There is overwhelming evidence that the way in which an individual organizes his or her world is based on and heavily influenced by stereotypes. According to Bem (1981), stereotypes are generalized attitudes, beliefs, and opinions that people hold about members of a group. Stereotypes serve many cognitive functions; for instance, they limit the amount of information requiring encoding, thereby preserving mental resources (e.g., Macrae, Milne, & Bodenhausen, 1994). More specifically, researchers have found a clear processing advantage when individuals use stereotypes of gender, age, and race to categorize others (e.g., McCann, Ostrom, Tyner, & Mitchell, 1985).

Research in this area suggests that gender stereotypes dominate over race and age stereotypes as a basis for categorization (Fiske, Haslam, & Fiske, 1991). Moreover, cross-cultural research reveals a high level of agreement across many countries in relation to characteristics associated with men and women (Schwartz, 1990; Williams & Best, 1982). In general, males are described as more active, strong, cortical, and adult-like, whereas females are described as more passive, weak, nurturing, and adaptive (Williams & Best, 1982). In addition, many Western studies suggest that the most common stereotype of women is the “submissive” housewife or “sexy” secretary, whereas the typical man lies somewhere between a businessman and macho man. Interestingly, researchers note that male stereotypes are less clear-cut (see Fiske, 1998, for a review).

Over the past several years, a vast amount of research has examined the cognitive processes underlying gender stereotype differentiation. One focus of this research has been to examine the organization and representation of gender stereotype information in memory. In addition, many cognitive researchers have focused on differences in memory accuracy for gender stereotype information. A meta-analytic review of these studies suggests that judgments are faster and memory is more accurate for material that is consistent with gender stereotypes (Fyock & Stangor, 1994). For example, Banaji and Hardin (1996) showed adult participants prime false memory for pictures of common household chores: evidence of a gender stereotype.

**False Memory for Pictures of Common Household Chores: Evidence of a Gender Stereotype**

The current study examined false memory for gender stereotype information using a novel picture paradigm based on the original word paradigm used by Deese (1959) and Roediger and McDermott (1995). We showed participants pictures of either a man or woman portraying stereotypically male-related and female-related household chores. We found a reliable false memory effect for pictures stereotypically related, but not presented in the study list. In addition, a greater proportion of errors occurred with pictures that were consistent with the female stereotype (M = .177) as compared to the male stereotype (M = .081), t(59) = 3.069, p = .003. The latter effect occurred independent of the sex of the participant and the sex of the individual pictured. We discuss the significance of these findings in terms of understanding the nature of memory errors and gender stereotypes.

**Author note.** The first author is a first-year graduate student in clinical psychology at the University of North Carolina at Greensboro. Portions of this manuscript were presented at the 2001 annual meeting of the Georgia Psychological Association in Atlanta, Georgia. We would like to thank Dr. Benjamin de Mayo and Beth Walton for assisting with the construction of the materials.

Correspondence can be sent to the second author, Kristen A. Diliberto, Department of Psychology, Berry College, Rome, Georgia 30144. Electronic mail may be sent to: kdiliberto@berry.edu.
words that were male related (e.g., father), female related (e.g., mother), or neutral (e.g., parent), followed by a target pronoun that was gender related (she, he) or neutral (it). Participants judged whether each target pronoun was male or female. Results suggest that the target judgment was faster and more accurate when target gender was consistent rather than inconsistent with the prime gender regardless of whether participants were aware or unaware of the prime-target gender relationship. Researchers have reported similar results with children (e.g., Bauer, 1993; Bem, 1981; Liben & Signorella, 1980; Signorella & Liben, 1984).

Although many researchers have examined gender stereotypes in terms of memory speed and accuracy, few researchers have examined the influence of gender stereotypes on memory errors (Stangor & McMillan, 1992). Despite the scant amount of research on memory errors, some results suggest that the distinction between memory accuracy and memory errors is trivial. Nonetheless, Lenton, Blair, and Hastie (2001) point out that both can influence the way that information is processed. Furthermore, in the case of memory errors, adding false information about someone based on stereotype information may have ramifications (e.g., legal, cultural, social). Thus, one of the aims of the current study is to examine gender stereotypes in terms of memory errors rather than accuracy.

