*The Zeigarnik Effect and Memory*

An Experimental Investigation of the Zeigarnik Effect

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Word count: 2,199

Introduction:

 The aim of our investigation is to test the effectiveness of the Zeigarnik Effect and to observe whether or not interruptions significantly affected one’s ability to better recall information. In testing this theory, not only did we as researchers want to see if we could accurately replicate Zeigarnik’s results, but also determine if it can be applied to daily routines. The Zeigarnik Effect was coined by Bulma Zeigarnik, who developed her findings while conducting research for her mentor, Kurt Lewin, whose initial observations reported that tasks left uncompleted were better recalled than those left completed. Conducting further research, Zeigarnik added a secondary variable: during half of the given tasks, she purposefully interrupted the subjects and did not allow them to continue work. Not only did she obtain results that supported Lewin’s theory, but she also found that after the examination, the best recalled tasks were indeed the ones that were interrupted (Schiffman et al., 1992). Replicating Zeigarnik’s findings would be especially valuable to the psychology community because if the relationship between recollection and interruption appears to be significant, interruptions can be used as a method of improving the retention of information, which can be applied to a range of applications, from improving study habits to specified fields of work.

 The study that we will be replicating is the secondary experiment of *Memory for Incomplete Tasks: A Re-examination of the Zeigarnik Effect* (Seifert & Patalano, 1991). Their aim was to observe memory recall of tasks based on their completion and the application of interruptions, time, and the size of the problem sets. Specifically, in the secondary experiment time remained constant when interruptions were applied. Thirty-four females and thirty-five males were given thirty pre-tested mathematical, logical and spatial reasoning questions that took approximately 30 seconds- 2 minutes to complete. Each problem, randomized, was presented on a singular sheet of paper and compiled into a workbook with room to solve under each question. Each testing group contained 10-20 subjects, each session lasted one hour, and each question was to be completed in one minute (the interruption being when time was called). They were asked to complete the questions to the best of their abilities and only circle their responses if they believed them to be accurate. If a response had not been developed, they were still required to move on at the end of time. As soon as the last question was completed, they were given 3 minutes to complete a free recall where they were asked to write down as much as they remembered about each question, so that the problem was significantly identifiable by another person. The results of the free recall responses showed that “subjects recalled a mean of .45 incomplete problems, with proportions ranging from 0 to 1” (Seifert & Patalano, 1991). Completed problems ranging from 0-1 had a mean of .33, showing that the difference had statistical significance, “t(68) =3.66”. They had successfully replicated the Zeigarnik Effect, supporting the premise that incomplete problems are better recalled. In our replicated experiment, to control for any bias that we as researchers may have, free recall will be determined by whether or not the subject correctly identifies a significant word from the prescribed titles initially given to each question.

Null Hypothesis: If subjects are given a series of problems to solve and are interrupted at a set time unbeknownst to them, then there will be no correlation between one’s ability to recall the prescribed title (DV) whether or not they were interrupted (IV).

Research Hypothesis: If subjects given a series of problems to solve are interrupted at a set time unbeknownst to them, they’re more likely to recall the title of the problem (DV) in which they were interrupted (IV) in comparison to a control group where time to complete each problem is not restricted.

Exploration:

 In assessing how to conduct this experiment, we evaluated that the structure needed to consist of independent measures because our experiment design required a control group that received ten minutes to complete the problem set with no interruptions and an experimental group that required interruptions every 30 seconds. The type of sampling that was used was convenience sampling because as high school students we didn’t have the resources to access a larger sample to choose from, just those who were able to volunteer; therefore, our target population was high school students that were willing to volunteer. We attempted to keep the numbers in our control and experimental as similar as we could. Subjects were 14-18 year-old male and female teen students from the same region.

