2009-01-01

Getting to know you: The effects of familiarity and time on social perception

Clarissa Arms Chavez
University of Texas at El Paso, cjarms@miners.utep.edu

GETTING TO KNOW YOU:

THE EFFECTS OF FAMILIARITY AND TIME ON SOCIAL PERCEPTION

CLARISSA JAYNE CHAVEZ

Department of Psychology

APPROVED:

Michael Zárate, Ph.D., Chair

Harmon Hosch, Ph.D.

Christian Meissner, Ph.D.

Ana Schwartz, Ph.D.

Penelope Espinoza, Ph.D.

Patricia D. Witherspoon, Ph.D.
Dean of the Graduate School

Dedicated to my son, Parker Thomas Chavez.

This has always been for you.

GETTING TO KNOW YOU:

THE EFFECTS OF FAMILIARITY AND TIME ON SOCIAL PERCEPTION

by

CLARISSA JAYNE CHAVEZ, M.A.

DISSERTATION

Presented to the Faculty of the Graduate School of

The University of Texas at El Paso

in Partial Fulfillment

of the Requirements

for the Degree of

DOCTOR OF PHILOSOPHY

Department of Psychology

THE UNIVERSITY OF TEXAS AT EL PASO

August 2009

ABSTRACT

A new direction in social perception research is developed. The present research explored the impact of familiarity and time on social perception processes based on cognitive neuroscience models, social categorization models, and memory consolidation constructs. Familiarity was manipulated within an exposure task and time was manipulated by testing participants both 2-6 hr and 48 hr after the exposure task. Experiment 1 investigated the influence of familiarity and time on the argument of the automaticity of social categorization and associated stereotypes by testing the argument with two separate tasks. Experiment 1a tested the influence of familiarity and time on associated stereotypes and found that, with familiarity and time, participants responded to individualizing information faster than to stereotypic information. Experiment 1b tested the influence of familiarity and time on social categorization and found further support for the automaticity of social categorization. Experiment 2 further investigated the influence of familiarity and time on social perception by embedding cognitive loads within a categorization task. Experiment 2 found little support for the influence of familiarity and time on social categorization and cognitive loads. The current research is discussed for its relevance to models of social perception.

TABLE OF CONTENTS

Page

ABSTRACT…………………………………………………………………………….. iii

TABLE OF CONTENTS…………………………………………………………… vi

FIGURE 1………………………..…………………………………………………viii

FIGURE 2……………………………………………………………………………ix

FIGURES 3 & 4…………………..………………………………………………….x

FIGURE 5 & 6…………………..…………………………………………………..xi

FIGURE 7 & 8……………………………………………………………………..xii

Chapter

1. INTRODUCTION……………………………………………………………….1

1.1. Social Categorization……………..……………………………………….2

1.2. What is Memory Consolidation?...6

1.3. Time and Social Perception………......……....…………………………12

1.4. The Current Research…………………..………………………………13

2. EXPERIMENTAL OVERVIEW……………......……………………………….15

3. EXPERIMENT 1……………..........……………………………………………..19

3.1. Methods Overview……………..…………………………………………19

3.2. Hypotheses……………………..…………………………………………20

3.3. Experiment 1a Methods…………....……………………………………21

3.4. Experiment 1a Results………......…………………………………….28

3.5. Experiment 1b Methods………………………………………………….32

3.6. Experiment 1b Results…………..………………………………………35

3.7. Discussion……………………………………………………………………37

4. EXPERIMENT 2……………………………………………………………………39

4.1. Introduction……………………………………………………………………39

4.2. Methods Overview……………………………………………………………44

4.3. Hypotheses……………………………………………………………………45

4.4. Method…………………………………………………………………………46

4.5. Results…………………………………………………………………………50

4.6. Discussion……………………………………………………………………52

5. GENERAL DISCUSSION……………………………………………………53

6. CONCLUSION………………………………………………………………65

7. LIST OF REFERENCES……………………………………………………66

8. APPENDIX A…………………………………………………………………79

9. APPENDIX B…………………………………………………………………80

10. APPENDIX C…………………………………………………………………81

11. APPENDIX D…………………………………………………………………82

12. APPENDIX E…………………………………………………………………83

13. CURRICULUM VITA…………………………………………………………86

LIST OF FIGURES

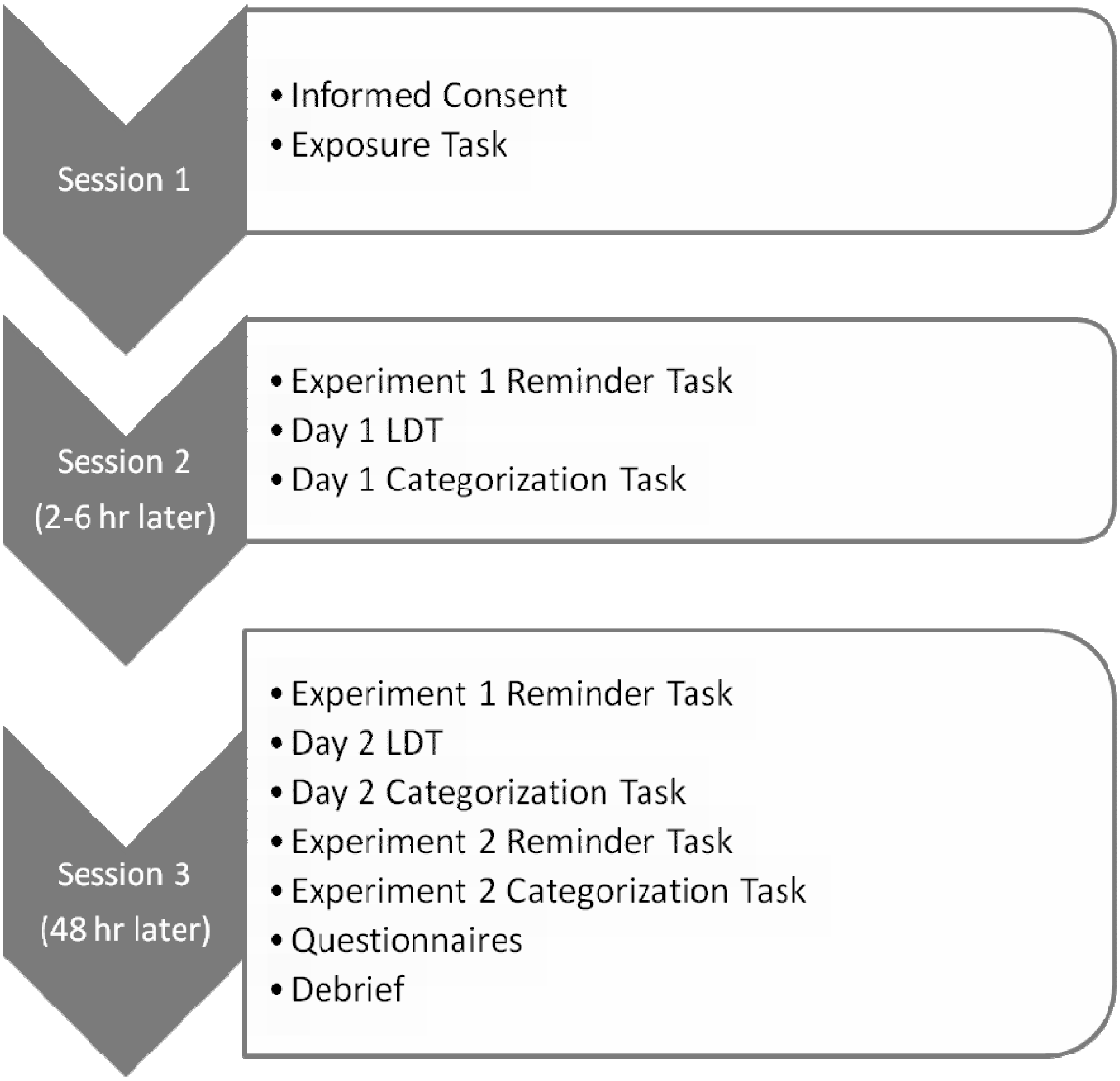

Figure 1. Overall Organization of Experiments.

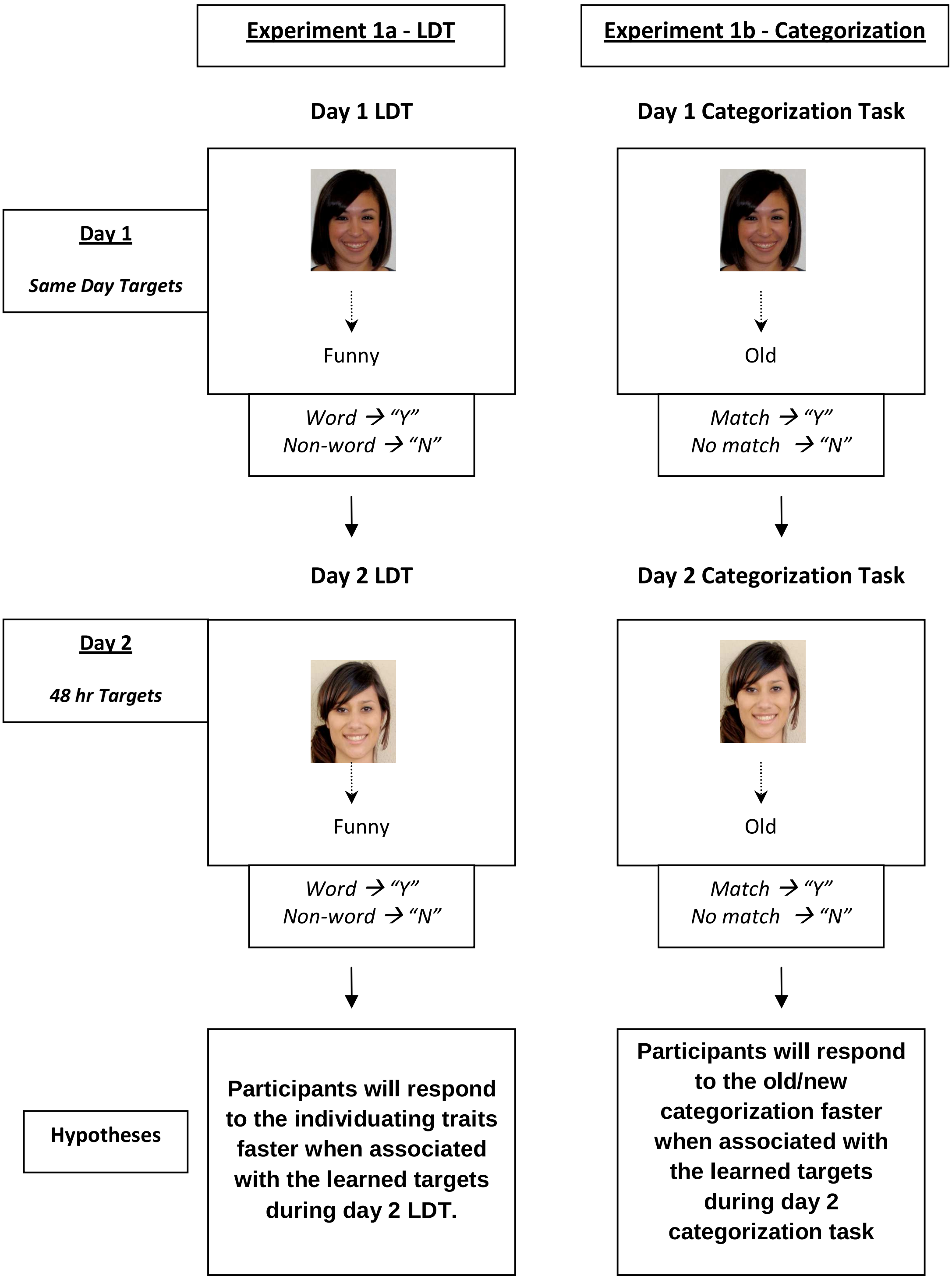

Figure 2. Organization of Experiment 1.

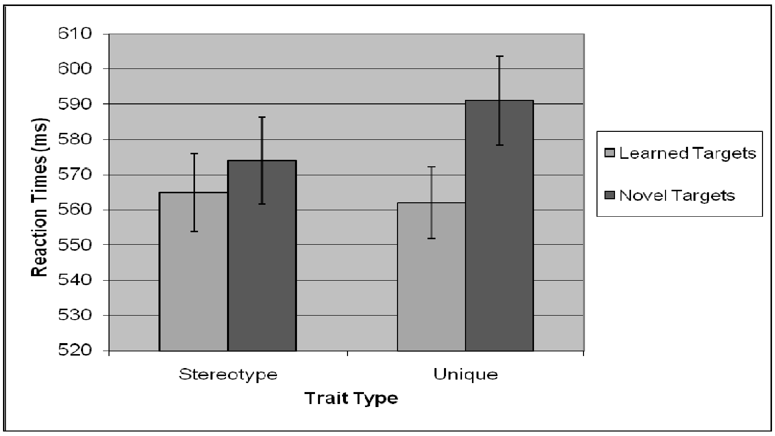

Figure 3. LDT: Target Type X Trait Type Interaction.

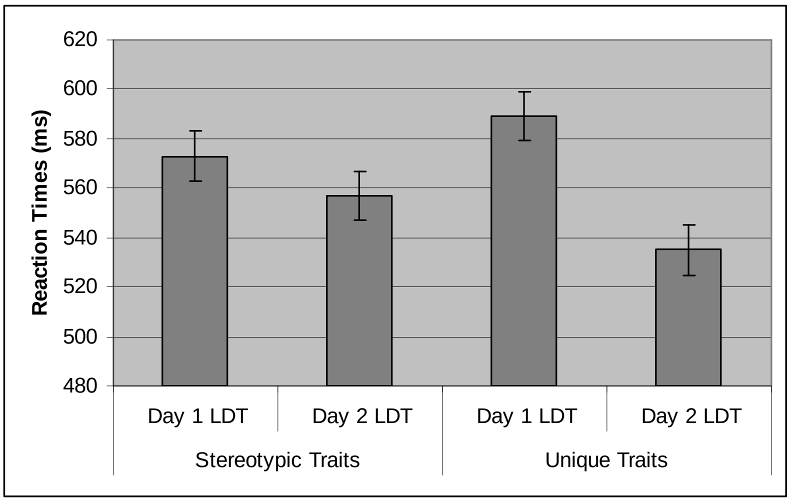

Figure 4. LDT: Time X Trait Type Interaction for Learned Targets.

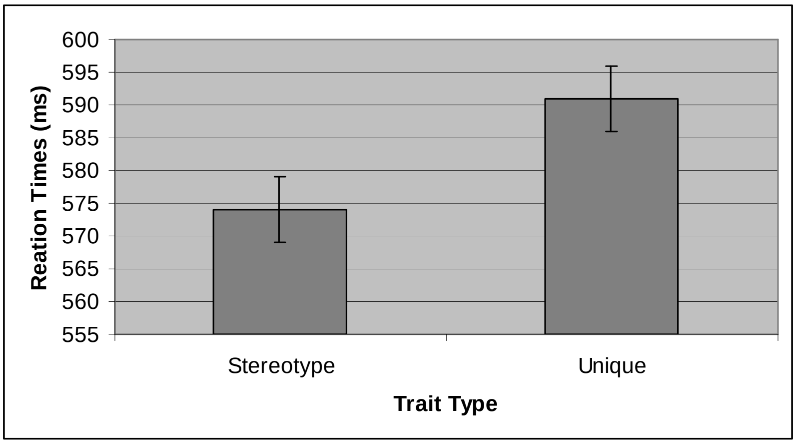

Figure 5. LDT: Trait Type Main Effect for Novel Targets.