The false memory paradigm, a dominant paradigm used to investigate memory errors, was originally introduced by Deese (1959) and was reintroduced by Roediger and McDermott (1995), and thus is known as DRM. In a typical DRM procedure, a participant listens to several word lists composed of associates (e.g., bed, rest, tired) of a critical nonpresented word (e.g., sleep). Following presentation of the word lists, researchers give participants a memory test. The general finding suggests that participants recognize or recall memory for the nonpresented word as frequently as for the studied words (e.g., Deese, 1959; Payne, Elie, Blackwell, & Neuschatz, 1996; Read, 1996; Roediger & McDermott, 1995; Underwood, 1965).

Recently, Lenton et al. (2001) examined the influence of stereotypes on false memory using the DRM paradigm. One advantage to investigating stereotypes using this paradigm is that it allows investigators to examine false memories for not only direct associations in memory (e.g., bed–sleep) but also for indirect associations in memory (e.g., nurse–model; Lenton et al., 2001). In the latter example, although nurse–model are not directly linked in memory, they share an underlying association with the concept female.

In their study, Lenton et al. (2001) presented participants with five 15-word lists. Four of the word lists contained direct relations, similar to those used by Roediger and McDermott (1995). The remaining word list contained 15 roles that were either stereotypically related to men (e.g., president, doctor) or women (e.g., secretary, nurse). Participants studied each word for approximately 1 s. Following a 3-min interpolated task, researchers gave participants a recognition task that contained words that were not presented, but were close associates to the studied list. Results corroborate the standard false memory effect reported by Deese (1959) and Roediger and McDermott (1995) for the direct associations. More importantly, they also found that participants were more likely to falsely remember a nonpresented word that was stereotypically consistent with the studied list as compared to a nonpresented word that was stereotypically inconsistent. Lenton et al.’s study was the first to demonstrate that indirect stereotype associations can produce false memories using the DRM procedure.

Although most studies of false memory have relied on use of the DRM paradigm to investigate false recollections, a few studies have reported a false memory effect using other paradigms (e.g., Miller & Gazzaniga, 1998; Seamon, Luo, Schiegel, Greene, & Goldenberg, 2000). For example, Miller and Gazzaniga (1998) reported a reliable false memory effect using a picture paradigm. Advantages of using pictures of scenes over word lists are that pictures are more natural and may be more generalizable to practical situations (Miller & Gazzaniga, 1998). In their study, Miller and Gazzaniga presented participants with color illustrations that depicted strong thematic stereotypical scenes (e.g., a beach scene). Participants viewed 12 pictures, and each picture had two identifiable (studied) objects (e.g., a beach ball, a beach umbrella) and was missing two thematically related (nonpresented) objects (e.g., a beach blanket in the sand, a lifeguard’s life preserver). Miller and Gazzaniga found that participants reported seeing the nonpresented objects almost as often as the studied objects, thereby producing a false memory effect for pictures that is similar to that found with word lists.

A second aim of the present study was to examine the false memory effect for gender stereotype information using scenes of men and women portraying stereotypically consistent and inconsistent household roles. Participants viewed groups of thematically related pictures of either a man or a woman performing a common household task. Following an interpolated task, researchers gave participants a recognition
test. Similar to predictions made by Lenton et al. (2001), we predicted a false memory effect for those pictures that were not presented in the study list but were meaningfully related to the pictures that were presented. More importantly, we also predicted a greater false memory effect if (a) the person performing the chore was a woman as opposed to a man and (b) if the chore was consistent with the gender stereotype (e.g., woman dusting; man hammering) as opposed to inconsistent with the gender stereotype (e.g., woman hammering; man dusting).

Method

Participants

Sixty undergraduate students (30 male, 30 female) from Berry College in Rome, Georgia, participated in the study. Most participants received extra credit in a psychology course; however, some participants volunteered and did not receive compensation.

Materials

Normative data. Twenty-one surveys were gathered from a separate pool of undergraduate students enrolled in an introductory psychology course. We developed the survey to assess prevalent stereotypes concerning whether common household chores were typically associated as being performed by “mostly male,” “mostly female,” or “neutral” persons. We selected eight of the chore categories most frequently rated by participants as stereotypically performed by a man and eight of the chores most frequently rated as stereotypically performed by a woman to use as the studied pictures and critical lure stimuli (see Appendix). We used the remaining eight chore categories to form the nonstudied pictures for the recognition test.

