that semantic *activation* did not occur, Spruyt and colleagues (2009) conclude that feature-specific attention allocation significantly modulates the semantic priming effect. Researchers could make a similar argument for stereotype priming. That is, the variable stereotype priming effects that currently exist in the literature may be the result of implementing participant tasks and experimental procedures that lead to differing levels of attention allocation.

## **1.7 ATTENTION ALLOCATION AND STEREOTYPE PRIMING**

Applied to stereotype priming, the GCM of classification would predict that priming should occur only under conditions in which attention is selectively allocated toward some stereotype-relevant dimension. When participants perform a categorization task, categorization judgments often explicitly direct attention toward the stereotype category of interest, such as gender (Banaji & Hardin, 1996; Blair & Banaji, 1996). This serves to enhance the stereotype dimension in psychological space, increasing the likelihood of stereotype priming. On the other hand, asking participants to perform a stereotype-irrelevant task would not direct attention

toward the stereotype category of interest. That is, when performing a task like the lexical decision task, attention is directed toward making word/nonword judgments rather than to any stereotype-relevant dimensions. As a result, the stereotype dimension is shrunk in psychological space, decreasing the likelihood of stereotype priming. This would explain why several studies in which participants performed a stereotype-irrelevant task failed to observe the stereotype priming effect (Banaji & Hardin, 1996, study 2; Macrae et al., 1997; Sassenberg & Moskowitz, 2005). However, even if a stereotype-irrelevant task is used, attention can still be directed toward the stereotype dimension of interest through other elements of the experimental procedure.

Those studies which obtained significant stereotype priming with the use of a stereotype-irrelevant task (Macrae et al., 1995; Macrae et al., 1994; Wittenbrink et al., 1997) often implemented extensive priming procedures which may have served as a more subtle way to direct attention toward the stereotype dimension of interest. For example, Macrae and colleagues (1994) provided participants with a picture of a male skinhead and asked them to spend 5 minutes writing a detailed description of their typical day. This would have oriented attention toward this social group. Wittenbrink and colleagues (1997) required participants to categorize 20 names as Black or White prior to the main study. The provided rationale was that this activity would increase the association between the prime words “Black” and “White” with the races Black and White. However, it may also have served to direct selective attention to these categories. Lastly, Macrae and colleagues (1995) exposed participants to 2 priming procedures (parafoveal priming and video viewing) prior to their execution of a lexical decision task. Again, these procedures may have served to direct attention to the stereotype dimensions under investigation. It is important to note that those studies that did not observe stereotype priming

(Banaji & Hardin, 1996; Macrae et al., 1997; Sassenberg & Moskowitz, 2005) did not implement any of the above described “pre-priming” procedures. It is therefore possible that in these studies sufficient attention was not directed toward relevant stereotype features, resulting in a lack of stereotype priming.

## **1.8 THE PRESENT STUDY**

Most of the above studies are commonly cited in the literature as demonstrations of a uniform, robust stereotype priming effect. However, having examined them in greater detail, it becomes evident that there are several inconsistencies in the stereotype priming effect that require further investigation. Because previous studies vary along the specific stereotype of interest (e.g., race, gender) and the form of stimuli used (e.g., words, pictures), it is difficult to make comparisons among them and draw firm conclusions regarding the variability of the stereotype priming effect. We are not aware of any studies that have systematically examined these inconsistencies in a single study, and thus the objective of the present study was to investigate the extent to which the stereotype priming effect differs due to differential attention allocation.

In the current study, the stereotype of interest (gender) was held constant while systematically manipulating the task and pre-priming procedures between subjects and prime stimulus type (pictures vs. words) within subjects. It was hypothesized that there would be no evidence of stereotype priming when attention was not directly allocated toward the stereotype feature of interest. This was accomplished by asking participants to merely pay attention to primes and perform a lexical decision task on target words. We further predicted that the strongest stereotype priming effect would be elicited when attention was strongly directed toward the stereotype feature of interest. This was accomplished by asking participants to

categorize target stimuli as more associated with men or women. An intermediate stereotype priming effect was expected when attention was subtly directed toward the stereotype feature of interest. This was accomplished by having participants perform a gender pre-priming procedure prior to performing a lexical decision task on target stimuli.

Previous research has demonstrated that participants respond more quickly to nontrait target words than to trait target words (Banaji & Hardin, 1996; Blair & Banaji, 1996; White, Crites Jr, Taylor, & Corral, 2009), thus we expect to find a similar pattern in the current study. Moreover, since it has been argued that pictures allow for quicker access and interpretation of semantic information than words (Intraub, 1979; Potter & Faulconer, 1975; Snodgrass, 1984), we anticipate that stronger stereotype priming will occur for trials that use pictures as primes than trials that use names as primes.