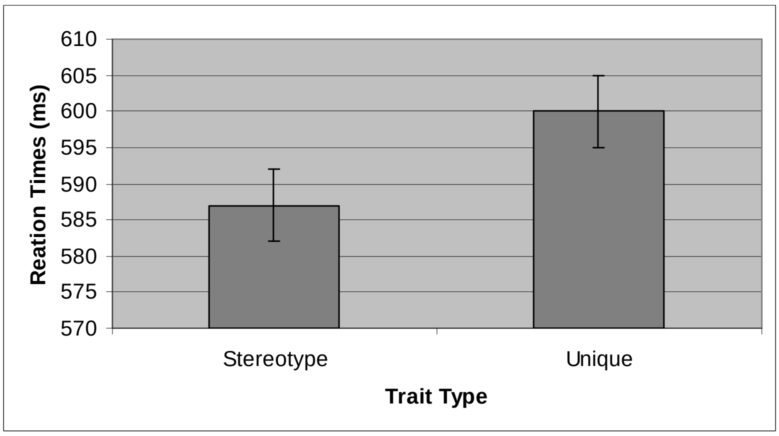

Figure 6. Day 1 LDT: Trait Type Main Effect

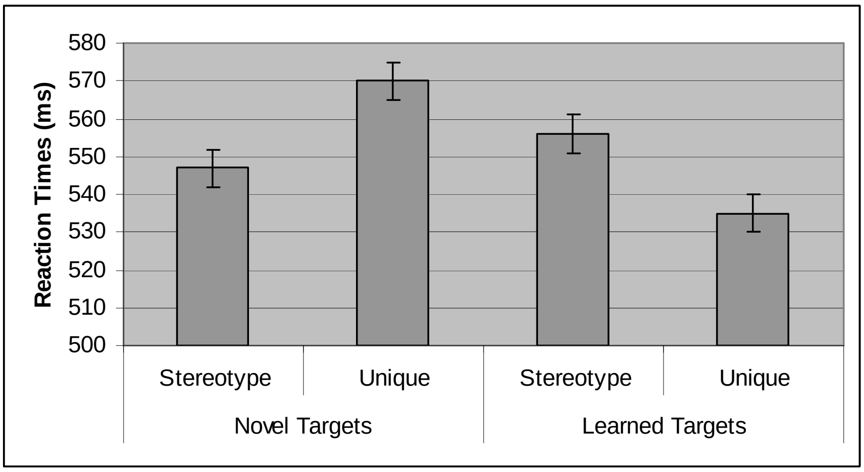

Figure 7. Day 2 LDT: Target Type X Trait Type Interaction.

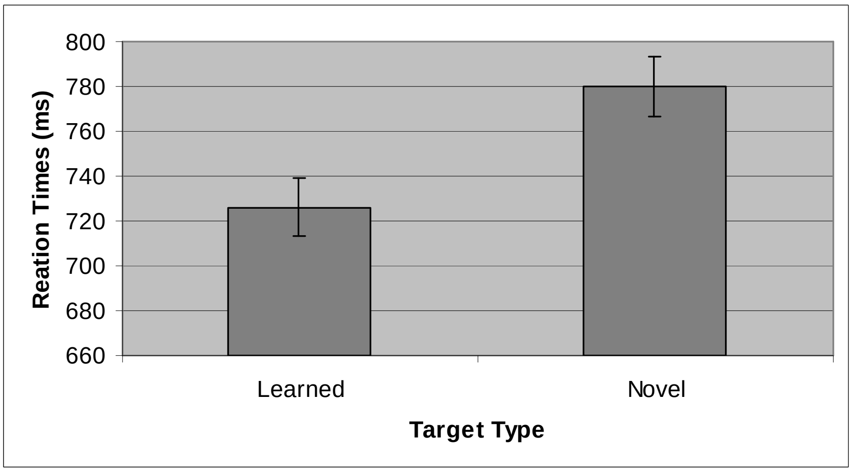

Figure 8. Categorization Task: Target Type Main Effect.

INTRODUCTION

A prevailing argument within social perception research is that social categorization is automatic. For instance, people perceive information pertaining to a person's age or race and then use this information to automatically categorize them into the corresponding social category. It is further argued that the stereotypes that are associated with that categorized group are also automatically activated (Fiske, 1989; Kawakami, Dovidio, Moll, Hermsen, & Russin, 2000; Stroessner, 1996) and used to guide further interaction. Yet this argument is overwhelmingly based on studies that test only first impressions of newly-learned targets. It does not fully account for the complexity of social perception as it occurs in the real world. While people might automatically categorize and stereotype the target individuals in these studies, these individuals are never seen again and thus have no impact on their lives. In contrast, our perception of the individuals that we see on a daily basis may proceed differently, simply because of previous individuating experiences. For example, one might see the same salesperson every morning when buying coffee on their way to work. Because these individuals are encountered more than once, the interactions may lead one to gather information about these individuals. While some of this information may work to confirm group stereotypes, there may also be personalizing information that goes beyond basic group membership (e.g., the person always wears the color blue), or information that might even contradict stereotypes (e.g., this woman is rude, not warm). A key difference between brief interactions in the lab and real world interactions is that real world interactions often occur over a period of time, as new information is integrated into existing information. Thus, memory consolidation constructs provide some insight and guidelines for how time may influence social perception. Because the majority of past research on social perception has examined first impressions based solely on photos of target individuals, our understanding of social perception is incomplete. The research presented here begins to address this important void in the literature by asking the following questions: How do impressions of others change over time? Does time change how personalizing information is both represented and retrieved? How does time influence the degree to which stereotypes versus individuating information impact perceptions?

Social categorization

Researchers have often argued that the automaticity of social categorization leads to the automatic activation of associated stereotypes (Dovidio, Evans, & Tyler, 1986; Fazio & Dunton, 1997; Zárate & Smith, 1990). Automatic processes are defined as "the unintentional or spontaneous activation of some well-learned set of associations or responses that have been developed through repeated activation in memory" (Devine, 1989, p.6). Within the social realm, individuals perceive such things as age and race quickly. Individuals are also extremely well practiced at perceiving others as either male or female (Blair & Banaji, 1996). A result of these automatic perceptions is that the stereotypes associated with social groups are then automatically activated (Kawakami et al., 2000; Zárate & Smith, 1990). As Blair and Banaji state, "that automatic processes may be involved in stereotyping is disturbing because such processes reveal the potential to perpetuate prejudice and discrimination independently of more controlled and intentional forms of stereotyping" (p.1159). For instance, research on racial categorization has found that individuals are often better at recognizing same race targets compared to other race targets (Levin, 1996; Meissner, Brigham, & Butz, 2005). This effect is generally interpreted as occurring because people perceive their in-group members via their individuating features, whereas out-group members are automatically categorized as part of the out-group without further thought. This effect, thus, lends credence to the argument that social categorization and the associated stereotypes are automatic and unintentional.

Research on the automaticity of social categorization has frequently used implicit tests in order to examine the automatic and unintentional activation and use of stereotypes. Implicit attitudes can be defined as automatically activated evaluations (i.e., stereotypes) that function and can be assessed without the individual's awareness (Dovidio, Kawakami & Gaertner, 2002). Implicit tests may be described as measures that do not explicitly ask individuals about their attitudes. One well known implicit test, the Implicit Association Test (IAT), measures implicit attitudes with the use of evaluative judgments (Greenwald, McGhee & Schwartz, 1998). In this task, participants are shown stereotypically White names and stereotypically Black names. Participants then implicitly and automatically associate positive attitudes with the stereotypically White names and unpleasant attitudes with the stereotypically Black names due to previously learned associations, and therefore, respond quicker to those paired items. Indeed, Greenwald et al. found strong support for this idea within their experiments. Also using the IAT, Rudman, Greenwald, and McGhee (2001) compared both implicit and explicit gender stereotypes. In particular, the researchers using sex stereotypes (e.g., males' association with power and coldness, and females' association with weakness and warmth) found that while only men expressed explicit gender stereotypes, both men and women showed strong implicit gender stereotyping. Other implicit tests include reaction time (RT) paradigms like the ones used in studies done by Zárate, Sanders, and Garza (2000) and self-report measures such as the stereotypic explanatory bias or the linguistic intergroup bias (Sekaquaptewa, Espinoza, Thompson, Vargas, & von Hippel, 2003; von Hippel, Sekaquaptewa, & Vargas, 1997).

The common theme running through implicit attitude paradigms is that participants are unaware of what is measured. It is well known that participants often try to hide or mask their true feelings on some topics when asked explicitly. Implicit measures, on the other hand, are less open to this conscious editing process (Dovidio, Kawakami, Johnson, Johnson, & Howard, 1997). When individuals are not given time or motivation to evaluate the consequences of their actions, the explicit attitudes give way to the more implicit attitudes (Dovidio et al., 2002). Thus, research has shown that the automaticity of social categorization can be appropriately examined with the use of implicit measures.

Whereas most research on social categorization has demonstrated the automaticity of categorizations with the use of implicit tests, there is an emerging literature demonstrating the malleability of these categorizations. For instance, research has found that social categorization processes can be diminished by training (Blair & Banaji, 1996; Kawakami et al., 2000; Kawakami, Dovidio, & van Kamp, 2005). Kawakami et al. (2000) found that merely training participants to say “NO” to a photograph of a target and an associated stereotype for 45 min was sufficient to inhibit stereotyping for up to 24 hr after training. In fact, this training is analogous to real-life situations as it is socially undesirable to express stereotypes. This social influence may be acting as our society's own form of stereotype negation training. For example, Wheeler and Fiske (2005) demonstrated that racial categorization was diminished when participants made a conscious effort to individuate targets. It is socially beneficial for individuals to attempt to view people as individuals rather than be labeled as racist or sexist. This social motivation may influence the conscious activation of social perception because it provides some guidelines as to when expressing stereotypes is deemed acceptable. As a rule, people try to refrain from judging individuals on the basis of stereotypic information alone (Yzerbyt, Schadron, Leyens, & Rocher, 1994). This rule then stresses the importance of acquiring additional information about an individual. Research has additionally shown that when a conscious effort is made to process information contrary to stereotypic beliefs, stereotype activation is reduced (Blair & Banaji, 1996).

Providing information about an individual also increases familiarity with that individual, which in turn impacts perceptions of that individual (Mollarat & Mignon, 2007; Smith, Miller, & Maitner, 2006). For example, minimal familiarity with out-group target individuals has been shown to inhibit group categorization (Zárate, Stoever, MacLin, & Arms-Chavez, 2008). Thus, the social goals we live by, which emphasize the importance of familiarity, can influence social perception.

Neurocognitive research suggests that the effects of familiarity on social perception are better understood if we distinguish between the cognitive processes involved when an individual is perceived as a person and the cognitive processes involved when an individual is perceived in terms of their social group membership (Zárate et al., 2000; Zárate et al., 2008). Zárate and colleagues proposed that social information is processed within two separate cognitive systems where the right cerebral hemisphere is better at processing social information in an exemplar-like manner, while left cerebral hemisphere more efficiently processes social information in a prototype-like manner. Within these separate perception systems, person perception has been found to proceed more efficiently within the right cerebral hemisphere, which produces social representations of persons in terms of their individuating characteristics. Conversely, group categorization has been found to proceed most efficiently within the left cerebral hemisphere, which produces social representations of persons in terms of the social groups or categories that they belong to (e.g., ethnicity, gender, or age). These distinct cerebral perception systems then allow us to speculate on how familiarity might impact future group categorizations as familiarity should be able to impact social perception processes only if there is a distinction between the cognitive processes involved when an individual is perceived as a person or in terms of their group membership (Zárate et al., 2000; Zárate et al., 2008).

While there is some evidence minimal familiarity with a person influences social perception, it is based on paradigms using one hr sessions. It, therefore, does not address how impressions of others change over time. The proposed research attempts to address this very question. Using memory consolidation constructs, the primary research question proposed here focuses on the impact of time on the malleability of social perception. How do familiarity and time influence social perceptual processes?

What is memory consolidation?

Familiarity is not instantaneous. Acquiring the information necessary for one to become familiar with another person requires time. The effect of time on social perception highlights an untested domain in social psychology. How does time influence social perception? Research in the memory consolidation literature provides a number of insights and guidelines. First, however, it is pertinent to explain what memory consolidation is and the theory behind it.

Memory consolidation is a time-dependent process where a newly formed and fragile memory trace is transformed into a stronger and more resilient permanent memory trace. This transformation results in a memory that is increasingly impervious to disrupting or competing factors (McGaugh, 2000; Medina, Bekinschtein, Cammarota, & Izquierdo, 2008; Spear & Mueller, 1984; Walker & Stickgold, 2006).

Memory consolidation research started over 100 years ago with Müller and Pilzecker (1900) explaining retroactive interference effects. Retroactive interference is defined as the forgetting of old information due to the competition between the newly learned information and the old information (Bower, Thompson-Schill, & Tulving, 1994). Müller and Pilzecker found that the shorter the interval between an initial learning session and a second learning session, the more information from the initial learning session was forgotten. The interpretation was that time was essential to form a stable memory. This initiated the idea that there were cognitive processes that were involved in changing the vulnerable memory trace into a more stabilized memory over a period of time. In 1949, Hebb took Müller and Pilzecker's theory one step further by proposing that memory consolidation involved a process where short-term memories are eventually moved into long-term memory stores. Since then, memory consolidation research has been tested from multiple perspectives. For instance, neuropsychology has studied the effects of memory consolidation with the use of retrograde amnesia patients (Squire, Cohen, & Nadel, 1984).

Memory consolidation theory, however, involves major assumptions and controversies. One of these debates concerns identifying the specific brain regions that are involved during consolidation. One hypothesis is that there are two distinct forms of memory consolidation: cellular consolidation and systems-level consolidation (Medina et al., 2008). Cellular consolidation is a fast consolidation process that "involves early molecular and cellular events" (Medina et al., 2008, p. 62). Cellular consolidation lasts only hours after training and is hypothesized to involve the medial temporal lobe and regions of the hippocampus. On the other hand, systems-level consolidation is described as a slow process that occurs over days, can last for weeks to months, and can be further enhanced if the memory is one that is associated with another memory previously stored (Dudai & Eisenberg, 2004; Eichenbaum, 2001; Tse, Langston, Kakeyama, Bethus, Spooner, Wood et al., 2007). Systems-level consolidation has been argued to involve the interaction between neocortical regions and medial temporal lobe structures. This interaction is hypothesized to reorganize newly learned memories into a more stable form as the memory trace slowly begins to exist independently of the hippocampus and the neocortex starts to support the now long-term memory (Bontempi, Laurent-Demir, Destrade, & Jaffard, 1999; Dudai & Eisenberg, 2004; Frankland & Botempi, 2005; McClelland, McNaughten, & O'Reilly, 1995; Medina et al., 2008; Squire & Alvarez, 1995; Squire, Stark, & Clark, 2004). Other research, however, argues that the memory trace never exists independently from the hippocampus. Instead, the argument is made that the hippocampus is imperative throughout the life of the memory trace (Lehmann, Lacanilao, & Sutherland, 2007; Sutherland, Weisand, Mumby, Astur, Hanlon, Koerner et al., 2001).

Another important debate is the role that sleep plays within memory consolidation. Sleep has long been argued to be an important factor within memory consolidation. With time and sleep, memories become progressively more resistant to disruption from other factors as they are integrated into long term memory (Walker & Stickgold, 2006). In terms of the systems-level consolidation, research has shown that both slow-wave sleep and rapid eye movement sleep are required for this transition to occur (Rasch & Born, 2008; Rauchs, Desgranges, Foret, & Eustache, 2005). For instance, Stickgold, Scott, Rittenhouse, and Hobson (1999) used a lexical decision task to explore semantic priming effects within different stages of sleep. Participants were given a task four times throughout the experiment: prior to sleep, after stage two non-rapid eye movement sleep, after rapid eye movement sleep, and five min after waking in the morning. The authors found that the stage two non-rapid eye movement sleep and the rapid eye movement sleep displayed different responses to the lexical decision task. When awakened after stage two sleep, participants displayed priming effects towards associated words. When awakened after the rapid eye movement sleep, however, participants displayed a quicker reaction time towards items that had a weak association. Thus, the two stages of sleep may add two qualitatively different aspects towards the consolidation of memories. Moreover, a sleep dependent effect can also be seen within a 60-90 min nap as long as the nap includes both slow-wave sleep and rapid eye movement sleep (Mednick, Nakayama, & Stickgold, 2003).

While the specific neurological and sleep processes involved within systems-level memory consolidation are still debated, this type of consolidation process is argued to be involved in the consolidation of declarative memory (Eichenbaum, 2001; Medina et al., 2008). Specifically, research has consistently shown that systems-level memory consolidation can improve and enhance declarative memory (DeKoninck, Lorrain, Christ, Proulx, & Coulombe, 1989; Gais & Born, 2004; Gais, Molle, Helms, & Born, 2002; Reed & Squire, 1998). The memory consolidation literature also highlights the relationships between the two types of declarative memory: semantic memory (i.e., memory for factual knowledge that people hold about the world and knowledge of categories; Schacter, Wagner, & Buckner, 2000) and episodic memory (i.e., memory information about a specific event or experience; Tulving, 1985).