Picture stimuli. One hundred ninety-two digital pictures were taken. Of these pictures, 96 were of a man performing 24 different household chores and 96 were of a woman performing the identical household chores as the man. Each chore category was associated with a sequence of four pictures showing a chore being completed in various stages. For example, a sample sequence included the man carrying a ladder, leaning the ladder against a house, climbing the ladder, and finally, cleaning a gutter. The same picture sequences were created for the pictures depicting a woman (see Figure 1 for a comparison). In addition, for the pictures depicting a man, 16 chore categories (i.e., 8 rated “mostly male” and 8 rated “mostly female” in the normative study) were selected. Of the four pictures associated with each category, three pictures were used to form the studied list (total of 48 items) and one picture (total = 16) was used to form the nonpresented critical lure. The nonpresented critical lure was thematically related to the studied list items, but appeared only on the subsequent recognition test. Finally, of the remaining 32 pictures, 16 were randomly selected to form the nonstudied pictures on the recognition test. The same process was repeated for the pictures depicting a woman, thereby creating two identical lists that differed only by the gender of the individual performing the chores.

The recognition test was comprised of 48 pictures. Of those 48 pictures, 16 were “old” (seen previously), 16 were “lures” (not seen previously, but from the studied categories), and 16 were “new” (not seen previously and from new categories).

Apparatus

We took the pictures using an Olympus 450 digital camera and edited them using Adobe Photoshop software. We used an Alto PC-compatible computer equipped with a MaxTech computer monitor to present the pictures. Participants sat approximately 50 cm from the computer screen. The second author created the program by using Micro Experimental Laboratories (MEL) Version 2 software (Schneider, 1995). Each picture measured 640 x 480 pixels and filled the entire computer screen.

Procedure

Study phase. We tested each participant individually. Each session lasted approximately 15 min. The experimenter read the instructions that were displayed on the computer screen while each participant followed along. If there were no questions, we instructed participants to press the Y key on the computer keyboard to begin. Next, a white fixation cross on a black background appeared in the center of the screen for 500 ms. Immediately following, each picture was presented for 1 s. We presented participants with either 48 pictures of a man or 48 pictures of a woman performing 16 different household chores. We randomly ordered the chores; however, we grouped together each set of three slides within each chore category.

Recognition phase. When participants finished viewing all of the pictures in the study phase, we instructed them to make a list of exemplars from an animal category for 3 min. This task served as a distracter and prevented participants from thinking about the pictures presented during the study phase. Following the distracter task, we gave the participants a picture recognition test. The recognition test was comprised of 16 old, 16 lure, and 16 new pictures presented randomly. Again, the experimenter read
FALSE MEMORY FOR PICTURES □ de Mayo and Diliberto

RESULTS

We evaluated all analyses using an alpha level of .05 unless otherwise indicated. We performed a $2 \times 2 \times 2 \times 2$ mixed-factor analysis of variance (ANOVA) on the data with chore stereotype (male, female) and item type (lure, new) as within-subject variables and with participant sex (male, female) and picture sex (male, female) as between-subject variables. The dependent variable was the mean proportion of false recognitions to pictures not presented during the study phase.

FIGURE 1
Sample pictures used in the study phase of the experiment.

(a)  (b)  (c)  (d)

Note. Pictures (a) and (b) are of a man and woman, respectively, performing a stereotypically female-related chore (i.e., dusting). Pictures (c) and (d) are of a man and woman, respectively, performing a stereotypically male-related chore (i.e., carrying a ladder). In the actual experiment, pictures were presented in color.

the instructions aloud as the participant followed along. For each picture that we presented, we instructed participants to press the $Y$ key if that exact picture was presented during the study phase, and the $N$ key if the picture was not presented during the study phase. We carefully instructed each participant to press the $Y$ key only if he/she specifically remembered the picture from the study phase. We gave participants 5 s to respond before the computer advanced to the next picture. After completing the recognition test, we fully debriefed participants and thanked them for their participation.
Surprisingly, there was no main effect of either participant sex or picture sex. In addition, the two-way interactions between participant sex and item type, participant sex and chore stereotype, picture sex and item type, and picture sex and chore stereotype were not statistically significant ($F s < 1$). Finally, the three-way interactions between participant sex, picture sex, and item type, and between participant sex, picture sex, and chore stereotype were not statistically significant ($F s < 1$); therefore, in order to examine the false memory effect, we performed a separate $2 \times 2$ repeated measures ANOVA on chore stereotype and item type.

