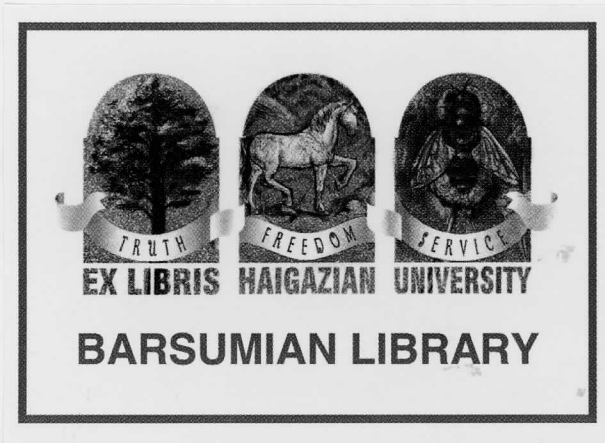


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False Memories in Social Settings as a Consequence Of
Categorical Thinking

Satenik Aghasyan

A Thesis submitted to the Faculty of Social & Behavioral Sciences in partial fulfillment of
the requirements for the Master of Arts degree in Psychology – Emphasis Clinical at
Haigazian University

Beirut – Lebanon

May 24, 2012

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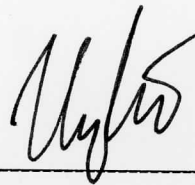
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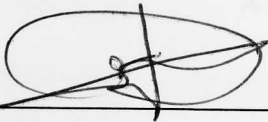
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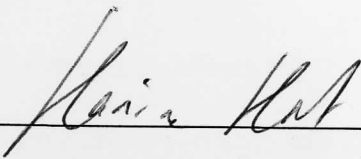
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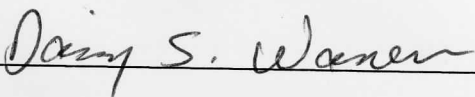
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ACKNOWLEDGMENTS

I would like to thank the Haigazian University Committee for being considerate and trustful and giving me the opportunity to complete my thesis project.

I sincerely thank my advisor Dr. Dr. **DEDICATION** for so much energy and time without any hesitation and giving endless hours leading to very interesting discussions. It was a privilege working with Dr. Tawil.

To my parents, Lavrenti Aghasyan and Anahit Manaseryan, for their unconditional love and support throughout my life. For the sacrifices that they have made to make all this a reality. Whatever I say or do, it will never be enough to fully express my gratitude towards you.

Love you, Mom and Dad!

Special thanks to Ani Arakelyan, my close friend, whose emotional and psychological support made me not give up at the times where there was no hope to succeed. You knew what and when to say exactly, that could give me the energy to continue.

Special thanks to Missis Feryal Chourban and Dr. Elias Chourban for being considerate and giving me the opportunity to spend more time and energy on my thesis. I really appreciate!

And finally, I am endlessly thankful to my family, to Huszn, my spouse, who made a lot of sacrifices, hard and shared with me the most difficult times, my brother and my parents whose presence and support was felt on every step of the way, even when they were far from me.

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I sincerely thank my advisor Dr. Daoud Tawil, for devoting so much energy and time without any hesitation and giving endless hours leading to very interesting discussions. It was a privilege working with Dr. Tawil.

Many thanks to Dr. Hannine Hout and Dr. Daisy Warren for their additional guidance.

I also thank my friends, Nayiry, Mary, Houry and Gabriel for their practical support.

I want to express my deepest gratitude to my dear friend Meline Bilbulyan, for her extremely positive emotional support and her practical, very efficient help, that was offered at the perfect time.

Special thanks to Ani Arakelian Merhej, my very dear compassionate friend, whose emotional and psychological support made me not give up at the times where there was no hope to succeed. You knew what and when to say exactly, that could give me the energy to continue.

Special thanks to Missis Feryal Choufani and Dr. Elias Choufani for being considerate and giving me the opportunity to spend more time and energy on my thesis. I really appreciate!

And finally, I am endlessly thankful to my family, to Husam, my spouse, who made a lot of sacrifices, bared and shared with me the most difficult times, my brother and my parents whose presence and support was felt on every step of the way, even when they were far from me.

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ABSTRACT

The present study examined the effects of stereotyping on creation of false memories in social settings. It examined how perceivers process (memorize and recall) expectancy consistent (stereotype congruent) and expectancy inconsistent (stereotype incongruent) information based on categorical thinking. Moreover, the study shed light on underlying phenomenological aspects of the participants' personal judgments of the recall of the items including forenames (Experiment 1) and faces (Experiment 2) paired with either mechanic or nurse occupations. The participants (Exp. 1 N=50, Exp. 2 N=30) were given a memorization task including expectancy consistent and inconsistent names (Exp. 1) and faces (Exp. 2) paired with mechanic or nurse occupations, after the recall task, participants were asked to give their personal judgment (remember, know or guess) about the recall. Results were computed, using paired samples and independent samples t tests. Obtained data showed that false and correct memories were stereotypically congruent in nature and that the participants were mostly guessing the answers due to the difficulty of the task relying on presence of stereotypy.

False Memories in Social Settings as a Consequence of Categorical Thinking

For ages, scientists', philosophers', and psychologists' focus of attention has been on the intimate connection between memory and self. Theorists have long recognized the inseparable nature of these two entities. As early as 1829, James Mill emphasized that memory and self are not only interrelated but they are actually one and the same. Further he stated, "This succession of feelings, which I call memory of the past, is that by which I distinguish my Self" (Mill J.S, 1829\1982, p175).

One of the contemporary theorists, LeDoux (2002) stressed that in the absence of memory and learning, the self will be an "empty, impoverished expression of genetic constitution" (as cited in, Schacter, Chiao & Mithchel, 2003).

What has been of particular interest for psychologists is not only that memory and self are linked, but also how they interact and what the underlying social cognitive processes are. How some information is well stored in our memory and can be easily retrieved and yet other occurrences are simply forgotten for good? In addition, how accurate are these memories that are clearly kept in our minds? Do they represent the accurate records of the past or they are simply the byproduct of our mind's illusions? Very often, people report events that have never occurred, and even more often, they acquire these events as if they were accurate records of experienced past but in fact they are not; they are simply false memories, unconsciously fabricated memory illusions (Bartlett, 1932; Johnson & Raye, 2000; Loftus, 2001; Macrae, Schloerscheidt, Bodenhausen & Milne, 2002; Payne, Elie, Blackwell & Neuschatz, 1996; Schacter et al., 2003).

But what is the underlying motive of the mind to create false memories? False memories can serve as ego's defensive mechanism when the reality becomes unbearable; the mind brings about alternative variations of reality, as a protective shield for the mind (Loftus, 1998). The past is often misremembered to accommodate ego needs, to confirm self theories or simply to serve the needs and motives of the self (Greenwald, 1980; Loftus, 1998; Shachter et al., 2003).

In addition, it was suggested that created false memories do not only emerge to cover the unsatisfying reality or have strong motives, but they are simply the product of ordinary functioning of cognitive system (Johnson & Raye, 2000; Macrae & Bodenhausen, 2001). More specifically how false memories can be originated as a consequence of cognitive categorical thinking and how the process of acquiring information can be guided and directly influenced by previously formed categories or schemas which in social settings are identified as stereotypes. As a consequence, the following question seems to emerge from the above mentioned discussion: can everyday social situations serve as good grounds for the generation of false memories?

The present study investigates false memories that are simply the byproduct of our everyday social cognitive functioning, with the emphasis of how false memories are elicited as a consequence of stereotype formation or categorical thinking. The present chapter introduces the background of the study, states the problem of the study, discusses its significance in the field and then presents a brief overview of the methodology used. The chapter concludes by defining specific terms used and stating the delimitations of the study.

Background of the Study

In review paper "The Seven Sins of Memory" Schacter et al. (2003) draws attention to seven basic memory imperfections: three different types of forgetting (transience, absent mindedness and blocking), three types of distortions (misattribution, suggestibility and bias) and finally intrusive memories (persistence). He focuses in details on misattribution, which is remembering that something happened but attributing that memory to incorrect source, a phenomenon called false memory (Schacter et al. 2003). For example, recalling an event heard on the radio when in fact it was told by a friend, or just imagining doing something, will consequently make the individual believe that he or she has actually done it (Schacter, et al., 2003). However, Schacter's (2003) memory theory was not the first attempt to draw light on the relationship between self and memory, but rather the conclusive ideas drawn from numerous works of theorists back from the beginning of the century.

Freud, back in 1890s, described the currently well known phenomena of repressed memories. Two types of memory distortions that he later analyzed were paramnesias (false recollections of forgotten events that took on subjective certainty) and screen memories (when one memory was substituted for another and screened out of consciousness) (as cited in Roediger III, 1996). However, one of the first major empirical (rather than theoretical) contributions to the phenomena of false memories was through the works of Bartlett (1932), when in his most recognized experiment, investigated the ability of British undergraduates to recollect a Native American folktale entitled "The War of the Ghosts". He found that when participants were asked to recollect the folktale, they reported events that were not part of the original story. The characteristics of these fabricated parts of the

story were consistent with a kind of information that one would expect to encounter in typical English fairytales. In other words, participants fabricated memories that were congruent with their existing beliefs about the world (Macrae et al., 2001). Another very important study, which will be discussed in details in the next chapter, was Roediger and McDermott's (1999) study of memorizing and recalling associative words. In Roediger and McDermott's word recognition experiments, which were later revised and extended by many other researchers, the participants were presented with a list of thematically associated words and then given a recognition task including presented words with non-presented critical words which were not part of the word list. As a result, subjects recognized the non-presented critical words to be the part of the thematically related words. Moreover, not only the subjects falsely recognized the critical words but they also assertively stated that the word has appeared before in the presented word list (Roediger and McDermott, 1995). These word recognition experiments, later named as DRM paradigm, have showed occurrences of striking memory illusions, of instances where people have recognized and claimed to remember the appearance of the words that they have actually never seen (Roediger, McDermott, 1999). Roediger et al. (1999) noticed that the subjects not only falsely recognized the critical non-presented words but they also claimed to "remember" seeing the word in the list, rather than just being familiar or "know" that the word might have appeared before. To understand why these false memories were created and what the underlying factors are which may influence the participants' judgment about the recall, different scholars' and theorists' speculations about the phenomenology of memory formation and the process of belief acquisition will be discussed further.

The first attempts to understand how we acquire information and, consequently, how it is processed in our minds are rooted in the debates of great thinkers. Bertrand Russell (1921) wrote, "Believing seems the most mental thing we do", moreover, the mechanism of believing constitutes the "central problem in the analysis of mind" (Russell, p231). The questions concerning the issue of belief acquisition are enormous and have been the subject of debate for ages. Nevertheless, one point of consensus seems to emerge: beliefs involve both the "mental representation and the positive assessment of meaningful information" (Gilbert, 1991). Furthermore, before acquiring an idea as a belief, the meaning of that idea has to be encoded, symbolized and stored in the mental system. In other words, an idea cannot be accepted as a belief unless there is acquired knowledge of that idea, through perception, words and actions. In addition, it was suggested that the natural pattern is that comprehension proceeds and is separate from information assessment (Gilbert, 1991).

Within the framework of belief acquisition, Descartes has done the first attempt to separate the mind into relatively active (controlled) and passive (automatic) domains. In addition, he proposed that a rejection and acceptance of an idea to be the outcomes of effortful (active) assessment process and the comprehension to be the subsequent automatic part. Later, Spinoza dismissed Descartes' theory of comprehension and assessment and instead he insisted that comprehension and assessment are the same operations. Spinoza argued, to comprehend an idea one must accept it and only later, if that idea conflicted with the knowledge already existing in mind then, it can be rejected (Gilbert, 1991). As a consequence of the early speculations of Spinoza and Descartes, the dual process model of social cognition seems to emerge. The model suggests that, to make

sense of the complex world, the perceiver's cognitive system is divided into two separate memory processes: familiarity and recollection. Familiarity is based on automatic (effortless) or "gist based" processing; on the other hand, recollection is based on controlled (effortful) "verbatim" processing. To summarize the dual processing theory, when the perceiver is encountered with relatively familiar stimuli, the processing of that information is relying mainly on gist based (automatic) structure. On the other hand, when the stimulus is completely novel to the mind, then it processes the information more thoroughly and therefore it is more controlled (Macrae & Bodenhausen; 2000; Wegner, 1994; Yonelinas, 2002).

Carrying identical characteristics with dual processing theory, based on the latter, fuzzy trace theory was later introduced by Reyna and Brainerd (cited in Conway, Gathercole, Cornoldi, 1998). Bartlett (1932) suggested that people actively try to process or to make sense of ambiguous or complex information in terms of internal schemas. These are organized pattern of thought or behavior or structured cluster of pre-conceived ideas. Based on Bartlett's theory of schemas as preconceived ideas, Johnston and Hawley (1994) formulated their mismatch theory. According to mismatch theory, the mind doesn't waste valuable attentional resources to process the occurrence of every single stimulus as novel. Instead, expectancy consistent information is processed quickly and efficiently in energy saving manner relying on already existing template (schemas) in memory. As a result, attention to that information decreases and system tends to extract only the gist or the general meaning of the available material (Johnston & Hawley, 1994). The opposite is the case of when novel or unexpected information is encountered. Because the nature of the stimulus is unexpected and doesn't match with previously encountered templates in the

mind, the processing of that information takes the route of more systematic and detailed passage (Friedman, 1979).

In summary, when the information processing system encounters expectancy consistent and inconsistent stimuli, only the latter material captures the interest of elaborative encoding operations. On the basis of categorical thinking as a function of expectancy consistent and inconsistent information processing lays stereotypy. Within the social context, stereotypes carry identical operational function as categories or schemas in cognitive processing of information. Consequently, stereotypes have essential role in the acquisition of the person perception process. Within this context, stereotypes can be identified as "cognitive structures that contain the perceiver's knowledge, beliefs and expectancies about a social group and its members" (Araya, 2003, p. 8).

Therefore, it can be concluded that schemas are clusters or structures within the cognitive framework, whereas stereotypes are cognitive structures within the social framework.

Statement of the Problem

There is a good reason to suspect that categorical thinking in everyday social interactions can facilitate the generation of false memories, particularly memories that are consistent with people's stereotypic beliefs of gender and occupation. People's evaluations, impressions and memories are shaped and guided by their knowledge and preexisting beliefs about the world. To make sense of the complex socially demanding world, perceivers tend to process information in a most efficient way, based on categorical thinking. Therefore, it is suggested that expectancy consistent or stereotypical stimuli will

trigger the activation of categorical thinking and therefore, will be processed in automatic or gist based manner. On the other hand, the stimuli that are expectancy inconsistent or non-stereotypical will be processed in more detailed verbatim manner. As a result, while recalling male and female names or faces linked with expectancy consistent (stereotype congruent) and inconsistent (stereotype incongruent) occupation, the false recalls will be consistent with their categorical schemas or stereotypes; which implies that male should be a mechanic and female should be a nurse.