First, during sleep, a newly formed and fragile memory trace undergoes structural changes that work to strengthen the declarative memories (Fischer, Drosopoulos, Tsen, & Born, 2006; Gais & Born, 2004; Wagner, Gais, Haider, Verleger, & Born, 2004). It has been further argued that when this structural change occurs a consolidation process might not consolidate all declarative memories equally. The process may even “selectively strengthen[s] memories that were competitively inhibited by similar but more recently encoded memories” (Drosopoulos et al., 2007, p. 170; Ekstrand, 1977). Could it be that memory consolidation somehow becomes an ally for the weaker declarative memories that experience competition from strong and over learned declarative memories? Drosopoulos and colleagues (2007) showed just that when they manipulated the amount of retroactive interference as well as the strength of encoding. The amount of retroactive interference was manipulated by using either an

A-B, A-C paradigm (i.e., retroactive interference), or an A-B, C-D paradigm (i.e., no retroactive interference). Additionally, the authors manipulated the amount of encoding of both learning paradigms by using either an intense encoding strategy or a weak encoding strategy. Consequently, Drosopoulos et al. (2007) found that sleep enhanced only the weakly encoded declarative memories against the effects of retroactive interference. Thus, the structural change produced within sleep and memory consolidation strengthens the weakly associated declarative memories against retroactive interference more so than the strongly associated declarative memories.

Second, memory consolidation processes provide a mechanism through which episodic memories become integrated with semantic memories (Spear & Mueller, 1984). A basic agreement within memory research is that the two types of memory (i.e., semantic and episodic) are intertwined and interdependent as the semantic memory system is a vital part of episodic memory retrieval. The interdependence between the two memory systems makes it difficult to test the two separately (Tulving, 1972). It has been argued that there are really no novel memories because the supposed novel episodic memories continuously tap into the previously stored semantic memories. When consolidation is added into the equation, the already existing interdependence, integration, and association of the episodic with the semantic memories is strengthened (Spear & Mueller, 1984). This argument begins to provide one with a more specific way that systems-level memory consolidation enhances memory and, in turn, social perception. If memory consolidation strengthens the integration of episodic memories with semantic memories, does time (i.e., memory consolidation) strengthen the integration of individuating memories (i.e., episodic) with stereotypic memories (i.e., semantic) within social perception?

Time and Social Perception

If memory consolidation processes selectively strengthen weakly associated declarative memories and provide a mechanism through which episodic memories are integrated with semantic memories (Spear & Mueller, 1984), how does one start to integrate social perception and memory consolidation? Social cognition involves semantic and episodic memory systems as well. For instance, semantic memory has been shown to elicit 'know' responses while episodic memory elicits 'recollection' responses (Gardiner, Ramponi, & Richardson-Klavehn, 1998). Semantic memory is also thought to be involved within heuristic source monitoring as it involves simple and effortless cues from a vague feeling of familiarity. On the other hand, episodic memory might be involved with the systematic source monitoring as this involves a more effortful recollection process (Sherman & Bessenhoff, 1999). Almeida (2007) argues that social expectations involve semantic encoding whereas actions that are socially unexpected additionally involve episodic encoding for further understanding. From a social cognitive view, knowledge about a specific individual, depending on the information acquired, includes both stereotypic (i.e., socially expected) and individuating memories (i.e., socially unexpected) (Kunda & Thagard, 1996). Thus, individuating memories (i.e., specific to that individual) should reflect episodic memory and stereotypic memories (i.e., general and categorical group information) should reflect semantic memory. Furthermore, stereotypic memories consist of stronger associations and are over learned whereas individuating memories consist of only weak associations. Because of this distinction between stereotypic memories and individuating memories, time (i.e., memory consolidation) may facilitate individuation. In fact, the structural change imposed by memory consolidation may selectively work to enhance and buffer the weakly associated individuating memories.

In addition to the memory research previously discussed (Tulving, 1972), there is evidence that social perception involves the integration of these two memory types. It is argued here that the integration found within episodic and semantic memories should also be found within individuating (i.e., episodic) and stereotypic (i.e., semantic) memories. Furthermore, this integration should be strengthened with time as research has shown that the integration of episodic memory within semantic memory is enhanced and strengthened with memory consolidation (Spear & Mueller, 1984). This integration provides a mechanism through which individuating experiences with an individual become associated with that individual over a period of time. Thus, as opposed to testing automatic associations with newly learned targets, memory consolidation constructs provide some insight as how to test learned associations with individuals that are encountered over a period of time.

The Current Research

The current research extends previous research by examining how familiarity and time impact social perception. Experiment 1 investigated how familiarity and time impact the automaticity with which social categorization proceeds and associated stereotypes are activated. Experiment 1 accomplished this by examining the effects of familiarity and time on social categorization and stereotyping separately. In order to test the impact of familiarity and time on the automaticity of associated stereotypes, Experiment 1a used a lexical decision task (LDT). In order to test the impact of familiarity and time on the automaticity of social categorization, Experiment 1b used a photo categorization task. As both Experiment 1a and Experiment 1b were based on memory consolidation constructs, it was hypothesized that familiarity and time would enhance and stabilize individuating memories (i.e., unique traits) due to the strengthened integration between the individuating memories and the automatic stereotypic traits. Experiment 2 examined the impact of familiarity and time on social perception with cognitive loads. It was hypothesized that, with familiarity and time, individuating memories of targets would be more resistant to concurrent loads when compared to targets that were not encoded with familiarity and time.

Experimental Overview

As depicted within Figure 1, the current research involved having participants participate across two days and three experimental sessions. The first day consisted of the first and second experimental session with an approximate 2-6 hr delay (i.e., day 1) between the two experimental sessions. The second day consisted of the third experimental session and occurred 48 hr after the beginning of the first experimental session (i.e., day 2).

Experimental session one included an exposure task where participants initially learned information about 12 target individuals. Experimental session two included a brief relearning task as well as the day 1 LDT and day 1 categorization task 2-6 hr after exposure of Experiment 1. Experimental session three included a brief relearning task, the day 2 LDT, the day 2 categorization task 48 hr after exposure of Experiment 1, another brief relearning task, and, finally, Experiment 2 (i.e., categorization task with cognitive loads). After participants completed Experiment 2 they were then debriefed and dismissed. Thus, all tests and experiments employed a within-participants experimental design.

Secondary Issues

Relearning Tasks. Throughout the experiments, three brief relearning tasks were employed immediately prior to all tests. The relearning tasks consisted of PowerPoint slideshows that exposed participants to the target once more. As participants were tested over a period of days, the use of the relearning tasks would then reduce group mean differences between the day 1 and day 2 tasks.

Self-Statements. All of the learning materials used within the exposure task included statements structured in the first-person that were meant to be perceived as being written by the targets themselves (Carlston & Skowronski, 1994). These self-statements (e.g., “I am persistent.”) were used for two specific reasons. First, individuals tend to believe that these statements could have actually been received from the actual target, therefore, adding more perceived validity to the task. Second, statements structured in this way focus the participant on their impression of the target and avoid possibly competing thoughts of other motives or individuals (Carlston & Skowronski, 1994).

Explicit Sexism Questionnaires. At the end of the two experiments, two sexism questionnaires were given to participants: The Ambivalent Sexism Inventory (Glick & Fiske, 1996) and the Ambivalence toward Men Inventory (Glick & Fiske, 1999). The social category used within the proposed research was sex. Using sex as the social category allows for both in-group and out-group testing. Research, however, shows that participants’ explicit sexist attitudes can influence or predict the level of target individuation and memory for targets (Stewart, Harris, van Knippenberg, Hermsen, Joly, & Lippman, 2006; Stewart, van Knippenberg, Joly, Lippman, Hermsen, & Harris, 2004; Stewart & Vassar, 2000; Stewart, Vassar, Sanchez, & David, 2000). For instance, Stewart and colleagues found that both male and female participants who hold explicit sexist attitudes towards females or female roles exhibit more errors within a female individuation task.

Thus, the measurement of sex-based explicit attitudes becomes important. The Ambivalent Sexism Inventory (Glick & Fiske, 1996) measured participants’ sexist attitudes towards females (i.e., "Women seek to gain power by getting control over men" and "Women should be cherished and protected by men"). This scale was measured on a five point Likert scale with 1 as "disagree strongly" and 5 as "agree strongly" and has a reported Cronbach's alpha coefficient ranging from .76 to .88 (Conn, Hanges, Sipe, & Salvaggio, 1999).

The targets within the experiments, however, were not solely female. Therefore, a similar scale was used to assess the participants' explicit sexist attitudes towards males. The Ambivalence toward Men Inventory was administered (Glick & Fiske, 1999). This scale measured participants' explicit attitudes towards males (i.e., "Men act like babies when they are sick."). This scale was measured on a five point Likert scale with 1 as "disagree strongly" and 5 as "agree strongly" and has a Cronbach's alpha coefficient ranging from .83 to .87 (Glick & Fiske, 1999).

Other Questionnaires. Throughout the two experiments four additional questionnaires were given to the participants: A sleep check questionnaire, a sleep quality questionnaire, an impression formation questionnaire, and a prior familiarity check.

The sleep check questionnaire, Appendix A, was administered to ensure that participants did not sleep (i.e., nap) for more than 30 min during the first break as it has been shown that 60-90 min naps that contain both REM and slow-wave sleep may elicit memory consolidation processes (Mednick et al., 2003). The data for participants who indicated that they slept for more than 30 min during the short interim were not used in the analyses.

A sleep quality questionnaire, Appendix B, was administered to assess the participants' total amount of sleep and the restorative value of this sleep during the 48 hr break. This measure helped to ensure that participants were actually sleeping as the experiments did not employ common memory consolidation sleep study measures.

A short impression formation questionnaire, Appendix C, was also administered to facilitate the participants' ability to form an impression of each target. This questionnaire consisted of two questions assessing the participants' impression of the targets.

Finally, within the prior familiarity check, Appendix D, participants were asked to indicate whether they personally knew any targets outside of the experiment. The data for participants who indicated that they did personally know targets were not used in the analyses.

EXPERIMENT 1

Methods overview

Experiment 1 investigated the influence of familiarity and time on the automaticity of social categorization and associated stereotypes. To accomplish this research goal, time was manipulated between two separate social perception tasks (i.e., Experiment 1a - LDT and Experiment 1b - categorization task). The categorization tasks were designed to test the automaticity of social categorization. The lexical decision tasks were designed to test the automaticity of the associated stereotypes. Prior to all tasks all participants completed an exposure task via PowerPoint slide show where they learned about 12 targets. Each slide contained a photo, one unique trait, and two self-statements of how that target exhibited that unique trait.

As depicted in Figure 2, participants were then asked to complete two test sessions that included both a LDT and a categorization task. While these test sessions involved the same methodological procedures, time between exposure and test was manipulated within the two test sessions. In order to test memories within a one day period, the first session (i.e., day 1 LDT and day 1 categorization task) was completed approximately 2-6 hr after the exposure task and included one half of the 12 learned targets. It was expected that this moderate break between the exposure task and the first test session allowed for a sufficient amount of time for normal day-to-day interference to occur as well as serve as an elimination of short-term memory effects. In order to test memories after a 48 hr period, the second session of tests (i.e., day 2 LDT and day 2 categorization task) were completed 48 hr after the exposure task and included the remaining half of the learned targets. Based upon memory consolidation findings and constructs, it was expected that the 48 hr break allowed for a sufficient amount of sleep.

Hypotheses

Experiment 1a – LDT. Within Experiment 1a, it was hypothesized that participants would respond to the unique/individuating traits associated with the learned targets faster after a 48 hr consolidation time (i.e., day 2 LDT) than after only a same day memory retention interval (i.e., day 1 LDT). Specifically for day 1 LDT, it was hypothesized that participants would respond to the stereotypic traits faster than the unique traits for both the learned targets and novel targets. In contrast, for day 2 LDT, it was hypothesized that the participants would respond to the unique/individuating traits associated with the learned targets faster than when associated with the novel targets. Moreover, it was hypothesized that participants who had high explicit sexist attitudes towards females would respond faster to the female stereotypic traits. It was also hypothesized that females who held high explicit sexist attitudes towards males would respond faster to the male stereotypic traits.

Experiment 1b – Categorization Task. Within Experiment 1b, it was hypothesized that participants would categorize learned targets faster as a familiar target when the exposure was 48 hr earlier (i.e., day 2 categorization) than when the exposure was within the same day (i.e., day 1 categorization). Specifically for the day 1 categorization task, it was hypothesized that participants would be faster to categorize both learned targets and novel targets by sex than as familiar. Specifically for the day 2 categorization task, it was hypothesized that the participants would categorize the learned targets as familiar faster than categorize the new targets as novel.

Overall Hypotheses. Collectively within both day 2 LDT and categorization task, it was further hypothesized that that there would be no significant differences between the unique/stereotypic traits or the categorization type (i.e., sex or familiar) for the learned targets. According to memory consolidation constructs, the memories should become integrated with the added time. Due to the repeated testing, it was also hypothesized that participants would respond faster to the learned targets within both day 2 tasks than the day 1 tasks.

Experiment 1a – LDT

METHOD

Participants

A total of 89 undergraduate Introduction to Psychology students were recruited via the Experimetrix system at the University of Texas at El Paso. Five participants did not fully complete the experiment because they failed to attend a session. Four of these participants failed to appear for the 3rd session and 1 participant failed to appear for both the 2nd and 3rd session. Thus, data from these participants were not analyzed due to measurement attrition.

Next, a total of 28 participants were removed from analyses in a step-wise fashion. Twenty-two participants were deleted from analyses because they indicated knowing the targets personally. As this experiment relies on conveying information about the learned target individuals in order to gain a sense of familiarity, the participants that personally knew the learned targets also knew this information was incorrect. If participants personally knew a novel target, that target would no longer be novel. Second, an additional 3 participants were removed from analyses because they reported sleeping more than 30 min during the 2-6 hr break between the exposure task and the day 1 LDT. While the present experiments did not test sleep patterns, creating the cut off at more than 30 min of sleep serves as a conservative way to eliminate any possible sleep-dependent learning that may confound the manipulation of time. Finally, an additional 2 participants were removed from analyses because they reported that they did not speak English.

After these deletions, data from 51 (24 female and 27 male) participants were analyzed. An a priori power analysis, conducted via G*Power 3.0.5 (Faul, Erdfelder, Lang, & Buchner, 2007), indicated that the total number of participants needed in order to obtain a power of .81 was 42. Thus, the number of participants analyzed within this study met the a priori power criterion.

Of the analyzed participants, 37 self-reported to be Mexican-American. The remaining participants reported themselves to be African-American (*n*=4), Asian-American (*n*=1), European-American (*n*=3), Mexican-National (*n*=1), and 5 participants identified as “other”. The mean participant age was 22 with a range from 18 – 56 and a mode of 18.

Materials

Photo Stimuli. The same type of photos was used within Experiment 1a , Experiment 1b, and Experiment 2 and will only be described in full detail here. Materials included 18 Latino and 18 Latina frontal head and neck stimulus color photos with 75 dpi. Each stimulus photo was approximately 7cm high (subtending 6.47

degrees of visual angle) and 6cm wide (subtending 5.55 degrees of visual angle). All photos were pilot-tested to ensure that the targets in the photos were perceived as Latina/o individuals in order to control for ethnicity effects. All of the individuals in the stimulus photos were from the same approximate age group (18-25) and did not have any major distinguishing features (e.g., glasses, facial hair). The 36 (18 male and 18 female) photos were then randomly divided into one “learned” set of 6 male and 6 female photos and 4 “novel” sets of 3 male and 3 female photos. In order to reduce any repetition priming effects, the “learned” set of photos were further randomly divided into 2 “learned” sets. Also to reduce repetition priming and to ensure novel photos remained novel, only 2 of the 4 sets of novel photos were used within Experiment 1a (i.e., novel set 1 was used within the day 1 LDT and novel set 2 was used within the day 2 LDT). The remaining 2 sets were used within Experiment 1b. Each set of photos represent an initial exposure sequence to which participants were randomly assigned. Within each of these initial exposure sequences, the male and female photos were randomly dispersed.

Word Stimuli. Materials also include 12 male stereotypic traits (e.g., cold, rude), 12 female stereotypic traits (e.g., warm, weak), 24 unique/individuating traits (e.g., likeable, anxious), and 48 non-words (e.g., ciern, losri). All of the traits were pilot-tested to ensure that they were perceived as the correct type of trait. In order to reduce repetition priming effects, all traits and non-words were divided into 2 groups (i.e., 6 male stereotypic traits, 6 female stereotypic traits, 12 unique/individuating traits, and 24 non-words). Both sets of traits also had an equal lexical frequency mean (CELEX Lexical Database, 1995). Each set of words represents an initial exposure sequence to which participants were randomly assigned and ensured that participants were not exposed to the same word stimuli between the day 1 and day 2 LDT tasks. In addition to the words, a total of 48 sentences (i.e., 2 sentences per unique/individuating trait) were used within the exposure task. As the sentences were meant to describe how a target exemplifies each unique/individuating trait, they were piloted-tested to ensure that the sentences correctly described each unique/individuating trait. The sentences were also gender neutral. Additionally, 12 names were used within the experiment. See Appendix E for all word stimuli.