## **Chapter 2: Method**

Participants were randomly assigned to one of three conditions. Participants assigned to the lexical decision task (LDT) condition were instructed to indicate if the target stimulus in each trial was a word or non-word. Participants assigned to the pre-primed LDT condition decided if the target stimulus in each trial was a word or non-word after first categorizing a series of names and pictures as male or female (pre-priming procedure). Participants assigned to the gender categorization condition decided whether each target stimulus was more associated with men or women.

### **2.1 PARTICIPANTS**

A total of 198 individuals participated in the study. Data from 11 participants were lost due to computer malfunctions and an additional 15 were excluded due to low accuracy scores. The final sample included 172 participants. The LDT condition included 57 participants, the pre-primed LDT condition included 61 participants, and the gender categorization condition included 54 participants. Participants were undergraduate students at the University of Texas at El Paso and received partial course credit for their participation. No exclusionary criteria were enforced.

### **2.2 STIMULI**

Individual trials consisted of the presentation of a prime (either a male/female name or a male/female picture), followed by a target stimulus. In the LDT condition and pre-primed LDT condition, target stimuli were either words or pronounceable nonwords<sup>1</sup>. In the gender categorization condition, target stimuli were always words. Trials could form either a stereotype

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<sup>1</sup> Pronounceable nonwords were chosen to ensure that participants fully read target stimuli before making their lexical decisions.

congruent pair (e.g., STEPHANIE : GOSSIPY), stereotype incongruent pair (e.g., JOSEPH : GOSSIPY), or a pair with a nonword target (e.g., MARIA : ZYMPH)<sup>2</sup>.

*Primes:* For all 3 conditions, primes were either male and female names or pictures of males and females of neutral attractiveness. Fifty four male and 54 female names were used as male and female primes in the present study. These names were chosen from a list of approximately 600 male and female names that were rated by 20 individuals along the dimensions of masculinity/femininity and familiarity. The masculinity/femininity of names was rated on a scale from -3 (very masculine) to +3 (very feminine). Familiarity was rated on a scale from -3 (very unfamiliar) to +3 (very familiar). The 54 most masculine and familiar names were chosen to serve as male primes, and the 54 most feminine and familiar female names were chosen to serve as female primes. The average masculinity rating for male names was -2.55, with a range of -2.2 to -2.95. The average familiarity rating for male names was 1.69, with a range of 1 to 2.76. For female names, the average femininity rating was 2.62, with a range of 2.4 to 2.95. The average familiarity rating for female names was 1.63, with a range of 1 to 2.76. An additional 8 names were chosen as primes for practice trials; these names did not appear in the experimental trials.

Pictures of unknown males and females were gathered from a public rating forum called “Rate My Picture” on MySpace.com. Pictures were initially gathered and then screened for unusual or distracting features (e.g., green hair, busy background). The remaining pictures were rated for attractiveness by 47 individuals on a scale from -3 to +3. The present study used 54 pictures of males and 54 pictures of females as primes, all neutral in attractiveness. An additional 8 pictures were chosen as primes for practice trials; these pictures did not appear in the experimental trials. Twelve male names, 12 female names, 12 male pictures, and 12 female

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<sup>2</sup> Only conditions 1 and 2 included trials with nonword targets.



pictures were chosen to be presented in the pre-priming session; these stimuli were not included in experimental trials.

*Targets:* Due to the minority-majority composition of the study's target population (majority Hispanic), we decided to examine gender stereotypes. Previous research demonstrates that traditional gender stereotypes apply across cultures (Williams & Best, 1982) (Williams & Best, 1982) and, in some cases, are particularly strong in Latin American cultures (Baldwin & DeSouza, 2001; Felix-Ortiz, Abreu, Briano, Bowen, & Columbus, 2001). Still, we chose to cultivate a target stimulus set tailored to the local population. Target stimuli consisted of 16 words stereotypically associated with women (e.g., NURTURING, NURSE), 16 words stereotypically associated with men (e.g., STRONG, PLUMBER), and 56 pronounceable nonwords (e.g., SPOMFS, EEBS) gathered from the ARC Nonword Database (Rastle, Harrington, & Coltheart, 2002). Gender stereotypical words were obtained in a series of steps. First, 18 undergraduate students were asked to list personality traits, occupations and objects stereotypically associated with men and women. Second, these were entered into a database and the most frequently generated words were identified. Lastly, these 70 words were rated by an independent set of 44 undergraduate students for masculinity/femininity (1 = very masculine, 7 = very feminine) and valence (-3 to +3). The 8 most feminine traits ( $M = 5.45$ ) and 8 most feminine nontraits ( $M = 6.23$ ) (e.g., occupations, objects, activities) were chosen to serve as female stereotypical targets. The 8 most masculine traits ( $M = 2.34$ ) and 8 most masculine nontraits ( $M = 1.66$ ) were chosen to serve as male stereotypical targets. These stimuli sets were matched for valence,  $t(30) = .989$ ,  $p = .330$ , length,  $t(30) = .896$ ,  $p = .378$  and frequency,  $t(17) = 1.10$ ,  $p = .287$ . An additional 12 stimuli associated with females and 12 stimuli associated with

males were chosen to serve as practice targets; these stimuli were not included in experimental trials.