Moreover the phenomenology of the expectancy consistent (stereotype congruent) and expectancy inconsistent (stereotype incongruent) false and correct answers can be based on *recollection* and *familiarity* processes. Because the unexpected information is likely to receive more detailed or elaborative encoding it should be recollected or remembered by the perceivers. On the other hand, because expected information is most likely to be encoded in more minimal or gist based fashion, it will feel familiar (Roedriger & McDermott, 1995). In the Roedriger's et al. (1995) word recognition experiments the subjects' judgment about the false recall was accompanied by "remember" personal judgment, which means that subjects could mentally recollect the details of the appearance of non presented word (Roedriger et al., 1995). Roedriger's et al., findings were clearly the opposite to his own predictions, drawn from the dual process theory of recognition memory judgment. Roedriger et al.(1995) himself have mentioned that "*Remember responses are given by subjects when they believe details of original stimuli are available, whereas know responses arise from general feeling of familiarity. The most natural mapping... is that, remember responses should reflect specific traces and know responses should arise from gist trace*" (Roedriger, et al., 1998, p. 235-236; as cited in Macrae et al.,

2002). Contrary to Roediger's et al. findings, there were other studies conducted in social settings that were in support of dual process theory, which suggests that false memories naturally should be accompanied by "know" subjective feeling which is based on familiarity, rather than "remember" feeling which is based on recollection (Araya 2003; Macrae et al., 2002). The present study has drawn its predictions based on the dual process theory, therefore, it was suggested that false memories which are created in social settings would be accompanied by familiarity rather than recollection.

Purpose of the Study

The purpose of this study was to investigate how stereotyping based on categorical thinking can induce the creation of false memories in performing a memory task, through linking names (Exp. 1) and later faces (Exp 2) with occupational roles. The study also sought to investigate the phenomenology of the participants' subjective judgment (remember vs. know) of correct and false expectancy consistent and inconsistent answers.

Hypotheses

Two experiments were designed, one (Exp 2) as a consequence of the other (Exp 1), to test the same hypothesis under the same conditions but with two different ways of presenting the gender occupational pairings. In Experiment 1 the participants were shown verbally presented names paired with *mechanic* or *nurse* (verbally labeled) occupation where as in Experiment 2 they were presented with pictorial presentations of faces, paired with verbal labels of *mechanic* or *nurse* occupations.

The participants were asked to memorize female and male names (Exp. 1) and later pictures of faces (Exp. 2) paired with expectancy consistent (stereotyped) occupation: male

mechanic / female nurse and expectancy inconsistent (stereotype incongruent) occupation: female mechanic/male nurse. Later, a recall task was performed to check for correct and false answers. The study examined the effects of categorical thinking on elicitation of false memories, therefore it was hypothesized that false memories will be mainly expectancy consistent (stereotype congruent) in nature. In addition, it was predicted that correct expectancy inconsistent (stereotype incongruent) items will be remembered more often than expectancy consistent (stereotype congruent) items. Moreover, the study sought to examine the phenomenology behind the personal source judgment of the correct and false answers. Specifically, when participants are asked to give their personal judgment about the recall, the false expectancy consistent items will be mainly accompanied by "know" judgment rather than "remember" and "guess" judgments. On the other hand, the correct expectancy inconsistent items will be accompanied by "remember judgment more often than "guess" or "remember" judgments. In conclusion, based on the information given above, the following hypothesis were tested for the purpose of this study.

Experiment 1

H1: Participants will falsely recall more expectancy consistent (stereotype congruent) items than inconsistent (non-stereotyped) items.

H2: Participants will correctly recall more expectancy inconsistent (non-stereotyped) items than expectancy consistent (stereotype congruent) items

H3: The falsely recalled expectancy consistent items will be more accompanied by "know" judgments than "remember" and "guess" judgments

H4: The correct expectancy inconsistent answers will be more accompanied by "remember" judgment than "know" and "guess" judgments.

Experiment 2

The purpose of Experiment 2 was to identify the possible outcomes of information processing of pictures of faces used as information stimuli. Since the pictures of persons represent more accurately the complex social world than verbal representations and they might carry different factors that may directly influence the stereotype activation based on categorical thinking, Experiment 2 was designed later as an extension of Experiment 1. Therefore, the purpose of the second Experiment was to accentuate the contrast of the expectancy consistent and inconsistent items by adding attentional resources, like attractiveness color and vividness of the pictures. Therefore, the same hypotheses were tested, with an additional hypothesis (H 2 b) within Hypothesis 2.

H1: Participants will falsely recall more expectancy consistent (stereotype congruent) items than inconsistent (non-stereotyped) items.

H2 (a) : Participants will correctly recall more expectancy inconsistent (non-stereotyped) items than expectancy consistent (stereotype congruent) items

H2 (b) : The participants' correctly recalled expectancy inconsistent items in Experiment 2 will increase compared to correctly recalled expectancy inconsistent items in Experiment 1.

H3: The falsely recalled expectancy consistent items will be more accompanied by "know" judgments than "remember" and "guess" judgments

H4 (a): The correct expectancy inconsistent answers will be more accompanied by "remember" judgment than "know" and "guess" judgments.

Significance of the Study

In 1964, there had been hundreds of studies dealing with perceptual illusions, but there were fewer than 30 publications that were directed towards the problem of memory errors (Roediger III, 1996). Due to the phenomenology of false memories, it was difficult for experimental psychologists to gather empirical evidence in explaining false memories. Although there is an abundant research dealing with stereotyping and social bias however surprisingly there is a few research concerning the issue of the effects of categorical thinking (stereotyping) in the creation of false memories. Moreover, by using faces, Experiment 2, further contributes to the suggestions given by many researchers to design experiments that are closer as possible to the real world of complex social environment. The present study therefore contributes to experimental design for direct means of triggering expectancy based processing in social settings, and allows drawing conclusions based on empirical grounds.

In addition, memory illusions, as a consequence of information processing, has been a focus of attention not only from experimental psychologists, but also professionals in other social fields.

This topic has been of particular interest in the area of law. The accuracy of eyewitness testimony or a wrong identification of suspects and false reports of investigations has been a particular interest for the people in the field (Loftus, 1979).

Finally, in the field of psychotherapy the issue of false memories has become a primary concern for many psychotherapists. Specifically, during therapy, when patients try to recover their childhood memories or traumatic events that happened in the past they might often generate false memories induced during the therapy, by imagining events, by reading about related stories or through directions and suggestions given by the therapist. Therapists became suspicious of these recovered memories. Do they represent the accurate recollection of the past or they are simply projections of the self (Loftus 1993)?

In general, false memories play a crucial role in our everyday busy social life, yet they have been given little attention. After all, the phenomenon of false memories can be generalized to societies and cultures in which case false memories can play a crucial role in the recreation of the past.

Overview of the Methodology

The present research adopted the quantitative method using statistical analysis. The data were analyzed using paired sample t- test and independent samples t-test . Data were tabulated and presented in chapter 4, and conclusions were drawn based on the obtained results.

Definitions of Terms

False memories – "failure of reality monitoring, a failure to distinguish between perceived information and internally generated information in memory (Johnson & Raye, 1998, p. 137).

Categorical thinking - the cognitive process of acquiring information based on categories or schemas (Macrae et al., 2002).

Expectancy consistent stimuli - items which are consistent with the person's expectations about the world (Macrae et al., 2002).

Expectancy inconsistent stimuli- items which are *not* consistent with the person's expectations about the world

Schema - organized pattern of thought or behavior or structured cluster of pre-conceived ideas (Bartlett, 1932).

Stereotypes – cognitive structures containing perceiver's knowledge, beliefs, and expectancies about social groups and its members (Araya, 2003).

Delimitations

There were few limitations to this study which should be taken into consideration for the future research.

1. Although the experimenter was cautious in choosing the hours to run the experiment in the cafeteria of the university to minimize distractions, there was constantly present background noise while performing the experiment and few inevitable distractions like sudden ring of the participant's phone and distracting conversations initiated by the friends of the participants who did not know that their friend is performing a task.
2. Based on the participants' feedback of the memorization task, it can be concluded that to memorize 40 male and female names or faces linked with either mechanic or

nurse occupations might have been too difficult or unexpected for the students.

Many of them stated that, during the memorization they were constantly worried that they will not be able to remember any items because they were quite similar as stimuli.

3. Since the experiment was run in one day in one cafeteria, the procedures and the instructions of the memory task were spread orally among the university students, because others were curious to know about the "memory test". This may have resulted in misinterpreting the proper instructions given for the "remember/know" personal judgments, which required detailed and proper introduction. The participants were simply too curious about the results of their performance and were not attentive to procedures.

CHAPTER II

Review of Literature

Numerous research studies have been conducted on the creation of false memories in cognitive domain. Studies included memorization of associative words and recognition of non presented words in recognition task using remember/know procedures to measure the participants' personal judgment of the recognition task. Many other studies have documented how categorical social believes guide information processing and as a result influence our behavior in regard to person perception. Yet very few studies have dealt with how stereotypes can influence the creation of false memories and what the underlying mechanisms of the processing of expectancy consistent and inconsistent information are based on categorical thinking.

This chapter summarizes the literature related to the field of false memories then it covers the theories and major findings regarding the processing mechanisms of expectancy consistent (stereotype congruent) and inconsistent information, further it reviews the conditions of the automatic activation process. In addition the two types of memory the recollection and familiarity of the dual process theory are discussed and finally their appropriate remember/know measuring procedures are elaborated.

False Memories

Back in 1932, Bartlett in his study titled "Remembering: A study in Experimental Social Psychology" describes how people perceive and react to the demanding world, based on past experiences and knowledge. He draws parallel lines between psychological and physiological mechanisms in explaining how people perceive, react and adapt to the

environmental stimuli. He states that, remembering involves determination of the past and it is not a re-excitation of innumerable, fixed fragmentary traces but instead it carries constructive character, upon which memory is based. These traces that are stored in our past are interest determined, interest carried traces, therefore the recall of a material highly depends on satisfying our attitudes which are built on that traces, and hence Bartlett concluded that remembering is hardly really ever exact (Bartlett, 1932). Bartlett was one of the first theorists to draw attention on the downfalls of memory. Drawing parallel lines with Bartlett's theory of memory, many theorists suggested that memory is fundamentally associative in character (Conway et al., 1998; Roediger III, 1996). Within this framework, associations are viewed as powerful force that benefits memory, moreover, the strength of associations determines the accuracy of memory, that is, strong associations can lead to false memories; as a result associations can play a beneficial as well as disruptive role (Roediger III, 1996). On one hand, associations can guide and aid information processing yet, on the other hand, processing information relying on associations, may carry disadvantages, such as inaccurate storage of information or memory illusions.

Bartlett was one of the pioneers in the field of memory illusions, a topic that was overlooked for a long time and systematically studied not earlier than 1960s. Throughout the history of empirical psychological studies, visual, perceptual illusions have grasped the attention of many philosophers, physicists and psychologists, whereas, errors in memory were rarely of interest in their own right (Roediger III, 1996). Yet, there were few studies dealing with memory illusions. The very first experiments showing the downfalls of memory were conducted independently by Binet (1900) and Stern (1910) in which they exposed children to events and later tested their memory with misleading questions. The

results showed memory distortions in children (Conway et al., 1998; as cited in Roedriger III, 1996). Later, Bartlett (1930) as well, in his series of experiments, emphasized on the occurrences of misremembered events. In one study, he showed people a painting for a short time and then when they were asked to recall the content of the painting, it was noted that, the reports of the recall were quite different from the content of the actual painting. Therefore, Bartlett concluded that the nature of remembering is constructive rather than recollective in nature. He argued that, remembering is imperfect and it would be even unnatural for people to remember everything verbatim (Bartlett, 1930). In addition, George Miller (1956) stated that, information is received from outside world in one way and later it is transformed and represented in different way internally (as cited in, Roedriger III, 1996). Finally much later, after numerous studies dealing with false memories Roedriger defined memory illusions as "*cases in which a rememeberer's report of past events seriously deviates from the event's actual occurrence*" (Roedriger, McDermott & Robinson, 1995; as cited in Conway et al., 1998). Although there were few studies conducted in regards of memory illusions, the main stream experimental psychologists did not show interest in memory illusions until 1970s with the start of series of word recognition tests initiated by Deese, Roedriger and McDermott.(Roedriger III, 1996).

Deese, Roedriger, McDermott Paradigm (DRM paradigm)

Bartlett's and following experiments, described earlier, discussed how people were misremembering events, sentences and passages of the original material. In addition, great bulk of evidence showed memory distortions in word recognition paradigms as well. The paradigm includes studies in which subjects studied word list and then later were given recognition test, composed of words that were presented in the list together with non

presented associative words that had semantic relation to the studied words. The very first "word recognition" tests were initiated by Underwood (1965). He gave his subjects continuous recognition test in which they had to decide whether or not each shown word was previously studied. When subjects saw a word that carried associative connection with previously studied words (they had to decide if chair had been previously presented, when in fact table had been) they were likely to falsely confirm that the word was presented to them with the studied words. In contrast, when the word bore no associations with the previously studied words the subjects did not show false memories (as cited in, Roediger III, 1996). Other instances of memory illusions were shown in Deese's word list learning paradigm. Deese (1959) presented subjects with list of semantic associates to non presented critical words. For the critical word "*needle*" the presented list of words consisted of *thread, pin, eye, sewing, sharp, point, pricked, thimble, haystack, pain, hurt, and injection*. After studying the words, the subjects were given free recall test. It was noticed that, during the free recall test, the non presented critical words were wrongly recalled more frequently than non presented but unrelated words (Gallo, Roberts & Seamon, 1997; McDermott, 1996; Roediger & McDermott, 1995; Shachter et al., 2003).

Roediger and McDermott (1995), later reported two experiments that replicated and extended Deese's 1959 study. In the first experiment, they used six lists of words that elicited highest frequency of false recall in Deese's experiment. Thirty six Rice University students, participated in the experiment. Students were read six word lists, after each presented list, they were given free recall test, where they wrote down all the words they could remember, after which the recognition test followed. The recognition test included studied words, nonstudied critical words (critical lures) and non studied unrelated words.

During the recognition test, the participants saw words on a sheet which they had to rate according to their confidence level of the previous appearance of the word on the list. The four point rating scale was used as for 4 - *sure the item was old*, 3 - *probably old*, 2 - *probably new*, and 1 - *sure it was new*. The results showed high levels of false recall in a single trial free recall. The critical non presented words were falsely recalled at about the same rate as items actually presented in the middle of the lists. In addition, critical non presented items were called as "old" at almost the same level as studied items. The false alarm rate for critical non-presented words was much higher than for other related words that had not been presented, and finally, more than half of the times students mentioned that they were certain that the critical word previously appeared on the list (Roediger et al., 1995). In their second experiment, Roediger and McDermott replicated and extended their first experiment to a wider set of materials, and more importantly, they obtained subjects' personal judgment about the phenomenological experience during the recognition task of non presented items (Gallo et al., 1997). To measure the participants' state of awareness in recognizing the non presented and presented items chosen as "old" or "new", Roediger et al, have made use of Tulving's (1985) *remember/know* judgment strategy. According to Tulving's theory, "remember" responses, which are reports of recollective experiences, represent auto-noetic consciousness, whereas "know" responses are reports of knowledge of facts or events in the absence of recollective experiences and they represent noetic consciousness (Gardiner, Kaminska, Dixon & Java.,1996; Tulving, 1985). Auto-noetic consciousness is identified with episodic memory, it is connected to remembering in the sense of self recollection with a mental re-enactment of previously experienced event. On the other hand, noetic consciousness is the awareness of the past limited to feelings of familiarity or knowing and it is identified with semantic memory

(Gardiner, 2001; Tulving, 1985). Since, in the first Roedrigier's et al. (1995) experiment the false alarms were linked with high levels of confidence, being certain that the non presented critical word appeared on the list before, based on Tulving's "remember/know" personal judgment measuring method, the purpose of the second experiment was to see whether the subjects who falsely recognized the critical non presented word would report "remember" judgment, As a consequence, in addition to creation of false memories, based on subjects' personal judgments about the recall, it could be implied that, the subjects could mentally relive experiences that have never occurred. To test this, the subjects were instructed to answer "remember" if they could mentally relive the experience (possibly recalling its neighboring words, what it made them think of, or what they were doing when they heard the word) on the other hand, they were asked to give "know" judgment when they were confident that the word appeared before but were unable to re-experience (remember) its occurrence. In Experiment 2, the subjects were presented with 16 word lists immediately after half, they did a free recall test, and after the other half, they solved math problems. Following the presentation of all the lists, subjects received a recognition test containing items from the 16 studied word lists and 8 lists that had not been studied. During the recognition test, subjects had to indicate whether the appeared word was "old" or "new", and then, give their "remember" or "know" judgment, for the words chosen as "old". As a result, subjects recalled, 55 % of the lists, the critical nonpresented words, which was a higher rate than in the first experiment. There were also remarkably high rates of false recognition for the critical items. And finally, the false recognition responses were frequently accompanied by "remember" judgment (Roedrigier III, et al., 1995). In summary, the highest rates of false recognition and the highest proportion of "remember" responses to the critical non studied words were for those items that were falsely recalled.