Questionnaires. Four questionnaires were administered to the participants within Experiment 1: a demographic questionnaire, a sleep check, a sleep quality questionnaire, the prior familiarity check, and an impression formation questionnaire.

Testing Materials. All tests were programmed and administered through SuperLab 4.0 software and responses were recorded via a RX-820 response pad that ensures 1 ms accuracy (Cedrus Corporation, 2007). Surveys, with the exception of the impression formation questionnaire, were administered online via Surveymonkey.com (2009).

Procedure

Participants were told that the experiment concerned memory for individuals and that they would be performing memory tasks during three experimental sessions over a period of two days.

Upon arrival to the experimental laboratory, participants were shown into a quiet and secluded room, asked to sit in front of any computer, and were given an informed consent document to read and sign. Participants were then asked to sign up for the second and third session times that were convenient for them as well as provide an alternative ID. This alternative ID could have been anything that the participant would recognize with the exception of their name, initials, social security number, or student ID. The alternative ID that the participant chose was entered on every form the participant used within the experiment along with the subject ID number assigned to the participant. Participants were then asked to complete the demographic questionnaire on the computer.

Exposure Task. The exposure task consisted of a Microsoft PowerPoint slide show and the impression formation questionnaire. Prior to the participants' arrival, an exposure condition was randomly assigned to each computer. The exposure condition counterbalanced the order of the initial exposure to each target as well as counterbalanced the information that was paired with each target. The slideshow included 12 target individuals (6 female and 6 male) with 1 target presented per slide. Each slide included a photo of the target, a name of the target, a sentence specifying a unique trait related to that target, and two sentences that served as examples of how the target exhibits that trait. All of the sentences appeared to be generated by the targets themselves. Each slide was shown a total of 3 times: once for 30 s and then twice for 15 s for a total of 1 min per slide. The exposure task took a total of 12 min and the target photos were randomized within each exposure sequence. Participants were instructed to study the given information and form an impression of each person. Participants were also instructed to fill out the impression formation questionnaire about each target during the initial 30 s exposure. After the exposure task was finished, participants were given an experimental reminder note that provided the date and times for the second and third session that the participant had signed up for previously. Participants were then dismissed and verbally reminded to return to complete the second experimental session later that same day.

Lexical Decision Tasks

Day 1 LDT. Upon returning for the second session, participants were asked to complete the sleep check questionnaire on the computer. Next, a brief relearning task was administered on the computer. The relearning task was composed of another PowerPoint slide show that included the 12 previously learned target individuals (from the exposure task) with 1 target presented in each slide. Each slide contained only the name of the target, the photo of the target, and the sentence describing a unique/individuating trait related to that target and was presented for 5 s each. The entire reminder task took a total of 1 min. Then, the participants read the instructions and completed the day 1 LDT. Within the day 1 LDT, a blank screen was presented for 1000 ms. A fixation point (X) was then presented centrally on the screen for 500 ms. Next, a photo was presented centrally on the computer screen for 400 ms. A blank screen was then presented for 50 ms, and finally, the participants were presented with a letter string for 1500 ms or until the participant responded.

Using the response pad placed in front of them, participants were instructed to decide, as quickly and accurately as possible, whether the letter string was a word or a non-word by pressing the appropriately labeled keys on the response pad. If the letter string was a word, participants were instructed to press ‘4’. If the letter string was a non-word, participants were instructed to press ‘5’. The photos used in the day 1 LDT consisted of the first learned photo set (i.e., 6 of the 12 learned targets) and 6 novel targets. The letter strings used within the day 1 LDT consisted of 12 gender stereotypes, 12 unique (non-gender stereotypic) traits, and 24 non-words. This test had 3 separate blocks of trials with a 30 s break in-between each block. The first block was practice to help participants become accustomed to the task. Within the practice block, a photo of either a banana or an apple was shown, followed by a letter string. The letter strings within the practice block were either a non-word or a non-trait word (i.e., school and house). Within the second block, each target was paired with 4 trials (i.e., consistent gender stereotype, unique trait, and two non-words). The third block was a replication of the second block with all trials in each block randomized. The day 1 LDT consisted of a total of 104 trials and took approximately 10 min to complete. Upon completion of the day 1 LDT, participants then completed the day 1 categorization task described in detail within Experiment 1b.

Day 2 LDT. After returning from the 48 hr break, participants were asked to complete the sleep quality questionnaire on the computer. Next, the same reminder task was again administered. Participants then read the instructions for and completed the day 2 LDT. The methods for this test remain the same as used within the day 1 LDT with two important distinctions. First, the photos used within the day 2 LDT consisted of the second learned photo set (i.e., the other ½ of the 12 learned targets from the exposure task) and 6 novel targets. Also, the letter strings used within day 2 LDT consisted of the 12 gender stereotypes, 12 unique (non-gender stereotypic) traits, and 24 non-words that were not used within the day 1 LDT. The day 2 LDT also consisted of 104 trials and took approximately 10 min to complete. Upon completion of the day 2 LDT, participants then completed the day 2 categorization task described in detail within Experiment 1b.

RESULTS

Consistent with previous research (Zárate et al., 2000; 2008), only correct RTs between 200 ms to 1,500 ms were analyzed. RTs below 200 ms are considered too fast for participants to have correctly completed the task and RTs above 1500 ms are considered too slow to provide a valid assessment of processing speed. When the aggregate means were evaluated for normality, the response latencies were positively skewed. Thus, all response latencies were replaced by their inverse (Ratcliff, 1993). This transformation produced a normal distribution of latency data.

The data were first analyzed within a 2 (Time: day 1 LDT vs. day 2 LDT) X 2 (Target Type: learned vs. novel) X 2 (Trait Type: stereotypic vs. unique) repeated measures ANOVA with RT serving as the dependent variable. First, this analysis revealed three main effects. As predicted, a significant main effect of time was found, $F(1,50)=12.85$, $p=.0008$, where participants exhibited overall faster RTs within the day 2 LDT ($M=552$, $SD=72$) than within the day 1 LDT ($M=594$, $SD=99$). Second, a significant main effect of target type was found, $F(1,50)=16.38$, $p=.0002$, where participants exhibited overall faster RTs for learned targets ($M=536$, $SD=73$) than novel targets ($M=583$, $SD=87$). Third, a significant main effect of trait type was shown, $F(1,50)=4.79$, $p=.033$, where participants exhibited overall faster RTs for stereotypic traits ($M=570$, $SD=81$) than unique traits ($M=577$, $SD=78$).

This analysis also revealed a significant Target Type X Trait Type interaction, $F(1,50)=8.23$, $p=.006$. To decompose this interaction, two separate ANOVAs were conducted with each comparing responses to learned and novel targets with either the unique traits or stereotypic traits. For the unique traits, there was a significant main effect of Target Type, $F(1,50)=22.81$, $p<.0001$. As depicted in Figure 3, unique traits were responded to faster when associated with the learned targets (*M*=562, *SD*=73) than the novel targets (*M*=591, *SD*=90). On the other hand, there was no significant difference for RTs to the stereotypic traits between the learned (*M*=565, *SD*=79) and novel targets (*M*=574, *SD*=89), $F(1,50)=2.99$, *ns*.

The initial analysis also revealed a significant 3-way interaction that included Time X Target Type X Trait Type, $F(1,50)=12.27$, $p=.001$. Because the primary focus of this study was the impact of time on learned versus novel targets, this 3-way interaction was decomposed by analyzing the learned and novel targets separately to identify differences within a multitude of analyses.

The first test included the learned targets in a 2 (Time: day 1 LDT vs. day 2 LDT) X 2 (Trait Type: stereotypic vs. unique) repeated measures ANOVA and revealed a significant Time X Trait Type interaction, $F(1,50)=11.21$, $p=.001$. Once again, to decompose this interaction, two separate ANOVAs were conducted with each comparing responses within the day 1 LDT and day 2 LDT with either the unique traits or stereotypic traits. For the unique traits, there was a significant main effect of Time, $F(1,50)=16.02$, $p=.0002$. As predicted, participants responded significantly faster to the unique traits within the day 2 LDT (*M*=535, *SD*=73) than within day 1 LDT (*M*=589, *SD*=100) when associated with the learned targets (See Figure 4). This was not found for the stereotypic traits between the day 1 LDT (*M*=573, *SD*=100) and the day 2 LDT (*M*=557, *SD*=85), $F(1,50)=.70$, *ns* (See Figure 4).

The next test included the novel targets as repeated measures in the same analysis and produced only a significant Trait Type main effect, $F(1,50)=11.34$, $p=.001$. As shown in Figure 5, participants responded significantly faster to the stereotypic traits ($M=574$, $SD=89$) than to the unique traits ($M=591$, $SD=90$).

Day 1 LDT Analyses

Next, the 2 LDTs (i.e., day 1 and day 2) were analyzed separately. For the day 1 LDT, the data were first analyzed within a 2 (Target Type: learned vs. novel) X 2 (Trait Type: stereotypic vs. unique) repeated measures ANOVA with RT serving as the dependent variable. As predicted, this analysis revealed a significant Trait Type main effect, $F(1,50)=10.69$, $p=.002$, where participants responded to the stereotypic traits ($M=587$, $SD=99$) faster than to the unique traits ($M=600$, $SD=104$, See Figure 6).

This analysis also revealed a significant Target Type main effect, $F(1,50)=12.07$, $p=.001$, where participants responded to traits associated with the learned targets ($M=581$, $SD=95$) significantly faster than to traits associated with the novel targets ($M=607$, $SD=112$).

Day 2 LDT Analyses

For the day 2 LDT, the same repeated measures ANOVA described within day 1 LDT analyses also produced a significant target type main effect, $F(1,50)=8.68$, $p=.004$, where participants responded to the traits associated with the learned targets ($M=546$, $SD=73$) significantly faster than to the traits associated with the novel targets ($M=558$, $SD=77$). In addition, this analysis produced a significant Target Type X Trait Type interaction, $F(1,50)=27.38$, $p<.0001$. To decompose this interaction, two separate ANOVAs were conducted with each comparing responses to learned and novel targets with either the unique traits or the stereotypic traits. For the unique traits, there was a significant main effect of Target Type, $F(1,50)=36.42$, $p<.0001$. As predicted, unique traits were responded to faster when associated with the learned targets ($M=535$, $SD=73$) than the novel targets ($M=570$, $SD=83$). This effect was not found for the stereotypic traits when associated between the learned ($M=557$, $SD=85$) and novel targets ($M=547$, $SD=83$), $F(1,50)=1.11$, *ns*. In addition, two separate ANOVAs were conducted with each comparing responses to stereotypic and unique/individuating traits with either the learned targets or the novel targets. While it was predicted that there would not be a significant difference between the unique and stereotypic traits when associated with the learned targets, a significant Trait Type main effect, $F(1,50)=8.03$, $p=.0066$, was found. When associated with the learned targets during the day 2 LDT, participants responded to the unique traits significantly faster ($M=535$, $SD=73$) than to the stereotypic traits ($M=557$, $SD=85$, See Figure 7). In contrast, a Trait Type main effect was also found for novel targets, $F(1,50)=10.52$, $p=.002$, where participants responded to the stereotypic traits ($M=547$, $SD=83$) significantly faster than the unique traits ($M=570$, $SD=83$, See Figure 7).

Explicit Sexism Scale Analyses

Both the Ambivalent Sexism Inventory (Glick & Fiske, 1996) and the Ambivalence toward Men Inventory (Glick & Fiske, 1999) failed to produce any significant or interesting correlations within the LDT analyses. Additionally, neither scale was a significant moderator of the main reported analysis and was thus dropped from further analyses.

Exploratory Post-hoc Analyses

Because Experiment 1 employed sex as the tested social category, exploratory analyses were conducted to investigate possible participant sex effects. In order to look for participant sex effects, the data were again analyzed within a 2 (Time: day 1 LDT vs. day 2 LDT) X 2 (Target Type: learned vs. novel) X 2 (Trait Type: stereotypic vs. unique) X 2 (Participant Sex) mixed measures ANOVA with RT serving as the dependent variable and participant gender as a between-participants variable. This analysis revealed only a significant target type X participant sex interaction, $F(1,49)=7.77$, $p=.007$. Female participants responded overall faster to the stereotypic traits ($M=552$, $SD=61$) than the unique traits ($M=567$, $SD=54$) while male participants responded to the stereotypic traits ($M=586$, $SD=93$) and unique traits ($M=585$, $SD=95$) with equal speed.

The possible effects of sleep were also examined within this experiment. Neither the amount of sleep participants reported during the two nights nor the self-reported restorative nature of the participants' sleep had a significant impact on results. Additionally, the results were not changed when either the amount of sleep or the restorative nature of sleep were used as covariates.

Experiment 1b – Categorization Task

METHOD

Participants & Procedure

Experiment 1a (i.e., LDT) and 1b (i.e., categorization) were run simultaneously with the same participants. Thus, the participants analyzed within Experiment 1a remain the same as within Experiment 1b with one distinction. An additional self-identified Mexican-American male was not analyzed due to measurement error (i.e., the participant mistakenly completed the day 2 LDT rather than the day 2 categorization task).

With the exception of one important distinction, the photos used within the categorization studies largely remain the same as Experiment 1a. As described previously within the Experiment 1a methods, 36 (18 male and 18 female) photos were randomly divided into 1 "learned" set of 6 male and 6 female photos and 4 "novel" sets of 3 male and 3 female photos. The 2 "novel" sets of photos that were not used within Experiment 1a were used within Experiment 1b. This was done to ensure that the novel photos remained novel to the participants throughout the duration of both experiments and reduce repetition priming effects.

Day 1 Categorization Task. After returning from the 2-6 hr break and completing the day 1 LDT, participants then read the instructions and completed the day 1 categorization task. Within this test, a blank screen was presented for 1000 ms. A fixation point (X) was then presented centrally on the screen for 500 ms. Next, a photo was presented centrally on the computer screen for 400 ms. A blank screen was then presented for 50 ms, and finally, the participants were presented with a group label for 1500 ms or until the participant responded. Using the response pad placed in front of them, participants were instructed to decide, as quickly and accurately as possible, whether the group label matched the previously shown target by pressing the appropriately labeled keys on the response pad. If the target in the photo could be correctly categorized with the group label, participants were instructed to press '4'. If the target in the photo could not be correctly categorized with the group label, participants were instructed to press '5'. The photos used in the day 1 categorization task consisted of the same learned photo set used within the day 1 LDT (i.e., 6 or ½ of the 12 learned targets from the exposure task) as well as 6 novel targets. The group labels used within both categorization tasks consisted of "Woman," "Man," "Old," or "New". The terms "Old" and "New" refer to whether the targets were part of the exposure task (i.e., familiar) or novel targets. Due to a possible semantic confusion between the word "Old" and a person's age, participants were explicitly and verbally informed that the category "Old" meant only that they had seen that person before (i.e., familiar) within the experiment and not the target's age.

The day 1 categorization task consisted of 3 separate blocks of trials with a 30 s break in-between each block. The first block was practice to help participants become accustomed to the task. Within the first block, a photo of either a banana or an apple was shown and followed the group label "banana" or "apple". Within the second block, each target photo was paired with 4 trials (i.e., each group label). The third block was a replication of the first block with all trials in each block randomized. The first categorization task consisted of a total of 100 trials and took approximately 10 min to complete. Upon completion of the day 1 categorization task, participants were then dismissed and reminded to return for the final experimental session 48 hr later.

Day 2 Categorization Task. After returning from the 48 hr break and completing the day 2 LDT, participants then read the instructions and completed the day 2 categorization task. Again, the methods for this test remain the same as used within the day 1 categorization task with one exception. The photos used within the day 2 categorization task consisted of the other learned photo set (i.e., the other ½ of the 12 learned targets from the exposure task) and 6 novel targets. The day 2 categorization task also consisted of a total of 100 trials and took approximately 10 min to complete. After the completion of the day 2 categorization task, the participants then completed Experiment 2.