We found a statistically significant main effect of chore stereotype, $F(1, 59) = 51.721, p = .000$, indicating that the proportion of false recognitions was greater to pictures of an individual performing a chore that was rated stereotypically female ($M = .245, SEM = .016$) than to pictures of an individual performing a chore that was rated stereotypically male ($M = .139, SEM = .012$). In addition, a statistically significant main effect of item type was found, $F(1, 59) = 113.727, p = .000$, indicating that the proportion of false recognitions was greater to lure pictures ($M = .298, SEM = .018$) than to new pictures ($M = .105, SEM = .011$). More importantly, we found a statistically significant interaction between chore stereotype and item type, $F(1, 59) = 9.420, p = .003$.

To follow up on the Chore Stereotype x Item Type interaction, separate planned $t$ test comparisons were performed on the lure and new items for chores rated stereotypically female and for chores rated stereotypically male. We found that the proportion of errors to lure pictures ($M = .373, SEM = .027$) was greater than the proportion of errors to new pictures ($M = .125, SEM = .017$) for chores rated stereotypically female, $t(59) = -6.333, p = .000, \eta^2 = .405$. Similarly, the proportion of errors to lure pictures ($M = .223, SEM = .021$) was greater than the proportion of errors to new pictures ($M = .088, SEM = .013$) for chores rated stereotypically male, $t(59) = -8.451, p = .000, \eta^2 = .548$. In summary, a false memory effect occurred for pictures rated stereotypically female and for pictures rated stereotypically male. Interestingly, the size of the effect, as computed by taking the difference score (i.e., lure–new), was greater for pictures rated stereotypically female than for pictures rated stereotypically male, $t(59) = 3.069, p = .003$. Furthermore, the three-way interaction between picture sex, chore stereotype, and item type was not statistically significant.

In order to examine the proportion of errors to old items (i.e., saying “no” to an item that appeared on the studied list), we conducted a one-way repeated measures ANOVA. We found that the proportion of errors to old items was greater for pictures rated stereotypically female ($M = .177, SEM = .016$) than to pictures rated stereotypically male ($M = .081, SEM = .014$), $t(59) = 5.424, p = .000$.

**Discussion**

The purpose of the present experiment was to examine false memory for gender stereotype information using pictures of men and women performing traditional and nontraditional household chores. We found a reliable false memory effect for the nonpresented lure pictures. Moreover, the false memory effect was greater for pictures that depicted a stereotypical female chore than for pictures that depicted a stereotypical male chore.

Researchers have shown that the use of a picture paradigm produces false memory effects equal to those produced by a word paradigm (Miller & Gazzaniga, 1998). The use of pictures in the study of false memory is also significant for the present experiment because using pictures has certain advantages over using words when testing for false memory. One such advantage is that the picture paradigm represents testing conditions that are more naturalistic than the use of words. Asking participants to recall visual information has closer ties to incidents in real life in which individuals’ visual reports may be critical, as in the case of eyewitness testimony (Miller & Gazzaniga, 1998). One downfall of using the picture paradigm, however, is that it doesn’t take into consideration the events surrounding the pictures, as would be the case in real life.

More interesting was the finding that the magnitude of the false memory effect was nearly twice as great for pictures that depicted a person performing a female-related chore (e.g., dusting, ironing) as opposed to a male-related chore (e.g., taking out the trash, hammering). One possible explanation for difference in the magnitude of the false memory effect may relate to the use of subtypes when stereotyping different groups of people. Sex is one of the most dominant subtypes in the process of categorization, and many instances can even take precedence over race (e.g., Fiske et al., 1991). Furthermore, subtypes found for Western women include that of a housewife or a sexy woman; however, the subtypes for men are much less well defined (see Fiske, 1998, for a review). Male subtypes seem to be less driven by sex and more so by competence in a particular area (Fiske, 1998). Studies have also shown that both men and women seem to view women as a more homogeneous group than men (Lorenzi-Cioldi, Eagly, & Stewart, 1995). Given the fact that women are more
readily subtyped according to their sex and that one of the largest subtypes used to categorize women is that of the housewife, it is only reasonable to assume that more false memory would occur for the female-related chores. It seems as though stereotypes, and especially those for women, served to categorize all female-related chores as performed by a woman regardless of what the picture actually depicted.