The results of the Roediger's et al. (1995) experiments were quite contradicting to other numerous experiments, where false memories of word lists were mainly accompanied by "know" judgments (Gardiner, 1998; Jones & Roediger, 1995; as cited in Roediger III, et al. 1995).

The present study was designed based on DRM paradigm procedures developed by Deese, Roediger and McDermott. This study aimed to discover whether similar phenomenon is likely to emerge in social settings, particularly where strong associations are not made in semantically related words, instead, false memories are originated in associations based on stereotypic, category based, beliefs about others. Extensive literature suggests that categorical beliefs about others guide and direct processing of information of complex social world through associations. As a result, it can be expected that categorical thinking would play a prominent role in eliciting false memories which are consistent with people's stereotypic beliefs about others.

Therefore, the following section of this chapter will discuss how the processing of information can be guided by categorical thinking.

Information Processing Based on Categorical Thinking

Motivated to better understand how perceivers make sense of the socially demanding world, researchers in experimental social psychology have been examining attitudes, language and perception, in regard to everyday memory and judgment.

Therefore, in describing the basic principles of person perception the following section of this chapter will discuss how categorical thinking or stereotype formation shape person perception and how categorical thinking might have preventive as well as efficient role in

regard to person perception. Moreover the underlying conditions of application of categorical thinking will be discussed in details.

Based on the previously mentioned theories, one prominent idea seems to emerge, concerning human perception and associations. People's impressions and attitudes are shaped by their knowledge and preexisting beliefs, which are acquired from previous experiences in social world (Bartlett, 1932; Macrae et al., 2000; Macrae et al., 2001; Quin, Macrae, & Bodehausen, 2003). As Bartlett (1932) suggested, the person perception is dominated by peoples preconceptions, preexisting ideas which he called "schemas". Moreover, according to Bartlett, cognition and perception are constructive in nature; therefore, person perception is formed on the basis of schematic thinking. In other words, information processing is guided by generic beliefs about the world in associative expectancy consistent manner (Bartlett, 1932; Macrae et al., 2001).

Within the challenging and complex social environment, given the limited recourses to process information, to make sense of the constantly bombarding stimuli, perceivers have developed an efficiency seeking strategy based on categorical thinking, to process information. This process involves two complementary and interactive cognitive skills. On one hand, to behave purposefully, perceivers render information according to mental models (schemas), and as a result, knowing what to expect is a strategy that makes the world meaningful, orderly and predictable place. On the other hand, however, to guide the behavior in truly flexible manner perceivers must also be responsive to unexpected (novel, surprising) stimuli, which do not comfortably lie within the preexisting schemas (Macrae et al., 2001) The ability to efficiently respond to expected and unexpected stimulus information is the basic tool in person perception process. Rather than considering

individuals in terms of their unique attributions and characteristics, perceivers refer instead to the internally established social categories to attain impression formation. These social categories or stereotypes are formed on well established classes like gender, age, occupation and race which reside in a schematic form in long term memory. Of course, it is also through the activation of these categories that perceivers rely on in processing the unexpected information. After all, one can only be surprised of someone's behavior or appearance, if one has prior expectation how that individual should look or behave (Macrae et al., 2000). At first glance, easy and rapid, but in fact, complex information processing mechanism is one of the basic and most remarkable method, that the mind goes through in the process of person perception (Quinn, et al. 2003). As Gilbert and Nixon (1991) have noted, "*the ability to understand new and unique individuals in terms of old and general beliefs ... is one of the handiest tools in social perceiver's kit*" (p. 509).

Automatic Activation of Stereotypes

Theorists of impression formation suggest that when categorization is made and when the appropriate stereotype is activated, they can influence the impression in direct and indirect way. The direct way is the basic category activation process, which are the direct influences that come from the activation of the stereotypic beliefs themselves. What is more interesting, however, is the indirect process in which stereotypes influence the interpretation of other less related available information. Moreover stereotypes direct attention and have influence on which information gets encoded and how that information is interpreted, based on existing stereotypical beliefs (Bodenhausen, 1988). People also tend to understand ambiguous information based on stereotypic beliefs (Jones, 1990;

Quinn, et al., 2003) and seek information that is consistent with their beliefs of others (Snyder and Swan, 1978).

What has been the central interest of many theorists in social cognition is the notion that stereotypes that are associated with certain categories can be activated automatically, by the mere presence of a triggering stimulus. A simple exposure to stimulus target is enough to stimulate categorical thinking and consequently bring about associated with it judgmental, memorial, behavioral stereotyped reactions (Allport, 1954; Macrae, et al., 2001). Within the context of this idea, Allport (1954) noted that "*The human mind must think with the aid of categories... We cannot possibly avoid this process*". Because a certain category has been frequently activated in the past, the well learned set of associations are automatically activated in the presence of the representative of the member of the categorized group (Macrae et al., 2001). Moreover, Divine (1998) proposed that, gender and race are stereotypes that can be activated automatically through mere exposure to a person's group membership. She argued that, because people are, inevitably and systematically, exposed to cultural and sexist stereotypic ideas during childhood socialization, social category membership become inevitably associated with stereotypic notions that are formed without perceiver's full realization (as cited in Quinn, et al., 2003). In addition, Fiske (1998) noted that sex, ethnicity and age are the most stereotyped categories which can be activated by mere exposure, verbally or visually, to the group member. Race, sex and age group, referred to as "The Big Three" in stereotyping, in fact can be activated quickly and effortlessly (Macrae, et al., 2001; as cited in Quinn, et al., 2003).

Conditions of Automatic Stereotype Activation

Backed by empirical observations, several theorists challenged the assumption that stereotyping can be unconditionally automatic and suggested that there can be several conditions that may play predominant role in the activation of stereotypes. Thus like there are different variations in frequency and consistency in people's exposure to stereotypes, similarly, there may be variations in the automatic factor of stereotype activation as well (Quinn, et al., 2003).

There are cognitive, motivational, contextual factors that may play an influential role in categorization and stereotype activation. One of the cognitive capacity related factors is the attentional resources. For example, in Gilbert & Hixon's (1991) experiment, participants viewed a video showing an Asian woman turning over a series of cards on which word fragments were written. The task was to complete each word fragment with the first word that comes to mind. The results showed that participants chose stereotypic word completions for fragments ("rice" rather than "mice" for "---ice") only when the participants had enough attentional resources. In other words stereotyping was activated only when the participants were presented with word completion task in the right context (cards were shown by Asian woman) referring to enough contextual clues and resources, in this case an Asian woman holding a card with an "----ice" word fragment.

Another important determinant of the activation of stereotypes is motivation.

Several researches have noted that the perceiver's immediate processing goals can be more influential in the stereotype activation than availability of attentional resources. Spencer, Fein, Wolfe, Fong and Dunn (1998) have proposed that even when the perceivers were under conditions of attentional depletion, motivated perceivers were more likely to

activate social stereotypes (cited in Quinn, et al., 2003). Moreover, Pendry and Macrae (1996) similarly noted that the level of stereotype activation can be moderated by perceivers' level of involvement with the target. Specifically, when there are relatively uninvolved processing targets are placed, stereotype activation occurs at the broad or more general level of categorization, however, when there are complex, outcome dependant operational goals are involved, categorization takes place in both higher order representation (ex., "woman") and deferential category subtype (ex., Business women) (as cited in Quinn, et al., 2003).

Factors outside the perceiver's mind, may also have impact on activation of stereotypes, examples as such are contextual cues and multiply categorizable targets. Wittenbrink, Judd and Park used a sequential paradigm, in which participants responded to Black and White faces primed with positive or negative background scenes (ex., a church interior or a street corner). The results revealed that black face primes produced majorly facilitated responses to negative items (as cited in, Quinn, et al., 2003). In addition, when the member of the group belongs to multiple categories (Asian woman, who belongs to low social economic class), in the impression formation process, all applicable categories tend to be activated and the most dominant one tends to be facilitated whereas the other conflicting or less relevant categories will be eliminated by the selection process. In other words the category selection is facilitated through the application of basic inhibitory processes, such that potentially distracting categories are removed from the cognitive field through the process of inhibition (Macrae et al., 2001).

In summary, a considerable body of research suggests that stereotypes are energy saving devices their main function is to aid person perception through the aid of categorical

thinking. With repeated confrontation and practice, social perceptions and evaluations, like other skills, can be activated automatically and influence task performance without perceiver's conscious awareness. Stereotypes can be activated automatically by mere exposure to the representative member of a certain category, which is created through social learning. Finally, the activation of stereotypes is not purely automatic but rather conditional, depending on several internal (motivational, attentional) and external (contextual, multiply categorizable) factors.

The main purpose of the present study was to examine how stereotypes can be activated automatically as a consequence of created false memories, within the context of remembering stereotype congruent (expectancy consistent) and stereotype incongruent (expectancy inconsistent) items carrying gender occupational information.

Processing Stereotype Congruent and Incongruent Information

In 1922, Lippman suggested that stereotypes are more likely to be activated, when perceivers have lack of motivation, time or cognitive capacity, to examine more attentively the information about others. In other words, judgment becomes more stereotypic when motivation and capacity are not available, and as long as there is no obvious contrast between stereotypic expectations and the present target information (as cited in Quinn 2003). But what is the underlying mechanism of such predisposition to stereotypically congruent information? As it was mentioned earlier categorical thinking promotes efficient cognitive functioning, particularly, it serves as energy saving mechanism to process information according to learned and well established categories or schemas. According to "encoding flexibility model" developed by Sherman, Lee, Bessenoff & Frost (1998), categorical thinking is efficient because it facilitates the dual processing mechanism, which

enables the brain to encode both expectancy consistent and inconsistent information. When the attentional capacity is low, with the aid of categories, perceivers process expectancy congruent material fluently and effortlessly where as all the spare processing resources are used for the processing of unexpected material, which may require more cautious processing. This dual processing mechanism is better understood within the Johnston & Hawley's (1994) "mismatch theory" on which later "encoding flexibility model" was established. According to "mismatch theory", the mind doesn't waste attentional resources on familiar (expectancy consistent) information, which can be encoded effortlessly with the aid of categories, instead, the attention to that information decreases and the expected item is processed in a more general gist based manner, consequently the attentional resources are used to process the unexpected or novel stimuli which may need more detailed and cautious processing mechanisms (Johnston et al., 1994).

In summary, when the mind is confronted with expectancy consistent and expectancy inconsistent stimuli, the elaborative encoding processes are directed towards the unexpected or novel material (Macrae et al., 2000; Macrae, et al 2002; Sherman et al., 1998). In addition a significant contribution in the area of information processing and pattern recognition was made by Alinda Friedman (1979), in describing how people comprehend and remember pictures of real world scenes. In her study, Friedman (1979) draws attention to frame theory, which is described as a theory about the representation and use of knowledge for pattern recognition. Friedman described frames as semantic pattern detectors, which constitute a "set of expectations about what belongs where" as well as set of descriptions of what certain stimuli generally look like. Consequently, once the appropriate frame is brought to mind, its descriptions may be used to direct subsequent

processing. In the familiar environment the perception with the aid of appropriate frames, will tend to be more automatic in nature. That is, the amount of details of stimulus necessary to process will decrease as the frame of reference gets bigger. Perceivers are able to identify expected objects by using automatized encoding procedures that function on general physical features. In contrast, detection and registration of unexpected stimuli (objects not congruent with currently active frames) require more elaborative analysis of the existing details. Therefore, Friedman (1979) concluded that any "truly" new stimuli will be remembered more veridically than expected stimuli, firstly because expectancy inconsistent stimuli required more elaborative processing therefore more details were remembered and it has consumed more attentional resources. Secondly, the reason why unexpected (expectancy inconsistent) stimuli should be remembered better is that since frames are resistant to change and are relatively invariant, the unexpected stimulus that sits rather uncomfortably with respect to a particular frame cannot change the content of the frame, as a consequence, the representation of such stimulus may be "stuck on" to the frame. Results of series of experiments performed by Friedman (1979) have brought about strong grounds in support of the suggested hypothesis. In one of Friedman's experiments, normative ratings were used to construct six target pictures. Each picture contained expected and unexpected objects.

In addition, the participants' eye movements were recorded, during the difficult recognition test. Participants were asked to discriminate the target pictures from distractors in which either expected or unexpected objects had been changed. As a result, the recorded fixation duration data showed that first fixation to the unexpected objects was twice as long as first fixation to the expected objects. On the recognition test, participants noticed only

the changes that had been made to the unexpected objects, moreover participants did not notice when expected objects were deleted or replaced with different expected objects, consequently it can be implied that, if two events trigger the same frame, they may often be indistinguishable, as long as their differences are trivial (Friedman, 1979).

Thus in light of the above noted literature, several predictions can be put forward within the framework of creation of false memories. Since stereotypes guide and process our person perception and can be automatically activated by the mere exposure to the member of a certain category, and since the processing of stereotype congruent (expectancy consistent) information is encoded on more general, automatic and gist based manner it would be expected that, during a memory task including stereotype congruent and incongruent stimuli, the participants will create false memories which will be mainly expectancy consistent in their context (H1). Moreover, because the expectancy inconsistent (stereotype incongruent or unexpected) stimuli is processed in a more elaborative way, and more attentional resources are used in the encoding process, expectancy inconsistent (unexpected) stimuli will be remembered more often (H2) than expectancy consistent (stereotype congruent) stimuli.

In second part of the present study, the phenomenological characteristics of the participants' subjective judgment - "what it feels like" - were in focus (Macrae et al., 2002), taking closer look at the correct and false expectancy consistent and inconsistent answers of the recall task.