RESULTS

Response times (RTs) below 200 ms were deleted from analyses. Consistent with previous research (Zárate et al., 2000; 2008), only correct RTs between 200 ms and 1,500 ms were analyzed. When the aggregate means were evaluated for normality, the data were normally distributed and no transformations were performed.

The data were first analyzed within a 2 (Time: day 1 categorization task vs. day 2 categorization) X 2 (Target Type: learned vs. novel) X 2 (Categorization Type: gender vs. familiar) repeated measures ANOVA with RT serving as the dependent variable. This analysis revealed three main effects. First, as predicted, a significant main effect of Time was found, $F(1,49)=27.06$, $p<.0001$, where participants exhibited overall faster RTs within the day 2 categorization task ($M=709$, $SD=108$) than within the day 1 categorization task ($M=776$, $SD=117$). Second, a significant main effect of Target Type was found, $F(1,49)=39.33$, $p<.0001$, where participants exhibited overall faster RTs for learned targets ($M=726$, $SD=87$) than novel targets ($M=780$, $SD=105$; See Figure 8). Third, a significant main effect of Categorization Type was found, $F(1,49)=104.18$, $p<.0001$, where participants exhibited overall faster RTs within the gender categorization ($M=671$, $SD=81$) than within the familiar categorization ($M=818$, $SD=125$). This analysis also revealed a significant Time X Target Type interaction, $F(1,49)= 4.89$, $p=.031$. In order to decompose this interaction, difference scores between day 1 categorization task and day 2 categorization task for both the learned and novel targets were analyzed and produced a significant main effect of Time *F*(1,49)=4.89, *p*=.031. RTs for the novel targets between day 1 categorization task and day 2 categorization task (*M*=78, *SD*=104) differed more than for the learned targets between day 1 categorization task and day 2 categorization task (*M*=47, *SD*=93).

However, the predicted 3–way interaction of Time X Target Type X Categorization Type was not significant, *F*(1,49)=2.10, *p*=.153. In order to test for the hypothesized effects within day 1 categorization task, a 2 (Target Type: learned vs. novel) X 2(Categorization Type: gender vs. familiar) repeated measures ANOVA with RT serving as the dependent variable was conducted. This analysis did not produce the predicted Target Type X Categorization type interaction, *F*(1,49)=2.77, *ns.* In order to test for the hypothesized effects with the day 2 categorization task, the same analysis was conducted. This analysis also did not produce the predicted Target Type X Categorization type interaction, *F*(1,49)=0.00, *ns.*

Exploratory Post-hoc Analyses

In order to test for participant sex effects, the data were again analyzed within a 2 (Time: day 1 categorization task vs. day 2 categorization task) X 2 (Target Type: learned vs. novel) X 2 (Categorization Type: gender vs. familiar) X 2 (Participant Sex) mixed measures ANOVA with RT serving as the dependent variable and participant sex as a between-participants variable. This analysis failed to reveal any significant Participant Sex effects.

The possible effects of sleep were also examined within this experiment. Neither the amount of sleep participants reported during the two nights nor the self-reported restorative nature of the participants' sleep had a significant impact on results.

Additionally, the results were not changed when either the amount of sleep or the restorative nature of sleep were used as covariates.

DISCUSSION

Experiment 1 investigated the influence of familiarity and time on the argument of the automaticity of social categorization and associated stereotypes. To accomplish this research goal, time was manipulated between two separate social perception tasks (i.e., Experiment 1a - lexical decision task and Experiment 1b - categorization task). The categorization tasks were designed to test the automaticity of social categorization and the lexical decision tasks were designed to test the automaticity of the associated stereotypes. Prior to all tests, participants learned personalizing information about 12 targets and then were tested via the two tasks both 2-6 hr and 48 hr later.

As predicted, Experiment 1a found that participants were quicker to associate unique/individuating information with novel targets when tested 48 hr after the exposure than when tested 2-6 hr after the exposure. This effect was not found for the stereotypic information associated with the learned targets or for the novel targets. Thus, participants were only significantly faster to react to individualizing information when associated with the learned targets when enough time had passed for those memory traces to stabilize. Moreover, Experiment 1a also found that with time and familiarity, participants were significantly faster to respond to the unique/individuating information than to the stereotypic information. On the other hand, Experiment 1b failed to find any of the hypothesized effects with the exception that participants were overall faster at day 2 than during day 1. Experiment 1b did find, however, that participants were overall significantly faster to categorize the learned targets than the novel targets.

Thus, Experiment 1b provided further evidence that social categorization may, in fact, be an automatic process. Moreover, the addition of familiarity and time seems to facilitate rather than impede social categorization. Experiment 1a, on the other hand, found evidence that the associated stereotypes are not always automatically activated. That is, when participants were provided with individualizing information about a target and time for those memory traces to become enhanced and stabilized, the individualizing information was activated faster. Moreover, when individuals were given time for the individualizing memory traces to become enhanced and stabilized, they not only used that information faster than without time but they were now faster to rely on the individualizing information rather than the stereotypical information. Thus, in contrast to previous arguments, Experiment 1a found support for the hypothesis that individualizing (or personalized) information is activated quicker than stereotypical information after familiarity is established over time.

EXPERIMENT 2

Experiment 2 was designed to further the investigation of the impact of familiarity and time on social perception. Within Experiment 2, the area of interest was the influence of a cognitive load on social perception. Research has consistently shown that social categorization is influenced by a cognitive load (Bodenhausen, 1988, 1990; Gilbert & Hixon, 1991; Kruglanski & Freund, 1983; Macrae, Hewstone, & Griffiths, 1993; Macrae, Milne, & Bodenhausen, 1994; Pendry & Macrae, 1999; Stangor & Duan, 1991). When individuals are cognitively busy, stereotypes essentially become the "tools that jump out" of our cognitive toolbox when one does not have the extra cognitive processes available to look for other tools (Gilbert & Hixon, 1991, p. 510). Experiment 2 extends this existing argument by testing how time (i.e. memory consolidation) impacts the cognitive load effect on social categorization. As memory consolidation has been shown to stabilize memories (McGaugh, 2000; Medina et al., 2008; Spear & Mueller, 1984; Walker & Stickgold, 2006), it was predicted that memories learned 48 hr prior to test should become more resistant to concurrent loads than newly learned memories. Time will essentially repackage the cognitive toolbox so that the tools that work towards individuation are now included in the set that "jump out" (Gilbert & Hixon, 1991, p. 510).

Social categorization and cognitive loads

Research suggests that people are "cognitive misers" (Taylor, 1981), which is to say that they rely on social shortcuts to simplify the task of sorting through the consistent barrage of social information (Fiske & Taylor, 1991). Within this line of thinking, the use of stereotypes or social categorization is beneficial as these processes essentially work as time savers and ease the perceptual work for individuals (Gilbert &

Hixon, 1991; Macrae et al., 1993). However, while social categorization proves to be a short-cut to organizing our daily world, individuation is a process that requires time and effort (Brewer, 1988; Fiske & Neuberg, 1990). When cognitive resources are low or limited, individuation is too taxing and individuals switch to the short-cut provided by categorization (Fiske & Neuberg, 1990). In fact, stereotype application is facilitated with the use of a cognitive load as stereotypes are the easiest and most accessible cognitive tools available (Gilbert & Hixon, 1991; Macrae et al., 1993; Pendry & Macrae, 1999).

In 1991, Gilbert and Hixon investigated the impact of cognitive load on social categorization. Within a word fragment completion task, the authors found that when a cognitive load was introduced during the application phase (e.g., during the formation of impressions) of their experiment, participants were more likely to apply their previously activated stereotypes. Macrae et al. (1993) found similar results with the use of a videotaped conversation between two females that had either a sex consistent job (i.e., hairdresser) or a sex inconsistent job (i.e., doctor). Afterwards, the participants were asked to recall the conversation. Participants who were also asked to remember an 8-digit number during this recall phase (i.e., the application phase), made an increased amount of stereotypic or target-based judgments. Furthermore, Pendry and Macrae (1999) found that when participants are cognitively busy they remember more stereotype consistent information and the variability of the group no longer matters.

Cognitive loads, however, are not necessarily limited to influencing stereotypic or categorical thinking. While many have argued that the activation of stereotypes is automatic (Devine, 1989), others have argued that this automaticity may, in fact, be conditional (Bargh, 1989). Gilbert and Hixon (1991) theorized that it may take more than mere exposure to an individual to activate an associated stereotype. The processes involved in stereotype activation, the authors argued, can also be taxed and hindered with a cognitive load. Thus, while research has shown that introducing a cognitive load during the stereotype application process increases stereotypic or categorical thinking, Gilbert and Hixon hypothesized that taxing cognitive resources during the stereotype activation processes will eliminate stereotype activation.

Gilbert and Hixon (1991) found that the increased load decreased stereotype activation when the cognitive load manipulation was employed during the encoding process. The authors had participants complete a word fragment completion task where a card turner appeared via a video. The card turner was either a Caucasian or Asian female. In the cognitively busy condition, participants were asked to remember an 8-digit number immediately before the video started. After the video, the busy participants were asked to recall the number followed by asking all participants to recall the ethnicity of the card turner in the video. Gilbert and Hixon found that the participants who were kept cognitively busy with the 8-digit task were significantly less likely to recall stereotypic completions to the word fragments when they viewed the Asian card turner. Yet, participants in both load conditions were able to recall the ethnicity of the card turner correctly. The authors concluded that the cognitive load was efficient at decreasing the activation of stereotypes even though participants were still able to correctly recall the ethnicity of the card turner. Therefore, the cognitive load actually eliminated the stereotype activation and turned the Asian card turner into a card turner that was not based on ethnicity. This finding led to the conclusion that incurring a cognitive load during the encoding of stereotypes may facilitate person perception processes (Gilbert & Hixon, 1991).

The idea that cognitive loads increase social categorization, however, is not without dispute. Spears, Haslam, and Jansen (1999) argue that both social categorization and individuation are effortful processes and, as such, both should be impacted by a cognitive load. Within two separate experiments, Spears et al., found that social categorization decreased with a cognitive load. How a cognitive load is conceptualized, however, is an important distinction with this argument. While the cognitive load studies discussed before used an 8-digit cognitive load manipulation, Spears et al. (1999) conceptualized cognitive loads as a memory set size. Even with this difference, the consensus remains that cognitive loads increase social categorization.

Memory consolidation, sleep, and selective resistance to interference

In order to tie in the systems-level memory consolidation research with the social categorization and cognitive load theories, one has to ask how systems-level memory consolidation has been shown to react to cognitive loads in previous cognitive research. Again, systems-level memory consolidation is defined as a time-dependent process that involves transforming a newly formed and vulnerable memory trace into a stronger and more resilient memory (McGaugh, 2000; Medina et al., 2008; Spear & Mueller, 1984; Walker & Stickgold, 2006). Additionally, memory consolidation processes are thought to counteract forgetting and form declarative memories that are resistant to interference (McGaugh, 2000; Walker & Stickgold, 2006). As discussed previously, many researchers have found evidence that sleep plays a role within the consolidation of declarative memories. Furthermore, it has been argued that sleep is the factor that essentially buffers or protects the new fragile memory from retroactive interference while the consolidation process is taking place (Wixted, 2004).

In 1967, Ekstrand tested the idea that sleep buffers new memories from retroactive interference using the A-B, A-C paradigm. The A-B, A-C paradigm involves the participants learning one list of words where a specific cue word (A) is associated with a specific target word (B). Participants then learn a second list of words where the same cue word (A) is now associated with a new target word (C). Within this paradigm, memory for the first list of words is typically hindered as the second list causes retroactive interference. Following the A-B, A-C learning paradigm, participants were then split into groups where they were either tested for retrieval after eight hrs of sleep or for retrieval in the same day without sleep. Ekstrand (1967) found that the participants who had slept were able to remember more overall and, more importantly, were better able to remember the words from the first list. Forty years later, Drosopoulos, Schuze, Fischer, & Born (2007) replicated Ekstrand's study and also found that sleep offsets the effects of retroactive interference on memories.

Cognitive load, categorical thinking, and time

The theory that cognitive loads increase social categorization has been widely accepted (Bodenhausen, 1988, 1990; Gilbert & Hixon, 1991; Kruglanski & Freund, 1983; Macrae et al., 1993; Macrae et al., 1994; Pendry & Macrae, 1999; Stangor & Duan, 1991). This theory, however, also relies on research using newly learned targets tested during one session. Thus, memory consolidation constructs, once again, point to some interesting distinctions that may lead to a more realistic test of the cognitive miser theory. Research shows that memory consolidation processes selectively strengthen weakly associated declarative memories against retroactive interference (Drosopoulos et al., 2007; Ekstrand, 1967). Thus, the argument made previously that individuating memories reflect an episodic memory and stereotypic memories reflect a semantic memory becomes relevant here as well.

Cognitive loads are believed to increase social categorization because individuation involves a complex and effortful process with weaker associations while social categorization is an effortless task that involves strongly over learned associations (Brewer, 1988; Fiske & Neuberg, 1990; Gilbert & Hixon, 1991; Macrae et al., 1993). Because social categorizations are the stronger and over learned associations, time (i.e., memory consolidation) may facilitate individuation. The structural change imposed by memory consolidation may selectively work to enhance and buffer the weakly associated individuating memories against the effects of retroactive interference (i.e., a cognitive load). This change may allow one to access the learned individuating memories and stereotypic memories equally. Thus, time (i.e., memory consolidation) may essentially reorganize the cognitive toolbox so the tools for individuation are more easily accessed during loads. Experiment 2 tests this hypothesis.

Methods Overview

Experiment 2 further explored the impact of time on social perception by investigating the impact of a cognitive load on the individuating memories that were encoded 48 hr earlier. To accomplish this research goal, cognitive loads were embedded within a categorization task. All participants first completed Experiment 1 where they acquired individuating memories for 12 targets within the exposure task and then completed an LDT and a categorization task (See Experiment 1 methods). After the completion of Experiment 1, participants were then asked to complete Experiment 2. Experiment 2 was designed to only test the individuation process. Thus, Experiment 2 consisted of a familiar vs. novel categorization task where cognitive load trials were randomly embedded within the task for each participant. The cognitive load trials consisted of participants subtracting 3 from a given number (i.e., 92 - 3) and recalling the answer (i.e., 89) when asked after the categorization. The categorization task included the 12 familiar targets from the exposure task 48 hr earlier (i.e., intentionally exposed targets), the 12 targets that were previously exposed as new targets during the second session of Experiment 1 (i.e., unintentionally exposed targets), and 12 additional novel targets.

Hypotheses

Within Experiment 2, it was hypothesized that intentionally exposed targets would be more resistant to concurrent loads when compared to the unintentionally exposed and novel targets. More specifically, it was hypothesized that during the cognitive load trials participants would respond to the unintentionally exposed targets significantly slower than to the intentionally exposed targets. Also, no significant differences were expected between the load trials and the no load trials for the intentionally exposed targets. Additionally, it was hypothesized that participants would respond to the unintentionally exposed targets slower within the load trials than within the no load trials. It was also hypothesized that time would produce a significant main effect. More specifically, participants would respond to the intentionally exposed targets faster overall than the unintentionally exposed targets.

METHOD

Participants

Experiment 2 and Experiment 1 were run simultaneously with the same participants. Thus, the participants that took part in Experiment 1 remain the same as those that took part in Experiment 2. The criteria and number of participants removed from analyses, however, change within Experiment 2. First, a total of 23 participants were removed from analyses because they indicated knowing at least one target. Second, an additional 2 participants were removed from analyses because they self-reported that they did not speak English. Next, a total of 15 additional participants were removed from analyses due to answering more than 9 of the load answer trials incorrectly. Within Experiment 2, 36 trials were load answer trials. Within these trials, participants were asked to give the correct math answer. If participants incorrectly answered or failed to answer more than 9 of these trials, the cognitive load manipulation may have had no impact on the participant. Previous research involving a cognitive load has commonly analyzed data only for participants that correctly recalled at least 75% of a load (Gilbert & Hixon, 1991). Thus, the inclusion criterion was followed within the current experiment. Finally, 17 additional participants were removed from analyses due to incorrectly answering or not responding to more than 54 of the 108 trials. Participants who had more than 54 errors were less than 50% correct overall within Experiment 2.

After these deletions, a total of 27 (10 female and 17 male) participants were analyzed. An a priori power analysis, conducted via G*Power 3.0.5 (Faul, Erdfelder, Lang, & Buchner, 2007); indicated that the total number of participants needed in order to obtain a power of .81 was 42. Thus, the number of participants analyzed within this study did not meet the a priori power requirement.

