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THE EFFECTS OF SURVIVAL, PLEASANTNESS, AND STORYTELLING CONDITIONS ON TRUE AND FALSE MEMORY RECOLLECTION

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A thesis submitted to the faculty of The University of Mississippi in partial fulfillment of the requirements of the Sally McDonnell Barksdale Honors College.

Oxford

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ABSTRACT

The purpose of the present study was to analyze the extent to which various processing scenarios influenced participants' rates of true and false memory recollection. Participants were placed in one of three conditions, storytelling, survival, or pleasantness, and then studied a list of common nouns. They were then instructed to comment on the words in a specific manner depending on the condition to which they were randomly assigned. Following this, participants completed a math distractor task, and were then asked to complete a free recall test for the previously studied words. The results indicated that participants in the storytelling condition correctly recalled more studied words than participants in either the survival or pleasantness conditions. Further, it was found that participants across all three conditions had not statistically significantly different rates of false memory.

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BACKGROUND

False memories - either remembering an event that never occurred or having a distorted memory of events that did occur- have been an area of interest in the field of cognitive psychology for some time. These memories are often believed to be veridical by the individuals who experience them and can lead to situations in which participants are quite confident in the accuracy of inaccurate representations of the past. False memories vary markedly, in terms of real world implications ranging from situations in which participants remember a word not presented on a list, to cases of mistaken eye-witness testimony. However, regardless of their relative importance, understanding the cognitive mechanisms underlying such memories could go a long way towards understanding how these memories form and persist.

Sir Fredric Bartlett is often credited with initiating modern research on memory distortions through his classic research titled *Remembering* (Jenkins and Bartlett, 1935). Bartlett "pioneered the use of errors and distortions" creating tools for researching reconstructive aspects of memories (Schacter, 1999). Reexaminations of Bartlett's work resulted in revivals of interest in the topic of memory distortions in the 1970s and 1990s, which led to the term "false memories" becoming increasingly popular. (Schacter, 2010). The term stemmed from the idea that false memories were recollections that were either slightly or entirely distorted, depending on the extremity of the case under consideration.

False memories can be formed in a number of ways and many are believed to stem from an error in source memory. Source memory errors can occur when one confuses memories from one particular event with a second event and combines the two to create a memory that did not,

in reality, actually occur (Loftus & Pickrell, 1995). In cases in which source confusion leads to false memories, individuals simply confuse two events with one another, combine them together, and thus formulate an inaccurate representation of the past. Another source for false memories can be corroboration. In one popular example, the lost-in-a-shopping-mall study, Elizabeth Loftus attempted to convince people that they were once lost in a shopping mall as a child. By suggesting that participants had strayed from their families and also allowing family members to subsequently corroborate such suggestions, many participants began to believe that the memories were real, and even fabricated vivid and detailed stories recalling the events. Such studies demonstrated that it was quite easy to convince an individual that an event had, in fact, happened to them although in reality it had never transpired (Loftus & Pickrell, 1995).

Another example of the formation of false memories through corroboration is false memories being implanted in individuals during therapy sessions involving measures such as hypnosis and guided imagery. A popular example of this, also explored by Loftus, is the case of Nadean Cool, a nurse who sought psychiatric help as a result of a traumatic event that had happened to her daughter. Over the course of multiple therapy sessions using such techniques, her therapist gradually uncovered repressed memories, and in the process, implanted false and disturbing memories, including convincing Cool that she had been a part of a satanic cult and that she had witnessed her best friend's murder when she was eight years old. This type of malpractice has been found in many other cases due to the use of dubious techniques designed to uncover memories buried deep in the subconscious mind as a result of traumatic experiences (Loftus, 1997). Although Cool's case represents an extreme example, it represents another situation in which events that did not actually transpire were vividly recalled in excruciating

detail. In this instance, she did not simply confuse one event with another, instead, it was completely fabricated, yet believable and resulted in the creation of a false memory.