Familiarity and Recollection

The empirical observations of cognitive and neuropsychological studies proposed the dual process theory in memory to shed more light on the participants' personal judgment for the word recognition tests, which suggests that recognition memory performance reflects two distinct types of memory: recollection and familiarity (Yonelinas, 2002). The major idea behind the dual process model is that previously encountered information can be recognized on the basis of two distinctive processes; recollection is based on the recognition of an item based on elaboration and registering specific details of the item, whereas familiarity involves more general processing and registering the item as a whole. Moreover recollection is analytic in nature, consciously controlled process, where more cautious processing is involved (Jacoby, Toth, Yonelinas, 1993; Yonelinas 2002). Tulving (1985) also separated these two memory recognition judgments by two distinct memory stems. One is episodic memory, which brings about the conscious experience of "remembering" (recollection) and the other is the semantic memory, which gives rise to the conscious experience of "knowing" (the feeling of familiarity). The episodic system stores personally experienced events and their relations to each other, on the other hand semantic system is responsible for storing general knowledge about the world. Both systems are flexible to learning new information although semantic system is slower than the episodic system (Tulving, 1985). Yonelinas and colleagues (1994, 1997, 1999, 2001a, 2001b) elaborated more by stating that familiarity reflects the assessment of "quantitative" memory, whereas recollection reflects a "qualitative" recollection of previously experienced events (As cited in Yonelinas, 2002). Thus the above mentioned information can lead to an educated guess, that because expectancy inconsistent (unexpected)

information is likely to be received through elaborative encoding, it should tend to be *recalled* by perceivers (H 4), on the other hand because expectancy consistent (expected) information is more likely to be processed in a gist based (general) manner it would more likely feel *familiar* (H 4) rather than *recalled*.

Remember Know Procedure

Remember/know procedure was developed by Tulving (1985) as a measurement of participants' recognition judgments of source memory based on *familiarity* and *recollection*. In the *remember/know* procedure participants are asked to introspect about the source of their memory judgments and state whether they recognize an item on the basis of remembering, that is they can recollect the specific details of the previously seen item, or they can recognize the item on the basis of knowing, that is they are familiar with the item but are not able to recollect certain details of it (Tulving, 1985). In other words the "remember" judgment refers to those items of which they have a "vivid" memory, a subjective feeling of being certain that the item has appeared before in the study episode and have a conscious recollection of its previous occurrence in the study list. On the other hand the "know" judgment refers to items for which they can tell (usually with certainty) that the item appeared before in the study list, although they cannot recollect in details the actual occurrence of the item (Gardiner, 1988; Rajaram, 1993; Tulving, 1985). One example that was given to participants to illustrate the "remember/know" recall judgments in the numerous studies on recognition memory tasks was the following. While describing a recent visit to national park, one may recall all the details and mentally relive the events that took place, and be able to remember specific details of the place and the event. This would be an example of "remember" judgment. On the other hand, it happens sometimes

that we meet someone in the street whom we met at a party recently. Although we know that we have seen the person at the party, we may not actually remember meeting the person or talking to him/her, or even unable to remember his or her name (Rajaram, 1993).

There is a good deal of empirical evidence that suggest that "remember" and "know" judgments represent two distinctive conscious states of the recognition process (Gardiner, 1998; Tulving, 1985). Some experimental factors have been found to increase the "remember" but not "know" judgments during the recognition test, yet other factors increase "know" but not "remember" judgments, moreover there are variables that increase "remember", but decrease "know" judgments (as cited in Inoue & Bellezza, 1998). Gardiner & Java (1990) further argued that "remember" and "know" are two measurable states of consciousness and they reflect "qualitatively" distinct components of recognition performance rather than indication of unitary dimension, like trace strength or confidence level (Donaldson, 1996; Gardiner & Java, 1990). In other words, "remember" and "know" are qualitatively rather than quantitatively different as subjective judgments of recognition memory tasks. Moreover Hirshman and Master (1999) supported further this idea by stating that "remember" and "know" judgments are not identical with sure or unsure statements, and that "remember" and "know" have different neural correlates (Hirshman & Master, 1997).

Based on the above mentioned theories on recollection and familiarity and respectively studies dealing with "remember /know" measures of subjective judgments of memory tasks, it can be hypothesized that false expectancy consistent (stereotype congruent) items in the recall task will be mainly assigned to "know" personal judgment,

where as correct expectancy inconsistent (stereotype incongruent) responses will be associated with "remember" personal judgment.

One important study concerning memory illusions and expectancy based processing was done by Macrae et al. (2002). The study aimed to examine how category based thinking can prompt the elicitation of false memories. Taking into consideration how expectancy consistent and inconsistent information is processed, it was anticipated that through gist based recognition, participants will create false memories that are stereotypical (expectancy consistent) in nature. The study was based on the DRM paradigm of associative word recognition tests, but instead of word lists the researchers used stereotypic and non stereotypic gender occupational pairings. Participants were presented with paired associate learning task in which series of male and female names were paired with one of the two occupations: mechanic or hairdresser. Because the participants stereotypically expect men to be mechanics and women to be hairdressers it was expected that these categorical beliefs will guide the encoding of stimulus materials. Specifically, because unexpected occupational pairings (male hairdresser/female mechanic) will tend to receive elaborative encoding, where as expected occupational pairings (male mechanic/female hairdresser) will be encoded in more general (gist based) manner, it was predicted that participants will generate expectancy consistent false memories. In addition, using the "remember/ know" measurement method for the participants' personal judgment of the recall task for each item, the results revealed that participants false memories were accompanied by subjective experience of "knowing" rather than "remembering" (Macrae, et al., 2002).

The present study was an extension of Macrae's et al. (2002) experiments. The present study used female and male names paired with stereotypic congruent or incongruent occupations: mechanic or nurse (Experiment 1) and it further extended the study by replacing names with pictorial pictures of male and female faces paired with one of the two occupations: mechanic or nurse (Experiment 2).

In light with the literature reviewed above, the present study will examine how false memories will be created as a consequence of categorical thinking. Further the study will take a close look at the phenomenological aspects of the participants' source memory judgments. More specifically, when the participants are asked to memorize names paired with expectancy consistent (male mechanic, female nurse) and inconsistent (male nurse, female mechanic) occupations, it is expected that, during the recall task, false memories will be fabricated, which will be expectancy consistent (stereotypical) in nature (male mechanic, female nurse). Moreover, the number of expectancy inconsistent (non stereotypical) items recognized correctly will be significantly higher than the correct expectancy consistent items. In addition, while examining the phenomenological status of the participants' personal judgment of the recall task, it was predicted that false expectancy consistent (stereotype congruent) items, rather than inconsistent (stereotype incongruent) items, will be accompanied by "know" subjective judgment more often than "remember" and "guess" personal judgment, moreover, it was predicted that the participants will give the "remember" judgment to correctly recalled expectancy inconsistent items more often than "know and "guess" judgments. In Experiment 1, during the memorization task, the participants were presented with male and female forenames paired with expectancy consistent (stereotypical) and expectancy inconsistent (non stereotypical) names as shortly

after they performed recall task and at the final stage the participants were asked to give their personal judgment about the recall of each item. Referring to the information given above, the following hypotheses were tested.

Experiment 1

H1: Participants will falsely recall more expectancy consistent (stereotype congruent) items than inconsistent (non-stereotyped) items.

H2: Participants will correctly recall more expectancy inconsistent (non-stereotyped) items than expectancy consistent (stereotype congruent) items

H3: The falsely recalled expectancy consistent items will be more accompanied by "know" judgments than "remember" and "guess" judgments

H4: The correct expectancy inconsistent answers will be more accompanied by "remember" judgment than "know" and "guess" judgments.

Experiment 2

In Experiment 2 during the memorization task the participants were presented with male and female pictorial images of faces paired with expectancy consistent (stereotypical) and expectancy inconsistent (non stereotypical) names as shortly after they performed recall task.

For the experiment 2 the following hypothesis will be tested:

H1: Participants will falsely recall more expectancy consistent (stereotype congruent) items than inconsistent (non-stereotyped) items.

H2 (a): Participants will correctly recall more expectancy inconsistent (non-stereotyped) items than expectancy consistent (stereotype congruent) items

H2 (b): The participants' correctly recalled expectancy inconsistent items in Experiment 2 will increase compared to correctly recalled expectancy inconsistent items in Experiment 1.

H3: The falsely recalled expectancy consistent items will be more accompanied by "know" judgments than "remember" and "guess" judgments

H4: The correct expectancy inconsistent answers will be more accompanied by "remember" judgment than "know" and "guess" judgments.

Participants

The participants in the study were university students from two universities. A total of 52 students participated; however, 3 of them were dropped out by the experimenter. One

CHAPTER III

Experiment 1

Method

The purpose of the study was to investigate how false memories can arise in the context of memorizing names paired with expectancy consistent (male mechanic, female nurse) and expectancy inconsistent (female mechanic, male nurse) occupation pairs. The study also intended to examine the phenomenology of the source judgment of the correct and false expectancy consistent and inconsistent answers.

The research context

The study took place in two different universities, Haigazian University, located in Beirut, Clemenceau, Hamra, and Lebanese University in Hadath. The experiment was run in the cafeteria and campus of the universities by the experimenter and her assistant. The participants were approached by the experimenter and asked if they can devote ten minutes of their time to participate in the experiment in psychology and they were required to perform a memory task. No time limit was imposed during the recall memory task, though the memorization task was limited, that is each slide of the name paired with occupation was set only for two seconds. The average time for completion of the experiment for each participant was about 10 minutes.

Participants

The participants in the study were university students from two universities. A total of 52 students participated; however, 2 of them were dropped out by the experimenter. One

female has answered to all the questions intentionally in inconsistent way, that is, she paired all the female names to mechanic occupation and all the male names to nurse occupation; she did not follow the procedures. The second one, also a female participant, started giving identical answers to all stimuli from the middle of the recall task, because of the fight that started among the students outside of the cafeteria and she lost her concentration and was focused on her fear of fight. Thus, the total number of the participants taking part in the study was 50. The age range was between 18 and 30 ($M=20.24$). Of the total sample 25 were males and 25 were females.

Materials

The experiment was composed of:

- a) A power point presentation of the memorization task.
- b) A power point presentation of the recall task.
- c) The answer sheets of the recall task, made up of 80 items, that were filled in by the experimenter (See Appendix F).

The memorization task

The power point presentation of the memorization task included 40 randomly assigned male and female names to one of the two occupations, either mechanic or a nurse. According to Sciencedirect (www.sciencedirect.com/science/article/pii/0001879176900592) nurse and mechanic are the most gender stereotyped occupations. In total there were 10 male nurses, 10 female mechanics: expectancy inconsistent stimuli and 10 male mechanics, 10 female nurses: expectancy consistent stimuli. The power point presentation started with the description

and instructions of the memory task (See Appendix A) followed by 40 names paired with either mechanic or nurse occupation (See Appendix B) and each name had 2 seconds interval blank page. In sum the power point included 82 slide shows.

The recall task

The procedures and instructions for the recall task (See Appendix C), were presented at the beginning of the slide show.

The recall task power point presentation included 80 randomly assigned names, forty "old" names, from the first power point presentation and 40 "new" names not presented before. Each name was presented with two questions: "old or new?" (See appendix D) then, it was followed by two multiple choice questions: 1) mechanic or nurse, and 2) remember, know or guess, as personal source judgments (Appendix E). Remember/know items were modeled after those used by Rajaram (1993). In sum, the power point included 165 slide shows.

Procedure

The experimenter approached the participants asked if they can devote 10 minutes from their time to perform an experiment. The experimenter explained that the aim of the study was to examine people's ability to remember occupational information about others. The experimenter told the participant that he or she will be presented with two power point slide shows, the first one is the memorizing task and the second one is the recall task, and at last they will have to give their personal judgment about the recall. With the start of the experiment the participants were presented with a computer power point presentation, the memorization task. First page thanked the participants for the participation, on the second

page procedures and instructions followed in which they were asked to try to remember 40 names, each presented at a time, paired with one of the occupations; either mechanic or a nurse. The task was to try to remember "who does what" as directly after, they will be asked to recall the names with the occupation. Each stimulus pair appeared on the screen for two seconds and the inter-stimulus interval was two seconds.

After the stimulus presentation and the five minute distracter task, in which they had to name 4 favorite vegetables, 4 favorite fruits, 2 favorite actors and 2 last seen movies, they performed the recall memory task. The detractor task was given to the participants to allow the processing of information to take place, since there was no interval time between the memorization task and the recall task. The first page of the recall memory task presented the participants the procedures and directions of the recall task. The participants were asked to indicate whether the forename that appeared on the screen was "old" or "new"; as of the 40 names that they saw in the first slide show were mixed with another 40 new names. If the participants answered "new" the experimenter turned to the next name, whereas, if the participants answered "old", then they had to proceed to the two following multiple choice question; a) if the name was paired with mechanic or a nurse occupation, b) give their personal remember\know\guess judgment. Each name and the multiple choice questions remained on the screen until the participants gave the answer. The description for the remember\know\guess personal judgment was as follows. They were asked to respond "remember" if they could mentally recollect and re-experience the presentation of the item in the slide show; if they could recover all the detailed representation of the item. They had to respond "know" if they were confident that the item appeared previously in the slide show but were unable to recover and visualize the detailed representation of the item that

appeared previously in the slide show. Finally, they had to respond "guess", if they could neither "remember" nor "know" the item that appeared before: they were simply guessing the answer. The guessing option was added to minimize the possibility of guessing between remember and know judgments which as a consequence will increase their validity and to identify when exactly the participants were guessing. Each answer of the participant, for all the items, was recorded by the experimenter on the separate answer sheet.

male names paired with occupations (mechanic, nurse) was used to check the participants' answers during the recall task. Further, the false and correct answers to "new" and "old" names were calculated. The items were considered as "false", when the participants correctly recognized the name as "old" but mismatched the occupation (ex. if it was a mechanic but he/she answered nurse) and if the item was "new" but was remembered as "old" and therefore was linked to a non existing occupation. Further, the false and correct answers were calculated and divided into four categories: first and second categories were false expectancy consistent (stereotyped) which was male mechanic, female nurse and false expectancy inconsistent (stereotype incongruent) which was male nurse, female mechanic, the third and fourth categories were correct expectancy consistent (stereotype congruent) which was male mechanic, female nurse and correct expectancy inconsistent (stereotype incongruent) which was male nurse, female mechanic. Finally, "remember" "know" "guess" judgments were assessed for each category.

To test Hypothesis 1 which stated that participants will falsely recall more expectancy consistent items than inconsistent items, a paired samples t-test was conducted. Results showed that the mean of false expectancy consistent items was higher than the mean of false expectancy inconsistent items. There was a significant difference between false expectancy consistent items and expectancy inconsistent items (see Table I). Thus

Results

The first experiment made use the memorization task of 40 male and female forenames paired with mechanic or nurse occupations and the recall task of 80 "old" and "new" names that were either presented previously "old" or have not been shown before in the memorization task: "new". In addition the answer sheet for "old" and "new" male and female names paired with occupations (mechanic, nurse) was used to check the participants' answers during the recall task. Further, the false and correct answers to "new" and "old" names were calculated. The items were considered as "false", when the participants correctly recognized the name as "old" but mismatched the occupation (ex., it was a mechanic but he/she answered nurse) and if the item was "new" but was misremembered as "old" and therefore was linked to a non existing occupation. Further, the false and correct answers were calculated and divided into four categories: first and second categories were false expectancy consistent (stereotyped) which was male mechanic, female nurse and false expectancy inconsistent (stereotype incongruent) which was male nurse, female mechanic, the third and fourth categories were correct expectancy consistent (stereotype congruent) which was male mechanic, female nurse and correct expectancy inconsistent (stereotype incongruent) which was male nurse, female mechanic. Finally, "remember" "know" "guess" judgments were counted for each category.

