Psychology hl internal assessment

Science

| PsychologyInternal Assessment| An experiment on instruction of free recall and serial recall on memory. | Psychology Higher Level| Name: Vanessa BarthovaCandidate Number: 001457-004School: QSI International School of BratislavaDate of Submission: February 25th, 2013Word Count: 1, 997| | | The aim of this experiment was to investigate whether recall of words can be influenced by instructed form of free recall versus serial recall. Since recall for any given item depends upon the position of that item in the series, it was investigated if the type of recall has influence on the primacy and recency effects.

The hypothesis predicted that participants in the free recall condition will show a classic position curve with the recency effect taking place almost equally to the primacy effect, then when compared to participants in the serial anticipation condition where the primacy effect will be dominant. This was based on previous research by Deese (1957), which demonstrated that it is possible to alter the form of the serial position curve by instructions as to the method of recall. The DV was number of words recalled and the IV was the fact whether free recall or serial-order recall was instructed.

The repeated measures design was chosen. An opportunity sample of 36 participants (N= 36) participated. 3 lists of 20 common English words were read out to participants in the control group, all of the lists were instructed for free recall before and after reading of the list. 3 lists of 20 common English words were read out to participants in the experimental group. In the first list free recall was called on for both before the reading of the list and after. In the second list, free recall was called on before the reading, and serial recall was instructed after the hearing of the list.

In the third list, serial recall was called on for both before the reading of the list and after The T-test showed the results of the list were significant at a 5% level of significance, so the research hypothesis that type of instruction affects recall was accepted. Word count: 304 Introduction Cognitive psychology deals with mental processes such as memory. Memory has been studied by psychologists since Atkinson and Shiffrin proposed theory of the multistore model of memory (MSM), which breaks-up memory into different categories.

Information is received by sensory stores, and some is passed to short-term memory stores (STS), which can then be passed to long-term memory stores (LTS). Attention is the control process responsible for transfer of information from sensory store to STS. This is supported by many studies that involve serial position effect, showing that when participants are presented with lists of words, they remember first few and last few words and are more likely to forget those in middle.

A study, conducted by Murdock (1962) investigates the relationship between serial position effect, position of words on given list, and participant' s ability to freely recall them. Murdock suggested that early words were put into long-term memory (primacy effect) because subject had time to rehearse words, and words from the end went into short term memory (recency effect). Words in middle had been there too long to be held in STS, due to displacement, and not long enough to be put into LTS, hence they're forgotten. Glanzer and Cunits (1966) conducted an experiment introducing the variable of immediate versus delayed recall.

They studied separate output of STS, since they introduced a variable, delayed start of recall, which had a different effect on long-term and short-term storage, and therefore changed the beginning and end of the serial position curve. Studies of the position curve and memory show that a delay of thirty seconds (being the time hypothesized that short-term memory lasts for) did not affect the primacy effect which was clearly present, but drastically lowered the amount of words of the recency effect. Deese (1957) focuses on serial organization of words.

The study showed probability of recall depended upon position of item in the series. It focused on a new variable, free recall versus serial anticipation, where subject not only had to remember words, but also in correct order. Serial anticipation changes the serial position effect, since when serial anticipation is compared to free recall, it can be noted that the curves are roughly mirror images of one another. The researchers divided their subjects into two groups, those who would freely recall words, and those who would be instructed to recall words in the order they were presented.

Findings show that although the total amount of words recalled was close to identical, there was a change in the serial position curve. In this case, early items have the highest probability of recall (not last), last items second highest (not first), and middle items least. This is due to the fact that when having to remember the words in order, long term stores would be most accurate as those words were most repeated in order. The above findings are important since they gave cognitive researchers an insight into memory processes, and support the multi-store model theory.

They show that we remember the beginning, because it is stored in long-term stores, and end, when the short-term storage is not interrupted, but least frequently middle words, as hypothesized by the serial position curve and the primacy and recency effects. This experiment is a replication of Deese (1957). It uses the distinction of free recall and serial anticipation, to affect the serial position curve and focus on LTS primarily. Aim: investigate effect of the recall of words in free recall, and recall by serial anticipation, and the effect it has on LTS and STS in relation to the serial position curve.