### **2.3 PROCEDURE**

Participants were run in groups of 1 to 4, and each session was randomly assigned to one of the 3 conditions. Upon arrival, participants read and signed an informed consent form and were seated in front of a computer. All participants were informed that they would see a series of stimuli flashed upon their computer monitor and their task would involve the categorization of these stimuli. Each trial began with a focus '+' for 200 ms. Primes immediately replaced the focus sign and were presented for 150 ms. Target stimuli were presented for 1050 ms. The SOA between prime and target was 250 ms to encourage automatic processing (ISI of 100 ms). The inter-trial interval between prime-target pairs was 1500 ms. Verbal stimuli were presented in white capital letters on a black background. Pictures were presented on a black background. Participants first viewed a practice block of 48 practice trials<sup>3</sup> (Fazio, 1990) and then 6 experimental blocks containing 104 trials each. Each experimental block began with 8 practice trials, followed by 96 experimental trials (total of 576 experimental trials). Participants thus saw each prime a total of 3 times and each target a total of 9 (LDT and pre-primed LDT conditions) or 18 times (gender categorization condition). To examine whether names or primes served as stronger primes of gender stereotypes, blocks alternated between the use of name and pictures primes; blocks were counterbalanced across participants within each condition. Participants were allowed to take short breaks in between blocks. It was emphasized that participants should pay attention to the first stimulus in each trial (primes), but not respond to them, and that they should

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<sup>3</sup> Participants in the pre-primed LDT condition performed a pre-priming procedure prior to the practice block.

try to respond to the second stimulus in each trial as quickly and accurately as possible.

Responses and response times were recorded by the computer for each trial.

*LDT condition:* Those assigned to the LDT condition were informed that they would view stimulus pairs flashed upon the computer monitor and that their task was to indicate whether the second stimulus was a word or nonword (i.e., Lexical Decision Task). Two keys were labeled with “Word” and “Nonword” on each keyboard and participants were told to use their right and left index fingers to indicate their response. Each block contained a total of 24 stereotype congruent trials, 24 stereotype incongruent trials, and 48 trials with nonword targets. Congruent trials consisted of 12 pairs with a male prime and male stereotypical target word, and 12 pairs with a female prime and female stereotypical target word. Incongruent trials consisted of 12 pairs with a male prime and female stereotypical target word, and 12 pairs with a female prime and male stereotypical target word. Twenty four of the nonword target word pairs began with a male prime, and 24 began with a female prime.

*Pre-primed LDT:* The pre-primed LDT condition was broken down into two sections. In the first section participants were informed that they would see pictures or names and their task was to categorize each stimulus as Male or Female. This procedure was based upon the methodology used by Wittenbrink and colleagues (1997). Two keys were labeled with “Male” and “Female” on each keyboard and participants were instructed to use their left and right index fingers to indicate their response. The pre-priming session (total of 48 trials) consisted of a block of male and female names and a block of male and female pictures (counterbalanced across participants), and participants were asked to categorize each name/pictures as male or female. During this session, names and pictures were presented one stimulus per trial for 3 seconds (3000 ms) and were preceded by a ‘+’ for 200 ms. The inter-trial interval was set at 1500 ms. The task

and instructions for the second section of the pre-primed LDT condition were the same as for the LDT condition. Each block contained a total of 24 stereotype congruent trials, 24 stereotype incongruent trials, and 48 trials with nonword targets. Congruent trials consisted of 12 pairs with a male prime and male stereotypical target word, and 12 pairs with a female prime and female stereotypical target word. Incongruent trials consisted of 12 pairs with a male prime and female stereotypical target word, and 12 pairs with a female prime and male stereotypical target word. Twenty four of the nonword target word pairs began with a male prime, and 24 began with a female prime.

*Gender categorization condition:* Those assigned to the gender categorization condition were informed that stimulus pairs would flash upon the computer monitor and that their task was to indicate whether the second stimulus was typically associated with Men or Women (i.e., gender categorization task). For example, if presented with the stimulus pair THOMAS : SOLDIER, they would respond that the occupation SOLDIER is more associated with men. Two keys were labeled with “Men” and “Women” on each keyboard and participants were instructed to use their left and right index fingers to indicate their response. Because the gender categorization condition did not use a lexical decision task, no nonword targets were included. Thus each block in the gender categorization condition contained a total of 48 stereotype congruent trials and 48 stereotype incongruent trials.

After completion of the response time task, participants were provided with a list of all target stimuli and asked to indicate how masculine or feminine (scale from very masculine to very feminine) they considered each trait or nontrait to be. They were then debriefed, dismissed, and awarded credit for their participation.

