
The Influence of Gender on Long-Term Incidental Memory

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A baby is born, and almost instantaneously, assigned to a life of stereotypical gender identity. The female is described as a “precious baby girl” and is given a little pink hat and wrapped in a pink blanket. The male is a “strong and healthy boy” and adorned in blue. Many children will spend their lives exposed to basic gender stereotypes. The girl “should” play with dolls and play pretend house. The boy “should” like sports, play with fire trucks and weapons. By the time the child has grown up and gone through schooling, gender typical stereotypes are engrained within them, even if they personally do not submit to the stereotypes (i.e., most people “know” women wear lipstick and high heels and men like cars and watch football). Such gender-stereotypical images are so embedded within society that the stereotypical exposure even influences everyday life (e.g., men fixing things and women grocery shopping). Given the prevalence of gender stereotypical information, this article examines how gender effects the information individuals unintentionally retain in their short term memory.
Individuals are exposed to gender stereotypes not only in daily interactions, but from mediums that pervade every society. Children’s books, for example, have an overwhelming predisposition to include gender-stereotypic material. This content can be influential as the children reading these books develop a sense of self (Taylor, 2009). While reading books and receiving external messages from a social point of view (e.g., women are nurses and men are doctors), children learn what it means to be a certain gender and in a stereotypical manner (Taylor, 2009). These implications of gender can be pervasive throughout an individual’s lifetime.

Gender stereotyping impacts many aspects of life. Good, Woodzicka, and Wingfield (2010) examined how stereotypes influenced performance in school. Freshman and sophomore high school students, age 13 to 17, were exposed to gender-stereotypical and counter-stereotypical images added to excerpts from their science textbooks (Good et al., 2010). Good et al. (2010) found that when females saw images of female scientists (counter-stereotypical) in their science books, they performed at a higher level than when using the same science textbook with male-stereotypical images. There was a corresponding finding for males viewing images of male scientists (Good et al., 2010). Simply viewing stereotypical and atypical photos in a science text changed how students of each gender performed with regard to the material contained therein.
Few differences are found in basic memory abilities between genders (Herrmann, Crawford, & Holdsworth, 1992), however, gender stereotypes do affect memory as Herrmann et al. (1992) showed in a study utilizing shopping lists. Herrmann et al. (1992) had 48 undergraduate participants, age 18 to 23, intentionally remember shopping lists with specific titles (e.g., Groceries or Hardware Store) as the only difference. Females recalled more items from the grocery list and males recalled more items from the hardware list (Herrmann et al., 1992). Although female and male memory appears similar, researchers have identified and continue to investigate differences that exist between the two.

Signorella, Bigler, and Liben (1997) researched children’s memory in relation to their gender. A meta-analysis of memory research indicated children’s gender schemas showed a gender-congruent bias in delayed memory (Signorella et al., 1997). Liben and Signorella (1980) also found first and second grade children’s attitudes informed their memories. Liben and Signorella (1980) tested recognition memory with pictures of female and male individuals in stereotypical and atypical occupations. Liben and Signorella (1980) measured each participant for gender-stereotyped attitudes utilizing a previously published measure adapted for the purposes of their study. The measure indicated what each child believed only males could do, only females could do, and what both genders could do (Liben & Signorella, 1980). Children were shown pictures of individuals in gender-traditional, gender-nontraditional, and gender-neutral occupations and were later asked to identify which images had been seen previously (Liben & Signorella, 1980). Children who scored higher on gender stereotyping recognized more gender-traditional pictures than non-traditional (Liben & Signorella, 1980). Gender related memory appeared higher in the children who hold more gender stereotypical beliefs.