Experimental hypothesis (H1): Participants in free recall condition will show a classic position curve with the recency effect taking place almost equally to the primacy effect, and then when compared to participants in the serial anticipation condition where the primacy effect will be dominant. (Free recall: words recalled in any order. Serial recall: words recalled in order they were presented.) Null hypothesis (H0): There will be no significant difference between recall of words when compared in free recall and serial anticipation situations, or any difference will be due to chance. Method Design:

Independent measures design was chosen to eliminate order effect, and to prevent boredom, tiredness, or improvement of skills with performance. Independent variable was used in the same sense, but with slight variation in the form of recall. If the same participants were used, they would know what to learn in the first part, and that would affect the second part of the experiment. One possible disadvantage of this design is that there may be participant variability. For example, participants may vary in memory ability, so the differences between groups may be due to this and not simply to the manipulation of the IV.

To avoid participant variability, participants were given two practice lists to memorize, and the mean in these two lists was within two standard deviations, suggesting that the participants had similar memory capacity. Another disadvantage would be participant sabotaging the study, or becoming distracted. This was prevented by eliminating empty lists submitted by participants from results, hanging a sign so that people would not enter the testing classroom, and asking anyone distractive to leave. Ethical considerations were followed, as each participant was briefed before the experiment, and debriefed after it.

It was clear that at any time participants had the right to withdraw from the experiment and their anonymity would be protected. Participants were not harmed physically or psychologically, and all signed informed consent form. Independent variable: Whether free recall or serial order recall was instructed. (Free recall: words recalled in any order. Serial recall: words recalled in order they were presented.) Dependent variable: Amount of words recalled. (Frequency of words recalled.) Participants: Opportunity sampling was used because this was the most convenient and saved time.

The target population was IB students at QSI Bratislava with fluency in English. Participants were asked, and those who accepted met in the classroom. The participants were required to have specific English abilities because the experiment was conducted in English. In total, for the experiment we had 11 boys and 25 girls (N= 36). Materials: * Consent forms * Standardized briefing and debriefing instructions * 8 lists of 20 different words * Answer sheets * Stopwatch Procedure: Before experiments began, 8

different lists of 20 words were randomly created from a list of 1, 000 common English language words.

First group of participants (N= 18), brought to a quiet classroom, each seated at a desk. Standardized briefing was read out loud, and informed consent was given. Answer sheets were placed face-down on each desk. 1. Subjects were required to recall two practice lists, given with standardized instructions. They were instructed free recall. Each list was read by experimenter at the rate of one word per two seconds, without emphasis, and recall was required immediately after the reading. 2. Participants were divided into control and experimental groups randomly. One group was tested at a time. . Control group was given 3 lists with the same instructions as those for practice lists. After finishing the lists, groups switched locations. 4. Experimental group had the following sequence of instructions: * First list: instructions were same as for practice list. (Free recall is called on for both before reading of the list and after.) * Second list: instructions before the list were for free recall, and instructions for recall in serial-order were instructed after hearing. * Third list: instructions were to recall in serial-order were given before and after reading list. . All lists were collected, and both groups were read standardized debriefing together. Second group of participants (N= 18) was tested, and same procedure was followed. Results Descriptive: The experiment collected interval ratio data. Therefore, mean and standard deviation were chosen as descriptive statistics. As this study has a focus on the amount of words recalled in different stages of the list, words were classified under four headings: " Beginning" (words 1-6), " Middle" (words 7-

14), and " End" (words 15-20), along with " Total" as summary, for comparison and analysis.

From Table 1. it can be deduced that when free recall was instructed and used, participants received similar results over-all (average of 8. 25 and 8. 75 words), although the results were not dispersed close to the mean. With standard deviations (SD) being differing and high (3. 31 and 5. 42), this suggests primacy and recency effect. From Table 2. it can be deduced that when participants were expecting to perform free recall, but were instructed serial recall, the performance over-all significantly dropped (averages of 7. 65 compared to 3. 95).

Furthermore more words were remembered in the situation of serial recall in beginning, since they were stored in LTS, and therefore their position could be better recalled, suggesting the primacy effect (7. 17 compared to 3. 67). From measures on table 3. it can be deduced that primacy effect is dominant in serial recall, as the mean of words in beginning (9. 00), dropped down in the end words (4. 38). Table 1: Mean recall and Standard deviation of words in A1 and B1 lists (free recall in both). | Beginning words 6 possible words (1-6)| Middle words8 possible words (7-14)| End words6 possible words 15-20)| Total words20 possible words (1-20)| | A1| B1| A1| B1| A1| B1| A1| B1| Mean| 10. 00| 9. 33| 7. 50| 5. 25| 7. 50| 11. 00| 8. 25| 8. 75| SD| 3. 58| 5. 89| 2. 78| 2. 12| 3. 56| 2. 45| 3. 31| 5. 42| N| 18| 18| 18| 18| 18| 18| 18| 18| Table 2: Mean recall and Standard deviation of words in A2 and B2 lists (free recall in A2 list, serial recall asked in B2 list after memorization process). | Beginning words 6 possible words (1-6)| Middle words8 possible words (7-14)| End

words6 possible words (15-20| Total words20 possible words (1-20)| | A2| B2| A2| B2| A2| B2| A2| B2|