In addition to this explanation, research has also shown that when people are under time pressure to encode and to make recognition judgments, as the participants were in the current study, they tend to process stereotype-consistent information faster because it is easier to assimilate into existing schemata (Fiske, 1998). Thus, it is possible that participants encoded less perceptual detail on the stereotypically female pictures and relied on the dominant stereotype or subtype to “fill in the gaps,” thereby resulting in more errors on those items.

Another possible explanation for the greater incidence of errors on the stereotypically female pictures is the finding by Stewart, Vassar, Sanchez, and David (2000) that both men and women who hold more traditional views of women tend to individuate men more than women. However, for men and women who were shown to be more progressive in their views of women by their scores on the Attitudes Toward Women Scale (AWS; Spence & Helmreich, 1972; Spence, Helmreich, & Stapp, 1973), the opposite was found to be true. The participants in these studies tended to individuate women more than men in what Stewart et al. (2000) viewed as an attempt to help improve the lower status of women in society. It is possible that the participants in the present study hold more traditional views concerning women and thus had better recall for the male-related chores than the female-related chores. Future studies should examine the role of attitudes toward women when investigating stereotypes based on sex as this seems to be a key aspect in memory recall.

Of particular interest is that we found no effect of participant sex. This finding was contrary to what the researchers hypothesized; however, other studies on gender stereotypes have also failed to find an effect of sex. Banaji and Hardin (1996) reported evidence for automatic stereotype associations that was independent of participant sex. Another study by Swim and Sanna (1996) found a similar effect regardless of participant sex. Also, contrary to our predictions, we found no effect of the picture sex (e.g., sex of the person performing the chore). One possible explanation for the failure to find this effect may be that participants ignored the sex of the individual portrayed in the photo because it was the same through-out, and instead focused on the details of the chores themselves. Given the complexity of design and of creating and editing the materials, we manipulated picture sex between subjects. A future study may want to use a within-subject comparison, which may be more sensitive to the picture sex variable.

In addition to the explanations of false memory based on stereotype generalizations, it is possible that the false memory may be related to differences characteristic of the chores or pictures themselves. For example, it is possible that it is a more common occurrence to see a person dusting than carrying a ladder. If this assumption is true, then is it equally likely that the less common occurrence is more salient and likely to capture more attention, thus producing greater memory. Also noteworthy is the fact that many of the chores reported by participants in the normative study for women were indoors, whereas for men the chores tended to be outdoors, which may also contribute to differences in saliency (see Appendix).

In conclusion, one limitation of the current study is that there was a noticeable age difference of the individuals depicted in the pictures; however, we do not believe that age had a significant influence on our results. Age was confounded with picture sex, and no effect was found. A second limitation of the current study is that only two models (one male and one female) were used. Also, the lure pictures represented the same individual at a different stage of the chore performed in the studied list. Future studies may want to replicate and extend this finding with different models (e.g., professions, age, or race) and use stereotypically related, but different, pictures as lures in order to make a more direct comparison with the word association studies.

References


APPENDIX

Critical Stimuli Used in the Experiment

<table>
<thead>
<tr>
<th>Male list</th>
<th>Female list</th>
</tr>
</thead>
<tbody>
<tr>
<td>grilling</td>
<td>ironing clothes</td>
</tr>
<tr>
<td>sawing a tree</td>
<td>watering house plants</td>
</tr>
<tr>
<td>mowing the lawn</td>
<td>vacuuming</td>
</tr>
<tr>
<td>trimming the hedges</td>
<td>dusting</td>
</tr>
<tr>
<td>taking out the trash</td>
<td>sweeping the floor</td>
</tr>
<tr>
<td>checking the oil in a car</td>
<td>cleaning the toilet</td>
</tr>
<tr>
<td>hammering</td>
<td>folding laundry</td>
</tr>
<tr>
<td>climbing a ladder</td>
<td>setting the table</td>
</tr>
</tbody>
</table>