To test Hypothesis 1 which stated that participants will falsely recall more expectancy consistent items than inconsistent items, a paired samples t-test was conducted. Results showed that the mean of false expectancy consistent items was higher than the mean of false expectancy inconsistent items. There was a significant difference between false expectancy consistent items and expectancy inconsistent items (see Table 1). Thus

Hypothesis 1 was confirmed. The participants' falsely recalled items were more accompanied by expectancy consistent (stereotype congruent) than inconsistent (stereotype incongruent) answers.

Table 1

Paired samples t-test of false expectancy consistent and false expectancy inconsistent items

FEC			FEI			FEC-FEI	
N	Mean	Std. Dev.	N	Mean	Std. Dev.	t	Sig. (2-tailed)
50	13.28	6.373	50	6.18	4.614	7.382	.000

To test if participants' will correctly recall more expectancy inconsistent (stereotype congruent) than expectancy consistent (stereotype congruent) items t-test was performed. Results showed that the mean of correct expectancy consistent items was higher than expectancy inconsistent items. Thus, hypothesis 2 was not supported (see table 2).

Table 2

Paired Samples Statistics of correct expectancy consistent (CEC) and correct expectancy inconsistent (CEI) items.

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 CEC	10.00	50	3.362	.476
CEI	5.32	50	3.371	.477

In addition, a paired samples t-test was performed to examine the phenomenology of the participants' source judgment of the recognition task. Hypothesis 3 stated that false expectancy consistent items will be accompanied by "know" judgments more than "remember" and "guess" judgments. The results showed that the mean of "guess" judgment was higher than the means of "remember" and "know" judgments. Thus, hypothesis 3 was not confirmed (see Table 3).

Table 3

Paired Samples Statistics of remember/know/guess judgments of false expectancy consistent (FEC) items

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	rem1	3.76	50	3.651	.516
	know1	2.90	50	3.272	.463
Pair 2	know1	2.90	50	3.272	.463
	guess1	6.48	50	5.433	.768
Pair 3	rem1	3.76	50	3.651	.516
	guess1	6.48	50	5.433	.768

Hypothesis 4 predicted that the correct expectancy inconsistent items will be more accompanied by "remember" personal judgment, for the source recognition task, more than "guess" and "know" judgments. A paired samples t-test was performed to test the hypothesis. The results showed that the mean of "remember" judgments was higher than "guess" and "know" judgment. The difference between the means of "remember" and "know" judgments was significant, as well as the differences between the means of "remember" and "guess" judgments. Thus hypothesis 4 was supported. The correct

expectancy inconsistent answers were more accompanied by "remember" personal judgment than "know" and "guess" judgments (see Table 4).

Table 4

Paired Samples t-test for Correct Expectancy Inconsistent (CEI) Items of Remember/Know/Guess Judgments

Remember			Know			Guess			Rem.- know		Know - Guess		Rem.- Guess	
N	Mean	St.D	N	Mean	St.D	N	Mean	St.D	t	Sig	t	Sig.	t	Sig
50	2.78	2.85	50	1.28	1.93	50	1.36	1.33	3.159	.003	-.230	.819	3.007	.004

Discussion

The results of the Experiment 1 showed that when participants recalled the male and female names paired with mechanic or nurse occupations the false answers were more expectancy consistent (stereotype congruent), which is male mechanic and female nurse than expectancy inconsistent in nature. Therefore it can be concluded that while recalling stereotype congruent and stereotype incongruent information the participants tended to automatically create false stereotype congruent memories, these false answers were congruent with the participants' expectations of male and female stereotypic occupations. As a conclusion the predictions that false memories can be created in social settings as a consequence of stereotyping were supported. However the prediction that expectancy

inconsistent items will be correctly recalled more frequently than consistent items was not sustained, which means that even the correct answers were dominated by expectancy consistent (stereotype congruent) items. Additionally, the results of the present experiment showed that the false expectancy consistent items were accompanied by "guess" personal judgment, based on the obtained results it can be implied that while falsely recalling expectancy consistent items the participants were guessing the answers most of the time. In contrast, during the correct expectancy inconsistent items, "remember" personal judgment was more often rated by the participants than "guess" and "know" personal judgments. In other words, the participants could mentally recollect details of the appearance of the name paired with one of the two expectancy inconsistent occupations; therefore "remember" personal judgment was assigned to the correct expectancy inconsistent items.

Based on the obtained results from Experiment 1 the second Experiment was designed using pictorial faces which represent better the context of social world and carry more inconsistency by their vividness. It was predicted that, having more contextual cues and attentional resources, pictures of faces can better guide the processing of expectancy consistent and inconsistent stimuli. Therefore, the same hypotheses were tested as in Experiment 1 but using pictures of male and female faces taken from the real world.

CHAPTER IV

Experiment 2

Introduction

Experiment 2 was an extension of Experiment 1 having similar procedures and variables but varying in the source of the given information in shifting from verbal stimulus material to pictorial stimuli which can carry important influential factors for the purpose of the present study. Using pictorial male and female faces in Experiment 2, carry multiple factors that may significantly differ from verbal presentation of stimuli in Experiment 1, therefore have different outcomes.

The foremost important point worth mentioning is that there is an omnipresent limitation among the studies done in the domain of stereotyping and person perception. To investigate the social cognitive categorization process, the majority of the research done on this field notably relied on the verbal representation of the stimulus material (category labels) (Macrae, et al., 2001; Macrae, et al., 2000). What can be problematic regarding this issue is that unlike pictures of real people, verbal representations do not represent the real social world (Freidman, 1979) but rather, by their very nature, represent category labels. Verbal labels are "already precategorized stimuli" which are directly associated with existing stereotypes or mental schemas (Macrae, et al., 2001). As a resolution to this issue, Friedman (1979) suggested that researchers know little about visual memory and even less about pictorial memory, moreover she stated that "*pictures are complex stimuli that are more nearly like the world than text is*" (p. 318). Although verbal representation can be experimentally well controlled, it may not properly clarify the "information processing

puzzle" of when perceivers encounter people in the real social world (Macrae, et al., 2000). Therefore, to resolve this issue, it was suggested by many researchers to further include more studies in the field of stereotyping where perceivers are encountered with real people (Macrae, et al., 2000; Macrae, et al., 2001; Friedman, 1979). In addition, as Gilbert and Hixon (1991) have recommended "*if we really want to know how persons think about persons, we may have to introduce our subjects to some*" (p. 516).

When perceivers are presented with real people (pictures of faces), the processing of the stimuli might take different routes and consequently involve different processing (Macrae, et al., 2001; Johnson & Raye 1998), due to several factors. Pictures of faces, unlike verbal labels, involve stimulus complexity, which implies that pictorial faces of people, when presented, can be classified into multiple categories like gender, age, attractiveness level, blonde vs. brunet etc. All these stereotypical categories can be activated with the presentation of a single picture of a person (Macrae, et al., 2001). As it was mentioned in the previous chapter when the perceiver is presented with multiple categorizable stimuli, all categories are activated and, under that specific circumstances, the most dominant, vivid and useful category takes over through the category selection process. Potentially distracting and therefore disruptive categories are eliminated from the cognitive landscape through the process of spreading inhibition (Macrae, et al., 2001). For the purpose of this study gender category was assumed to be the dominating category in the presentation of the faces, because of the repeated exposure and directed attention of the participants in the memorization and the recall task in the instructions.

Another factor that may directly influence the categorization process is the attentional resources. Relying on empirical evidence, Gilbert and Hixon (1991) suggested

that stereotyping is most likely to take place when there are enough available attentional resources. Pictures include numerable perceptual cues that may help the participants to memorize better. The pictures in the present study were colorful photos of close up realistic faces with the full of details that were not present in the verbal representation of the stimuli. Johnson and Raye (1998) noticed that all these perceptual cues serve as attentional resources for the information to be processed differently from the verbal labels. Other perceptual cues, using faces, were hair length and color, the form of the face, face features, smile, texture and light direction. In addition, Macrae, Hood, Rowe and Mason noticed that the direction of the eye gaze of the target stimuli (faces) can act as a cue and therefore have direct effect on stereotyping. In their experiment they found that gender categorization was faster for the direct-gaze of faces than of faces with diverted gazes or faces with closed eyes (as cited in Quinn, et al., 2003).

Finally, numerous experiments demonstrated that mood and affect can have impact on stereotype activation. In general happy or positive moods can trigger the activation of gist based (automatic) processing (e.g., Isen & Daubman, 1984; Ottati, Terkildsen & Hubbard, 1997; Worth & Mackie 1987), whereas sad moods are associated with minimized use of gist processing and reliance on schemas (e.g., Bless, Bohner, Schwarz & Strack, 1990; Weary & Gannon, 1996) (as cited in Quinn, et al., 2003). In other words happy or positive moods are more likely to activate categorical thinking; in contrast, sad or negative moods are less likely to rely on stereotyping. In the present study the faces that were used were mostly attractive and smiling, therefore, it can be concluded that, positive moods were most likely to be induced while the participants are memorizing the items.

In summary, faces are stimulus materials that are more vivid, bigger in size, relatively easier to memorize in contrast to verbal stimuli. In addition, pictures of faces carry many details and have perceptual cues which will help the participants to memorize the stimuli better; moreover faces can induce positive moods and have more attentional resources. Taking into consideration all the above mentioned factors, the memorization of faces, as pictorial stimuli, can carry different processing routes and therefore have different recall outcomes.

In the second experiment of the present study the participants, during the memorization task, were presented with male and female pictorial images of faces paired with expectancy consistent (stereotypical) and expectancy inconsistent (non stereotypical) names as shortly after they performed recall task.

For Experiment 2 the following hypothesis will be tested:

H1: Participants will falsely recall more expectancy consistent (stereotype congruent) items than inconsistent (non-stereotyped) items.

H2 (a): Participants will correctly recall more expectancy inconsistent (non-stereotyped) items than expectancy consistent (stereotype congruent) items

H2 (b): The participants' correctly recalled expectancy inconsistent items in Experiment 2 will increase compared to correctly recalled expectancy inconsistent items in Experiment 1.

H3: The falsely recalled expectancy consistent items will be more accompanied by "know" judgments than "remember" and "guess" judgments

H4: The correct expectancy inconsistent answers will be more accompanied by "remember" judgment than "know" and "guess" judgments.

Method

The purpose of the study was to investigate how false memories can arise in the context of memorizing faces paired with expectancy consistent (male mechanic, female nurse) and expectancy inconsistent (female mechanic, male nurse) occupation pairs. The study also intended to examine the phenomenology of the source judgment of the correct and incorrect expectancy consistent and inconsistent answers.

The research context

The study took place in the Lebanese University in Hadath. The experiment was run in the cafeteria and campus of the university by the experimenter and her assistant. The participants were approached by the experimenter and asked if they can devote ten minutes of their time to participate in the experiment in psychology and they were required to perform a memory task. No time limit was imposed during the recall memory task, though the memorization task was limited, that is each slide of the name paired with occupation was set only for two seconds. The average time for completion of the experiment for each participant was approximately 10 minutes.

Participants

The participants in the study were university students from two universities. A total of 30 students participated. The age range was between 18 and 30 ($M = 19.3$). Of the total sample 15 were males and 15 were females.

Materials

The experiment was composed of:

- a) A power point presentation of the memorization task of faces paired with mechanic or nurse occupations.
- b) A power point presentation of the recall task.
- c) The answer sheets of the recall task, made up of 80 items that were filled in by the experimenter (See Appendix F).

The memorization task

The power point presentation of the memorization task included 40 randomly assigned pictures of male and female (moderate to high attractiveness, middle age) faces to one of the two occupations, either mechanic or a nurse. In total there were 10 male nurses, 10 female mechanics pictures: expectancy inconsistent stimuli, and 10 male mechanics, 10 female nurses: expectancy consistent stimuli. The pictures of faces had the same size and the same grey background. The power point presentation started with the description and instructions of the memory task (See Appendix G) followed by 40 faces paired with occupation (See Appendix H) and each face with occupation had 2 seconds interval blank page. In sum the power point included 82 slide shows.

The recall task

The procedures and instructions for the recall task (See Appendix I), were presented at the beginning of the slide show.

The recall task power point presentation included 80 randomly assigned faces, forty old names, from the first power point presentation and 40 new faces not presented before. Each face was presented with two questions: old? or new? (See appendix K) then, it was followed by two multiple choice questions: 1) mechanic or nurse, and 2) remember know or guess, as personal source judgments (Appendix L). Remember\ know items were identical with those used by Rajaram (1993). In sum, the power point included 165 slide shows.

Procedure

The participants were approached by the experimenter and asked if they can contribute 10 min of their time to take part in an experiment. The experimenter explained that the aim of the study was to examine people's ability to remember occupational information about others. They will be presented with two power point slide shows, the first one is the memorizing task and the second one is the recall task, and at last they will have to give their personal judgment about the recall. With the start of the experiment the participants were presented with a computer power point presentation, the memorization task. First page thanked the participants for the participation, on the second page procedures and instructions had followed in which they were asked to try to remember 40 faces, each presented at a time , paired with one of the occupations; either mechanic or a nurse. The task was to try to remember "who does what" as directly after, they will be

asked to recognize the faces recall the occupation that was paired with the face. Each stimulus pair appeared on the screen for two seconds and the inter-stimulus interval was two seconds.

After the stimulus presentation and the five minute distracter task, in which they had to name four favorite vegetables, four favorite fruits, two favorite actors and two last seen movies, they performed the recall memory task. The first page of the recall memory task presented the participants the procedures and directions of the recall task. The participants were asked to indicate whether the face that appeared on the screen was old or new; as of the 40 faces that they saw in the first slide show were mixed with another 40 new faces. If the participants answered new the experimenter turned to the next face, whereas, if the participants answered old, then they had to proceed to the two following multiple choice question; a) if the face was paired with mechanic or a nurse occupation, b) give their personal remember\know\guess judgment. Each face and the multiple choice questions remained on the screen until the participants gave the answer. The description for the remember\know\guess personal judgment was as follows. They were asked to respond "remember" if they could mentally recollect and re-experience the presentation of the item in the slide show; if they could recover all the detailed representation of the item. They had to respond "know" if they were confident that the item appeared previously in the slide show but were unable to recover and visualize the detailed representation of the item that appeared previously in the slide show. Finally, they had to respond "guess", if they could neither "remember" nor "know" the item that appeared before: they were simply guessing the answer. Each answer of the participant, for all the items, was recorded by the experimenter on the separate answer sheet.

Results

The second experiment made use of the memorization task of 40 male and female pictures of faces paired with mechanic or nurse occupations and the recall task of 80 "old" and "new" names that were either presented previously: "old" or have not been shown before in the memorization task: "new". The study also made use of the answer sheet of the recall task to calculate all the correct and false answers and divide the answers into categories.

The false and correct answers to "new" and "old" faces were calculated. The items were considered as "false", when the participants correctly recognized the face as "old" but mismatched the occupation (ex., it was a mechanic but he/she answered nurse) also, if the item was "new" but was misremembered as "old" and therefore linked to a non existing occupation. Further, the false and correct answers were divided into four categories: first and second categories were **false** expectancy consistent (stereotyped) which was male mechanic, female nurse and false expectancy inconsistent (stereotype incongruent) which was male nurse, female mechanic, the third and fourth categories were **correct** expectancy consistent (stereotype congruent) which was male mechanic, female nurse and correct expectancy inconsistent (stereotype incongruent) which was male nurse, female mechanic. Finally, "remember" "know" "guess" judgments were counted for each category.