## Chapter 3: Results

Seven participants in the LDT condition, 3 participants in the pre-primed LDT condition, and 5 participants in the gender categorization condition were excluded from further analyses due to accuracy scores more than 2 standard deviations below their condition's average accuracy score. When these participants were removed, average accuracy was 91.246% ( $SD = 5.83\%$ ) for the LDT condition, 89.44% ( $SD = 8.72\%$ ) for the pre-primed LDT condition, and 88.97% ( $SD = 8.20\%$ ) for the gender categorization condition.

Average response time across trial types was calculated for each participant. For each participant, any response times that were more than 2 standard deviations above their average were replaced with a value 2 standard deviations above that participant's average. All response times that were below 250 ms were eliminated because it was assumed that an appropriate response could not be made under this amount of time. All analyses were performed upon responses to 'word' targets- responses to nonword targets were not of interest to the current study and therefore were not examined.

### 3.1 ACCURACY

Accuracy scores were log transformed to meet the assumptions of the ANOVA model. Means and standard errors are reported in percentages for ease of interpretation. Data were analyzed with a 3 (condition: LDT, Pre-primed LDT, or gender categorization) x 2 (congruent or incongruent) x 2 (prime type: names or pictures) x 2 (target: trait or nontrait) mixed factorial ANOVA with all factors within subjects except for condition.

*Effect of Congruency:* There was a significant main effect for congruency, such that participant responses were more accurate for stereotypically congruent trials ( $M = 92.9\%$ ,  $SE =$

.345) than stereotypically incongruent trials ( $M = 91\%$ ,  $SE = .439$ ),  $F(1, 511) = 27.17$ ,  $p < .001$ . There was also a significant main effect for condition,  $F(2, 511) = 13.97$ ,  $p < .001$ . Participants were most accurate in the LDT condition ( $M = 94.3\%$ ,  $SE = .625$ ), the least accurate in the gender categorization condition ( $M = 88.9\%$ ,  $SE = .642$ ), and of intermediate accuracy in the pre-primed LDT condition ( $M = 92.6\%$ ,  $SE = .604$ ). The predicted interaction between congruency and condition was also found,  $F(2, 511) = 19.48$ ,  $p < .001$ . Simple effect analyses reveal that the congruency effect was significant only in the gender categorization condition (see Table 1).

Table 1: Simple effects for the congruency effect by condition interaction

Condition	Mean diff (%)	<i>F</i>	<i>p</i>
LDT	.6	2.411	.122
Pre-primed LDT	0	.232	.630
Gender categorization	4.9	17.45	< .001

There was also a significant three way interaction between congruency, condition, and target,  $F(2, 511) = 3.26$ ,  $p = .039$ , such that the congruency effect in the gender categorization condition was stronger when targets were nontraits than traits.

*Effect of Target:* Analyses revealed a significant main effect for target, such that participants were more accurate responding to trials with a nontrait target ( $M = 93.1\%$ ,  $SE = .356$ ) than to trials with a trait target ( $M = 90.8\%$ ,  $SE = .409$ ),  $F(1, 511) = 67.35$ ,  $p < .001$ . However, this effect interacted significantly with condition,  $F(2, 511) = 30.76$ ,  $p < .001$ . The target effect was significant for the pre-primed LDT and gender categorization conditions, but was not significant in the LDT condition (see Table 2). No other effects were significant.

Table 2: Simple effects for the target effect by condition interaction

<b>Condition</b>	<b>Mean diff (%)</b>	<b><i>F</i></b>	<b><i>p</i></b>
LDT	.4	.632	.428
Pre-primed LDT	1.2	7.51	.007
Gender categorization	5.4	64.22	< .001

### 3.2 RESPONSE TIMES

Response times were log transformed for analysis; however, means are reported in milliseconds for ease of interpretation (see Table 3). Response time data were analyzed with a 3 (condition: LDT, Pre-primed LDT, or gender categorization) x 2 (congruent or incongruent) x 2 (prime type: names or pictures) x 2 (target: trait or nontrait) mixed factorial ANOVA with all factors within subjects except for condition.

Table 3: Mean response times broken down by condition, congruency, prime type and target type

Condition	Congruency	Prime Type	Target Type	Mean (ms)	SD (ms)
LDT	Congruent	Names	Trait	558	74
			Nontrait	550	68
		Pictures	Trait	564	72
			Nontrait	559	71
	Incongruent	Names	Trait	558	74
			Nontrait	554	76
		Pictures	Trait	572	75
			Nontrait	556	66
Pre-primed LDT	Congruent	Names	Trait	567	84
			Nontrait	558	77
		Pictures	Trait	577	84
			Nontrait	565	80
	Incongruent	Names	Trait	564	79
			Nontrait	559	76
		Pictures	Trait	580	84
			Nontrait	572	81
Gender categorization	Congruent	Names	Trait	620	70
			Nontrait	595	64
		Pictures	Trait	615	72
			Nontrait	595	70
	Incongruent	Names	Trait	640	69
			Nontrait	612	63
		Pictures	Trait	644	71
			Nontrait	614	64