Humans have multiple ways of processing information and categorizing perceptions. One way is through the use of heuristics (i.e., rules of thumb) to categorize information for storage (Cherney, 2005). Individuals often use a type of heuristic called a schema (Bem, 1981). Bem (1981) explains schemas as a memory tool individuals use to better assign meaning to particular information. A person with a particular gender schema processes and codes information congruent with sex and gender related information (Bem, 1981). As Valian (2005) discussed, the human mind categorizes information for ease of recall. Schematic categories are the first steps to organizing memories. To avoid overload and in attempt to minimize categorization difficulties, as few categories as possible are used to accomplish the task at hand (Valian, 2005). Here, Valian (2005) points out individuals are not necessarily sexist when using gender categories to organize and process information, but rather vulnerable to the accessibility of such schemas in memory. Gender schemas are used to help organize information for later recall, as are other gender related processes.

Gender stereotypes can help facilitate memory (Wood, Groves, Bruce, Willoughby & Desmarais, 2003). Wood et al. (2003) examined undergraduate memory for the ability to draw upon gender stereotypical information when using an elaborative strategy to remember facts about females and males. Participants were given sentences about an individual, with a specific gender, doing an activity. Participants were, then, asked to elaborate on “why” the actor was doing the activity as way help recall the information later. Wood et al. (2003) found that, for the most part, memory regarding both genders was equal, however, both females and males would elaborate more with gender stereotypical information for the female actors. Research also showed when the stereotypical information helped define facts pertaining to females and males, information was recalled with more accuracy (Wood et al., 2003). Gender stereotypes help categorize information which produces improved recall performance for this information.

The brain forms patterns that aid in coding information and memory. These patterns form and link meaning to events and circumstances. In this way, the mind is selective in what is retained (Martinez,
Martinez (2010) found human memory codes information primarily relevant to the individual and new information connects to what is already known. This theory of memory could lead to how stereotypes might aid in connections made during learning and memorization. For example, McKlevie (1981) found memory was linked to participant gender. Undergraduate participants were asked to view a series of different faces and later indicate previously seen faces from a large selection (McKlevie, 1981). Facial recognition studies showed an ease for both females and males to recognize faces congruent with their own gender (McKlevie, 1981). Memory, in a multitude of facets, shows improvement when gender congruent or drawing upon gender schemas and stereotypes.

Cherney (2005) found gender schemas influenced instructed memory (i.e., participants informed information would need to be recalled later) quite heavily when studying for recall of gender-stereotyped toys. Incidental memory (i.e., participants not informed information would need to be recalled later) was also affected by gender schemas, as stereotypes are often prompted when using heuristics and processing ambiguous information (Cherney, 2005). Cherney (2005) informed half the participants they would be asked to recall the toys they would soon be shown at a later time (instructed memory) and the other half were not informed they would be asked to recall the toys (incidental memory). Participants used gender schemas to process information and, thus, recalled more gender-congruent than gender-atypical toys (Cherney, 2005). Gender schemas appear to facilitate both female and male memory.

Chipman, Kimura, and Fraser (1998) investigated why females outperform males in recall tasks of information they were not specifically instructed to remember. Chipman et al. (1998) found evidence this pattern could be attributed to the verbal aspect of previous studies, as females generally perform better than males on verbal tasks. Cherney and Ryalls (1999) conducted a study to examine the theory females remember more information from their environment than males. Children, age 3 to 6, and adults were shown female- and male-stereotypical toys and objects in a toy room for the children, and an office for the adults, for 2 min. Females and males in each age group recalled more objects congruent with their own gender, but females did not show the hypothesized advantage over males (Cherney & Ryalls, 1999). Females and males show some differences in memory patterns, but both show a tendency for gender-congruent memory in different situations.

Wagner (1974) theorized incidental memory comes from development and experiences. For information to be coded into memory at all, the information must be focused and fixated on long enough to code (Castelhano & Henderson, 2005). If objects, events, facts, and information are not properly fixated on, they will not be stored in short-term memory or processed for promotion into long-term memory. Wagner (1974) also discussed incidental memory is selective for what is most relevant to an individual, potentially, including gender.

The current study examines the impact of gender on long-term incidental memory. Based on gender schema theories (Bem, 1981; Signorella et al., 1997) and gender-facilitated memory (Herrmann et al., 1992), we predict gender will improve female and male recall of gender-congruent words.