Mean| 11. 50| 7. 17| 5. 00| 2. 25| 7. 33| 3. 67| 7. 65| 3. 95| SD| 1. 22| 2. 23| 2. 62| 1. 67| 3. 01| 4. 32| 3. 60| 3. 39| N| 18| 18| 18| 18| 18| 18| 18| 18| Table 3: Mean recall and Standard deviation of words in A3 and B3 lists (free recall in A3 list, serial recall in B3). | Beginning words6 possible words (1-6) | Middle words8 possible words (7-14)| End words6 possible words (15-20| Total words20 possible words (1-20)| | A3| B3| A3| B3| A3| B3| A3| B3| Mean| 9. 33| 9. 00| 7. 38| 1. 00| 10. 00| 4. 38| 9. 10| 4. 55| SD| 4. 08| 6. 26| 3. 16| 0. 93| 1. 90| 5. 15| 3. 18| 5. 0| N| 18| 18| 18| 18| 18| 18| 18| 18| Inferential: T-test was chosen since the experiment tested difference between frequency of words remembered between various lists, and the way they were stored (by observing the primacy and recency effect), with the comparison of control lists to experimental. T-test was chosen because it is more powerful, and shows whether they have significant differences. Advantages are that it works well with two means—its good for ratio data, such as in this experiment. Disadvantage is that results are assumed to come from a normally distributed population.

This test is good to use when the population mean and standard deviation are unknown, and 2 separate groups are being compared, that is why it was chosen over other tests. Table 4. This table presents a comparison between the first and last 6 words of each experimental list, comparing the significance of primacy and recency effect on recall. List:| Primacy (average # of words recalled)| Recency (average # of words recalled)| Significance? | B1| 9. 33| 11. 00| The two-tailed P value = 0. 5003 This difference is

considered to be not statistically significant| B2| 7. 17| 3. 67| The two-tailed P value = 0. 542 This difference is considered to be not quite statistically significant. | B3| 9. 00| 4. 38| The two-tailed P value = 0. 0805 This difference is considered to be not quite statistically significant. | Table 5. This table statistically states the p value of comparisons between different sections of control tests to experimental tests. Comparing lists| First words | Middle words| Last words| Over-all| A1 vs. B1| P value = 0. 8174 This difference is considered to be not statistically significant. | P value = 0. 0901This difference is considered to be not quite statistically significant. P value = 0. 0756This difference is considered to be not quite statistically significant| P value = 0. 7266This difference is considered to be not statistically significant. | A2 vs. B2| P value = 0. 0019 This difference is considered to be very statistically significant. | P value = 0. 0252 This difference is considered to be statistically significant. | P value = 0. 1189 This difference is considered to be not statistically significant. | P value = 0. 0021 This difference is considered to be very statistically significant. | A3 vs. B3| P value = 0. 9152

This difference is considered to be not statistically significant. | P value is less than 0. 0001 This difference is considered to be extremely statistically significant. | P value = 0. 0439 This difference is considered to be statistically significant| P value = 0. 0024 This difference is considered to be very statistically significant. | Lists of A1 and B1 (both free recall), had P-value of . 7266, so the difference is not statistically significant. A2 and B2 lists (control both free-recall versus instructions before the list were for free recall, and after list instruction for serial-order), had P-value of . 021, so the difference is

statistically significant. A3 and B3 lists (control free recall versus serial recall), had P-value of . 0023, meaning difference is statistically significant. The difference between free recall and serial recall list had a value lower than the significance chosen of P= 0. 05, we rejected the null hypothesis and accepted the experimental hypothesis. Graph 1. This graph maps out all the 6 lists (3 control and 3 experimental), in order to visually represent the primacy and recency effects of each list. Discussion

This experiment observed relationship between frequency of recall per item and order of emission in immediate recall. Previous research has shown that as sequence is introduced into material to be recalled by free recall, serial position curve changes from free recall of disconnected items to recall by serial anticipation. This suggests that its possible to alter the form of serial position curve by method of recall. For the experimental lists, Deese (1957) had averages of 3. 69 in second list, and 4. 33 in third, similar to this experiment, performance in first list was highest, as it was in free recall.