 To allow for our experiment to run as successful as possible, we deliberately took precautionary measures to eliminate extraneous variables. For example, we conducted our control group experiment first so that when we brought in our experimental group, they would not expect the incoming interruptions. In addition to this, both the control and experimental group received the same set of ten mathematical, logical, and reasoning problems in the same exact order. Furthermore, we made sure that the experimental group awaiting their test was far away from the classroom setting being used, to ensure that they did not overhear any directions that were given that indicated that this experiment was conducted to assess memory recall. In addition, we color coded the booklets used by our experimental group to certify that each subject moved onto the next problem when time was called.

 To ensure that all ethical considerations were taken, every underage participant had parental consent (Appendix 1). We split the participants into 2 equal groups, control and experimental, keeping the male to female ratio consistent. The control group was escorted into the classroom setting and seated apart from one another. Then, they were given an Informed Consent form and read their Standardized Directions (Appendix 3), not including the free recall instructions. After signing the form, indicating they understood they had the right to withdraw from the experiment at any time, no harm would come to them by participating in this experiment, and their results would remain confidential, they were collected and the question booklets were distributed (Appendix 8). Participants were given ten minutes to complete the test. One minute after the tests were collected, they were additionally informed that they were to be given three minutes to freely recall the given problems, using the prescribed titles (Appendix 3). The experimental group was given the same set of problems, only they were told that they only had one minute to complete each problem and that they must move on to the next problem when time is called. In addition to this, they were unknowingly informed when thirty seconds remained to complete each problem. After a minute passed, they were given the same directions as the control group for free recall (see procedure, Appendix 7). We decided that it was necessary to limit their knowledge of the memory recall and interruption aspects of the experiment in the initial set of directions as to not skew the results. Lastly, after a group’s free recall sheets were collected, a debrief was given that indicated that the experiment was testing memory recall influenced by interruptions, that this was not a measurement of their academic capabilities (Appendix 5).

Analysis:

 Free recall was scored by assessing whether each participant was able to recall a key word or key words from each prescribed title of the assigned problem. The median score of the control group was 2 with an interquartile range of 1-3 problems. The median score of the experimental group was 3 with an interquartile range of 0.5-4 problems. Median and interquartile range were used because this experiment is assessing one’s natural tendency to recall information; therefore, there needs to be an acknowledgement that there will be outliers within this tendency. Median and IQR provide the best understanding of where most of our data lies, or our middle data, without skewed perception of outliers. Mann-Whitney U was used because we needed to compare two separate sets of ordinal data, each with a single dependent variable, calculated using independent measures. In addition to this, what differed between our control and experimental were our independent variables: interrupted or uninterrupted.

 Our U-Score was 52.5 and our critical value was 31, therefore our results were not statistically significant as it showed a far greater variance than .05. The results did not support our research hypothesis, as there was no large significant difference between the number of problems recalled in our control and experimental data.

 In summation, we fail to reject the null hypothesis that if subjects are given a series of problems to solve and are interrupted at a set time unbeknownst to them, then there will be no correlation between one’s ability to recall the problem whether or not they were interrupted.

Descriptive Statistics:





Evaluation:

 The results indicated that our replication of the Zeigarnik Effect was unsuccessful as we did not see a statistical significance in our findings, despite that *the Re-examination of the Zeigarnik Effect* succeeded in replicating Zeigarnik’s same findings, and that our procedure was very similar to their secondary experimental procedure. Our U-value of 52.5 does not nearly fall within the variance of .05 of the critical value of 31. Therefore, even though Seifert, Patalano (1991) and Zeigarnik were able to find results that correlated with the idea that interruptions improved memory recall, the results from our replicated experiment did not appear to show any form of significance that might support the findings of their studies.