**Methodology**

This study was designed to test the influence of gender stereotypes on incidental memory. Female and male participants viewed a single word list comprised of female-stereotypical and male-stereotypical words. After viewing word lists with no instruction to remember the words, an intermediate math distractor task was employed after which participants were asked to recall as many words from the
initial list as possible. The variable of interest was gender and the relevant measure for analysis was the number of recalled words.

Study 1

Participants. Study 1 included a sample of 81 participants (39 females, 42 males) from a population of undergraduate students. Participants were identified via convenience sampling and restricted to those between the ages of 18 to 25 years to control for memory ability (Fernandes & Grady, 2008).

Procedure. Upon arrival and only after indicating their willingness to participate in the study, participants completed an information card including basic demographics. Participants were fully informed about the tasks they would be asked to perform, however, the true purpose of the study was not revealed until a final debriefing period.

Participants were tested in groups, in a single room, and facing a projection screen. As the study began, each participant was assigned a participant number and was provided a pen and white piece of paper with only this participant number at the top. This paper was used by participants to record information related to the distractor task and perform the final memory task.

Participants first completed a mathematic distractor task. This non-verbal task was used to minimize any potential verbal and word related interactions (Blank, 2005). Participants were asked to repetitively subtract the number 7 from 280 (i.e., 280 minus 7 is 273, 273 minus 7 is 276, and so on), out loud, at their own pace for 60 s. The initial two numbers, 7 and 280, were projected for clarity and to minimize the cognitive load required to complete the task. Participants were instructed to not use the pen and paper they had been provided and were prompted to cease the repetitive subtraction task at 60 s. At this time, participants wrote the number they reached during repetitive subtraction on the provided paper. This number was of no relevance other than in its contribution to obscuring the true aim of the study.

After recording the product of repetitive subtraction, participants watched a slideshow of female- and male-stereotypical words. Each word was displayed for 3 s and participants were asked to visualize the word. The serial position effect, particularly primacy and recency effects, could arise as participants studied the word list. Maylor (2002) explains primacy as the likelihood for people to better remember items from the beginning of a memory task, whereas recency is the likelihood for people to better recall items at the end of a memory task. Primacy arises from the disproportionate opportunities for rehearsal, and thus, movement of items into long-term memory (Maylor, 2002). Recency occurs because the end of a list is most recent and items remain in short-term memory (Maylor, 2002). To alleviate the impact of primacy effects, each group was exposed to one of two word lists. These two word lists contained the same words, but in a different, random, order. To minimize the recency effect, another mathematic distractor task was performed immediately after viewing the word list.

After viewing the word list slideshow, participants completed another mathematic distractor task. Participants were asked to repetitively add the number 4, starting with 27 (i.e., 27 plus 4 is 31, 31 plus 4 is 35, and so on), out loud, for 60 s. These two numbers (27 and 4) were also projected. After 60 s, participants wrote the result of their repetitive addition on the provided paper underneath the result of their repetitive subtraction task.

After this second distractor task, participants were asked to recall the words from the slideshow. Instructions were given to write down as many words, in no particular order, with as much accuracy
as possible, on the opposite side of the paper from their notated numbers. Participants were given 4 min to free recall as many words as possible.

Finally, to distract participants from the true aim of the study, they were asked to internally (i.e., using no paper or pen) sum the two digits recorded on their paper from the mathematic tasks. Once this addition was complete, participants wrote this final number on the paper, immediately following their recalled word list. Participants were debriefed, asked to not share the procedure of the study with anyone to prevent potential participants from knowing the aim of the study before the debriefing period, and thanked for their time.

Materials. The 40-item word list consisted of both female- and male-stereotypical words. The word list was compiled for the purpose of the current study (see Appendix A for complete list). Pilot data on the gender-stereotypical value of 80 words were collected from 20 participants. From the original list, the 20 words ranked as most female-stereotypical and the 20 male-stereotypical were used in the study. Words within each gender stereotype were balanced for word length. The 40 words selected were ordered randomly, with the exception that word order alternated between female- and male-stereotypical words. Two word list orders (note: no change in words in the list) were constructed to reduce the impact of primacy, recency, and order effects. These two list orders were presented in random order over the course of the study.

