False Memory in Images and Words

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Abstract

This study was designed to examine the effects of stimulus type on eliciting false memories. We were studying whether or not words could induce more false memories in participants than images. Participants ($N = 20$) were presented with a words condition and an images condition and asked to recall the items that they saw at the end of each trial. The list at the end of each trial contained items that were in the sequence and distracter items. There were normal distracters that were not related to the items in the sequence. The most important item in the list was the special distracter, which was related to all of the items in the sequence and was the prototype for those items. We did find a significant main effect for stimulus type ($p = .001$), such that whether the stimulus was words or images did influence the recall. We also found a significant main effect for whether the item on the list was in the sequence or a distracter item ($p < .001$), such that the recall was the highest for items that were in the sequence, and the lowest for the normal distracters. There was a significant interaction between stimulus type and whether the item was in the sequence or a distracter ($p < .001$). This means that when the stimulus was images the recall for items on the sequence was higher than words, but the recall of the special distracters was lower for images than words.

False Memory in Images and Words

False memories occur when a person believes they saw an item that was never presented to them. The reason we have false memories is because of the schematic nature of our memory. We form schemas to organize information about the world. There is such a massive amount of information in our environment that we must build representations of that information to better understand it. Schemas are the abstract mental representations we form around an idea. For example, for the schema sleep, a person might also be reminded of the words bed and pillow. Therefore, they might recall seeing sleep as a word presented along with bed and pillow, even though that word was not in the sequence. These schemas are so engrained in us that they allow us to overlook details in order to better understand the whole idea.

Furthermore, false memories do not only occur with words. They can also occur with images. We form schemas about images as well. Images have meaning to us, so they can be inter-connected to other concepts in a schema. The conceptual-propositional hypothesis for mental imagery states that we store interpretations of events, rather than components of the event. We do this for both verbal and visual stimuli (Solso & Maclin, 2008). A study conducted by Solso and McCarthy (1981) looked at participants' ability to accurately remember images of faces. They showed the participants a string of some images of faces, and asked the participants to rate the confidence that they saw a certain face. The prototype face was rated with the highest confidence by the participants. This face was never seen by the participants. It was a face made up of components from the other faces. This displays the schematic nature of our memory because participants' remembered the representation of the face, not its individual components.

Therefore, when looking at the studies that observed false memories, we were interested in the differences in the prevalence of false memories when you alter the type of stimulus being presented to the participants. Mainly, we were interested in the differences in eliciting false memories with images and words. The differences between linguistic input and an image in

memory is the detail of the information (Solso & Maclin, 2008). Therefore, we hypothesized that images would induce less false memories than words because they are more complex. They are not just a string of letters like words are; they have more visual properties in them. This means that the participants would recall more special distracters, the prototypal items of the sequence, in the word condition than the image condition.

Method

Participants

The participants ($N = 20$) were obtained from a convenience sample at Hanover College. There were 12 females and 8 males in the study. Their ages ranged from 19 to 22. There were 19 Caucasian participants and 1 African American participant. All of the participants had normal or corrected to normal vision.

Equipment

The computers used in the experiment were manufactured by Gateway, and were the E4300 model with a Pentium 4 processor. The monitor was a 15.4" LCD screen (Model number: FPD1565) with the resolution set at 1024 x 786 pixels. The browser used was Internet Explorer 8. The program we used was the False Memory Program on the Cognitive Psychology Experiments (Krantz, 2010). The program was written in Java.

Stimuli

The stimuli presented to the participants were images or words. The images were selected by the researchers. The images in each trial were of various objects, such as images of flowers or fruits. The special distracter and normal distracters for each set were also chosen by the

researchers. For example, the special distracter for the trial of flower images was a rose, with normal distracters being unrelated images such as fruits or dogs. The words for each trial were related to a broader concept, such as pillow and bed being related to sleep (special distracter). The words were in 24 size font. Each item in the image and word conditions was presented on the screen for a 2 second duration. There were 11 images or words in each trial. There was a 20 second period for recall at the end of each trial.

Procedure

The participants came into the Psychology computer lab, signed an informed consent form, and answered a demographic questionnaire. We alternated the order each participant would complete the conditions to prevent an order effect. Therefore, we assigned participants a number where odd numbers would complete the image condition first and even numbers would complete the word condition first. They were asked to recall the items they saw in a list at the end of each trial. The list contained a special distracter and normal distracters among the items that were presented to the participant. The participants received a data summary after their first condition that was recorded. Then participants repeated the process of recalling the items in the second condition. Each condition consisted of 6 trials with 11 words or images in each trial. After the participants completed both conditions, they were debriefed and dismissed.