 Furthermore, our inability to replicate the Zeigarnik Effect may have been because we based recall on whether or not subjects were able to recall key words from the prescribed title and not necessarily recall the problem itself. Although it was stated in the standardized directions to intently read *both* theprescribed title and the question, we often saw that subjects were more often able to recall the details of the problem, but not the prescribed title itself. As per our experimental design, this was not considered sufficient enough to say that they remembered the prescribed title. We deduced that having a clear and unbiased form of identifying whether a prescribed title was recalled would help eliminate bias and subjectivity introduced by the original researcher’s method of affirming how each problem is recalled, by having subjects jot down a descent description so that they could identify the problem, but it resulted in a significant limitation. More subjects, having spent more time on the problem itself, were much more concerned with solving and working through the problem than retaining a prescribed title that didn’t require much analysis. In addition, another limitation that we as researchers ran into was gathering questions that were similar to the original study. When reviewing their methods, it was stated that they used multiple different question books developed by different psychologists; there was no possible way to go through their cited material and pick out their same questions. We contacted the researchers to see if the original questions were accessible, but received no reply. We did the best that we could to find reasonable questions to develop our own booklets, but as students we have no educational background that guarantees that they were as sufficient as those used in the original study.

In addition to this, a strength of our conducted experiment is the choice of color coding each problem in the experimental group so that it allowed us to weed out any subjects that chose to commit any form of misconduct. Also, our sample size, being relatively the same age and attending the same high school, had a similar level of education and therefore were more likely to achieve similar results. A limitation associated with our sample, is that even though they were likely to achieve similar results, we only tested one specific age group’s ability to recall information and therefore our results may not apply to groups of all ages.

Furthermore, although mentioned above as a limitation, I believe that the way we went about finding a clear and unbiased way of recall can be considered a strength. Our method may need modification, but it was much more effective in eliminating bias than the original study. To modify, as researchers we need to find a clear and un-subjective way to look at the problem recalled and assess it through specified standards to unintentionally skew results in favor of our hypothesis.

Additionally, when designing our experiment, we chose to focus on the single variable of interruptions, whereas the replicated study incorporated both completeness of a

problem with and without interruption. For modifications we should incorporate both elements as well, seeing that the Zeigarnik Effect at its fullest is indeed supposed to incorporate Lewin’s findings of better recall of incomplete tasks as well as Zeigarnik’s findings of better recall of interrupted tasks.

In conclusion, our replication failed to reject our null hypothesis, meaning that we have failed to replicate the Zeigarnik Effect; in regards to our aim, we are unable to say that this method can improve memory recall or be useful in daily routines and work. Utilizing the modifications above it is encouraged that other researchers attempt to replicate the study above to asses the reliability of this effect.

References:

Schiffman, Noah, and Suzanne Griest-Bousquet. "The Effect of Task Interruption and Closure

on Perceived Duration." *Bulletin of Psychonomic Society*, vol. 30, no. 1, 1992, pp. 9+, interruptions.net/literature/Schiffman-BPS92.pdf. Accessed 20 Oct. 2018.

Seifert, C. M., & Patalano, A. L. (1991). Memory for incomplete tasks: A Re-examination of the

Zeigarnik Effect. In Proceedings of the Thirteenth Annual Conference of the Cognitive Science Society [refereed] (pp. 114-119). Mahwah, NJ: Erlbaum.

Appendices:

Appendix 1: Parental Consent Form

September 4, 2018

Dear Parents,

I am writing this letter to inform you directly about the nature of the Psych IA Experiment Day that will be taking place on Tuesday, October 2nd, 2018. All Psychology students need to be there to participate as subjects (Psych I) or as experimenters & subjects (Psych II) from approximately 2:30-4:30pm. I am asking for volunteers from NHS and Key Club to act as participants (for service hours) in the experiments as well. Ethical guidelines require that parents give consent for their minor children in order to participate in a Psychology IA. If you agree to let your child(ren) participate in Psych IA Day, please write their name(s) below and sign and date on the line. If you have any questions or would like to review the procedural or ethical guidelines, I would be happy to email them to you. Thank you for your cooperation and support for this required, albeit inconvenient, IB activity.