Study 2

Participants. Study 2 included 84 participants (40 females, 44 males) sourced from the same population as Study 1. Participants were selected using the same process as in Study 1 with the addition of the restriction that no participant from Study 1 could be a part of Study 2.

Materials. A new 40-item word list was compiled based on Crawford, Leynes, Mayhorn, and Bink’s (2004) collection of gendered and neutral words. The words used in Study 2 were selected from Crawford et al.’s (2004) word list with focus on balancing stereotype value and word length between genders. The 20 words within each gender stereotype were balanced by gender stereotype strength and word length (see Appendix B). The 40 words selected were ordered randomly with list order alternating between female- and male-stereotypical words. Two word list orders (note: no change in words used in the list) were constructed to reduce the impact of order effects. These two list orders were presented in random order over the course of the study.

Procedure. The experimental procedure used in Study 2 was identical to that used in Study 1 with the exception of replacing the original word list with the new word list sourced from Crawford et al. (2004). Study 2 was conducted to examine the relative impact of words sourced from a peer-reviewed, gendered, word list rather than an independently constructed word list.

Results and Discussion

Data were collated and sorted by the number of male-stereotypical words recalled subtracted from the number of female-stereotypical words recalled by each participant. This resulted in a recall number. If the recall number was positive, this indicated the individual recalled more female-stereotypical words. If negative, the individual recalled more male-stereotypical words. A recall number of zero indicated equal recall of female- and male-stereotypical words. Data were, then, sorted by participant gender.
A nonparametric alternative to the paired $t$-test, the Wilcoxon Signed-Rank Test (McDonald, 2009), was used to analyze the data. This non-parametric alternative was used since the data were not normally distributed. Alpha was set at $p \leq .05$.

**Study 1**

Analysis of word list recall for the 39 female participants revealed a significant difference ($p = .003$) for female recall of gender-congruent, stereotypical words. Analysis of word list recall for the 42 male participants showed no significant difference ($p = .169$) in recall of gender-congruent, stereotypical words. Given these patterns of results, the null hypothesis (i.e., no difference in recall of gender-stereotypical words) was rejected for females, but not males. This permits acceptance of the alternative hypothesis (i.e., recall of more words congruent with the participant’s gender) for only the female sample.

![Figure 1](image.jpg)

*Figure 1.* Averages of female and male recall number. The female group showed a significant difference ($p = .003$) in recall of female (i.e., gender-congruent) stereotypical words. The male group showed no significant difference ($p = .169$) in the recall of either female- or male-stereotypical words.

**Study 2**

Analysis of word list recall for the 40 female participants revealed a significant difference ($p < .001$) for recall of gender-congruent, stereotypical, words. Analysis of word list recall for the 44 male participants showed no significant difference ($p = .582$) for recall of gender-congruent stereotypical
words. For females, the null hypothesis was rejected, permitting acceptance of the alternative hypothesis. For males, rejection of the null hypothesis is not warranted.

![Graph of average recall number](image)

**Figure 2.** Averages of female and male recall number. The female group showed significant difference \( (p < .001) \) in recall of gender-congruent, stereotypical words. The male group showed no significant difference \( (p = .582) \) in the recall of either female- or male-stereotypical words.

The results of the current studies do not align with previous research as only females showed a tendency for gender-congruent recall of stereotypical words. Previous research on gender schema theories (Signorella et al., 1997) and gender-facilitated memory (Herrmann et al., 1992) indicated both females and males were equally influenced by gender in relation to memory.

**Limitations**

In both Study 1 and Study 2, the female- vs. male-stereotypical words ranked higher in stereotype strength. The disproportionate stereotyped nature of these words may have influenced gender-congruent word recall.