*Effect of Congruency:* Results supported our prediction that, across conditions, participants would respond more quickly to target words preceded by a stereotypically congruent prime ( $M = 577$  ms,  $SE = 2.86$ ) than by a stereotypically incongruent prime ( $M = 585$  ms,  $SE = 2.86$ ),  $F(1, 511) = 83.32$ ,  $p < .001$ . There was also a main effect of condition, such that response times to targets were lowest in the LDT condition ( $M = 559$  ms,  $SE = 5.09$ ), highest in the gender categorization condition ( $M = 617$ ,  $SD = 4.94$ ), and intermediate in the pre-primed LDT



condition ( $M = 568, SD = 5.25$ ),  $F(2, 511) = 39.16, p < .001$ . Our primary hypothesis predicted an interaction between the effect of congruency and condition. We anticipated that the congruency effect would be non-significant in the LDT condition, strongly significant in the gender categorization condition, and intermediate in strength in the pre-primed LDT condition. Results partly support this hypothesis. Overall, there was a significant interaction between congruency and condition,  $F(2, 511) = 50.35, p < .001$ . Simple effects reveal that while the congruency effect was non-significant in the LDT condition and strongly significant in the gender categorization condition, contrary to our hypothesis the congruency effect was also non-significant in the pre-primed LDT condition (see Table 4).

Table 4: Simple effects for the congruency effect by condition interaction

<b>Condition</b>	<b>Mean diff (ms)</b>	<b><i>F</i></b>	<b><i>p</i></b>
LDT	2	1.364	.245
Pre-primed LDT	1	1.858	.174
Gender categorization	22	140.12	< .001

Priming effects can sometimes dissipate quickly, and thus it is possible that the congruency effect for those in the pre-primed LDT condition was significant early on in the study and tapered off as the number of trials increased (analyses were run on 6 experimental blocks totaling 576 trials). If so, then a significant effect of congruency might be found for this condition if some experimental blocks were removed from the analysis. The congruency by condition interaction was therefore also examined with only 4 (384 trials) and 2 (192 trials) experimental blocks included in the analysis. The congruency by condition interaction observed in the 6 block analysis remained significant at the  $p < .001$  level regardless of whether 4 ( $F(2,$

341) = 46.075,  $p < .001$ ) or 2 ( $F(2, 169) = 22.66, p < .001$ ) blocks were included in the analysis. Simple effect results from analyses on 4 blocks mirrored those from the original analysis, as did the results from analyses on 2 blocks. That is, the effect of congruency was non-significant for the LDT condition, strongly significant for the gender categorization condition, and non-significant for the pre-primed LDT condition (see Table 5).

Table 5: Simple effects for the congruency effect by condition interaction for 4 and 2 blocks

<b>Blocks in the Analysis</b>	<b>Condition</b>	<b><i>F</i></b>	<b><i>p</i></b>
4	LDT	.072	.789
	Pre-primed LDT	.483	.488
	Gender categorization	106.78	< .001
2	LDT	.157	.693
	Pre-primed LDT	.000	.998
	Gender categorization	53.98	< .001

Participants were presented with both traits and nontraits that were stereotypically associated with either men or women. While these stimuli were matched for length and valence across the 2 gender categories, nontraits were significantly more stereotypical than traits for both female stimuli,  $F(1, 14) = 14.75, p = .002$ , and male stimuli,  $F(1, 14) = 12.45, p = .003$ . It is possible that the congruency effect was “watered down” by trait stimuli, resulting in a null effect for the pre-primed LDT condition. We therefore performed an exploratory ANOVA analysis that included only those trials that used nontrait target stimuli. The congruency by condition interaction was significant,  $F(2, 511) = 20.78, p < .001$ , and simple effect analyses revealed a pattern closer to the predicted interaction pattern. That is, the congruency effect was

nonsignificant for the LDT condition, strongly significant for the gender categorization condition, and of intermediate strength for the pre-primed LDT condition (see Table 6).

Table 6: Simple effects for the congruency by condition interaction using only nontrait targets

Condition	Mean diff (ms)	<i>F</i>	<i>p</i>
LDT	1	.031	.86
Pre-primed LDT	4	3.325	.070
Gender categorization	18	81.79	< .001

Congruency also interacted significantly with prime type ( $F(2, 511) = 5.38, p = .021$ ), such that the congruency effect was stronger when trials used pictures for primes ( $F(1, 514) = 58.69, p < .001$ ) than when trials used names for primes ( $F(1, 515) = 20.59, p < .001$ ). This indicates that stronger stereotype priming effects were elicited through the use of pictures as primes than names. Additional analyses were performed with only 4 blocks (384 trials) and 2 blocks (192 trials) to examine whether this interaction remained significant. When only 4 blocks were included, the interaction was significant ( $F(2, 515) = 36.12, p < .001$ ), such that the congruency effect was stronger when trials used pictures for primes ( $F(1, 343) = 38.84, p < .001$ ) than when trials used names for primes ( $F(1, 343) = 7.47, p = .007$ ). However, the interaction was no longer significant when only 2 blocks were included in the analysis. No other effects of congruency were significant.