Sincerely,

Teacher X

Please Print Name(s) of Minor Child(ren) Who Will Participate in the Psychology IA Day below:

Student Name(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Parent Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_

Appendix 2: Informed Consent

Consent Form

* I have been informed about the nature of the research.
* I understand that I have the right to withdraw from the research at any time, and that any information/ data about me will remain confidential.
* My anonymity will be protected as my name will not be identifiable.
* The research will be conducted so that I will not be demeaned in any way.
* I will be debriefed at the end of the research and will have the opportunity to find out the results at a later date.

I give my informed consent to participating in this research.

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Contact number: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Appendix 3: Control Group Instructions

Standardized Instructions for the Control Group:

The purpose of this experiment is to investigate cognitive processes associated with the Zeigarnik Effect. You will receive a set of 10 mathematical, logical and spatial reasoning problems in a booklet. Your task is to solve the problems to the best of your abilities within 10 minutes. When you open the booklet, you will find 10 problems with prescribed titles in bold above the instructions and question. Each question is on its own page. All work should be recorded in the space provided beneath each prescribed title and the problem associated with it. Work consistently and diligently throughout the experiment, making every attempt to solve each problem. Take your time. Read all of instructions carefully. Remember that this is not an assessment of your intelligence, but you should do your best to complete all the problems. When time is called, you must stop working on the problems. Do not open the booklets until you are told to do so. Write your name on the test booklet. Are there any questions?

Standardized Instructions for Recall (Control Group)

Sit quietly for one minute.

Now that you have completed the problem sets, you have three minutes to do your best to recall as many prescribed titles as you can from the problem set. Are there any questions?

Appendix 4: Experimental Group Instructions

Standardized Instructions for the Experimental Group

The purpose of this experiment is to investigate cognitive processes associated with the Zeigarnik Effect. You will receive a set of 10 mathematical, logical and spatial reasoning problems in a booklet. Your task is to solve the problems to the best of your abilities within 10 minutes. When you open the booklet, you will find 10 problems with prescribed titles in bold above the instructions and question. Each question is on its own page. You only have one minute to work on each problem, and you MUST stop working on a problem and move on to the next when time is called. DO NOT FLIP TO THE NEXT QUESTION UNTIL YOU ARE INSTRUCTED TO DO SO. You may only work on one question at a time, so you cannot bounce back and forth between questions. We will be monitoring your progress to ensure that you follow these instructions. Do not remove the sticky notes attached to your booklet. If you do not follow these instructions, your data will not be included in the results of this experiment. All work should be recorded in the space provided beneath each prescribed title and the problem associated with it. Work consistently and diligently throughout the experiment, making every attempt to solve each problem. All work should be recorded in the space provided beneath each prescribed title and the problem associated with it. Take your time. Read all of instructions carefully. Remember that this is not an assessment of your intelligence, but you should do your best to complete all the problems. When time is called, you must stop working on the problems. Do not open the booklets until you are told to do so. Write your name on the test booklet. Are there any questions?

Standardized Instructions for Recall (Experimental Group)

Sit quietly for one minute.

Now that you have completed the problem sets, you have three minutes to do your best to recall as many prescribed titles as you can from the problem set. Are there any questions?

Appendix 5: Standard Debrief

Standardized Debrief (Control and Experimental Group)

First, the researchers would like to thank those of you who chose to take part and participate in the Interruption vs. Recall experiment. The aim of this experiment was to demonstrate and investigate how subjects’ ability to recall information is impacted by the presence of interruptions. The researchers of the study we replicated found that “if a goal to solve a problem is not satisfied, information about that failure can be used to preserve and encode the problem in a way that might facilitate its later retrieval. Consequently, failed problems may be more likely to be recalled, and to be pursued for a second time.” A control group had no interruptions. Control group subjects could to solve problems in the order they desired and spend as much time on each problem as they desired. On the other hand, the experimental group was only allowed to work on one problem at a time and could only spend one minute on each problem. The researchers of this replicated experiment can debrief the results of the experiment that was conducted today if you wish to learn about them. You have the right to withdraw at any time and your data will not be included. Are there any questions?