Another possible influence on the observed pattern of results is evidence showing females often outperform males on verbal tasks (Chipman et al., 1998). Females not only outperform males in verbal task, but also verbal memory (Kimura & Clarke, 2002). This predisposition could have influenced the results and contributed to the finding of gender-congruent memory in the female group.
Implications and Context

Excepting these potential limitations, the implications of this study are significant. The pattern of results was the same for both of the current studies. The null hypothesis was rejected for both female groups, but failed to be rejected for males. There was concern the experimenter generated word list from Study 1 contributed to this pattern of results, thus, Study 2 was conducted, with only a change in the word list and the same pattern of results were produced. The findings from both studies imply female memory is more likely to be influenced by the gender-stereotype value of words used in text.

For females, this tendency toward gender-congruent memory suggests gender influences how information is processed and remembered. Such information can, then, lead to explanations of differing memory abilities between genders. When females take in information, they may be more likely to focus on information relating to their own gender. Males seem to encode information regardless of relation to their gender.

Another implication of the current set of studies relates back to Good et al.’s (2010) study of stereotypical- and atypical-images in science textbooks and the impact on performance. The impact of these textbook images on female and male recall relates to the concept of stereotype threat. Stereotype threat is the anxiety of potentially confirming a negative group stereotype when an individual believes he or she is a part of the group (Keller, 2007; Rivardo, Rhodes, Camaione, & Legg, 2011). In the current set of studies, females but not males, showed gender-congruent memory. Given this finding, it makes sense to consider a potential tendency for females to tune into gender-stereotypical information more so than males. If this is the case, this could, in turn, influence performance in educational settings, as females may face stereotype threat during study of traditionally male dominated subjects (e.g., sciences and math). By providing educational materials with information confirming stereotype threats (e.g., science textbooks with pictures of males performing experiments) individuals can be placed at a disadvantage not only in performance, but also with regard to their general feeling about the topic of study (Good et al., 2010).

Gender stereotypes within learning environments should be considered. Whether in textbook images, writing style, or topic, gender stereotypes influence female memory more so than males, at least in some areas. No group should feel isolated or discouraged because the material used in classrooms is insensitive to one gender or another. Suggested research for the future could investigate ways to develop and utilize diversity inclusive and sensitive material within the classroom.

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References


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**Appendix A**

*List of Female- and Male-Stereotypical Words used in Study 1*

<table>
<thead>
<tr>
<th>FEMALE</th>
<th>MALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>blush</td>
<td>beard</td>
</tr>
<tr>
<td>bra</td>
<td>cologne</td>
</tr>
<tr>
<td>doll</td>
<td>fire</td>
</tr>
<tr>
<td>flower</td>
<td>fishing</td>
</tr>
<tr>
<td>glitter</td>
<td>football</td>
</tr>
<tr>
<td>gorgeous</td>
<td>gamer</td>
</tr>
<tr>
<td>gossip</td>
<td>garage</td>
</tr>
<tr>
<td>jewelry</td>
<td>gun</td>
</tr>
</tbody>
</table>
lipstick  handsome
maid    lawnmower
makeup  mechanic
mascara muscular
nurturing police
pedicure prince
perfume truck
pink    tuxedo
pretty  war
purse   weapon
secretary weights
skirt   wrestling

*Note.* 40-item word list generated for the purpose of Study 1. Words were rated for stereotype value and balanced for word length.

**Appendix B**

*List of Female- and Male-Stereotypical Words used in Study 2*

<table>
<thead>
<tr>
<th>FEMALE</th>
<th>MALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>barbie</td>
<td>beard</td>
</tr>
<tr>
<td>blossom</td>
<td>bicep</td>
</tr>
</tbody>
</table>
blouse  bowtie
bouquet  boxing
bunny  burly
corsage  cigars
corset  devil
dress  fishing
fairy  goateee
flowers  hairy
gossip  hockey
makeup  hunting
mascara  necktie
nanny  pirate
petite  plumber
pretty  poker
purse  sheriff
rainbow  soldier
skirt  umpire
teacher  veteran
Note. 40-item word list (balanced for stereotype value and word length) sourced from a 600-item gendered and neutral word list (Crawford et al., 2004) designed to balance stereotype value.