*Effect of Target:* In line with previous research (Blair & Banaji, 1996; White et al., 2009), participants responded more quickly to nontrait target words ( $M = 574$  ms,  $SE = 2.94$ ) than trait target words ( $M = 588$  ms,  $SE = 2.78$ ),  $F(1, 511) = 240.03, p < .001$ . This effect interacted significantly with condition,  $F(2, 511) = 28.35, p < .001$ . While participants responded

significantly faster to nontrait targets than trait targets for all conditions, the effect was strongest in the gender categorization condition (see Table 7). No other effects of target type were significant.

Table 7: Simple effects for the target by condition interaction

<b>Condition</b>	<b>Mean diff (ms)</b>	<b><i>F</i></b>	<b><i>p</i></b>
LDT	8	8.021	.005
Pre-primed LDT	9	10.42	.001
Gender categorization	26	240.47	< .001

It is unlikely that the effect of target is due to differences in length or valence effects, as traits and nontraits were matched on these dimensions (valence:  $F(1, 30) = 3.788, p = .061$ ; length:  $F(1, 30) = .033, p = .858$ ). As previously mentioned, nontraits were rated as more stereotypical of their corresponding gender category than traits, but the lack of an interaction between congruency and target implies that this dimension may also fail to explain quicker responses to nontraits. Previous research has attributed this effect to the difference in concreteness between traits and nontraits (e.g., Blair & Banaji, 1996). That is, occupations and objects (i.e., nontraits) are more concrete than personality traits, which allows for quicker categorization. While we do not have concreteness ratings for our target stimuli, we believe differences in concreteness may also explain the effect of target type in the present study.

*Effect of Prime Type:* Overall, participants responded more quickly when names were used as primes ( $M = 578$  ms,  $SE = 2.95$ ) than when pictures were used as primes ( $M = 584$ ,  $SE = 2.98$ ),  $F(1, 511) = 12.54, p < .001$ , but this effect interacted with condition,  $F(2, 511) = 3.98, p = .019$ . Simple effect analyses indicate that participants responded more quickly when names

were used as primes than when pictures were used as primes for both the LDT condition and pre-primed LDT condition, but not in the gender categorization condition (see Table 8). It is possible that the presentation of a stimulus in pictorial form may interfere with or make it more difficult for participants to make a word/non-word judgment. No other effects of prime type were significant.

Table 8: Simple effects for the prime type by condition interaction

<b>Condition</b>	<b>Mean diff (ms)</b>	<b><i>F</i></b>	<b><i>p</i></b>
LDT	8	6.91	.009
Pre-primed LDT	11	12.87	< .001
Gender categorization	0	.004	.947

## Chapter 4: Discussion

The goal of the present study was to demonstrate the variability of the ‘standard’ stereotype priming effect through the manipulation of participant task and the use of a pre-priming procedure. It was predicted that the stereotype priming effect would be non-significant when participants performed a lexical decision task on target stimuli with no pre-priming procedure (LDT condition), strongly significant when participants performed a gender categorization task on target stimuli (gender categorization condition), and of intermediate strength when participants performed a lexical decision task on target stimuli after performing a pre-priming procedure (pre-primed LDT condition). Results partly supported these predictions. The stereotype priming effect was non-significant in the LDT condition. When participants performed a gender categorization task, the stereotype priming effect was strongly significant. However, inconsistent with our predictions, there was no evidence of a gender stereotype effect in the pre-primed LDT condition. We draw upon semantic priming literature, specifically the generalized context model (GCM) of classification (Nosofsky, 1986, 1987; Spruyt et al., 2009), to explain these results.

Recall that the GCM of classification (Nosofsky, 1986, 1987) states that for multi-dimensional stimuli, allocating attention to one dimension enlarges that dimension in psychological space while shrinking other dimensions. Spruyt and colleagues (2009) extended this model to account for variations in semantic priming, demonstrating that the semantic priming effect is modulated by the differential allocation of attention to the semantic dimension. We contend that this can also be extended to the dimension of stereotype associations.

One could argue that the tasks used in previous stereotype priming paradigms has led to differing amounts of attention being allocated to the feature of interest (e.g., gender, race, etc.).

For example, asking participants to categorize target stimuli along the stereotype dimension of interest (make a male or female decision when investigating gender stereotype priming, Banaji & Hardin, 1996, study 1; Blair & Banaji, 1996, studies 1 & 2) would direct attention to the stereotype dimension. Directing attention to the stereotype dimension of interest in turn would boost the stereotype priming effect. In the current study, participants assigned to the gender categorization condition also had their attention drawn to the dimension of gender through their assigned task (participants in this condition were asked to categorize targets as more associated with women or men), resulting in a strongly significant stereotype priming effect<sup>4</sup>.