False memories are commonly explored in the laboratory using the Deese-Roediger-McDermott (DRM) paradigm, a paradigm known to induce false memories in adults and children. In Roediger and McDermott's study, Creating False Memories: Remembering Words not Presented in Lists, the two researchers created lists of semantically related words. After a delay or "buffer" task, participants were presented with a series of words and asked if they remembered the words from the original list. Researchers included a "critical lure", or a word that was not on the original list, but was strongly semantically related to those that were, in an attempt to study the formation of false memories. For example, participants may study words like "snow", "cold", "Christmas", and "December" and subsequently falsey recognize having seen the strong semantic associate "Winter". Typically, the critical word was recognized with high confidence (Roediger & McDermott, 1995). Other studies have found that this effect can be demonstrated over both short and long delays, furthering the idea that the DRM paradigm can produce false recollection (Pardilla-Delgado and Payne, 2017). Since the publication of Roediger and McDermott's paper, the DRM paradigm has been used in a number of studies to better understand how false memories form and under what circumstances they are most likely to occur.

For example, researchers have sought to determine whether certain categories of words result in higher or lower rates of false memories. One example of this is the concept of survival processing, which is the idea that words processed with respect to their survival value are often remembered better than other words (Parker, Dagnall & Abelson, 2018). The idea stems from a 2008 study in which it was found that when one processes information based on its relation to

Survival participants tend to have higher rates of retention for the information when compared to processing the information in other contexts (Nairne, Pan- deirada, Gregory, & Van Arsdall, 2009). In the study, participants were placed into one of two conditions: one processing for survival and the other for pleasantness. It was observed that those in the survival conditions correctly identified more words from their original lists than those in the pleasantness condition. Other studies demonstrate similar findings when using a "survival" and "moving" condition, in which the survival condition again performed better and correctly identified more words (Meyers et al., 2020). While these studies and many others with similar findings were important to understanding both survival processing and false memories, the studies themselves focused only on accuracy - or how many words participants correctly identified. In other words, these studies focused solely on errors of omission, meaning they recorded how many words participants correctly recalled, and did not focus on how many words participants falsely recalled, also known as errors of commission.

Later studies began to incorporate errors of commission, or false memories, into their research on survival processing using the DRM paradigm. Otgaar and Smeet's 2010 study sought to determine whether survival processing would increase true memory while also lowering both childrens' and adults' vulnerability to false memories. Researchers hypothesized that if natural selection in fact "tuned" memory to recall survival and fitness relevant information, then participants processing in terms of survival would have a higher rate of true recollection and a lower rate of false recollection than participants processing for categories such as pleasantness and moving (Otgaar & Smeets, 2010). Using the DRM paradigm, it was found, similar to previous studies, that participants in the survival condition had a higher rate of true recall, meaning that these participants correctly identified a higher rate of the words presented to them.

While higher true recall is a recurrent finding across numerous studies examining survival processing, Otgaar and Smeets' study concluded that survival processing also results in an increased rate of false recognition, meaning that, when presented with a word not on their original lists, participants were more likely to believe that the word had, in fact, been included on the list. Participants processing in terms of survival incorrectly identified words presented to them more often than participants in other processing conditions, a concept present in both adults and children. They concluded that survival processing increases both true and false recollection. Their explanation for this effect is that spreading of activation of studied items occurs throughout integrated networks and extends to non-presented, though related, items (Otgaar & Smeets, 2010).

Another study, also conducted in 2010, followed a similar but slightly more complex design and found similar results: participants in the survival processing condition had a higher rate of both true and false memories (Howe & Derbish, 2010). This study took the concept of survival processing further by using lists of both survival-related words and non-survival, emotionally negative words along with a list of neutral words. The researchers made use of two processing conditions: pleasantness and survival. Participants were assigned to a list type along with a processing condition, as they worked their way through the experiment. Participants in the survival processing condition overall had higher rates of both true and false memories, regardless of the type of word list that they encoded. The participants processing in terms of survival correctly identified more words, but also incorrectly identified more words than did participants in the pleasantness condition. When survival processing was combined with the survival-related words, this condition produced the lowest levels of overall net accuracy and the highest rate of false memories. Those who received survival-related words and attempted to process them in

terms of survival seemed to incorrectly recall more words than any other group, which was counter to the researchers' original hypothesis.