Performance in second list was worst, as it was unexpected serial recall. In third list serial recall was expected, hence it was higher than second list, but lower than first, as free recall is more efficient than serial, confirmed by previous research. In this experiment when participants recalled lists using free recall, similar amount of words was recalled (8. 25 and 8. 75), implying the two groups are comparable. Second experimental list showed significantly decreased performance (7. 65 and 3. 95), the P-value being 0. 0021 with 5% significance.

This could be due to unexpected instruction of serial recall. Third experimental list suggests loss in total number of items recalled with

anticipated serial order, compared to free recall (9. 10 and 4. 55). However, primacy effect is dominant to recency effect (9. 00 to 4. 48), with P-value 0. 0439, suggesting change of position curve from that characteristic of free recall to that of serial anticipation. It seems reasonable to conclude that form of serial position curve in free recall is dependent on order of emission of items in recall.

If recall is completely unstructured (free recall), items are recalled in order of strength, and last items, on average, are recalled first, as suggested Murdock 1962. This experiment further supports that if serial recall is induced, items are recalled in order and the first items are most frequently recalled, supporting the experimental hypothesis. The results of this study support the findings of Deese 1957, confirming correlation between frequency of recall per item, list position and position in recall found in previous experiments.

Results are consistent with findings of Deese as it can be noted that the primacy effect is dominant in the serial recall compared to the free-recall conditions. It also supports the multi-store memory model of Atkinson & Schiffrin because it can be seen that the memory is composed of long-term and short-term stores, due to a significant difference between the amount of words recalled from the beginning, middle, and end of the list. One limitation is that most participants were IB-diploma students so they were probably trained in remembering terms.

Additionally, generalization could be a problem because of the participant's age range of 16-19 years compared to the original experiment with the age range of 18-54 years. The similar average in free recall lists of both

conditions (8. 25 and 8. 75) indicates that participants performed relatively similar. This may be because students were similar in age and were all IB students. An improvement in a future experiment is to use a larger age range such as Deese 1957. Also the fact that most participants were not native in English language could affect results.

Furthermore although independent measure was chosen, participants did not have same lists, which might have had an effect on the participants' ability to memorize the words. It can be noted that means of the free-recall conditions are differed, which indicates that participants remembered some lists better than the others. A modification could be that the control and experimental group would get the same word lists in order to make the comparison more reliable. Although all participants were not tested at same time, all procedures were followed for both groups, so that they would have comparable results.

Lastly, artificiality is a problem because of the experimental method. However, seeing as the experiment was conducted in a classroom, this can be considered a naturalenvironment. Researchers are discussing to what extent results on memory like these can be relied on. One modification is to use words the sample is familiar with such as party, and cell-phone, instead of horse and person. Nonetheless, replications of the study by Deese (1957) have demonstrated the clear effect of using concrete words on recall, and thus we can rely on these results.

In conclusion, the results attained in this experiment are consistent with cognitive theories about memory processes such as MSM, and the primacy and recency effects. Therefore this experiment concluded that words using

free recall are better recalled than of serial recall. This is probably due to us having access to both long-term and short term memory. In serial order, one mainly knows the position of words stored in long-term memory. However, the researchers did not study whether people would perform better if they could not easily associate with the words, nor strategies used in memorization.

This is a possible topic for further research. References Atkinson, R. C. ; Shiffrin, R. M. (1968). Chapter: Human memory: A proposed system and its control processes. The psychology of learning andmotivation(Volume 2). New York: AcademicPress. pp. 89–195. Murdock B. The Serial position effect of free recall. Journal of Experimental Psychology 1962, Vol. 64, No. 5, 482-488. Glanzer M. and Cunitz A. Two storage mechanisms in free recall. Journal of verbal learning And verbal behavior (Volume 5). 351- 360. 1966 Deese, J. Serial Organization in the recall of disconnected items. Psychological reports. 957, 3, 577-582. Southern Universities Press. Appendices Appendix 1. Informed consent: Informed Consent Form IB Psychology Experiments I give my consent to participate in the IB Psychology experiment about memory run by Vanessa Barthova and Katarina Hlavata on December 13, 2012. I have been informed about the nature of the experiment. I understand that my participation is voluntary. I may withdraw from the study at any time and request that my data not be used in the experimental results. I have the right to a debriefing about the general results of the study and I may obtain my individual results upon request.