Hypothesis 1 stated that participants will falsely recall more expectancy consistent items than inconsistent items. A paired samples t-test was conducted to test the hypothesis. It was found that the mean of false expectancy consistent items was higher than the mean of false expectancy inconsistent items (see Table 1).

There was a significant difference between false expectancy consistent items and false expectancy inconsistent items (see Table 1). Thus Hypothesis 1 was supported. The participants' falsely recalled items were more accompanied by expectancy consistent (stereotype congruent) than inconsistent (stereotype incongruent) false answers.

Table 1

Paired Sample t-test of False Expectancy Consistent (FEC) and False Expectancy Inconsistent (FEI) Items

FEC			FEI			FEC-FEI	
N	Mean	Std. Dev.	N	Mean	Std. Dev.	t	Sig. (2-tailed)
30	13.40	6.339	30	6.00	3.543	5.746	.000

Furthermore, to test if participants will correctly recall more expectancy inconsistent (stereotype congruent) items than expectancy consistent (stereotype congruent) items, t-test was performed. Results showed that the mean of correct expectancy consistent items were higher than the mean of expectancy inconsistent items.

Thus, hypothesis 2 (a) was not supported (see table 2).

The difference of the means of correct expectancy inconsistent items of Experiment 2 (faces) and Experiment 1 (names) was significant (see table 4). Thus Hypothesis 2 (b)

Table 2

Paired Sample Descriptive Statistics of Correct Expectancy Consistent (CEC) and Correct Expectancy Inconsistent (CEI) Items

		Mean	N	Std. Deviation	Std. Error Mean
Pair	CEC	9.77	30	2.921	.533
1	CEI	6.93	30	3.629	.663

In addition Hypothesis 2 (b) stated that, the participants in Experiment 2 will correctly recall expectancy inconsistent (stereotype congruent) items more than the participants in Experiment 1. Independent sample t-test was performed, to test this hypothesis. The results showed that the mean of correct expectancy inconsistent (stereotype incongruent) items in Experiment 2 (faces) was higher than the mean of correct expectancy inconsistent (stereotype incongruent) items in Experiment 1 (names) (see Table 3).

Table 3

Means of Correct Expectancy Inconsistent Items of the Two Experiments

groups	N	Mean	Std. Deviation	Std. Error Mean
result names	50	5.32	3.371	.477
faces	30	6.93	3.629	.663

The difference of the means of correct expectancy inconsistent items of Experiment 2 (faces) and Experiment 1 (names) was significant (see table 4). Thus Hypothesis 2 (b)

was supported. The number of expectancy inconsistent (stereotype incongruent) items in Experiment 2 was significantly higher than the number of correct expectancy inconsistent (stereotype incongruent) items in Experiment 1.

Table 4

Independent sample t-test of Correct Expectancy Inconsistent items of Experiments 1 & 2

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper	
result	Equal variances assumed	.717	.400	-2.014	78	.047	-1.613	.801	-3.208	-.018
	Equal variances not assumed			-1.977	57.661	.053	-1.613	.816	-3.247	.021

In addition, a paired samples t-test was performed to examine the phenomenology of the participants' source judgment of the recognition task of the names paired with expectancy consistent (stereotype congruent) and inconsistent (stereotype incongruent) items. Hypothesis 3 stated that falsely recalled expectancy consistent (stereotyped) items will be accompanied by "know" judgments more than "remember" and "guess" judgments. The results showed that the mean of "guess" judgment was higher than the means of "remember" and "know" judgments. Thus, hypothesis 3 was not confirmed (see Table 5).

Table 5

Paired Samples Statistics of Remember/Know/Guess Judgments of False Expectancy Consistent (FEC) Items.

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	rem1	3.83	30	4.094	.748
	know1	3.27	30	3.140	.573
Pair 2	know1	3.27	30	3.140	.573
	guess1	6.37	30	4.123	.753
Pair 3	rem1	3.83	30	4.094	.748
	guess1	6.37	30	4.123	.753

In Hypothesis 4 it was stated that the correct expectancy inconsistent items will be accompanied by "remember" personal judgment, for the source recognition task, more often than "guess" and "know" judgments. A paired samples t-test was performed to test the hypothesis. The results showed partial support of the Hypothesis. The difference between the means of "remember" and "know" judgments was not significant, as well as the differences between the means of "know" and "guess" judgments. Nevertheless the difference between "remember" and "guess" judgments was marginally significant at 0.07 level. Therefore, hypothesis 4 was partially supported (see Table 6).

Table 6

Paired Samples t-test for Correct Expectancy Inconsistent Items of Remember/Know/Guess Judgments.

Remember			Know			Guess			Rem.- know		Know - Guess		Rem.- Guess	
N	Mean	St.D	N	Mean	St.D	N	Mean	St.D	T	Sig.	t	Sig.	t	Sig.
30	2.90	2.84	30	2.37	2.28	30	1.67	1.67	.754	.457	1.445	.159	1.873	.071

Discussion

The results obtained from Experiment 2 were similar to Experiment 1 with slight differences. The participants falsely recalled more, expectancy consistent items than inconsistent items. Recalling pictures of faces paired with stereotype congruent and stereotype incongruent occupations the participants created false memories based on their stereotyped expectations of gender occupational roles, which is male should be mechanic and female should be nurse. The correct expectancy inconsistent items were not better recalled than expectancy inconsistent items, as it was predicted, although the participants better recalled expectancy inconsistent items in the present Experiment using faces than in the first Experiment using names, it was observed that the difference between the correct expectancy inconsistent items was significant in the two experiments. In addition, similar to Experiment 1, the false expectancy consistent items were more accompanied by "guess" personal judgments than "remember" and "know" judgments. Concerning the correct

expectancy consistent (stereotype congruent) answers there was no significant difference between the means of "remember" and "know" personal judgments, but there was a significant difference between "remember" and "guess" answers. Therefore it can be concluded that participants were guessing while falsely recalling the expectancy inconsistent items whereas for the correct expectancy inconsistent items they were remembering more than guessing the answers.

personal evaluation of each answer of the recall task, based on familiarity (know) or recollection (remember). The participants were also given the choice to state when they were guessing the answer. The main purpose of the study was to test if false memories can be originated as a consequence of stereotyping which is rooted in categorical thinking. The sample of the study was composed of university students who were asked to memorize names or pictures of faces paired with stereotype congruent (male mechanic/female nurse) and incongruent (male nurse/female mechanic) occupations. Later they were asked to recall all the items and give their personal judgment about the recall. It was hypothesized that false memories will be mostly expectancy consistent (stereotype congruent) in nature, which is male mechanic, female nurse and participants will mostly correctly remember expectancy inconsistent items, which is male nurse, female mechanic than consistent items. In addition it was hypothesized that false expectancy consistent items will be mostly linked to "know" personal judgment and correct inconsistent items will be accompanied by "remember" personal judgment.

This chapter of the study will discuss in detail the results obtained for each hypothesis, state the limitations and finally, propose suggestions for future research.

CHAPTER V

General Discussion

The purpose of this quantitative study was to investigate the effects of processing of information based on categorical thinking in recalling stereotype congruent and incongruent information within social context. In addition, the study sought to examine the nature of phenomenology of the participants personal evaluation of each answer of the recall task, based on familiarity (know) or recollection (remember). The participants were also given the choice to state when they were guessing the answer. The main purpose of the study was to test if false memories can be originated as a consequence of stereotyping which is rooted in categorical thinking. The sample of the study was composed of university students who were asked to memorize names or pictures of faces paired with stereotype congruent (male mechanic/female nurse) and incongruent (male nurse/female mechanic) occupations. Later they were asked to recall all the items and give their personal judgment about the recall. It was hypothesized that false memories will be mostly expectancy consistent (stereotype congruent) in nature, which is male mechanic, female nurse and participants will mostly correctly remember expectancy inconsistent items, which is male nurse, female mechanic than consistent items. In addition it was hypothesized that false expectancy consistent items will be mostly linked to "know" personal judgment and correct inconsistent items will be accompanied by "remember" personal judgment.

This chapter of the study will discuss in detail the results obtained for each hypothesis, state the limitations and finally, propose suggestions for future research.

Generation of false memories

The study primarily predicted that participants will create false memories during the recall task of male and female names and faces paired with mechanic and nurse occupations that will mostly be expectancy consistent in nature: male mechanic and female nurse. The results of Experiments 1 and 2 supported the prediction; created false memories were mostly expectancy consistent memories, therefore it can be implied, that the answers of the participants were highly stereotyped.

The explanation for this phenomenon lies within the numerous theories on information processing based on categorical thinking. To function effectively in our everyday complex social world the mind has acquired a highly efficient two independent but collaborating qualities: stability and plasticity. In other words to successfully process highly complex information the mind has to attend or process the familiar information which is congruent with the internal schemas or categories but at the same time it has to be attentive and responsive for the unfamiliar information that is inconsistent with the previously established categories or schemas. As a resolution the mind has succeeded to create an internal balance and established this dual processing mechanism based on categorical thinking (Macrae & Bodenhausen, 2000). Unfortunately, as much as the dual information processing system can be efficient and time preserving it may have drawbacks as well. In light of this idea, Allport (1954) noted, that perceivers "must think with the aid of categories" and that the categorization process is unavoidable hence, the perceivers highly rely on categories which within the social context are referred as stereotypes. Since social categories or stereotypes are internally well established (Macrae, et al.,2001), are highly resistant to change (Bargh, 1999), and our minds unavoidably rely on them (Allport

1954), in the process of acquiring information, one possible disadvantage could be that the mere exposure to expectancy consistent (stereotypical) stimuli can automatically trigger categorization process (Macrae, et al., 2001; Macrae, et al., 2002). As a result false stereotype congruent memories can be easily created. In addition, because the occupation and gender belong to the most stereotyped categories (Quinn, 2003) and because in the Lebanese culture bias and prejudice are persistent tendencies, these factors served as good grounds for stereotype congruent false memories to occur within the context of memorizing names and faces paired with mechanic or nurse occupations.

Recalling Expectancy Consistent and Inconsistent Items

According to Johnston and Hawley's (1994) mismatch theory, while processing expectancy consistent (stereotype congruent) and inconsistent (stereotype incongruent) stimuli the perceiver's mind does not waste attentional resources in processing familiar material which can be encoded effortlessly and efficiently relying on internal categories or templates (Macrae et al., 2002). Instead, that saved resources from processing of expected material are directed to encoding expectancy inconsistent information which need more effortful and elaborative encoding operations (Friedman, 1979). Moreover, Friedman (1979) have noted that, in contrast to automatic processing of familiar information, since the understanding of unfamiliar information requires more attentive and detailed encoding the unexpected stimuli will be remembered more often than expected stimuli.

Therefore, drawing conclusions from Friedman's findings and based on mismatch theory it was hypothesized that participants will remember more often the expectancy inconsistent stimuli while memorizing names (Experiment 1) and faces (Experiment 2) paired with mechanic and nurse occupations. However, the identical results, for

Experiment 1 and 2, did not support the hypothesis; instead, participants remembered better the expectancy consistent items.

Taking closer look at the literature of acquiring and processing the stereotype congruent and incongruent information, as an explanation for the obtained results it would be necessary to mention that there is a possibility that stereotypes, serving as powerful generic knowledge structures, can lead to preference of stereotype congruent rather than incongruent information (Araya, 2003). Taylor and Crocker (1981) proposed that stereotypes can overpower, or in other words, "filter out" stereotype incongruent information. It was suggested, that expectancy congruent information can be given more attention and all the information that goes against or violates the perceiver's expectations creates a kind of dissonance with the preexisting stereotypes and therefore can be blocked away or may simply be left unattended. As a result, under the power of stereotyping, recalling may result in remembering better stereotype congruent information rather than incongruent information. Under this context, Araya (2003) provides an example of a situation where African American is shoving a European American. Perceivers, holding a stereotyped view of the African Americans being hostile, may comprehend the event as a hostile activity based on the perceptual features of the shove and their preexisting stereotyped ideas.

Moreover, because the behavior information is congruent with their stereotype congruent expectancies, they might miss out the details of the given information. Instead the perceiver might "fill in the missing" information through reconstructive processes based on stereotypes. Under these circumstances they are more likely to remember the gist of the behavioral information (the African American attacking the European American)

consistent with their pre-owned stereotypes, where as memory of particular details of the behavioral information are most likely to be lost. On the other hand, a person who does not carry stereotypical ideas about African American being hostile will be more sensitive to details and perceive information as novel which requires careful processing (Araya, 2003). In addition, according to Sherman's et al., (1998) encoding flexibility model, stereotypes can be efficient and they can facilitate the encoding of expectancy consistent and inconsistent information, especially when cognitive capacity is limited. In other words when cognitive resources are plenty, the processing of expectancy consistent versus inconsistent stimuli are encoded according to their demands; however, when cognitive abilities are restrained (due to various circumstances) the stereotypically incongruent information is poorly encoded and understood (Araya, 2003; Sherman, et al., 1998). Furthermore, as Friedman (1979) suggested, because processing of expectancy inconsistent stimuli demands more elaborative and detailed operations, consequently, more time will be spend on processing that stimuli in contrast to expected information, which is encoded faster relying on gist based processing. Perceivers also tend to provide more explanation for the stereotype incongruent (expectancy inconsistent) than congruent (expectancy consistent) information (Hastie, 1984; Millar, & Cole, 1984; as cited in Araya, 2003). Hence, stereotype incongruent information may receive extensive processing, demanding more time, and be given more explanations in attempt to resolve the discrepancy and therefore be remembered better only when there is enough time provided and there are enough cognitive resources (Macrae, Hewstone, & Griffiths, 1993; Stangor & Duan, 1991; as cited in Araya, 2003). In summary, when perceivers are unable (under certain conditions) to give extra time to processing incongruent information and when their cognitive capacity is limited, recall of the expectancy consistent stimuli might be reduced.

For Example, Stangor and Duan (1991) have demonstrated that increasing the complexity of the task, which apparently decreases cognitive resources, will consequently weaken the recall of incongruent information (as cited in Araya, 2003). More importantly, it was further noted that, with the presence of strong stereotypical information the recall preference for stereotype incongruent information is reduced (Bodenhausen, 1988; Crocker, Hannah, & Weber, 1983; as cited in Araya, 2003).

In light of the aforementioned research, for the present study, it will be necessary to mention that the time given to memorize each item and the difficulty of the memorization task could have played a dominant role in obtaining such results. In experiments 1 and 2, the exposure time of each name and face paired to occupations was only 2 seconds, therefore it might be implied that 2 seconds was not enough time to process the expectancy inconsistent stimuli in the presence of such strong stereotypical information like gender and occupation which could have strong influence over the processing of the whole information. In addition, students reported that the task was too difficult. Some of them complained that to memorize 40 male and female different names or faces with only two occupations given in 2 seconds for each item was too demanding, regarding the fact that, there were no other informational or logical clues to rely on in memorizing the items. No logical connections or links could have been made between names or faces and the two occupations; it was a pure memorization task of 40 paired different items. Some students also said that they are not used to such kind of tasks and it was unexpected, even when they memorize, for example, a biology lesson, in contrast to this task, the logical links are present even in memorizing a text full of terminology. Therefore, it was concluded that, time and the difficulty of the task had dominant effects in memorizing expectancy

consistent and inconsistent items in resulting for the preference given to the stereotype congruent rather than incongruent information.