Several attempts have been made to explain why survival processing results in higher true recall, yet also produces more false recall. One idea is that survival processing elicits higher "richness-of-encoding", meaning that the more one encodes for survival, the easier it is to generate ideas that may be used as an advantage when it comes to recall (Röer, Bell, & Buchner, 2013). In other words, when participants are told to process words with respect to their relevance to survival, they place more importance on the words related to survival due to an evolutionary-based advantage that alerts humans to prioritize these survival related words. When presented with semantically related lures, participants automatically *want* to recognize the survival words due to relics from the ancestral past.

Similar to the concept of survival processing is the "chaining" or "story telling" method: a method in which researchers ask participants to create narrative stories using the words in a presented list. The idea is that the words on the lists should be put into a story, in the same order they are presented, using different levels of emotion and emphasis on the words, so that the participants can easily remember them (Bower & Clark, 1969). Bower and Clark explored the idea of storytelling in their study as they presented participants with a unique list and encouraged participants in one condition to create a narrative story whereas participants in another condition served as the control and simply studied the list in the absence of specific encoding instructions. They hypothesized that participants in the narrative condition would perform better in that they would have a significantly higher true recall rate. Upon completion of the recall test, it was found that participants in the narrative condition performed significantly better, recalling six to seven times more words than those in the control condition. This suggests that by generating

meaningful sentences in order to create a relationship between the presented words, participants were able to create a distinctive memory, allowing them to perform better and recall more words accurately. Researchers also noted that those in the narrative condition "rarely intruded non list words in their recall test", however, the concept of false memories or errors of commission were not a primary concern of their study. It was found that, overall, those in the narrative condition had the highest overall net accuracy with the highest rate of true recall and lowest rate of false recall, which differs from the previous discussion of survival processing.

Overall, these studies have all had similar hypotheses and similar results in their findings of what conditions have the possibility to heighten false recollections. While all have focused heavily on the rates of false recall produced by certain conditions, there remains a lack of research spanning all three conditions. There also is a lack of analyzing the amount of true memories produced, in which researchers study the amount of true recall in respect to the amount of false recall produced by the same condition and word list. While analyzing false recall is important for understanding these conditions and what may induce false memories, it is crucial to also analyze the amount of true recall in order to find the condition(s) in which our memory is most heightened. Future research should continue to analyze all conditions together while studying both true and false recall.

INTRODUCTION

This study aims to combine pleasantness, survival, and storytelling conditions in an effort to compare the said conditions in a singular study. The goal of this study is to examine which of the three conditions is the most effective by revealing which condition results in the highest rate of true recall and the lowest rate of false recall. Using a similar method to previously discussed studies, this study will utilize the DRM paradigm to analyze which of the three conditions yields the most effective rates of memory recollection. Due to data collected from previous research, it is suggested that this study should confirm previous findings that participants in the storytelling condition should provide the highest rates of net accuracy, meaning that they will yield the highest rate of true recall and the lowest rate of false recall. The expectation is that as conditions move from storytelling, to survival, to pleasantness, the overall net accuracy will decrease, meaning storytelling should perform the best and pleasantness should perform the worst. This hypothesis stems from the idea that in each condition, a different level of importance is placed on the words depending on how participants are asked to think about them. Because of this, it is hypothesized that the storytelling condition will outperform the remaining conditions and yield the highest overall net accuracy.

METHODS

Participants.

Participants consisted of 45 students from the University of Mississippi. Participants tested in a group setting, based on the condition they were placed in, in a classroom at the university. Each condition was tested separately, meaning participants were only being tested with students in their same condition. Participants consisted of both male and female individuals, who were recruited through classroom announcements pertaining to the study.

Materials.