I give my consent knowing that all aspects of my participation will remain confidential and that I will not be subjected to any harm or deception. I

understand that the experiment has potential benefits. The aim of all IB Psychology experiments is to improve cognitive processing skills in areas such as memory, perception, problem-solving, and attention. _____ _____ Student Name Date Appendix 2. Standardized briefing: Welcome everyone! Thank you for allowing time to participate in this experiment on memory.

The other researcher will distribute an informed consent form that we will ask you to sign your agreement. If at any time you should change your mind do know that you are entitled to withdraw from this experiment. Please listen carefully and do not talk to any of the other participants. Furthermore, do not look at any papers on the table until instructed to do so. You will then be read 2 practice lists of words, and 3 additional lists of words, that you are to memorize hen you will be asked to write down all the words you recall on the paper in front of you.

Turn the paper over when instructed to. If you have any questions you are more than welcome to ask one of the researchers. Standardized debriefing: The aim of this experiment was to investigate if the type of recall had effect on the words recalled, as seen through their position in the list. Group A was the control group, which had free recall after all the lists, meaning that they just wrote down all the words remembered, in any order. Group B on the other hand, had instructed serial recall on two lists, meaning that they had to try to recall the words in the order that they were read.

Previous research has shown that in free recall, you have the highest ability to memorize the first and last words of the list. The first words are repeated by you when you try to memorize them, so they are stored in your long term

memory. The last words were just recently heard, so you have them stored in short term memory, for easy recall. When serial recall is instructed, mostly the words remembered correctly are the first words, because they were stored in long term stores, most likely in order, due to memorization through repetition.

If you wish to know the full results of the experiment or have any further questions you are more than welcome to leave your e-mail. Thank you once again for your participation. Appendix 3. Lists of words: Practice 1: (aka #1) 1. bus 2. reply 3. love 4. person 5. eight 6. sentence 7. need 8. old 9. cat 10. sleep 11. brother 12. newspaper 13. snow14. sharp 15. water 16. apple 17. box 18. grass 19. lady 20. king Practice 2: (aka #2) 1. Kitchen 2. Juice 3. Potato 4. Monkey 5. Moon 6. Window 7. Village 8. Children 9. Horse 10. Mouse 11. Friend 12. Read 13. Weather 14. Train 15. City 16. Eye 7. Bone 18. Picture 19. Wild 20. Joy Control 1: (aka A1) 1. Cook 2. Home 3. Heavy 4. Prison 5. Evening 6. Ocean 7. Star 8. Wash 9. Heart 10. Dance 11. Alone 12. Knock 13. Never 14. Pink 15. Story 16. Today 17. Wheel 18. Leg 19. Sand 20. Color Control 2: (aka A2) 1. Even 2. Die 3. Cup 4. Hat 5. Milk 6. Orange 7. Piano 8. Needle 9. Job 10. Gun 11. Fish 12. Hall 13. Basket 14. Ask 15. Circle 16. Tree 17. News 18. Mud 19. Knee 20. Sport Control 3: (aka A3) 1. Toe 2. Work 3. Young 4. Gum 5. Shop 6. Pillow 7. Sky 8. Hotel 9. King 10. Listen 11. Heaven 12. Open 13. Nature 14. Cheese 15. Enemy 16.

Computer 17. Brown 18. Forest 19. Air 20. Corn Experimental 1: (aka B1) 1. Jelly 2. Face 3. Good 4. Active 5. Clean 6. Heart 7. Iron 8. Shell 9. Rice 10. Pull 11. Nose 12. Map 13. Office 14. Ring 15. Uncle 16. Yard 17. Zoo 18. Room 19. Pink 20. Old Experimental 2: (aka B2) 1. Rich 2. Rent 3. City 4. Eye