Of the analyzed participants, 20 self-reported as Mexican-American. The remaining participants self-reported as African-American (*n*=2), European-American (*n*=3), Mexican-National (*n*=1), and 1 participants self-identified themselves as “other”. The mean participant age was 21 with a range from 18 – 38 and a mode of 19.

Materials

The photos used within Experiment 1 largely remained the same as within Experiment 2 and details for the photos are described in full within Experiment 1a methods. As participants within Experiment 2 also completed the exposure task within Experiment 1, the same 12 (6 female and 6 male) photos used within the exposure task described within Experiment 1 were used within the present study. In addition, the 12 novel targets used within the day 2 LDT and categorization tasks of Experiment 1 were also used within Experiment 2. However, an additional 12 (6 female and 6 male) photos were employed within Experiment 2. While the specifications and criterion for these photos remained the same as within Experiment 1, these photos were not used within Experiment 1 ensuring that these photos were novel to the participants. Each set of photos represent an initial exposure sequence to which participants were randomly assigned. Within each of these initial exposure sequences, the male and female photos were randomly dispersed.

A total of 44 random numbers between 5 and 100 were also used within Experiment 2. These random numbers were employed as the cognitive load. Participants were shown a number and instructed to subtract 3 from the number. All of the numbers were randomly generated via an online random number generator. A total of 36 of these numbers were randomly selected to be used within the actual task and another set of 8 numbers was randomly selected to be used within the practice trials.

All tests were programmed and administered through SuperLab 4.0 software (Cedrus Corporation, 2007) and participants responded via a generic computer keyboard.

Procedure

After the completion of Experiment 1, a brief reminder task was administered on the computer. The reminder task consisted of an additional PowerPoint slide show that included the 12 target individuals from the exposure task and the 12 previously novel target individuals from the day 2 LDT and categorization tasks. One target was presented per slide and each slide contained only the photo of the target. Each slide was presented for only 5 s. Thus, the entire reminder task was 2 min long.

Following the completion of the reminder task, participants read the instructions for the categorization task. The test consisted of a familiar vs. novel categorization task. Cognitive loads were also embedded within the test itself. Thus, half of the trials were load trials and the other half were no load trials.

No Load Trials. First, a blank screen was presented for 1000 ms. A fixation point (X) was then presented centrally on the screen for 500 ms. Next, a blank screen was then presented for 50 ms. Finally, a photo was presented centrally on the computer screen for 2000 ms or until the participant responded. Using the keyboard, participants were instructed to decide, as quickly and accurately as possible, whether the individual in the photo was familiar or novel. Participants were again explicitly and verbally informed that familiar meant that they had seen that individual before within the experiment and novel meant that they had not seen that individual within the experiment. If the individual in the photo was familiar, participants were instructed to press “1” on the number pad. If the individual in the photo was novel, participants were instructed to press “3” on the number pad.

Load Trials. First, a blank screen was presented for 1000 ms. Then, a large red dot was presented centrally on the computer screen for 500 ms to forewarn the participants of the upcoming math load. Next, a number was presented centrally on the computer screen for 2000 ms. Within the instructions, participants had been instructed to mentally subtract 3 from the given number. Next, a blank screen was then presented for 50 ms. Finally, a photo was presented centrally on the computer screen for 2000 ms or until the participant responded. If the individual in the photo was familiar, participants were instructed to press “1” on the number pad. If the individual in the photo was novel, participants were instructed to press “3” on the number pad. Finally, the text “Math Answer?” and a text box appeared centrally on the computer screen until the participant responded. Participants were instructed to enter the answer to the subtraction problem previously presented using the number pad.

The test consisted of three blocks of trials with the first block being a practice block. Within the practice block, the photos consisted of either an apple or banana. If the photo was a banana, participants were instructed to press “1” on the number pad. If the photo was an apple, participants were instructed to press “3” on the number pad. The practice block also consisted of both load and no load trials. A total of 8 random numbers were used within the load trials for the practice block. The practice block consisted of a total of 24 trials in an attempt to let the participants become accustomed to the task at hand. Within the remaining test blocks, all targets were shown within both a load trial and a no load trial. Within the second block, half of the targets were shown within a load trial and the other half were shown within a no load trial. The third block reversed the targets within load and no load trials. The order that the second and third blocks were presented to the participant was randomized in order to control for any order effects. This categorization task consisted of a total of 132 trials and took approximately 20 min to complete. Upon completion of the test, all participants were then asked to complete The Ambivalent Sexism Inventory (Glick & Fiske, 1996), the Ambivalence toward Men Inventory (Glick & Fiske, 1999), and prior familiarity check in a randomized order. Participants were then fully debriefed on both Experiment 1 and Experiment 2 and were dismissed.

Results

RTs below 200 ms were deleted from analyses. As done in previous research (Zárate et al., 2000; 2008) and within Experiment 1, only correct RTs between 200 ms to 1,500 ms were analyzed. The aggregate means were evaluated for normality and all response means fell within acceptable limits and no transformations were used.

The main design of Experiment 2 was a 3 (Target Type: intentionally exposed, unintentionally exposed, or novel) X 2 (Cognitive Load: load or no-load) within-subjects design with RT serving as the dependent variable. The analysis only revealed a significant main effect of Target Type, *F*(2, 52)=28.11, *p*<.0001. As predicted, planned comparisons showed that participants were faster to respond to the intentionally exposed targets (*M*=697, *SD*=56) than to the unintentionally exposed targets (*M*=744, *SD*=60). Additionally, participants responded significantly faster to the exposed targets than the new targets (*M*=764, *SD*=53). This main analysis, however, failed to produce the predicted Target Type X Load interaction, *F*(2, 52)=2.17, *p*=.124. Moreover, the analysis also failed to produce the predicted main effect of Load, *F*(1, 26)=.55, *ns*.

Because it was hypothesized that the intentionally exposed targets would be more resilient to concurrent loads when compared to the unintentionally exposed targets, difference scores of the load and no load trials were conducted and analyzed. These difference scores calculated the amount of change in RT between a no load trial and a load trial. Positive numbers indicated the no load trials were slower than load trials and negative numbers indicated that the load trials were slower than the no load trials. However, a one-way repeated measures analysis of these difference scores for both the intentionally and unintentionally exposed targets failed to reveal a significant difference, *F*(1, 26)=.92, *ns*. Due to the drastic amount of data that was eliminated from the above analyses and in an attempt to better understand the data, this same one-way analysis was conducted without the error deletions. Thus, rather than analyzing 26 data sets this analysis included 38 data sets. However, this analysis also failed to produce a significant finding, *F*(1, 37)=.66, *ns*.

Discussion

Experiment 2 investigated the impact of familiarity and time on cognitive loads within a social perception task. Experiment 2 utilized a familiar vs. novel categorization task with cognitive loads embedded within the task. Participants learned personalizing information about 12 targets 48 hr prior to the test and were then unintentionally exposed to an additional 12 targets in the duration of the second session of Experiment 1. The ensuing analyses revealed only a significant main effect of Target Type where participants responded faster to the targets exposed 48 hr earlier (i.e., intentionally exposed) than to the targets exposed within the same day (i.e., unintentionally exposed).

Due to a large error rate, 68% of the data was removed from analyses which resulted in this experiment being underpowered. Therefore, any interpretation of analyses should be done with the idea of repairing the cognitive load manipulation and re-running this experiment again in the future.

GENERAL DISCUSSION

The present research explored the impact of familiarity and time on social perception processes. Familiarity was manipulated with an exposure task. Within the exposure task, participants learned individualizing information about 12 targets. Time was manipulated by testing the participants both 2-6 hr and 48 hr after the exposure task. Therefore, the time between exposure and test was either within the same day (2-6 hr) after the exposure task or two full days (48 hr) after the exposure task. Experiment 1 investigated the influence of familiarity and time on the argument of the automaticity of social categorization and associated stereotypes by separating the argument into two parts. First, Experiment 1a tested the influence of familiarity and time on associated stereotypes. Contrary to the prevailing arguments made in social perception literature, Experiment 1a found that, with familiarity and time, participants responded to individualizing information faster than to stereotypic information. Second, Experiment 1b tested the influence of familiarity and time on social categorization and found further support for previous findings. Experiment 2 further investigated the influence of familiarity and time on social perception processes by imbedding a cognitive load into a social categorization task. Experiment 2 found little support for the hypothesis that familiarity and time would influence social categorization and cognitive loads. Experiment 2 found only that participants were overall faster to respond to the targets they had learned 48 hr earlier than to the targets they had been exposed to 20 min earlier.

Experiment 1 was designed to test the impact of familiarity and time on a consistent argument with social perception research: social categorization and the associated stereotypes are automatic processes (Brewer, 1988; Fiske, 1989; Dovidio et al., 1986; Fazio & Dunton, 1997; Kawakami et al, 2000; Stroessner, 1996; Zárate & Smith, 1990). Specifically, Experiment 1 tested the influence of familiarity and time on social perception with the use of both a LDT and a categorization task. This distinction was specifically designed to better investigate the argument that both social categorization and the associated stereotypes are automatically activated by breaking the argument into two separate arguments. Experiment 1b was designed to test the argument that social categorization is automatic by manipulating familiarity and time within a social categorization task. Experiment 1a was specifically designed to test the argument that the associated stereotypes are also automatically activated by manipulating familiarity and time within a LDT.

The first part of this argument (i.e., social categorization is automatic) revolves around the idea that social categorization is a time-saving and well-practiced activity that we use daily (Gilbert & Hixon, 1991). Due to this constant practice, individuals are able to perceive and categorize others by age, race, and sex very quickly which leads to the argument that social categorization is an automatic process. In fact, Experiment 1b provided further evidence that social categorization may, in fact, be an automatic process. Even when participants were given individuating information about a target and time for those memory traces to become enhanced and stabilized, participants were still faster to categorize targets by sex. In fact, participants were faster to categorize the learned targets than the novel targets. It seems, then, that familiarity and time may work to facilitate categorization rather than impede categorization processes.

Still, Experiment 1b found further support for the argument that social categorization is an automatic cognitive process.

The same, however, may not be said about the second part of the argument. The second part of this argument states that the stereotypes associated with the automatically categorized group are also automatically activated. For example, when a female target has been automatically categorized as a “woman”, female stereotypes such as “warm” or “moody” are also automatically activated. Additionally, the argument that stereotypes are automatically activated has also led the debate regarding the inevitability of stereotyping others (Devine, 1989; Lepore & Brown, 1997). Experiment 1a, on the other hand, asked if inevitability of stereotype activation really depicts the whole picture of social perception. Are people always automatically sexist/racist or has social perception research simply been missing a piece of the puzzle? In fact, Experiment 1a provides evidence that stereotypes are not always first to be automatically activated. When associated with the learned targets, participants were faster to respond to the provided individualizing information when tested 48 hr after exposure than when tested only 2-6 hr after exposure. That is, when participants were provided with individualizing information about a target and time for those memory traces to become enhanced and stabilized, the individualizing information was activated faster. Moreover, when tested 48 hr after exposure, participants were faster to react to the individualizing information associated with the learned targets than to the stereotypic group information associated with the learned targets. That is, when individuals were given time for the individualizing memory traces to become enhanced and stabilized, they not only used that information faster than without time but they were now faster to rely on the individualizing information rather than the stereotypical information. Thus, in contrast to previous arguments, Experiment 1a found support that familiarity and time leads to the automatic activation of the associated individualizing information. While this finding contradicts previous research, Experiment 1a also found support for the argument that stereotypes are automatically activated. First, participants were faster to respond to the stereotypic group information associated with the novel targets than to the individualizing information when tested both 2-6 hr and 48 hr after exposure. Furthermore, participants were still faster to respond to the stereotypic group information associated with the learned targets when tested only 2-6 hr after exposure. This provides evidence that familiarity alone is not enough to change people's automatic perceptions. Familiarity paired with time, however, is enough to do so.

Overall, the results within Experiment 1b lead to the conclusion that categorization may occur automatically. However, Experiment 1a shows that this automatic categorization does not always lead to an automatic activation of associated stereotypes. On the other hand, when people are given individualizing information about a target and time for these memories to stabilize, an automatic categorization may lead to an automatic activation of individualizing information.

Previous research on the automaticity of social categorization and the associated stereotypes has consistently tested only first impressions of newly learned targets. However, when only testing new targets, research is drastically oversimplifying a complex process. Thus, in order to grasp the whole picture of social perceptual processes, research also needs to test the impact of later impressions of familiar targets. The design of Experiment 1 was meant to examine the claims made by the majority of previous social perception studies that test only first impressions on newly learned targets. Experiment 1 begins to provide a more realistic picture of the processes involved within social perception by asking how familiarity and time influences perceptions. When experiments only provide a photo of a target, the only information participants have to use within social perception tasks is the target's appearance. Furthermore, the appearance of a target only provides social group information (e.g, a black male). Experiment 1, however, finds that when participants are provided with more information about the target and time for the information to become stabilized, participants utilize the individualizing information faster than the group information. Providing minimal information about a target may also be more desirable to the participant. As a social rule, people try to refrain from forming impressions of people on the basis of stereotypic information alone (Yzerbyt et al., 1994). Thus, providing more information than simply a photo of a target allows a participant to use that information to form an impression. This is an option that is not provided within the standard social perception experimental design.

Additionally, the moderators of familiarity and time are naturally occurring variables within everyday life. While familiarity and time were experimentally manipulated and contrived within the current experiments, a similar version of this manipulation occurs everyday in the real world. As people, we acquire familiar strangers within our daily life. Whether a familiar stranger is the salesperson at a shop or a fellow student in a college seminar, familiar strangers are all around us and we interact with these people typically on a daily basis. We also learn information about our familiar strangers. The information we acquire about these familiar strangers is not extensive, but we gather little pieces of information every time we interact or simply see that familiar stranger. Additionally, this type of minimal familiarity also requires time. We may have to see this familiar stranger three or more times over a period of days in order for that individual to become truly familiar to us. Thus, the use of familiarity and time within a social perception experiment begins to provide a more realistic picture of real-life social perception processes.

The findings within Experiment 1a also fit within a memory consolidation perspective. The variable of time was based upon memory consolidation theories and constructs and was, therefore, manipulated so that participants were tested both within the same day as the exposure and 48 hr after exposure. Stickgold, James, and Hobson (2000) argue that while learning begins with people participating in the training task, the consolidation of the information during sleep in the following 48 hr is also crucial to learning. Thus, memory consolidation shows optimal improvement when the test is 48 hr after the first learning experience and the participants sleep between tasks. Due to this argument and the consistent finding that both slow-wave and rapid eye movement sleep processes are somehow involved within memory consolidation, the tests 48 hr after exposure were expected to show the predicted influence of time.

As research has argued that memory consolidation provides a way for episodic memories to become integrated within semantic memories (Spear & Mueller, 1984), the argument may be extended that memory consolidation can do the same for individuating (i.e., episodic) memories and stereotypic (i.e., semantic) memories. This integration then provides a mechanism through which individuating experiences with an individual become associated with that individual over a period of time. Moreover, memory consolidation research has found that consolidation does not strengthen all declarative memories equally (Drosopoulos et al., 2007, p. 170; Ekstrand, 1977). Rather, consolidation may selectively strengthen a memory that has been weakly associated more so than strongly associated memories. Experiment 1a found support for this theory. When tested 48 hr after exposure, participants were faster to respond to the individuating information (i.e., episodic memories) than to the stereotypic information (i.e., semantic memories) for the learned targets. The fact that the associations between the learned targets and the individuating information were weaker than the over-learned stereotypic associations may have prompted a consolidation process to selectively strengthen those memories. Thus, the current experiments, while not explicitly measuring memory consolidation, suggest that memory consolidation may influence social perception.

The proposed experiments, however, are not without an acknowledged confound. The order of tasks was not counterbalanced. For instance, during day 1, all participants completed the day 1 LDT and then the day 1 categorization task. Furthermore, participants were tested on the same set of learned targets within both of the day 1 tasks. The lack of counterbalancing the order of tasks might have contributed to the lack of influence of time within Experiment 1b. If participants had just been tested on the learned targets during the day 1 LDT, one may question then whether time would have an impact on the day 1 categorization task at all due to a possible recency effect or repeated testing effect.