Participants were presented with a list of 34 words (See appendix). The list contained three sub-lists, each containing between 10 and 13 words. The lists contained semantically related words (i.e. *candy, sugar, chocolate*) and each list had a critical lure word (i.e. *sugar*). Word lists were chosen from a study titled *Norms for word lists that create false memories* (Stadler, McDermott & Roediger, 1999). Words were chosen from the appendix of this study from the "chair", "doctor", and "sweet" lists. Each list had words semantically related to "chair", "doctor", and "sweet", with these three words serving as the critical lure (false memory) words for this study.

Design and procedure.

The study served as a between-subjects design with the condition being the independent variable. Participants were randomly assigned to one of three conditions: pleasantness (n = 15), survival (n

= 15), or storytelling (n = 15). Participants were then given a sheet of paper with the DRM list and read aloud directions depending on the condition they were in.

Pleasantness. "In this task, we are going to show you some words, and we would like you to list a few ways that each word is pleasant or unpleasant. If you don't feel that the word is pleasant or unpleasant, please be sure to state that in the space provided."

Survival. "In this task, we would like you to imagine that you are stranded in the grasslands of a foreign land, without any basic materials. Over the next few months, you'll need to find steady supplies of food and water and protect yourself from predators. We are going to show you some words, and we would like you to list a few ways that each word may help you to survive in this situation. If you don't feel that the word would be helpful, please be sure to state that in the space provided."

Storytelling. "In this task, we are going to show you some words and we would like you to write a short story using each of the words in the space provided below. Please cross out each word as you use it in your story."

Participants were then instructed to complete the task according to the instructions they had just heard. Participants wrote down all answers on the sheet provided to them directly next to the word lists. All participants received ten minutes to complete this task. There was no mention that there would later be a recall task. After finishing rating the words, participants were instructed to flip their page over. On the back of the page were a series of mathematical problems and participants were then instructed to complete as many problems as they could in 60 seconds. After the 60 seconds were completed, participants were told there would be a surprise free recall

task in which they had five minutes to recall as many words from the list as possible. Participants were told to write down as many words as they could remember from the list on the front of their page. If participants finished early, they were asked to continue attempting to recall words until the full five minutes were completed. Each session lasted approximately 16 minutes. Each sheet was then collected and received a score based on how many words were recalled. It counted how many words were truly recalled, how many were falsely recalled, and how many how many intrusion words were recalled. Intrusion words were any words that were neither words on the list nor words that served as the critical lure word.

RESULTS

An alpha level of .05 was adopted for all of the statistical analyses presented below. In the present experiment, participants used a word list that comprised strong semantic associates to create a story, list pleasant or unpleasant attributes about each word or listed how various words might help them to survive in a grasslands scenario. Following this, participants completed a math distractor task and then completed a free recall test for the studied words. There were three primary dependent variables in the study. Those were the proportion of words correctly recalled, the proportion of critical items (false memories) recalled, and the number of words that participants remembered that were neither presented on the list nor were critical items (intrusions).

A One-Way Analysis of Variance revealed that participants' recall rates differed as a function of the instructional condition to which they had been assigned, F(2,42) = 4.03, p < .05. Subsequent planned comparisons indicated that participants recalled more words correctly in the story condition (M = .78) than in the pleasantness condition (M = .63), t(28) = 3.39, p < .01. This result replicates the 'story processing effect' whereby asking participants to create a story using a list of words increases subsequent recall performance relative to other well-known deep-processing tasks. However, participants' recall rates in the story condition (M = .71), t(28) = 1.18, p > .05. Furthermore, participants' recall performance did not differ as a function of instructional condition between the survival group and the pleasantness group, t(28) = 1.49, p > .05. Thus, although story processing led to better memory than the other conditions, no other differences in recall performance were observed.

Similar results were obtained when analyzing the other dependent measures of interest. A One-Way ANOVA revealed that participants remembered not statistically significantly different numbers of critical items in all three conditions, F(2,42) = 2.18, p > .05. However, this result may have resulted from the unfortunately lower than planned number of participants per condition, as participants appeared to include more critical items in the story condition (M = .31) than in either the survival condition (M = .18) or the pleasantness condition (M = .16). Furthermore, participants did not appear to interject more intrusions into their responses as a function of instructional condition, F(2,42) = 0.09, p > .05. Thus, across all three conditions, it was relatively rare for participants to recall words, other than the critical items, that were to be presented on the original study lists.