5. Cat 6. Open 7. Now 8. Left 9. Ice 10. Head 11. Gold 12. Female 13. Dish 14. Bird 15. Clock 16. Ear 17. Duck 18. Hurt 19. Life 20. Leaf Experimental 3: (aka B3) 1. Music2. Police 3. Shirt 4. Army 5. Copper 6. Hungry 7. Nature 8. Power 9. Red 10. Tooth 11. Glass 12. Bridge 13. Dream 14. Fox 5. Nose 16. Machine 17. Rock 18. Smile 19. Work 20. Brother Appendix 4. Answer sheets, cut into strips of separate lists. # 1 #2 A 1 A 2 A 3 B 1 B 2 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. B 3 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. Appendix 5. Scrip for experiment / Standardized Instructions: Instructions: # 1 * " Do not write anything down, nor turn the paper placed on your desk around until you are told to do so. I am going to read to you a list of words. You are to listen very carefully and remember as many words as possible. (5 sec pass) * Read list * (5 sec pass) " Now write down all the words that you can remember from the list I have just read on the paper in front of you. You have a minute and a half. " # 2 * " Again, do not write anything down, nor turn the paper placed on your desk around until you are told to do so. I am going to read to you another list of words. You are to listen to this list very carefully and remember as many words as possible. " (5 sec pass) * Read list * (5 sec pass) " Now write down all the words that you can remember from the list I have just read on the paper in front of you.

You have a minute and a half. " DIVIDE GROUPS: " Now we are going to separate into two groups. A and B. I will draw the names of members in each group randomly from a hat. Group A: _____. Group B: _____. (Record names on board) GROUP B, please exit the room and wait in the UR room and do not go anywhere else. We will come get you in a few minutes. A 1 * "

Do not write anything down, nor turn the paper placed on your desk around until you are told to do so. I am going to read to you a list of words. You are to listen very carefully and remember as many words as possible. " (5 sec pass) * Read list (5 sec pass) " Now write down all the words that you can remember from the list I have just read on the paper in front of you. You have a minute and a half. " A 2 * " Again, do not write anything down, nor turn the paper placed on your desk around until you are told to do so. I am going to read to you another list of words. You are to listen to this list very carefully and remember as many words as possible. " (5 sec pass) * Read list * (5 sec pass) " Now write down all the words that you can remember from the list I have just read on the paper in front of you. You have a minute and a half. A 3 * " Again, do not write anything down, nor turn the paper placed on your desk around until you are told to do so. I am going to read to you another list of words. You are to listen to this list very carefully and remember as many words as possible. " (5 sec pass) * Read list * (5 sec pass) " Now write down all the words that you can remember from the list I have just read on the paper in front of you. You have a minute and a half. " THANK YOU GROUP A, THAT IS ALL. PLEASE EXIT THIS ROOM AND WAIT IN THE UR. WELCOME GROUP B, DO WE HAVE EVERYBODY? (check list on board) LET US BEGIN. B 1 " Do not write anything down, nor turn the paper placed on your desk around until you are told to do so. I am going to read to you a list of words. You are to listen very carefully and remember as many words as possible. " (5 sec pass) * Read list * (5 sec pass) " Now write down all the words that you can remember from the list I have just read on the paper in front of you. You have a minute and a half. " B 2 * " I am going to read you another list of words. Again, you are to listen to this list very

carefully and remember as many words as possible. Do not write anything down nor turn your paper around until you are told to do so. (5 sec) * After the list was read * (5 sec) " This time I want you to try to remember the words exactly in the order in which I read them on the paper in front of you. You may turn it around. You have a minute and half. " B 3 * " I am going to read you another list of words. Listen very carefully and remember as many words as possible, in the order that they are presented. Do not write anything down until you are told to do so. " (5 sec) * Read list * (5 sec.) " Write down the words exactly in the order in which I read them. You have a minute and half. " GET GROUP A AND DEBREAF. Appendix 6. Raw Data:

These tables summarize the position in the list of a words, and frequency recalled. Practice lists: Practice #1| | | Practice #2| | | Word #| Frequency| | Word #| Frequency| | 1| 32| | 1| 31| | 2| 24| | 2| 25| | 3| 29| | 3| 21| | 4| 14| | 4| 19| | 5| 15| | 5| 17| | 6| 14| | 6| 17| | 7| 13| | 7| 18| | 8| 16| | 8| 15| | 9| 20| | 9| 17| | 10| 8| | 10| 18| | 11| 14| | 11| 12| | 12| 12| | 12| 6| | 13| 16| | 13| 12| | 14| 13| | 14| 7| | 15| 9| | 15| 13| | 16| 13| | 16| 13| | 17| 9| | 17| 12| | 18| 8| | 18| 14| | 19| 21| | 19| 13| | 20| 13| | 20| 20| | Total participants| 36| | Total participants| 36| | Control lists: A1 | | | A2| | | A3| |