Furthermore, there are alternative explanations for the influence of time other than memory consolidation. One of these explanations involves the use of the impression formation questionnaire. Hallmarks of memory consolidation include stable and more easily retrieved memories that are more resistant to interference. Conceptually, this mirrors memory brought about through deeper cognitive processing. According to the levels of processing model of memory (Craik & Lockhart, 1972), there are no individual stores of memory, but rather, memory functions as a continuum whose effectiveness varies upon the depth of cognitive processing given to an item. Items that are processed at a deep-level are more likely to be recalled than items processed at a shallow level due to the processing of the item at encoding. Some researchers have argued that this deeper level of encoding is intrinsically interwoven with the quality of the processing instead of the quantity of processing (Winograd, 1981). According to the elaboration hypothesis, making assumptions about a person's personality traits will assist one's memory of this person due to a broader feature sampling (1981). Asking participants to make personalizing assumptions about the target individuals based upon given information will facilitate their feature sampling of that target which, in turn, will lead to a deeper encoding of that information. Furthermore, other research has shown that a self-reference effect also facilitates a deep-level of encoding (Rogers, Kuiper, & Kirker, 1977). For example, asking a participant to think of personality traits in terms of themselves proves to enable a deeper level of encoding. Together, this facilitates the participant's ability to form an impression of each target individual which facilitates the participant's memory for the personality traits (Hamilton, Katz, & Leirer, 1980). Depth of memory and memory consolidation, however, could also prove to be intrinsically interwoven and difficult to separate. However, the experimental procedure used within this study did not manipulate the depth of processing elicited within each participant.

An additional alternative explanation is that of spaced learning. Often referred to as the spacing effect, it has been generally accepted that learning is most benefited by spacing intervals of learning as opposed to a massed learning section (Atkinson, 1972; Karpicke & Roediger, 2007; Pavlik & Anderson, 2005; Pavlik & Anderson, 2008; Underwood, 1970). Once again, attempting to disentangle effects of spaced learning and time from memory consolidation is difficult. According to Cepeda, Pashler, Vul, Wixted, and Rohrer (2006), learning is only considered to be massed when the lag between the learning is less than one second. Thus, any studies involving a manipulation of time necessarily involves learning that is defined as spaced.

Future Directions

Experiment 2 investigated the impact of time on social perception processes with a cognitive load. However, this study was severely underpowered due to a large amount of excluded data. The main reason behind this exclusion was participant error. In fact, a total of 32 participants (15 for load errors and 17 for overall errors) were excluded from the analyses. That is, 38% of the data was not analyzed due to participant error. With all of the deletions, only data from 27 participants was analyzed leaving Experiment 2 underpowered.

The fact that the major reason for this exclusion was participant error leads one to suspect that the task in and of itself was too difficult for participants. For instance, perhaps the cognitive load manipulation was too strong. While it is obvious that the cognitive load manipulation worked, it might have worked too well. The task of subtracting 3 from a random number is not a hard task by itself. However, as this task was randomly embedded with a familiar vs. novel categorization task, the combination of the two tasks proved to be difficult. To add to this difficulty, participants were only shown the initial number for 2 s and were then shown a photo to categorize only 50 ms later. Furthermore, the actual categorization task might have added to this difficulty further. The categorization task within Experiment 2 was a familiar vs. novel categorization. Thus, the participants had to decide as quickly as possible whether the photo that was shown was someone they had previously seen within the experiment. The difficulty in this task is really due to two reasons. First, this task is not as well-practiced and automatic as a social categorization task. Second, the targets within this task included the intentionally exposed targets, unintentionally exposed targets, and novel targets. The problem lies within distinguishing familiarity between the unintentionally exposed targets and the novel targets. Participants had seen the unintentionally exposed targets only a limited number of times. Initially, the unintentionally exposed targets had only been exposed to the participants 20 min before Experiment 2 for a total of eight times for 400 ms within Experiment 1. Additionally, the unintentionally exposed targets were shown once for a total of 5 s during a relearning task. So, the unintentionally exposed targets had only been exposed to participants for a total of 8.2 s. Therefore, distinguishing whether they had seen that target would have added to the difficulty of the task due to a possible confusion between the unintentionally exposed targets and the novel targets.

Still, while interpreted with caution, the results within Experiment 2 lead to the unresolved question of whether or not time will impact cognitive loads differentially within a social perception task. The design of Experiment 2, however, needs to be rethought. First, the task itself should be an easier task. Given the results of

Experiment 1, a future study should investigate the impact of time and cognitive loads on stereotype associations rather than categorization. Additionally, employing a LDT would also make the task easier for the participant and result in less participant error. Furthermore, a future study should also use a between-subjects design rather than the within-subjects design employed within Experiment 2. Doing so would alleviate the need to imbed a cognitive load randomly throughout a task and reduce confusion. Finally, a future study should also employ an easier cognitive load technique. As the load (i.e., subtract by three) method seemed to overload participants within Experiment 2, one might suggest using the common load of remembering an eight digit number (Gilbert & Hixon, 1991).

In addition to rethinking Experiment 2, future studies should continue to investigate the impact of familiarity and time within social perception processes. For instance, given the results of Experiment 1, the next logical question might be how familiarity and time impacts prejudice? One future study might investigate this by manipulating familiarity and time within an IAT or within a LDT using positive and negative words. Future studies should also further investigate the impact of familiarity and time on associated stereotypes. For example, extending the results within Experiment 1 to look at how familiarity and time impact the cerebral asymmetries previously found within social perception (Rivera, Arms-Chavez, & Zárate, In Press; Sanders, McClure, & Zárate, 2004; Zárate et al., 2000; Zárate et al., 2008). Additionally, in order to fully investigate the automatic and controlled cognitive processes involved, it would be interesting to extend the results of Experiment 1 by employing a process dissociation paradigm (Payne, 2008). Because the influence of familiarity and time is a largely unexplored yet demonstrably important topic within social perception research, it has the potential to initiate a variety of novel research questions.

CONCLUSION

Further evidence was found for the argument that social categorization is an automatic cognitive process. However, when people are given information about an individual and time for the memory to stabilize, the stereotypes associated with the categorization are no longer automatically activated. Rather, with familiarity and time, the individuating information associated with the individual is automatically activated. That is, with familiarity and time, people individuate targets faster than stereotype targets. Therefore, investigating the impact of familiarity and time provides yet another piece of the complex social perception puzzle.

REFERENCES

Almeida, J. (2007). The semantic/episodic distinction: The case for social information processing. *Journal of Experimental Social Psychology, 43,* 842-849.

Atkinson, R. C. (1972). Optimizing the learning of a second-language vocabulary. *Journal of Experimental Psychology, 2,* 124-129.

Banaji, M., Hardin, C., & Rothman, A. (1993). Implicit stereotyping in person judgment. *Journal of Personality and Social Psychology, 65*, 272-281.

Bargh, J. A. (1989). Conditional automaticity: Varieties of automatic influence in social perception and cognition. In: J.S. Uleman & J.A. Bargh (Eds.) *Unintended Thought.* Guilford Press: New York. (pp. 3-51).

Blair, I.V., & Banaji, M.R. (1996). Automatic and controlled processes in stereotype priming. *Journal of Personality and Social Psychology, 70,* 1142-1163.

Bodenhausen, G.V., (1988). Stereotypic biases in social decision making and memory: Testing process models of stereotype use. *Journal of Personality and Social Psychology*, *55*, 726-737.

Bodenhausen, G.V., (1990). Stereotypes as judgmental heuristics: Evidence of circadian variations in discrimination. *Psychological Science*, *1*, 319-322.

Botempi, B., Laurent-Demir, C., Destrade, C., Jaffard, R. (1999). Time-dependent reorganization of brain circuitry underlying long-term memory storage. *Nature, 400*, 671-675.

Bower, G., Thompson-Schill, S., & Tulving, E. (1994). Reducing retroactive interference: An interference analysis. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 20*, 51-66.

Brewer, M. B. (1988). A dual process model of impression formation. In R. S. Wyer and T. K. Srull (Eds.) *Advances in Social Cognition*, *vol. 1*. (pp. 1-36). Hillsdale, NJ: Lawrence Erlbaum Associates.

Carlston, D., & Skowronski, J. (1994). Savings in the relearning of trait information as evidence for spontaneous inference generation. *Journal of Personality and Social Psychology, 66*, 840-856.

Cedrus Corporation. (2007). SuperLab Pro (Version 4.0.2) [Computer software]. San Pedro, CA: Author.

CELEX Lexical Database (1995). [Computer software]. Philadelphia, PA: Harold R. Baayen et al.

Cepeda, N. J., Pashler, H., Vul, E., Wixted, J. T., & Rohrer, D. (2006). Distributed practice in verball recall tasks: A review and Quantitative Synthesis. *Psychological Bulletin, 132*, 354-380.

Conn, A., Hanges, P., Sipe, W., & Salvaggio, A. (1999). The search for ambivalent sexism: A comparison of two measures. *Educational and Psychological Measurement, 59*, 898-909.

Craik, F.I., & Lockhart, R.S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning & Verbal Behavior, 11,* 671-684.

De Koninck, J., Lorrain, D., Christ G., Proulx, G., & Coulombe, D. (1989). Intensive language learning and increases in rapid eye movement sleep: Evidence of a performance factor. *International Journal of Psychophysiology, 8,* 43-47.

Devine, P. (1989). Stereotypes and prejudice: Their automatic and controlled components. *Journal of Personality and Social Psychology, 56*, 5-18.

Dovidio, J., Evans, N., & Tyler, R. (1986). Racial stereotypes: The contents of their cognitive representations. *Journal of Experimental Social Psychology, 22*, 22-37.

Dovidio, J., Kawakami, K., & Gaertner, S. (2002). Implicit and explicit prejudice and interracial interaction. *Journal of Personality and Social Psychology, 82*, 62-68.

Dovidio, J., Kawakami, K., Johnson, C., Johnson, B., & Howard, A. (1997). On the nature of prejudice: Automatic and controlled processes. *Journal of Experimental Social Psychology, 33*, 510-540.

Drosopoulos, S., Schulze, C., Fischer, S., & Born, J. (2007). Sleep's function in the spontaneous recovery and consolidation of memories. *Journal of Experimental Psychology: General, 136*, 169-183.

Dudai, Y., & Eisenberg, M. (2004). Rites of passage of the engram: Reconsolidation and the lingering consolidation hypothesis. *Neuron*, 44, 93-100.

Ekstrand, B.R. (1967). Effect of sleep on memory. *Journal of Experimental Psychology, 75*, 64-72.

Ekstrand, B.R. (1977). The effect of sleep on human long-term memory. In R. R. Drucker-Colin & J.L. McGaugh (Eds.), *Neurobiology of Sleep and* Memory (pp.419-438). New York: Academic Press.

Eichenbaum, H. (2001). The long and winding road to memory consolidation. *Nature Neuroscience*, *4*, 1057-1058.

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*, 175-191.

Fazio, R., & Dunton, B. (1997). Categorization by race: The impact of automatic and controlled components of racial prejudice. *Journal of Experimental Social Psychology, 33*, 451-470.

Fischer, S., Drosopoulos, S., Tsen, J., & Born, J. (2006). Implicit learning-explicit knowing: A role for sleep in memory system interaction. *The Journal of Cognitive Neuroscience, 18,* 311-319.

Fiske, S. T. (1989). Examining the role of intent: Toward understanding its role in stereotyping and prejudice. In J. S. Uleman & J. A. Bargh (Eds.) *Unintended Thought*. Guilford Press: New York. (pp. 253-283).

Fiske, S. T., & Neuberg, S. L. (1990). A continuum of impression formation, from category-based to individuating processes: Influences of information and motivation on attention and interpretation. *Advances in Experimental Social Psychology, 23,* 1-74.

Fiske, S., & Taylor, S. (1991). *Social Cognition* (2nd ed.). New York, NY England: Mcgraw-Hill Book Company.

Frankland, P.W., & Bontempi, B. (2005). The organization of recent and remote memories. *National Review of Neuroscience, 6,* 119-130.

Gais, S., & Born, J. (2004). Declarative memory consolidation: Mechanisms acting during human sleep. *Learning and Memory, 11,* 679-685.

Gais, S., Molle, M., Helms, K., & Born, J. (2002). Learning-dependent increases in sleep spindle density. *Journal of Neuroscience, 22,* 6830-6834.

Gardiner, J.M., Ramponi, C., & Richardson-Klavehn, A. (1998). Experiences of remembering, knowing, and guessing. *Consciousness and Cognition, 7,* 1-26.

Gilbert, D., & Hixon, J. (1991). The trouble of thinking: Activation and application of stereotypic beliefs. *Journal of Personality and Social Psychology*, *60*, 509-517.

Glick, P., & Fiske, S. (1996). The Ambivalent Sexism Inventory: Differentiating hostile and benevolent sexism. *Journal of Personality and Social Psychology, 70*, 491-512.

Glick, P., & Fiske, S. (1999). The Ambivalence toward Men Inventory: Differentiating hostile and benevolent beliefs about men. *Psychology of Women Quarterly*, *23*, 519-536.

Glick, P., & Fiske, S. (2001). An ambivalent alliance: Hostile and benevolent sexism as complementary justifications for gender inequality. *American Psychologist, 56*, 109-118.

Glick, P., Fiske, S.T., Mladinic, A., Saiz, J.L., Abrams, D., & Masser, B., et al. (2000). Beyond prejudice as simply antipathy: Hostile and benevolent sexism across cultures. *Journal of Personality and Social Psychology, 79*, 763-775.

Greenwald, A.G., McGhee, D.E., & Schwartz, J.K.L. (1998). Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality and Social Psychology, 74*, 1464-1480.

Gold, P.E., & Greenough, W.T. (Eds.). (2001). *Memory consolidation: Essays in Honor of James L. McGaugh.* Washington, D.C.: American Psychological Association.

Hamiton, D.L., Katz, L.B., & Leirer, V.O. (1980). Cognitive representation of personality impressions: Organizational processes in first impression formation. *Journal of Personality and Social Psychology, 39,* 1050-1063.

Hebb, D. (1949). *The Organization of Behavior: A Neuropsychological Theory*. Oxford, England: Wiley.

Karpicke, J. D., & Roediger, H. L., III. (2007). Expanding retrieval practice promotes short-term retention, but equally spaced retrieval enhances long-term retention. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 33,* 704-719.

Kawakami, K., Dovidio, J.F., & van Kamp, S. (2005). Kicking the habit: Effects of nonstereotypic association training and correction processes on hiring decisions. *Journal of Experimental Social Psychology, 41,* 68-75.

Kawakami, K., Dovidio, J.F., Moll, J., Hermsen, S., & Russin, A. (2000). Just say no (to stereotyping): Effects of training in the negation of stereotypic associations on stereotype activation. *Journal of Personality and Social Psychology, 78,* 871-888.

Keppel, G. (1984). Consolidation and forgetting theory. In H. Weingartner & E.S. Parker (Eds.), *Memory Consolidation: Psychobiology of Cognition* (pp. 149-161). Hillsdale, NJ, US: Lawrence Erlbaum Associates.

Kruglanski, A., & Freund, T. (1983). The freezing and unfreezing of lay-inferences: Effects on impressional primacy, ethnic stereotyping, and numerical anchoring. *Journal of Experimental Social Psychology*, *19*, 448-468.

Kunda, Z., & Thagard, P. (1996). Forming impressions from stereotypes, traits, and behaviors: A parallel-constraint-satisfaction theory. *Psychological Review, 103,* 284-308.

Lehmann, H., Lacanilao, S., & Sutherland, R.J. (2007). Complete or partial hippocampal damage produces equivalent retrograde amnesia for remote contextual fear memories. *European Journal of Neuroscience, 25,* 1278-1286.

Lepore, L. & Brown R. (1997). Category and stereotype activation: Is prejudice inevitable? *Journal of Personality and Social Psychology, 72*, 275-287.

Levin, D.T. (1996). Classifying faces by race: The structure of race categories. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *22*, 1364-1382.

Macrae, C., Hewstone, M., & Griffiths, R. (1993). Processing load and memory for stereotype-based information. *European Journal of Social Psychology*, *23*, 77-87.

Macrae, C., Milne, A., & Bodenhausen, G. (1994). Stereotypes as energy-saving devices: A peek inside the cognitive toolbox. *Journal of Personality and Social Psychology, 66*, 37-47.

McClelland, J.L., McNaughten, B.L., & O'Reilly, R.C. (1995). Why there are complementary learning systems in the hippocampus and neocortex: Insights from the successes and failures of connectionist models of learning and memory. *Psychology Review, 102*, 419-457.

McGaugh, J.L. (2000). Memory: A century of consolidation. *Science, 287*, 248-251.

Medina, J., Bekinschtein, P., Cammarota, M., & Izquierdo, I. (2008). Do memories consolidate to persist or do they persist to consolidate? *Behavioural Brain Research*, *192*, 61-69.