Although hypothesis 2 was not supported in the two experiments the further prediction regarding hypothesis 2 (b) in Experiment 2 which stated that the correctly remembered expectancy inconsistent (stereotype incongruent) items will be remembered better in the face condition than in the condition of memorizing names. The results supported the hypothesis; in Experiment 2 the participants remembered more expectancy inconsistent stimuli of faces linked with mechanic or nurse occupations, than in Experiment 1 with names paired with one of the occupations. Taking into consideration the above given information in light with the previously, in chapter two, mentioned concept that, pictures of faces can carry more attentional resources like color, age, direction of light and expression of the faces, it was concluded that these attentional resources had provided the participants with more cognitive capacity to memorize better the inconsistent items of faces (Experiment 2) than names (Experiment 1). Nevertheless, the influence of the stereotype was strong enough not to have significant difference between the correctly recalled expectancy consistent and inconsistent items in the Experiment 2. In addition, because the pictures of faces were more vivid, bigger in size and carried more inconsistency, the participants in Experiment 2 (faces) recalled more expectancy inconsistent items than the participants in Experiment 1 (names).

Participants' Judgment About the Recall: Remember, Know or Guess

In addition to false stereotype congruent memories and recalling expectancy inconsistent and consistent items the present study examined closer the phenomenology of the participants' experience of recall of names and faces paired with mechanic or nurse

occupations. It was predicted that when participants create false expectancy consistent memories their personal judgment of the recall of such answers will be mostly linked to "know" judgment, which represents the processing of information based on familiarity. In other words since the processing of information is guided by the reliance on pre-existing ideas or stereotypes the fabricated memories which are predominantly expectancy consistent in nature will feel more familiar to participants since they are processed through semantic associations. In addition to choosing between "remember" and "know" judgments the participants were given an option to state when they were guessing. The results did not show support for the made prediction, instead the results showed that the participants false expectancy consistent (stereotype congruent) items were linked to "guessing", rather than "knowing", which means that while recalling the answers the participants were guessing most of the time.

The logical explanation for these results can be that, since it was reported that the memorization task was too difficult, given the possibility to guess seemed a practical solution for the problem. In addition, based on the observations and comments made by the students there is a probability that the definitions of know and remember were not clear for the participants. Although the participants could clearly understand the description of "remember" judgment, the explanation for "know" judgment was vague for them. Therefore, to resolve the problem of not knowing the exact definitions of "remember" and "know", to be on the safe side, they could have simply concluded that when the answer is not "remember" then it can be "guess". Other participants commented that they thought that "know" is more certain based on the English verbal meaning of the word. When someone says "I know", the statement itself carries the meaning of certainty. It can be

concluded that the definition of "remember" and "guess" judgments was not clearly understood by many participants, specifically, other than misinterpreting that the "remember" and "know" judgments are qualitatively different measures, which carry two distinctive characteristics (Gardiner et al., 1996; Inoue, et al., 1998), the participants could have also wrongfully prescribed certainty level to each.

In support to the previously mentioned speculations, the research concerning "remember" and "know" judgments shows ambiguous results. There have been numerous studies performed based on the DRM paradigm or the word recognitions tests in attempt to shed light on the phenomenology of "remember" and "know" judgments. Moreover, there have been multiple studies done to manipulate better the two judgments under different conditions. Yet the consensus was not reached (Donaldson, 1996; Gallo, et al., 1997; Gardiner & Java, 1990; Gardiner, et al., 1996; Inoue, et al., 1998). Appendix L presents the table of diverse data obtained from deferent recognition memory studies using "remember" and "know" measures, taken from Donaldson's (1996) meta-analysis study of "remember" and "know" judgments. Moreover, Donaldson (1996) in his meta-analytical study criticizes the remember/know paradigm. Elaborating more on the usefulness of these two measures, Donaldson stated that the distinction between recollective and non-recollective memories is not well clarified with remember/know procedure. He further states "*I do not believe it is useful...this introspective technique fails to capture the distinction between recollective and non recollective memory*" (Donaldson, 1996, p. 532). In addition to Donaldson's criticism, it is worth mentioning that taking the remember/know measures from the DRM paradigm of word recognition tests and using these measure for the stereotype congruent and incongruent memory in social settings might not be the right option. Instead, it is

possible to develop a better replacing, more exact measurement for memories of person perception in social context.

At last, as a final hypothesis for the present study, it was suggested that the correct expectancy inconsistent items will be more accompanied by "remember" judgment than "know" and "guess" judgments. The obtained results supported the hypothesis with a slight difference in Experiment 2. Based on the familiarity and recollection of dual process theory, the processing of the unfamiliar (expectancy inconsistent) information receives more analytical, consciously controlled, less automatic and more attending to details. Therefore, the recognition of that information was reached through recollective experience where the subject can recollect or *remember* the details of the stimuli rather than just being familiar with it or *knowing* it. The above described phenomenon was observed in the present study as well. In conclusion, although, in the earlier predictions of the present study the participants' correctly remembered items were not more often expectancy inconsistent than consistent, due to the strong presence of stereotype, nevertheless in the instances when they did succeed to register the inconsistent stimuli, they assertively judged it by "remember" statement.

Conclusion

The present study investigated the effects of categorical thinking in memorizing stereotype congruent and stereotype incongruent information which can play a prominent role in creation of false memories in social settings. In addition the phenomenological experiences of participants' personal judgment of the recognition task were examined closely.

The results of the study showed that gender and occupation stereotypes can play a prominent role in creation of false memories in social settings. Furthermore, the effect of stereotypes in memorizing stereotype congruent and incongruent information was overruling among all other conditions. Because the participants were highly relying on stereotypes to process the expectancy consistent (stereotype congruent) and expectancy inconsistent (stereotype incongruent) gender and occupational information, the predictions that expectancy consistent (stereotype congruent) correct items will be remembered better was not supported. Even when the participants correctly recalled items, they were expectancy consistent in nature. Moreover, the difficulty of the task and the limited time had an effect on the participants' judgment of the recall task, since they were given the alternative to state when they were guessing. As a result, the limitations of the present study seem to emerge.

First of all it is worth to mention that the memorization task was too difficult for the university students, as of memorizing 40 names or faces paired with mechanic or nurse occupation. A relatively easier task may be presented where there could have been fewer items. The second limitation of the study was that the time limit of each presented item was too little to make any connections or links to be able to properly memorize the items. Instead, more time given for each item during the memorization task may be considered for further research. Finally, during the recognition task, the design of the recall task has given the participants higher chances of guessing. When they had to choose between *old* or *new* options the participants may have been given a third option: *don't know*. Similarly, when the occupations had to be stated, the third *don't know* statement should have been included to try to minimize the chances of guessing.

Findings of this study can contribute to further understanding of the effects of stereotypes in our everyday social lives. Moreover, the study can give more opportunity to recognize the mechanism of categorical thinking and better observe the hidden "cognitive monster" of automatic stereotype activation, and how people might often report events that are not true which can be simply the byproduct of the downfalls of everyday social cognitive mechanisms.

For future studies, the researcher suggests a replication of the present study with important variations. It will be useful to conduct a study using pictures of people with less stereotyped occupations, additionally manipulating the inconsistency with the level of attractiveness or by adding inappropriate background context for each occupation. Unlike the predominant research in the field, including the present research, giving enough time may be taken into consideration for the memorization of each picture as stimuli (especially if there is a background included) and guessing occasion should be minimized to the minimum level possible. Another suggestion would be to replicate the present study but additionally include the control group where there would be no or little stereotype used.

316-322.

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APPENDIX A

The Procedures and Instructions for the Memorization Task of Experiment 1

In the present experiment, each slide will show a name linked with an occupation.

There are 40 male and female names paired with one of two occupations: either: ***mechanic*** or ***nurse***. Each slide will be shown only for 2 seconds.

The task is to try to remember the name and the given occupation with it, after the presentation of the names, in another slide show, you will be asked to recall “**who does what?**”

APPENDIX C

The Procedures and Instructions of the Experiment 1 APPENDIX B

One Item of the Memorization Task of Forenames Paired with Occupations for

Experiment 1

The procedure for the recall task is described in the following 3 steps:

1. For step 1, choose one of the two given options: old or new.
 - o Answer old if you have seen the name earlier in the experiment during the first slide show.
 - o Answer new if you have not seen the name before.
2. If your answer was old, proceed to step 2 & 3:
In step 2, you will have to choose one of the occupations that was previously linked with the given name.
3. In step 3, you will have to give you personal judgment about the recall.
 - o Answer remember, if you can remember the visual representation of the name with the occupation, if you recall the detailed image of the name, with specific details.
 - o Answer know, if you are sure about the details of it, the visual image of the word is not so clearly kept in your mind.
 - o Answer guess, if you just guessed the name linked with the occupation.

Dany

mechanic

APPENDIX C

The Procedures and Instructions of the Recall Task of Experiment 1

The procedure for the recall task is described in the following 3 steps:

1. For step 1, choose one of the two given options: **old** or **new**.
 - Answer **old** if you have seen the name earlier in the experiment during the first slide show.
 - Answer **new** if you have not seen the name before.
2. **If your answer was old**, proceed to step 2 & 3:
In step 2, you will have to choose one of the occupations that was previously linked with the given name.
3. In step 3, you will have to give you personal judgment about the recall.
 - Answer **remember**, if you can remember the visual representation of the name with the occupation. if you recall the detailed image of the name, with specific details.
 - Answer **know**, if you are not so sure about the details of it, the visual image of the word is not so clearly kept in your mind.
 - Answer **guess**, if you just guessed the name linked with the occupation.

APPENDIX D

The Recall Task of Experiment 1, Including the Question Linked With the Name

2. Mechanic or Nurse

3. Remember

Hilda

Old ?

New?

Know
Guess

APPENDIX E

Multiple Choices of the Recall Task of Names Paired with Occupations of Experiment 1

2. Mechanic or Nurse

3. Remember

Know

Guess

APPENDIX F

The Answer Sheet of the Recall Task of Experiment 1 and 2

1. Hilda

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

2. Scott

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

3. Donovan

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

4. Tony

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

5. Mike

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

6. Clara

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

7. Lydia

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

8. Caroline

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

9. Diana

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

10. Grace

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

11. Ludwig

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

12. George

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

13. John

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

14. Elsa

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

15. Alan

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

16. Oliver

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

17. Cindy

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

18. Freddie

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

19. Karl

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

20. Irene

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

21. Emma

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

22. Norma

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

23. Harris

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

24. Bruce

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

25. Mona

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

26. Robert

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

27. Mary

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

28. Kevin

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

29. Doris

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

30. Patrick

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

31. Betsy

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

32. Annete

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

33. Travis

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

34. Lewis

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

35. Adele

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

36. Linda

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

37. Claude

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

38. Vivian

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

39. Edith

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

40. Paula

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

41. Martin

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

42. Henry

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

43. Vicky

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

44. Arthur

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

45. Melany

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

46. Victor

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

47. Thelma

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

48. Agnesse

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

49. Nadine

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

50. Vincent

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

51. Philip

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

52. Thomas

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

53. Mark

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

54. Frank

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

55. Gordon

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

56. Nick

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

57. Karla

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

58. Oscar

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

59. Jerome

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

60. Charles

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

61. Julia

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

62. Elias

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

63. Jenifer

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

64. Rena

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

65. Nellie

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

66. Isabel

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

67. Nathan

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

68. Russel

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

69. Letitia

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

70. Stella

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

71. Emily

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

72. Ronald

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

73. Joanna

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

74. Suzan

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

75. Gerald

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

76. Gary

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

77. Alice

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

78. Barbara

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

79. Alex

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

80. Flora

1	new	old		
2		mechanic	nurse	
3		remember	know	guess

APPENDIX G

Description and Instructions of the Memory Task of Experiment 2

In the present experiment, each slide will show a face and an occupation.

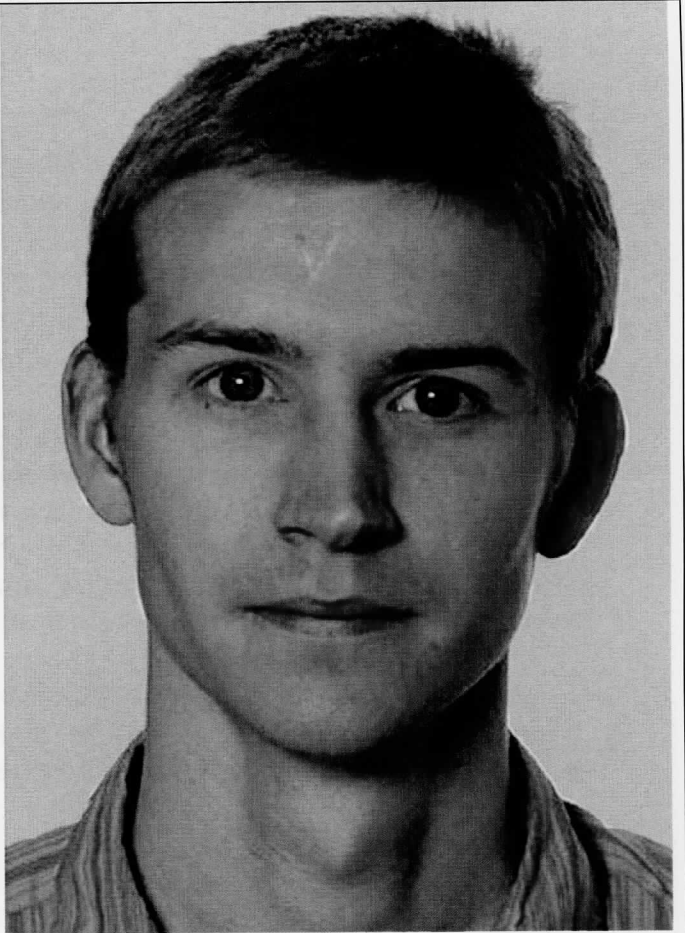
There are 40 male and female faces paired with one of two occupations: either: ***mechanic*** or ***nurse***. Each slide will be shown only for 2 seconds.

The task is to try to remember the face and the given occupation with it, after the presentation of the faces, in another slide show, you will be asked to recall **“who does what ?”**

APPENDIX H

Items as Faces Linked with Mechanic or Nurse Occupations for the Memorization Task of Experiment 2

Mechanic



APPENDIX I

*The Procedures and Instructions of the Recall Task of Experiment 2***The procedure for the recall task is described in the following 3 steps:**

1. For step 1, choose one of the two given options: **old** or **new**.
 - Answer **old** if you have seen the face earlier in the experiment during the first slide show.
 - Answer **new** if you have not seen the face before.
 2. **If your answer is old**, proceed to step 2 & 3:
In step 2, you will have to choose one of the occupations that was previously linked with the face.
 3. In step 3, you will have to give you personal judgment about the recall.
 - Answer **remember**, if you can remember the visual representation of the face with the occupation. If you recall the image of the face, with specific details.
 - Answer **know**, if you are not so sure about the details of it, the visual image of the face is not so clearly kept in your mind, but you know that you have seen it.
 - Answer **guess**, if you just guessed the face linked with the occupation.
- Next slide is shown to you as an example of the next 80 recall slides. It is not part of the recall task in the experiment, it's just given to you as an example.