Appendix 6: Raw Data (Mann- Whitney U)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Subject | D | K | O | U | F | I | R | B | G | L | A | C | E | H | J | M | N | T | Q | S | P |
| Number of correctly recalled prescribed titles | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 6 |
| Rank | 2.5 | 2.5 | 2.5 | 2.5 | 6 | 6 | 6 | 9 | 9 | 9 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 19.5 | 19.5 | 21 |

T1= (2.5) +(2.5) + (6) + (6) + (9) + (9) + (14.5) + (14.5) + (14.5) + (14.5) +(14.5)

T1= 107.5

T2= (2.5) +(2.5) + (6) + (9) + (14.5) + (14.5) + (14.5) + (19.5) + (19.5) + (21)

T2= 123.5

n1= 11

n2= 10

nx= 11

$$ U=n1×n2+nx ×\frac{nx+1}{2}-Tx$$

$$ U= \left(11×10\right)+11 ×\frac{\left(11+1\right)}{2}-123.5$$

$$ U=176-123.5$$

$$U=52.5$$

Appendix 7: Official Procedure

1. Split participants into control and experimental groups by dividing them in half, keeping the ratio of males and females consistent.
2. Begin with the control group.
3. Seat the participants in a manner in which they are spread apart and unable to look over their shoulders for answers.
4. Pass out the Informed Consent form (Appendix 2) and instruct participants to wait patiently until the informational and directions are given, before signing it.
5. Read aloud the Standardized Directions for the Control Group (Appendix 3), not including the the free recall instructions.
6. Instruct participants to sign the Informed Consent form, collect them, and pass out the mathematical and logical reasoning question booklets (Appendix 8).
7. Set a timer for ten minutes and instruct the participants to begin test taking as soon as the timer starts.
8. When ten minutes have passed, ask that participants close their test booklets and out their pencils down, then set a timer for one minute and collect the test booklets.
9. Once one minute has passed, distribute a blank sheet of paper and read the free recall section in the Standardized Directions for the Control Group (Appendix 2).
10. Once three minutes have passed, collect the free recall response sheets and read the Standard Debrief (Appendix 5).
11. After the control group has left, go to the designated area where the experimental group was told to wait patiently and escort them to the classroom setting.
12. Repeat steps 3&4.
13. Read aloud the Standardized Directions for the Experimental Group (Appendix 4), not including the free recall section.
14. Repeat step 6.
15. Set a timer for ten minutes and instruct the participants to begin as soon as the timer starts.
16. At every 30 second interval, interrupt the participants by informing them that they have half a minute left to complete the question, before they must move on.
17. At every minute interval, instruct participants that they must move on to the next question.
18. Repeat steps 8,9 & 10.

Appendix 8: Booklet Questions

Do not open this test booklet until you are told to do so.

Name:

1: Family Tree

Pointing to a photograph, Todd said, "She is the daughter of my grandfather's only son." How is Todd related to the girl in the photograph?

Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2: Know Your Directions

If South-East becomes North, North-East becomes West and so on, what will West become?

Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3: Handshakes

At a conference, 12 members shook hands with each other before and after the meeting. How many total number of handshakes occurred?

Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4: Days of the week

The day after the day after tomorrow is four days before Monday. What day is it today?

Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5: Two Trains

Two trains starting at the same time from 2 stations 200 km apart and going in opposite direction cross each other at a distance of 110 km from one of the stations. What is the ratio of their speeds?

Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6: Order of Operations

A student was asked to divide a number by 6 and add 12 to the quotient. He, however first added 12 to the number and then divided it by 6, getting 112 as the answer. What should have been the correct answer?

Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7: Shapes in boxes

Draw the next image in the sequence.

Answer:

8: Odd Stars

Choose the odd one out. Justify your answer with a response

Answer: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_