Word # | Frequency| | Word #| Frequency| | Word #| Frequency| 1| 17| | 1| 13| | 1| 13| 2| 10| | 2| 11| | 2| 14| 3| 9| | 3| 13| | 3| 12| 4| 8| | 4| 11| | 4| 6| 5| 7| | 5| 10| | 5| 6| 6| 9| | 6| 11| | 6| 5| 7| 11| | 7| 5| | 7| 11| 8| 4| | 8| 8| | 8| 5| 9| 5| | 9| 5| | 9| 10| 10| 8| | 10| 6| | 10| 7| 11| 12| | 11| 3| | 11| 12| 12| 6| | 12| 0| | 12| 4| 13| 7| | 13| 8| | 13| 5| 14| 7| | 14| 5| | 14| 5| 15| 3| | 15| 7| | 15| 9| 16| 5| | 16| 5| | 16| 7| 17| 5| | 17| 6| | 17| 10| 18| 10| | 18| 5| | 18| 12| 19| 11| |

19| 8| | 19| 10| 20| 11| | 20| 13| | 20| 12| Total participants| 18| | Total participants| 18| | Total participants| 18|

Experimental Lists: B1| | | B2| | | B3| | Word #| Frequency| | Word #| Frequency| | Word #| Frequency| 1| 18| | 1| 11| | 1| 16| 2| 15| | 2| 5| | 2| 17| 3| 8| | 3| 8| | 3| 8| 4| 7| | 4| 7| | 4| 6| 5| 5| | 5| 7| | 5| 6| 6| 3| | 6| 5| | 6| 1| 7| 8| | 7| 1| | 7| 1| 8| 3| | 8| 2| | 8| 1| 9| 3| | 9| 2| | 9| 1| 10| 4| | 10| 1| | 10| 0| 11| 5| | 11| 3| | 11| 0| 12| 7| | 12| 6| | 12| 1| 13| 8| | 13| 1| | 13| 1| 14| 4| | 14| 2| | 14| 3| 15| 13| | 15| 1| | 15| 2| 16| 7| | 16| 0| | 16| 0| 17| 13| | 17| 3| | 17| 1| 18| 9| | 18| 0| | 18| 6| 19| 13| | 19| 10| | 19| 6| 20| 12| | 20| 8| | 20| 14|

Total participants| 18| | Total participants| 18| | Total participants| 18| Appendix 7: Graphs of serial position curves, for each control and experimental list. A1 list B1 list In this comparison, we can notice that both the primacy and recency effects are present. These two groups were the same in the fact that both were instructed free recall, and only difference between them was the participants and the words they had to memorize. As we can notice, the lines are not exactly the same, as natural variations occur, but according to the Student T-Test these two groups are not statistically different, so the difference is by chance.

However, we still see the fall in number of words recalled in the middle (words 6-14), which had on average 2 words recalled (out of 8), while the first had around 5 (out of 6) , and the last around 4 (out of 6). A2 list B2 list A2 list is the control for B2, where in the A2 free recall was instructed, while the B2 had implied free recall before the list was read, and then instructed serial recall. This list (B2), had a predicted drop in frequency of words

memorized, as the participants did not expect to memorize in order, so over-all panic lead to overall performance loss.

As we can see, the total average recall in A2 list of 8 words, dropped down to 3 in the B2 list. However, although of the poor preset, we can see that the primacy effect is starting to be much stronger (average of 7 words compared to 4), whereas in the control. A3 list B3 list These two graphs differ in the fact that in the A3 list, free recall was instructed, whereas in the B3 list serial recall was instructed. Noticeably there is a drop in the frequency of middle words remembered, from an average of 7 words remembered (out of 8) in the control A3 list, to only 1 word remembered in B3, with serial recall.

Appendix 8: The mean, standard deviation and the P-value was used by performing a T-test on this website: http://www. graphpad. com/quickcalcs/ttest1. cfm --- [1]. In Atkinson and Shiffrin 1968 [2]. In Murdock 1962 [3]. In Glanzer and Cunits 1966 [4]. In Deese 1957 [5]. In Deese [6]. See Appendix 2 [7]. See Appendix 2 [8]. See Appendix 1 [9]. See Appendix 3 [10]. See Appendix 4 [11]. See Appendix 5 [12]. See Appendix 5 [13]. See Appendix 2