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When information is forgotten, sometimes a visual cue can act as a spark to cue your memory into remembering the lost facts. In this study, the task at hand is recalling as many of the 50 United States as possible. Twenty undergraduate students were randomly assigned into two groups, where the first group's task was free recall of the 50 states and the second group received a blank map of the states to test cued recall. This memory task may sound like an easy one but recalling the United States of America is tougher than participants imagined. However, there was no difference in the mean number of states recalled between the free recall condition and the cued recall condition.

Has anyone ever asked you to remember something that you learned years ago? When this happens, you may have the sharpest memory of anyone and just recite or write down the information that was requested or you may just frustrate yourself and wonder why you didn't retain that information during the learning process. Whether you learned the information yesterday or fifteen years ago, sometimes all you need is a hint and the information could come right back to you. One type of hint is a visual cue. Does cued recall yield better retrieval than free recall?

James Reffel (1997) conducted a similar research design. His research design consisted of three different settings of college students. In one study of 95 students, he used a repeated measures design. The participants first performed a free recall of the 50 United States. The second part of the experiment was cued recall of the 50 states given a

blank map and an answer sheet with 50 lines on it. He found that in the free recall task the mean number of states recalled was 41.4. Cued recall consisted of a blank United States map to perhaps spark some recall. In the cued condition, the mean number recalled was 31.8 states. Given these data, it appears that free recall is more accurate than cued recall. If you were not taught the direct relationship between the state maps and their names, you may have difficulty labeling a blank United States map and therefore the map may not serve as a positive cue for your recall of the states (Reffel, 1997).

An article by Sharps, Foster, Martin & Nunes (1999) discusses visual and spatial cues to recall certain items. In this particular study, age is a relevant factor, whereas in my study it is not. In this experiment young and older adults were asked to recall the location of sets of common objects placed on a table-sized context. The contexts were pf the same dimensions and structural layout but provided different levels of environmental support. A good point is made that the recall performance of older adults is shown to benefit more from visually distinctive cues to location than that of young adults. This shows that memory across the lifespan may be improved with help from visuospatial cues. If this theory were applied to my study then whoever learned the states according to the map at a younger age would be more likely to succeed in recall when given the map as a visual cue at a later age.

Images may help us in recall but a lot of verbal coding helps us with recall as well. Paivio's (1986) dual coding theory tells us about the importance of verbal and non-verbal processing. The theory assumes that there are two cognitive subsystems, one specialized for the representation and processing of nonverbal objects/events (i.e., imagery), and the other specialized for dealing with language. In stating this, we can say

that recall of auditory information, when presented in conjunction with imagery, is enhanced during immediate recall (Pinon, 1999). Pinon's (1999) experiment studies whether televised imagery could improve children's acquisition of visual-spatial geographic information. 50 second graders and 40 fourth and fifth graders watched a videotaped program on US geography. For half of the states shown, imagery was inclded to enhance elaboration and retrieval of the state shapes. The imagery aided in recall of the shapes of the states but not their locations. He did determine that overall learner who uses imagery has better recall than one who does not.

Webb and Saltz's (1994) study examined elementary students' ability to remember information when given iconic cues in addition to verbal stimuli. Fifth grade students studied maps of a fictitious island while listening to a related narrative. It was found that students remembered more text features and were more confident when cued by icons. The memory for feature information and pictorial retrieval cues appeared to activate memory for nonfeature info contained in the text.

Barker and Mcinerney (2002) researched the level of processing, deep and shallow, which is an important issue in recall tasks. 200 primary school students were randomly assigned into four groups: mastery focused condition, performance approach conditon, performance avoidance condition and control group. The participants were motivationally manipulated prior to receiving 12 stimulus words designed to be encoded at either shallow or deep levels. The students were then given a free recall test followed by a cued recall test. The results indicated that the cued recall test resulted in more words remembered over a free recall test. Performance approach and avoidance goals resulted in superior recall in both the free and cued recall tests.

In my study, it is unclear whether the participants are visual or auditory learners or even the method in which they were taught the 50 United States in school. The participants are undergraduate college students so the estimated length of time since their learning the states should be around seven or eight years. After considering all the background information, I have found some information that supports my hypothesis that participants who have a visual cue will recall more states with more accuracy. I have also found information that contradicts my hypothesis. I believe in my hypothesis because this is a simple experiment with only one independent variable and the task at hand involves information that was learned at an earlier time in the participants' lives.

Method

Participants

There were 20 participants involved in this study. The participants will be randomly assigned to one of two groups. One group will have a visual cue and the other will not.

Most of the participants were recruited from Lindenwood University's Human Subject Pool, which consists of students who are in psychology, sociology and anthropology classes. The remaining students were recruited from the McCleur residential dormitory on Lindenwood's campus. I was not interested in sex differences so both men and women were invited to participate.

Materials

The materials I used were simple. They consisted of a blank map of the United States of America and an answer sheet with fifty lines numbered one to fifty. For examples of materials, see Appendix A. The participants were provided with pens if they did not bring their own. In most cases, I used a small to medium sized classroom to

conduct the research. In the other cases, I used a quiet dorm room without noisy distractions and conducted one participant at a time.

Procedure

First, I had all the students sit and complete the consent form before beginning the experiment. I handed out the materials so they would all have the same amount of time. The first group of participants was given the answer sheet and was asked to recall the 50 United States. They were given fifteen minutes to complete this task. On another day, the second group of participants was given the answer sheet and a blank map of the United States. They were asked not to write on the map itself and to recall as many of the states as possible and write them on the answer sheet provided. This group was also given 15 minutes to complete the task.

This is a between-subjects design so it is uncertain whether the groups were equal to start with. I collected most of the data in the afternoon but because of scheduling there was some evening data collection, which may have contorted the data in some way. I can foresee two possible problems in this type of design and that is the knowledge of the participants. If the groups of participants that were given the maps did really well because they had the maps to trigger their memory, that would be good, unless the group without the maps performed poorly. These are individual differences that I can't predict or control. I cannot attempt to overcome the possible problem unless I gave everyone a pre-test that might have created demand characteristics.

Results

In order to test the hypothesis that cued recall would yield better retrieval than free recall, an independent t-test was conducted with the recall type (free or cued) as the

independent variable and the score as the dependent variable. The results revealed no statistically significant effect of type of recall on the participants' scores, $t(18) = -.179$, $p > .05$. The t-test showed that the presence of the map as a visual cue was not an asset when recalling the fifty states in the allotted time.

The mean number of states recalled in the free recall condition was 40.30 and 40.90 states were recalled in the visual cue condition. In the overall experiment, the minimum number of states recalled was 19 and the maximum, 50.

Discussion

Contrary to my prediction, cued recall was not more effective than free recall in remembering the 50 United States of America. The results were interesting to me after reviewing Reffel's (1997) study that was the most similar to mine. He reported that the overall recall of the 50 states was poorer than expected for college students. Reffel (1997) mentions that the recall for states in close proximity to a subject's current residence is better and that perhaps students live in a geographic bubble. If this is true, then it is not shocking.

An interesting and shocking aspect of my findings was the spelling errors of college students when recalling the 50 states. I understand forgetting a couple states, but I don't understand the spelling errors. The top five misspelled states were Connecticut, Massachusetts, Tennessee, Louisiana and Pennsylvania.

One thought I had after conducting this experiment was the possibility of international students that might participate in the study. Their schools most likely do not place emphasis on learning the 50 United States of America.

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