Although not an element of the GCM of classification, it is possible that requiring participants to categorize stimuli along a stereotype relevant dimension elicits an even stronger stereotype priming effect because this type of task also introduces the cognitive mechanism of response competition. Response competition is best illustrated by the Stroop task (MacLeod, 1991). During the Stroop task, the name of a color is presented in colored ink and activates two competing responses- a central response relevant to the assigned task (e.g., saying the color of the ink), and an irrelevant response that must be inhibited (e.g., the name of the color). If the word “yellow” is presented in yellow font, both the central and irrelevant responses are the same, and no response conflict arises. However, if the word “yellow” is presented in red font, the central and irrelevant responses conflict, leading to longer response times. Applied to stereotypes, if participants are required to make male/female decisions on target stimuli, male/female primes will pre-activate a male or female response which may conflict with responses to targets. That is, when a participant is presented with a male prime, the ‘male’ response is pre-activated. If the target requires a ‘male’ categorization, the target response does

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<sup>4</sup> Results from the current study reveal a response time difference of 22 ms between congruent and incongruent trials in the gender categorization condition. Previous research using a similar task report similar differences ranging from 15 to 30 ms (Banaji & Hardin, 1996; Blair & Banaji, 1996).

not conflict with the response pre-activated by the prime. However, if the target requires a 'female' categorization, the target response conflicts with the pre-activated response, leading to a slower categorization decision. Studies that ask participants to make categorization decisions relevant to the stereotype of interest (Banaji & Hardin, 1996; Blair & Banaji, 1996) therefore boost the stereotype priming effect through both feature-specific attention allocation and the introduction of response competition. In the current study thinking in terms of male/female predisposed participants to also categorize primes as male or female; when they saw a male prime, the response "male" was pre-activated prior to perception of the target. If the target was to be categorized as male (i.e., stereotypically congruent trial), no response competition arose. However, if the target was to be categorized as female (i.e., stereotypically incongruent trial), the pre-activated response did not match the response the target required, leading to response conflict and slower response times to target stimuli. We argue that drawing attention to the stereotype category of interest and the introduction of response competition led to the strongly significant stereotype priming effects found in the studies performed by Banaji and colleagues (Banaji & Hardin, 1996; Blair & Banaji, 1996), as well as in the gender categorization condition of the current study. But using a categorization task is not the only way in which attention can be drawn to the stereotype category of interest.

Attention can be directed toward the stereotype feature of interest more subtly through extended or repeated exposure to the stereotype dimension of interest (i.e., pre-priming), such that significant stereotype priming is observed even when a lexical decision task is required. Asking participants to detail the typical day of a stereotyped individual (Macrae et al., 1994) or exposing participants to parafoveal and/or video primes (Macrae et al., 1995) appear to direct sufficient attention to the stereotype dimension for the stereotype priming effect to be observed.



However, it is possible that not all pre-priming procedures are sufficient to elicit the effect. In the current study, participants assigned to the pre-primed LDT condition categorized a series of 48 names and pictures as male or female prior to performing a lexical decision task. This procedure was modeled after a study conducted by Wittenbrink and colleagues (1997), in which participants categorized 20 names as Black or White prior to performing a lexical decision task with masked primes. While Wittenbrink and colleagues (1997) observed significant racial stereotype priming, the current study found no evidence of gender stereotype priming for those in the pre-primed LDT condition<sup>5</sup>. Perhaps there is a threshold of attention that must be surpassed in order for the stereotype priming effect to be observed, and the pre-priming procedure used in the current study did not meet this threshold. This may be the case because it is common to encounter males and females in everyday interactions the threshold for attention allocation may be high for this social dimension. However, it is possible that encountering a minority group member is more unusual, leading to a lower threshold for attention allocation for this particular dimension. Thus the absence of stereotype priming in the present study may be because the specific stereotype that was investigated did not command as much attention as other stereotypes (i.e., gender vs. race). This still, however, suggests that when attention is *not* drawn to the stereotype category of interest, there should be no evidence of stereotype priming.

The results from several previous studies, along with the present study, suggest that mere exposure to primes is not sufficient for the stereotype priming effect to manifest. In the current study, there was also no evidence of a stereotype priming effect in the LDT condition. With regards to previous research, the priming effect has failed to be observed in several different

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<sup>5</sup> In the present study, the response time difference between congruent and incongruent trials for the pre-primed LDT condition was only 1ms. However, previous research in which extensive priming procedures were employed has reported differences on the order of 8 ms (Wittenbrink et al., 1997), 92 ms (Macrae et al., 1994), and 109 to 280 ms (Macrae et al., 1995).

studies (Banaji & Hardin, 1996, study 2; Macrae et al., 1997; Sassenberg & Moskowitz, 2005). Also, our lab has conducted several studies in which exposure to gender category primes (category labels as well as individual male or female names) did not induce the stereotype priming effect when participants performed a lexical decision task on targets. Together these studies suggest that the stereotype priming effect may be contingent upon the allocation of attention<sup>6</sup>.