DISCUSSION

Numerous previous studies have examined the three conditions (survival, pleasantness, and storytelling) individually, and how each condition produces either true recall or false recall. While most previous studies have had similar designs and hypotheses, there remained a lack in studying all the conditions together, while also analyzing both true and false recall. For this study, the intention was to analyze all three conditions and their ability to produce true and false recall. A set of instructions was presented to each participant, asking them to think of each word they were presented with based on the condition they were in. After completing the task, participants completed a buffer task and then participated in a surprise free recall test.

It was initially hypothesized that participants in the storytelling condition would perform best in terms of true call, meaning that the storytelling condition would have the highest rate of correct words recalled. Results from the study indicated that in fact, participants in the storytelling condition recalled more words correctly than those in the pleasantness condition. However, those in the storytelling condition and those in the survival condition had not statistically significantly different rates of true recall. This finding supports both the idea of the story telling, or chaining, effect as well as the concept of survival processing, as both of these conditions performed better than the pleasantness condition.

Further, it was hypothesized that the storytelling condition would also perform best in terms of false recall, meaning that this condition would produce the lowest rates of false memories, or in other words, remember the least amount of critical lure words. However, it was found that participants across all three conditions recorded a not statistically significantly different amount of critical lures. There was no one condition that performed significantly better

when studying the dependent variable of critical lure words, which contradicts most previous research that states

that survival processing results in a significantly heightened amount of false memories and storytelling results in a significantly lower amount of false memories. The same concept applied when studying intrusions, as there was not a significant difference between the three conditions.

Despite there being no significant difference, there appeared to be a slight trend of the story telling condition producing more false memories (M = .31) than in either the survival condition (M = .18) or the pleasantness condition (M = .16). This trend again contradicts previous studies that found that storytelling results in the least amount of false memories, and contradicts the original hypothesis of this study.

The low sample size of this study is a possible explanation for the trends discovered. The three conditions only contained fifteen participants each, which could explain the abnormal trends presented. In the future, it would be ideal to reach at least thirty participants in order to develop a study that could produce more statistically accurate results.

Another limitation that occurred was the number or words presented on the list for each participant. There were a total of thirty-four words on the list, which consisted of three sub lists. The first sub-list contained ten words, the second contained thirteen, and the third sub-list contained eleven words. The amount of total words presented, along with the unequal amount of words on the sub-lists, could be another limitation that created skewed results. In the future, it would be ideal to create a slightly shorter list. Additionally, if sub-lists are used, there should be an equal amount of words in each list in order to not place any additional emphasis on one list over another.

Overall, this study found similar results to multiple previous studies, yet also had some results that contradicted previous research. In the future, researchers should continue to study the idea of false memory formation through the DRM paradigm. When paired with varying conditions, the DRM paradigm has served as an excellent tool for studying what circumstances false memory is heightened in. It is important to note that studies should continue to analyze both true and false memory rates, and not choose just one concept to analyze for the study. Studying both allows researchers to fully understand accurate memory retention by finding conditions where true memory is heightened and false memory is lessened.

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TABLES AND FIGURES



True Recall Across Conditions

TABLES AND FIGURES



False Recall Across Conditions

Appendix

Word Lists Used for all Conditions

Taste	Nurse	Head
Candy	Lawyer	Table
Sugar	Medicine	Legs
Tooth	Hospital	Seat
Honey	Dentist	Couch
Soda	Physician	Desk
Chocolate	Stethoscope	Recliner
Heart	Surgeon	Sofa
Cake	Clinic	Wood
Pie	Cure	Cushion
Critical Lure: Sweet	Ache	Stool
	Fear	Critical Lure: Chair
	Stomach	
	Critical Lure: Doctor	