Results

After obtaining the data summaries from all of the participants, we ran a 2 (stimulus type: images or words) by 3 (items in the recognition list: items in the sequence, normal distracters, or special distracter) ANOVA with repeated measures. The 2 x 3 ANOVA indicated that there was a significant main effect for stimulus type, $F(1, 19) = 15.11$, $p = .001$, such that when the stimuli were images there was a higher recall for items in the sequence than words, and there was a

lower recall of special distracters when the stimuli were images rather than words (See Figure 1). Therefore, the stimulus type affected the participant's ability to recall the items. There was also a significant main effect for items in the recognition list, $F(2, 38) = 246$, $p < .001$. This is evident because the items that were in the sequence were recalled at a much higher accuracy than the special and normal distracters. The normal distracters were recalled at a much lower accuracy, primarily because when the participants selected the normal distracters it was accidental. The special distracters had a moderate recall compared to the recall of the items in the sequence and the normal distracters (See Figure 1). The 2 x 3 ANOVA also indicated that there was a significant interaction between stimulus type and items in the recognition list, $F(2, 38) = 38.35$, $p < .001$. When the stimulus was images, the recall of items in the sequence was higher than words, but the special distracters of the images were recalled lower than the ones of the words (See Figure 1).

After running the 2 x 3 ANOVA, we ran a post hoc t-test with a Bonferroni correction to determine the differences between the kinds of items in the recall list when the stimulus was words or images. We found a significant difference between the recall of the items in the sequence between words or images, $t(19) = 2.81$, $p < .001$, such that images had a higher accuracy of recall ($M = .86$, $SD = .02$) than words ($M = .78$, $SD = .02$). There was no significant difference in the recall of the normal distracters for words and images, $t(19) = -1.91$, $p = .07$. However, there was a significant difference between the recall of the special distracters for words and images, $t(19) = -5.60$, $p < .001$, such that the recall of the special distracters was higher for words ($M = .61$, $SD = .05$) than for images ($M = .32$, $SD = .05$). (See Figure 1)

Figure 1. The mean recall of items in the recall list (+/- 95% *CI*) for the images and words conditions.

Discussion

In this study, we hypothesized that words would elicit more false memories than images. This means that participants would recall more special distracters for words than images. When we ran the post hoc t-test with a Bonferroni correction, we found that participants did in fact recall more special distracters when the stimulus was words ($M = .61$) than when it was images ($M = .32$). Therefore, our hypothesis was supported. The participants had more recall of the items in the sequence when the stimulus was images ($M = .86$) rather than words ($M = .78$), which would explain the higher recall for special distracters in words if participants were not recalling as many actual items from the sequence. This was indicated by the significant interaction between stimulus type and items on the recognition list ($p < .001$) because when the stimulus was images, the recall of items in the sequence was higher than the word condition, but the recall of the special distracters was lower than the words. For the word condition, the participants were recalling more special distracters than the image condition, so their recall of items in the sequence was adversely affected. There are many possible reasons for the differences in recall and elicitation of the false memories in images and words.

First of all, image memory may have different properties than word memory. Both types of stimuli have semantic importance. We do produce schemas for images and words. This is evident because there were false memories for both the images and words condition. However, the image condition had a much lower recall of the special distracters. This could be because we can remember different parts of the image. We do form mental representations, but we can remember details of stimuli too. Images can be remembered by different properties of the image, such as the following: shapes and lines in the image, size of individual parts of the image, colors,

and the position of items in the image. This differs greatly from the word condition, which consisted of words that were uniform in color and size. The words were all 24 size font and white on a black screen. Therefore, words had less identifying properties that could aid in recall. Images can be more easily discerned if they had been seen because of their complexity.

Another reason that the special distracter recall may be less in images than words is that that the researchers chose the special distracter images. This could be problematic because it was only three people's opinion on what constitutes a prototypal image for each set of images. This is limited because of its subjectivity. A prototypal image may vary from person to person. This is especially true for dealing with images of objects. People's preferences and familiarities with the objects vary greatly. Therefore, before choosing the prototypal special distracter for each set, we should have gained more opinions from a variety of individuals about what they would choose for the prototype for that type of object. This may have increased the special distracter recall for the image condition, and overall decrease the bias present in our study.

Furthermore, we had some other minor limitations in our study. First of all, the thumbnails of the images in the recall sections were difficult for the participants to see. The small size of the images could have influenced their ability to properly distinguish which items were which. This could have affected their recall of the items in the images condition. Another issue was the types of images. All of our images had to do with objects. This is a limited type of images. Memory of faces could be drastically different, which could make our results unrepresentative of memory of images. Therefore, to overcome these limitations, we would make the images larger in the recall period, and incorporate different types of images in a future study to see how it affects our recall compared to the recall of words.

Lastly, in a future study, we could further see how false memories could be different in images and words. To test this, we could make the images have more uniform properties, such as

making the images black and white. This could cut down on the complexity of the image and possibly increase special distracter recall in images. Also, incorporating different types of images could allow us to see differences in elicitation of false memories in the various types. Images and words can induce false memories in the way that we see meaning in them. We use this meaning to intertwine the stimulus into our schemas that we have formed. This allows us to have false memories because we see the similarities in meaning in the items presented in the set of words or images. However, we have observed images to have less generation of false memories because of their complexity compared to words. If we lower this complexity by cutting down some of the visual properties that aid in recall, we could observe if there still is any difference in false memories with words and images.

References

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