It should be mentioned that there are 2 studies that observed significant stereotype priming despite the use of a lexical decision task and no extensive pre-priming procedures. However, we are of the opinion that other subtle elements of the experimental context served to direct attention to the stereotype dimension of interest. Gaertner and McLaughlin (1983) obtained significant racial stereotype priming in their 2 studies, but their procedure for stimuli presentation was unique. Rather than present primes and target sequentially, Gaertner and McLaughlin (1983) presented both primes and targets together on the screen and asked participants to indicate whether both were or were not real words. This allowed the prime categories (“Black” and “White”) to exert continual influence on responses. Also, participants were informed before the study began that the labels “Black” and “White” referred to Negroes and Caucasians, respectively, which may have cued participants into the purpose of the study (an examination of stereotypes and prejudice). Again, because the stereotype of interest was race, rather than the more routine dimension of gender, this may have been sufficient to draw attention to the stereotype dimension. We therefore still contend that in the absence of direct attention allocation to the stereotype dimension, stereotype priming will fail to manifest. Moreover, it

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<sup>6</sup> The response time difference for the LDT condition in the present study was 2 ms. Previous research reports differences of 0 to 2 ms (Banaji & Hardin, 1996, study 2) and 14 to 21 ms (Macrae et al., 1997).

appears that the stereotype priming effect is more sensitive to attention allocation than the classic semantic priming effect.

While mere exposure to primes is apparently sufficient to activate the semantic priming effect (e.g., Neely, 1977; Neely et al., 1991), this does not appear to be the case for the stereotype priming effect. Study 2 from Banaji and Hardin (1996) is the most direct demonstration of this. The task required participants to categorize targets as pronouns or non-pronouns, and therefore attention was not directly drawn to the dimension of gender. The gender priming effect was significant for trials that used a prime related to gender by definition, but not for trials in which the prime was related to gender by stereotype norms. Trials with a prime related to gender by definition more closely approximate a semantic relationship than a stereotype relationship, which is more purely associative in nature. The results therefore suggest that when attention is not strongly directed toward the dimension of interest, semantic priming can be observed, but stereotype priming is not. It is possible that stereotypes are not as directly or strongly associated in semantic memory as other semantic relationships, making them more sensitive to modulation by attention; but we are reticent to speculate further given that this was not the focus of the current study. This may be a fruitful avenue for future research.

The stereotype priming effect has enjoyed tremendous popularity as a research topic over the past few decades, and researchers may be enticed to believe the effect as robust as the original semantic priming effect. However, results from the present study, along with a careful review of the literature, seem to indicate otherwise. The semantic priming effect is itself modulated by the selective allocation of attention (Spruyt et al., 2009), and the stereotype priming effect may be sensitive to the impact of attention to an even greater extent. While researchers have begun to investigate the malleability of the stereotype priming effect under

various conditions (Blair, 2002), it is important that researchers acknowledge that the ‘standard’ stereotype priming effect is itself subject to variability. Acknowledging the sensitivity of the stereotype priming effect to attention may prevent future researchers interested in the effect from designing studies in which there is little chance of observing stereotype priming. Lastly, we contend that the stereotype priming effects in the existing literature are best categorized by the level of attention that is directed toward the stereotype dimension of interest, rather than as a single representation of uniform stereotype priming.

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## Curriculum Vita

Katherine R. White was born in El Paso, Texas on November 7, 1983 to Irma and Rodrick White. She graduated from Coronado High School in El Paso, Texas in May of 2002 and attended both Texas A&M University and the University of Texas at El Paso (UTEP) during her undergraduate education. She graduated Suma Cum Laude with a Bachelor of Science in Psychology from UTEP in May 2007 and was awarded the Most Outstanding Academic Senior Award from the Department of Psychology. She entered the Social/Cognitive/Neuroscience doctoral program of Experimental Psychology at UTEP in Fall 2007 where she began researching stereotype activation. Katherine was awarded the Department of Homeland Security Fellowship award in September of 2008, which has allowed her to dedicate more of her time to research. Under the direction of Dr. Stephen Crites, Jr., Katherine has worked to develop the N400 ERP component as a measure of stereotype activation and is currently investigating the conditions under which stereotype activation is malleable. She has presented her research at national conferences and has published a first-author manuscript in the journal *Social Cognitive and Affective Neuroscience*. She also actively participates in the projects of fellow lab members Jennifer Taylor and David Herring, who are investigating the cognitive mechanisms underlying evaluative and affective priming. Katherine continues to work in Dr. Crites' laboratory on her dissertation research.

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