Mednick, S., Nakayama, K., & Stickgold, R. (2003). Sleep-dependent learning: A nap is as good as a night*. Nature Neuroscience, 6*, 697-698.

Meissner, C.A., Brigham, J.C., & Butz, D.A.(2005). Memory for Own- and Other-race Faces: A Dual-process Approach. *Applied Cognitive Psychology, 19,* 545-567.

Mollaret, P., & Mignon, A. (2007). Polysemy of traits and judgment of familiar people. *European Journal of Social Psychology, 37,* 339-346.

Müller, G.E., & Pilzecker, A. (1900). Experimentelle Beiträge zur Lehre vom Gedächtnis. *Zietschrift für Psychologie, Ergänzungsband, 1*, 1-300.

Pavlik, P. I., Jr., & Anderson, J. R. (2005). Practice and forgetting effects on vocabulary memory: An activation-based model of the spacing effect. *Cognitive Science, 29,* 559-586.

Pavlik, P. I., Jr., & Anderson, J. R. (2008). Using a model to compute the optimal schedule of practice. *Journal of Experimental Psychology: Applied, 14*, 101-117.

Payne, B.K. (2008). What mistakes disclose: A process dissociation approach to automatic and controlled processes in social psychology. *Social and Personality Psychology Compass, 2,* 1073-1092.

Pendry, L., & Macrae, C. (1999). Cognitive load and person memory: The role of perceived group variability. *European Journal of Social Psychology, 29*, 925-942.

Ratcliff, R. (1993). Methods for dealing with reaction time outliers. *Psychological Bulletin, 114,* 510-532.

Rasch, B., & Born, J. (2008). Reactivation and consolidation of memory during sleep. *Current Directions in Psychological Science, 17*, 188-192.

Rauchs, G., Desgranges, B., Foret, J., & Eustache, F. (2005). The relationships between memory systems and sleep stages. *Journal of Sleep Research, 14*, 123-140.

Reed, J.M., & Squire, L.R. (1998). Retrograde amnesia for facts and events: Findings from four new cases. *Journal of Neuroscience, 18,* 3943-3954.

Richeson, J.A., & Trawalter, S. (2005). On the Categorization of Admired and Disliked Exemplars of Admired and Disliked Racial Groups. *Journal of Personality and Social Psychology, 89,* 517-530.

Rivera, L.O., Arms-Chavez, C.J., & Zárate, M.Z. (In Press). Resource-dependent effects during sex categorization. *Journal of Experimental Social Psychology.*

Rogers, T.B., Kuiper, N.A., & Kirker, W.S. (1977). Self-reference and the encoding of personal information. *Journal of Personality and Social Psychology, 35,* 677-688.

Rudman, L.A., Greenwald, A.G., & McGhee, D.E. (2001). Implicit self-concept and evaluative implicit gender stereotypes: Self and ingroup share desirable traits. *Personality and Social Psychology Bulletin, 27*, 1164-1178.

Russel W.R. (1971). *The Traumatic Amnesias*. Oxford: Oxford University Press.

Sanders, J.D., McClure, K.A., & Zarate, M.A. (2004). Cerebral hemisphere asymmetries in social perception: Perceiving and responding to the individual and the group. *Social Cognition, 22,* 279-291.

Schacter, D.L., Wagner, A.D., & Buckner, R.L. (2000). Memory Systems of 1999. In E. Tulving & F.I.M. Craik (Eds.), *The Oxford Handbook of Memory* (pp. 627-643). New York, NY, US: Oxford University Press.

Sekaquaptewa, D., Espinoza, P., Thompson, M., Vargas, P., & von Hippel, W. (2003). Stereotypic explanatory bias: Implicit stereotyping as a predictor of discrimination. *Journal of Experimental Social Psychology, 39*, 75-82.

Sherman, J.W., & Bessenhoff, G.R. (1999). Stereotypes as source-monitoring cues: On the interaction between episodic and semantic memory. *Psychological Science, 10,* 106-110.

Smith, E.R., Miller, D.A., Maitner, A.T., Crump, S.A., Garcia-Marques, T., & Mackie, D.M. (2006). Familiarity can increase stereotyping. *Journal of Experimental Social Psychology, 42,* 471-478.

Spears, R., Haslam, S., & Jansen, R. (1999). The effect of cognitive load on social categorization in the category confusion paradigm. *European Journal of Social Psychology, 29*, 621-639.

Spear, N.E., & Mueller, C.W. (1984). Consolidation as a function of retrieval. In H. Weingartner & E.S. Parker (Eds.), *Memory Consolidation: Psychobiology of Cognition* (pp111-147). Hillsdale, NJ, US: Lawrence Erlbaum Associates.

Squire, L.R. & Alvarez, P. (1995). Retrograde amnesia and memory consolidation: A neurobiological perspective. *Current Opinion in Neurobiology, 5,* 169-177.

Squire, L.R., Cohen, N.J., & Nadel, L. (1984). The medial temporal region and memory consolidation: A new hypothesis. In H. Weingartner & E.S. Parker (Eds.), *Memory Consolidation: Psychobiology of Cognition* (pp. 185-210). Hillsdale, NJ, US: Lawrence Erlbaum Associates.

Squire, L.R., Stark, C.E., & Clark, R.E. (2004). The medial temporal lobe. *Annual Review of Neuroscience, 27*, 279-306.

Stangor, C., & Duan, C. (1991). Effects of multiple task demands upon memory for information about social groups. *Journal of Experimental Social Psychology, 27*, 357-378.

Stewart, T., Harris, K., van Knippenberg, A., Hermsen, B., Joly, J., & Lippmann, M. (2006). The effect of attitude toward women on the relative individuation of women and men is mediated by perceived gender subgroups. *British Journal of Social Psychology, 45*, 759-775.

Stewart, T. L., van Knippenberg, A., Joly, J., Lippmann, M.W., Hermsen, B. J., & Harris, K. R. (2004). The influence of attitudes toward women on the relative individuation of women and men in the Netherlands*. Psychology of Women Quarterly*, *28*, 240–245.

Stewart, T. L., & Vassar, P. M. (2000). The effect of occupational status cues on memory for male and female targets. *Psychology of Women Quarterly, 24*, 161–169.

Stewart, T. L., Vassar, P. M., Sanchez, D. T., & David, S. E. (2000). Attitude toward women's societal roles moderates the effect of gender cues on target individuation. *Journal of Personality and Social Psychology, 79*, 143–157.

Stickgold, R., James, L., & Hobson, J.A. (2000). Visual discrimination learning requires sleep after training. *Nature Neuroscience, 3,* 1237-1238.

Stickgold, R., Scott, L., Rittenhouse, C., & Hobsen, J.A. (1999). Sleep-induced changes in associative memory. *Journal of Cognitive Neuroscience, 11,* 182-193.

Stroessner, S. J. (1996). Social categorization by race or sex: Effects of perceived non-normalcy on response times. *Social Cognition*, *14*, 247-276.

Surveymonkey.com (2009). [Computer software]. Portland, OR: Ryan Finley.

Sutherland, R.J., Weisand, M.P., Mumby, D., Astur, R.S., Hanlon, F.M., Koerner, A. et al. (2001). Retrograde amnesia after hippocampal damage: Recent vs. remote memories in two tasks. *Hippocampus, 11*, 27-42.

Taylor, S. E. (1981). A categorization approach to stereotyping. In D. L. Hamilton (Ed.), *Cognitive Processes in Stereotyping and Intergroup Behavior* (pp. 87-114). Hillsdale, NJ: Erlbaum.

Tse, D., Langston, R.F., Kakeyama, M., Bethus, I., Spooner, P.A., Wood, E.R. et al. (2007). Schemas and memory consolidation. *Science, 316*, 76-82.

Tulving, E. (1972). Episodic and semantic memory. In E. Tulving & W. Donaldson (Eds.)*, Organization of Memory (p. 423).* Oxford England: Academic Press.

Tulving, E. (1985). Memory and consciousness. *Canadian Psychology, 26,* 1-12.

Tulving, E., & Thomson, D. (1973). Encoding specificity and retrieval processes in episodic memory. *Psychological Review, 80*, 352-373.

Underwood, B.J. (1970). A breakdown in the total-time law in free-recall learning. *Journal of Verbal Learning & Verbal Behavior, 9,* 573-580.

von Hippel, W., Sekaquaptewa, D., & Vargas, P. (1997). The linguistic intergroup bias as an implicit indicator of prejudice. *Journal of Experimental Social Psychology, 33*, 490-509.

Wagner, U., Gais, S., Haider, H., Verleger, R., & Born, J. (2004). Sleep inspires insight. *Nature, 427,* 352-355.

Walker, M.P., & Stickgold, R. (2006). Sleep, memory, and plasticity. *Annual Review of Psychology, 57,* 139-166.

Wheeler, M.E., & Fiske, S.T. (2005). Controlling racial prejudice: Social-cognitive goals affect amygdala and stereotype activation. *Psychological Science, 16,* 56-63.

Wixted, J. (2004). The psychology and neuroscience of forgetting. *Annual Review of Psychology, 55*, 235-269.

Winograd, E. (1981). Elaboration and distinctiveness in memory for faces. *Journal of Experimental Psychology: Human Learning and Memory, 7, 181-190.*

Yzerbyt, V.Y., Schadron, G., Leyens, J., & Rocher, S. (1994). Social judgeability: The impact of meta-informational cues on the use of stereotypes. *Journal of Personality and Social Psychology, 66,* 48-55.

Zárate, M. A., & Smith, E. R. (1990). Person categorization and stereotyping. *Social Cognition*, *8*, 161-185.

Zárate, M. A., Sanders, J. D., & Garza, A. A. (2000). Neurological disassociations of social perception processes, *Social Cognition*, *18*, 223-251.

Zárate, M. A., Stoever, C. J., MacLin, M. K., & Arms-Chavez, C. J. (2008). Neurocognitive underpinnings of face perception: Further evidence of distinct person and group perception processes. *Journal of Personality and Social Psychology, 94,* 108-115.

APPENDIX A: Sleep Check Questionnaire.

Please answer the following questions about the time spent between Session 1 and Session 2. Your answers to the following questions will in no way impact your participation in this study, so please answer them honestly.

1. Did you fall asleep at any time during the break today?

   Yes   No

   1a. If you answered "Yes", for approximately how long did you sleep?

   ____

2. Were you kept consistently busy during the break today?

   Yes   No

3. Were you able to go relax during the break today?

   Yes   No

4. Did you take a nap during the break today?

   Yes   No

   4a. If you answered "Yes", for approximately how long did you sleep?

   ____

APPENDIX B: Sleep Quality Questionnaire.

Your answers to the following questions will not affect your participation in the study, so please answer them honestly.

1. During the 2 day break, how many hours (approximately) did you sleep the FIRST night?

   0 1 2 3 4 5 6 7 8 9 10+

   1a. On a scale from 0 to 100, 0 being not at all refreshing/restorative and 100 being very refreshing/restorative, please indicate how refreshing/restorative this sleep was.

0	10	20	30	40	50	60	70	80	90	100
Not at all Restorative										Very Restorative

2. During the 2 day break, how many hours (approximately) did you sleep the SECOND night?

   0 1 2 3 4 5 6 7 8 9 10+

   2a. On a scale from 0 to 100, 0 being not at all refreshing/restorative and 100 being very refreshing/restorative, please indicate how refreshing/restorative this sleep was.

0	10	20	30	40	50	60	70	80	90	100
Not at all Restorative										Very Restorative

APPENDIX C: Impression Formation Questionnaire.

Armando

How friendly do you think **Armando** is?

1	2	3	4	5
Not at all Friendly	*Slightly Friendly*	*Moderately Friendly*	*Mostly Friendly*	*Extremely Friendly*

How much do you like **Armando**?

1	2	3	4	5
Not at all	*Slightly*	*Moderately*	*Mostly*	*Extremely*

~

Monica

How friendly do you think **Monica** is?

1	2	3	4	5
Not at all Friendly	*Slightly Friendly*	*Moderately Friendly*	*Mostly Friendly*	*Extremely Friendly*

How much do you like **Monica**?

1	2	3	4	5
Not at all	*Slightly*	*Moderately*	*Mostly*	*Extremely*

~

Miguel

How friendly do you think **Miguel** is?

1	2	3	4	5
Not at all Friendly	*Slightly Friendly*	*Moderately Friendly*	*Mostly Friendly*	*Extremely Friendly*

How much do you like **Miguel**?

1	2	3	4	5
Not at all	*Slightly*	*Moderately*	*Mostly*	*Extremely*

~

APPENDIX D: Prior Familiarity Check.

1. Do you know any of the people in the photos seen in this experiment PERSONALLY? In other words, do you personally know any of these individuals in real life?

2. If "YES", please indicate in what task of THIS EXPERIMENT you saw this individual if you can. (I don't need to know where you personally know them from...)

APPENDIX E: Word Stimuli.

Names:

- Female Names:
  - Monica
  - Claudia
  - Julia
  - Rosa
  - Ana
  - Maria

- Male Names:
  - Miguel
  - Jesus
  - Armando
  - Carlos
  - Javier
  - Efrain

Unique Traits:

	EXPSOURE A					EXPOSURE B			
	Trait	Unique	Frequency	Length		Trait	Unique	Frequency	Length
1	Honest	U	35.98	6	1	Humble	U	11.34	6
2	Lively	U	13.74	6	2	Logical	U	28.1	7
3	Wise	U	35.14	4	3	Relaxed	U	29.66	7
4	Direct	U	95.64	6	4	Funny	U	49.33	5
5	Playful	U	2.96	7	5	Driven	U	39.55	6
6	Frugal	U	1.9	6	6	Messy	U	3.97	5
7	Secure	U	34.19	6	7	Corny	U	1.12	5
8	Fiesty	U	0	6	8	Tense	U	17.6	5
9	Ornery	U	0.34	6	9	Smart	U	21.68	5
10	Naïve	U	3.18	4	10	Vain	U	13.35	4
11	Candid	U	2.29	6	11	Polite	U	21.34	6
12	Modest	U	29.11	6	12	Shy	U	18.04	3
		Freq Avg=	254.47				Freq Avg =	255.08	

Stereotypic Traits:

- Female
    - Bossy (-)
    - Caring (+)
    - Frail (-)
    - Gentle (+)
    - Kind (+)
    - Loyal (+)
    - Moody (-)
    - Needy (-)
    - Nice (+)
    - Picky (-)
    - Warm (+)
    - Weak (-)
- Male
    - Active (+)
    - Brave (+)
    - Brutal (-)
    - Cold (-)
    - Daring (+)
    - Dull (-)
    - Fit (+)
    - Hasty (-)
    - Lazy (-)
    - Macho (+)
    - Proud (+)
    - Rude (-)

Non-words:

1	bisrg	34	epotosi
2	ciern	35	elbat
3	losri	36	lebasy
4	golptar	37	retnew
5	cularik	38	nimzaj
6	epoarl	39	licnep
7	alwek	40	alako
8	yarsin	41	drowie
9	tabyag	42	siarund
10	yibulas	43	nackish
11	folut	44	retaw
12	visrey	45	ghading
13	otasir	46	oledder
14	hamit	47	tenduts
15	intes	48	murnit
16	frink		
17	kopsek		
18	cofals		
19	hanolis		
20	revinsy		
21	cauliny		
22	koskos		
23	malify		
24	reyas		
25	tanbic		
26	surped		
27	yaroff		
28	tilfine		

CURRICULUM VITA

Clarissa Jayne Chavez was born in Grand Junction, Colorado. The first child of Jay and Geri Arms, she graduated from Forreston High School, Forreston, Illinois, in the spring of 1998. She then entered Western Illinois University that same fall and majored in Psychology. She received a bachelor's of science degree at Western Illinois University in 2002. As an undergraduate, several of her research projects culminated in conference papers that were presented at the Midwestern Psychological Association Conference where two of her papers also received the Psi Chi Regional Research Award. In the fall of 2002, she entered the Graduate School at the University of Texas at El Paso and received her Masters of Arts within the Experimental Psychology program in the spring of 2006. During her time at The University of Texas at El Paso, she published two papers in leading social psychology journals. She also presented numerous posters at the Society for Personality and Social Psychology conference and the Neural Systems of Social Behavior conference. Upon receiving her Ph.D., she accepted an Assistant Professor of Psychology position at Auburn University-Montgomery in Montgomery, Alabama and entered employment in the fall of 2009.

Permanent Address: 2325 Halcyon Downs Loop
Montgomery, AL 36117

This dissertation was typed by the author.