APPENDIX J

Recall Task of Experiment 2 Including Items Presented as Faces with a Question



Old?

New?

Table Data of Remember-Know Studies Presented in Appendix K (Only Some Analysis Study)

APPENDIX K

Multiple Choices of the Recall Task of Faces Paired with Occupations of Experiment 2

2. Mechanic or Nurse

3. Remember

Know

Guess

Appendix L

Table Data of Remember/Know Studies Presented in Donaldson's (1996) Meta-Analysis Study

Table 1
Remember/Know Studies and Basic Data

Study	Experiment	Level	Recognition Performance						Remember						Know					
			HIT	FA	A'	B _D '	d'	C	HIT	FA	A'	B _D '	d'	C	HIT	FA	A'	d'		
Conway & Dewhurst (1995)	1	PERFORM	0.74	0.09	0.90	0.54	1.98	0.35	0.48	0.01	0.87	0.99	2.53	1.31	0.26	0.09	0.71	0.70		
		WATCH	0.62	0.09	0.86	0.71	1.65	0.52	0.36	0.01	0.84	0.99	2.22	1.47	0.26	0.09	0.71	0.70		
		IMAGINE	0.51	0.09	0.82	0.80	1.37	0.66	0.24	0.01	0.80	1.00	1.87	1.64	0.27	0.09	0.72	0.73		
	2	PERFORM	0.68	0.12	0.86	0.55	1.62	0.32	0.46	0.03	0.84	0.95	1.78	0.99	0.22	0.09	0.68	0.57		
		WATCH	0.60	0.12	0.84	0.66	1.38	0.44	0.30	0.03	0.79	0.97	1.36	1.20	0.30	0.09	0.73	0.82		
		IMAGINE	0.56	0.12	0.82	0.70	1.28	0.49	0.29	0.03	0.79	0.98	1.33	1.22	0.27	0.09	0.72	0.73		
Curran, Gardiner, Java, & Allen (1993)	PRE	POST1	0.83	0.11	0.92	0.25	2.18	0.14	0.64	0.03	0.90	0.90	2.24	0.76	0.19	0.08	0.67	0.53		
		POST3	0.62	0.11	0.85	0.66	1.54	0.46	0.39	0.03	0.82	0.96	1.60	1.08	0.23	0.08	0.70	0.67		
		POST5	0.70	0.11	0.88	0.55	1.75	0.36	0.45	0.03	0.84	0.95	1.75	1.01	0.25	0.08	0.72	0.74		
	POST5	PRE	0.77	0.11	0.90	0.41	1.97	0.25	0.48	0.03	0.85	0.94	1.83	0.97	0.29	0.08	0.74	0.86		
		POST1	0.76	0.11	0.90	0.44	1.94	0.26	0.58	0.03	0.88	0.92	2.08	0.84	0.18	0.08	0.67	0.49		
		POST3	0.79	0.11	0.91	0.37	2.04	0.21	0.68	0.03	0.91	0.88	2.35	0.71	0.11	0.08	0.58	0.18		
Dewhurst & Conway (1994)	1	PICTURES	0.83	0.11	0.92	0.25	2.18	0.14	0.66	0.03	0.90	0.89	2.29	0.94	0.17	0.08	0.66	0.46		
		WORDS	0.88	0.11	0.94	0.05	2.41	0.03	0.71	0.03	0.91	0.86	2.43	0.67	0.17	0.08	0.66	0.46		
		PICTURES	0.92	0.12	0.94	-0.22	2.59	-0.12	0.77	0.02	0.93	0.87	2.79	0.66	0.15	0.10	0.60	0.24		
	2	WORDS	0.59	0.12	0.83	0.67	1.41	0.48	0.31	0.02	0.81	0.98	1.55	1.28	0.28	0.10	0.71	0.70		
		PICTURES	0.79	0.08	0.92	0.51	2.22	0.30	0.58	0.01	0.89	0.97	2.53	1.07	0.21	0.07	0.70	0.67		
		WORDS	0.93	0.08	0.96	-0.07	2.89	-0.04	0.76	0.01	0.94	0.94	3.04	0.81	0.17	0.07	0.67	0.52		
3	PICTURES	0.93	0.02	0.98	0.57	3.53	0.29	0.79	0.00	0.95	1.00	3.39	0.89	0.14	0.02	0.74	0.97			
	WORDS	0.93	0.02	0.98	0.57	3.53	0.29	0.64	0.00	0.91	1.00	2.94	1.11	0.29	0.02	0.80	1.50			
	W-WRITE	0.72	0.21	0.84	0.19	1.39	0.12	0.39	0.04	0.82	0.95	1.47	1.02	0.33	0.17	0.67	0.51			
4	P-WRITE	0.81	0.08	0.92	0.46	2.29	0.27	0.59	0.02	0.89	0.94	2.28	0.91	0.22	0.06	0.72	0.79			
	W-RATE	0.91	0.06	0.96	0.22	2.90	0.11	0.71	0.00	0.93	1.00	3.13	1.02	0.20	0.06	0.71	0.72			
	P-RATE	0.81	0.08	0.92	0.46	2.29	0.27	0.53	0.02	0.87	0.96	2.13	0.99	0.28	0.06	0.75	0.98			
5	HIGH	0.70	0.08	0.89	0.66	1.93	0.45	0.55	0.02	0.88	0.95	2.18	0.96	0.15	0.06	0.67	0.52			
	LOW	0.60	0.10	0.85	0.71	1.53	0.52	0.33	0.02	0.81	0.98	1.61	1.25	0.27	0.08	0.73	0.80			
	ASSOC	0.85	0.02	0.96	0.79	3.09	0.51	0.67	0.01	0.91	0.96	2.77	0.95	0.18	0.01	0.78	1.41			
Gardiner (1988)	1	RHYME	0.63	0.03	0.89	0.90	2.21	0.78	0.47	0.02	0.85	0.96	1.97	1.07	0.16	0.01	0.77	1.34		
		GENIh	0.83	0.08	0.93	0.40	2.36	0.23	0.68	0.05	0.90	0.80	2.12	0.59	0.15	0.03	0.73	0.84		
		READIh	0.50	0.08	0.82	0.84	1.41	0.71	0.36	0.05	0.80	0.94	1.29	1.01	0.14	0.03	0.72	0.80		
	2	GENIw	0.60	0.27	0.75	0.29	0.86	0.18	0.42	0.10	0.78	0.85	1.08	0.74	0.18	0.17	0.52	0.03		
		READIw	0.46	0.27	0.67	0.52	0.51	0.36	0.26	0.10	0.70	0.92	0.64	0.96	0.20	0.17	0.55	0.11		
		LEARN	0.68	0.13	0.86	0.52	1.60	0.33	0.50	0.03	0.86	0.94	1.88	0.94	0.18	0.10	0.63	0.36		
Gardiner, Gawlik, & Richardson-Klavehn (1994)	1	FORGET	0.43	0.13	0.76	0.80	0.95	0.66	0.23	0.03	0.77	0.98	1.14	1.31	0.20	0.10	0.65	0.44		
		LEARN	0.67	0.13	0.86	0.53	1.57	0.35	0.40	0.03	0.83	0.96	1.63	1.07	0.27	0.10	0.70	0.67		
		FORGET	0.55	0.13	0.81	0.69	1.26	0.50	0.26	0.03	0.78	0.98	1.24	1.26	0.29	0.10	0.72	0.73		
	2	LOW	0.60	0.11	0.84	0.69	1.48	0.49	0.43	0.04	0.83	0.94	1.57	0.97	0.17	0.07	0.67	0.53		
		HIGH	0.47	0.14	0.77	0.75	1.00	0.58	0.31	0.05	0.78	0.95	1.15	1.08	0.16	0.09	0.63	0.35		
		WORD	0.44	0.15	0.75	0.76	0.89	0.60	0.28	0.04	0.78	0.97	1.17	1.17	0.16	0.11	0.59	0.24		
NONWD	0.48	0.14	0.78	0.74	1.03	0.57	0.18	0.03	0.75	0.99	0.96	1.40	0.30	0.11	0.71	0.71				

Gardiner & Java (1991)	1	10m	0.75	0.05	0.92	0.73	2.32	0.49	0.00	0.87	1.00	2.55	1.31	0.26	0.05	0.76	1.01	
		1h	0.66	0.07	0.88	0.75	1.89	0.54	0.42	0.01	0.85	0.99	2.13	1.27	0.24	0.06	0.74	0.85
		1d	0.54	0.09	0.83	0.79	1.44	0.62	0.27	0.03	0.78	0.98	1.72	1.47	0.27	0.06	0.75	0.95
		1w	0.48	0.13	0.78	0.76	1.08	0.59	0.25	0.05	0.75	0.97	0.98	1.16	0.23	0.08	0.70	0.67
2	1w	0.49	0.15	0.77	0.71	1.01	0.54	0.24	0.05	0.75	0.97	0.94	1.18	0.25	0.10	0.69	0.61	
	4w	0.40	0.11	0.76	0.85	0.98	0.74	0.19	0.02	0.77	0.99	1.17	1.47	0.21	0.09	0.68	0.53	
	6m	0.32	0.14	0.69	0.86	0.61	0.78	0.15	0.05	0.69	0.98	0.61	1.35	0.17	0.09	0.64	0.39	
	UNDIV	0.70	0.05	0.90	0.78	2.17	0.57	0.50	0.01	0.87	0.98	2.33	1.17	0.20	0.04	0.74	0.91	
Gardiner & Parkin (1990)	1	DIV1	0.58	0.08	0.85	0.79	1.61	0.61	0.38	0.01	0.84	0.99	2.02	1.32	0.20	0.07	0.70	0.64
		DIV2	0.49	0.10	0.81	0.81	1.31	0.66	0.27	0.01	0.81	0.99	1.72	1.47	0.22	0.09	0.68	0.57
		SPOKEN	0.86	0.21	0.89	-0.24	1.89	-0.14	0.58	0.02	0.88	0.95	2.25	0.93	0.28	0.19	0.61	0.30
		SILENT	0.64	0.21	0.80	0.36	1.17	0.23	0.32	0.02	0.81	0.98	1.58	1.26	0.32	0.19	0.64	0.41
Gregg & Gardiner (1991)	1	SPOKEN	0.81	0.22	0.87	-0.09	1.65	-0.06	0.49	0.03	0.85	0.94	1.85	0.96	0.32	0.19	0.64	0.41
		SILENT	0.63	0.22	0.79	0.35	1.10	0.22	0.29	0.03	0.79	0.98	1.33	1.22	0.34	0.19	0.66	0.47
		NORM	0.70	0.34	0.76	-0.09	0.94	-0.06	0.45	0.14	0.76	0.76	0.96	0.60	0.25	0.20	0.57	0.17
		REVL	0.70	0.44	0.71	-0.29	0.68	-0.19	0.39	0.16	0.72	0.78	0.72	0.64	0.31	0.28	0.53	0.09
Mogg, Gardiner, Stavron, & Golombok (1992)	1	THREAT	0.56	0.10	0.83	0.76	1.43	0.57	0.27	0.03	0.78	0.96	1.27	1.25	0.29	0.07	0.75	0.93
		NONTHREAT	0.62	0.07	0.87	0.79	1.79	0.59	0.36	0.01	0.83	0.99	1.97	1.35	0.26	0.06	0.75	0.92
		THREAT	0.57	0.12	0.82	0.68	1.36	0.50	0.24	0.03	0.77	0.98	1.17	1.30	0.33	0.09	0.74	0.90
		NONTHREAT	0.61	0.05	0.88	0.85	1.93	0.69	0.36	0.02	0.82	0.98	1.69	1.21	0.25	0.03	0.78	1.21
Parkin & Russo (1993)	1	LAG 0	0.77	0.23	0.85	0.00	1.48	0.00	0.51	0.06	0.84	0.88	1.59	0.77	0.26	0.17	0.61	0.31
		LAG 6	0.85	0.23	0.88	-0.26	1.78	-0.15	0.66	0.06	0.89	0.78	1.97	0.58	0.19	0.17	0.53	0.07
Parkin & Walter (1992)	1	YOUNG	0.77	0.05	0.92	0.70	2.39	0.46	0.52	0.01	0.87	0.98	2.38	1.14	0.25	0.04	0.76	1.08
		OLD	0.66	0.10	0.87	0.65	1.69	0.44	0.20	0.01	0.79	0.99	1.49	1.59	0.46	0.09	0.80	1.24
2	YOUNG	MIDDLE	0.80	0.07	0.92	0.54	2.32	0.32	0.37	0.02	0.83	0.98	1.72	1.19	0.43	0.05	0.82	1.47
		OLD	0.68	0.09	0.88	0.65	1.81	0.44	0.19	0.02	0.77	0.99	1.17	1.47	0.49	0.07	0.83	1.45
Rajaram (1993)	1	ASSOC	0.67	0.09	0.88	0.67	1.78	0.45	0.12	0.02	0.73	0.99	0.87	1.62	0.55	0.07	0.85	1.61
		RHYME	0.86	0.16	0.91	-0.08	2.07	-0.05	0.66	0.02	0.91	0.92	2.46	0.82	0.20	0.14	0.59	0.24
		VISUAL	0.62	0.16	0.82	0.53	1.30	0.34	0.32	0.02	0.81	0.98	1.58	1.26	0.30	0.14	0.68	0.56
		AUDITORY	0.74	0.16	0.87	0.30	1.63	0.18	0.49	0.02	0.86	0.96	2.02	1.04	0.25	0.14	0.64	0.41
2	PICTURES	WORDS	0.90	0.09	0.95	0.06	2.62	0.03	0.81	0.01	0.95	0.92	3.21	0.73	0.09	0.08	0.53	0.07
		UNREL	0.69	0.09	0.88	0.64	1.84	0.42	0.51	0.01	0.87	0.98	2.36	1.15	0.18	0.08	0.67	0.49
3	REP	UNREL	0.67	0.23	0.81	0.24	1.18	0.15	0.43	0.05	0.82	0.92	1.47	0.92	0.24	0.18	0.58	0.21
		UNREL	0.60	0.18	0.80	0.50	1.17	0.34	0.42	0.05	0.82	0.93	1.45	0.93	0.18	0.13	0.58	0.21
Smith (1993)	2	GEN	0.91	0.09	0.95	0.00	2.68	0.00	0.52	0.01	0.87	0.98	2.38	1.14	0.39	0.08	0.78	1.13
		GEN	0.86	0.17	0.91	-0.11	2.03	-0.07	0.71	0.08	0.89	0.65	1.96	0.43	0.15	0.09	0.62	0.30
Tulving (1985)	2	8d	0.62	0.27	0.76	0.25	0.92	0.15	0.34	0.11	0.73	0.88	0.82	0.82	0.28	0.16	0.64	0.41
		8d	0.62	0.27	0.76	0.25	0.92	0.15	0.34	0.11	0.73	0.88	0.82	0.82	0.28	0.16	0.64	0.41
Wiprich (1992)	1	READ	0.41	0.14	0.74	0.80	0.85	0.66	0.17	0.02	0.76	0.99	1.10	1.50	0.24	0.12	0.66	0.47
		GEN	0.71	0.14	0.87	0.43	1.63	0.27	0.40	0.02	0.83	0.97	1.80	1.15	0.31	0.12	0.71	0.68

Note.—The "Experiment" column indicates the experiments from the studies listed in the left column. The "Level" column identifies the levels of independent variable. See text for the definitions and formulas of the data presented.