Psychology Internal Assessment (SL)

Research Title: Investigating the use of a filler task during free recall and its effects on the strength (or presence) of the recency effect

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Introduction

From the cognitive approach, "the serial position effect suggests that we best remember items at the beginning and end of a sequence more accurately than the items in the middle of the list. This is caused by two memory recall biases, namely the primacy effect and the recency effect."[i] The primary effect describes our inclination to remember the information at the start of a series better since these items are stored in our long-term memory (LTM) since remembering single items requires less processing capacity in our brains. As the series progresses, our brains are forced to process collections of items, making the following items more challenging to recall. The recency effect, on the other hand, is our tendency to remember items in a series that is at the end of a sequence or items that were most recently told to us. This occurs because it is thought that these items are stored in our short-term memory (STM), which holds only a small amount of information at a time and has recently been told to allow us to access it quickly during recall.

According to the Multi-Store Memory (MSM) Model developed by Atkinson and Schriffin in 1968, information moves from STM to LTM if it is rehearsed but gradually decays if it is not. It also states that STM has a duration of about 30 seconds. Glanzer and Cunitz's (1966, experiment 2) experiment study supports the theory's idea by incorporating the primacy and recency effect.

Glanzer and Cunitz studies the primacy and recency effect on a sample of army-enlisted men. The study **aimed** to investigate the serial position effect with and without interference from a filler activity and examine whether the **position of words** in a series (primacy and recency effects) influence memory recall and see if MSM memory exists. The researchers showed 15

lists of 15 words, one at a time, and had the participants recall the words under one of three conditions at a time: recall with no delay, with a 10-second delay, and with a 30-second delay. The results from this study suggested that with the immediate recall both primacy and recency effect was present when there was no filler activity. With the 10-second filler activity, there was a significant reduction of recency effect and with the 30-second filler activity, there was little to no trace of the recency effect. The results about the serial position effect from the study were used to support the theory that STM and LTM are separate models and MSM exists as proposed by Atkinson and Schiffrin.

This study is a replication of Glanzer and Cunitz's (1966, experiment 2) study mainly focusing on the recency effect. The aim of the study being conducted is to investigate the effect of the presence or absence of a filler task and how it will affect the strength of the recency effect in recalling words from a list on international high school students. This is worth investigating because it is important to understand how biases play an effect on memory recall. It helps us better understand real-life scenarios like the students studying for exams and how can the knowledge of the MSM can aid in better preparation while studying. This study can also help us understand by supporting the theory that there are different MSM models like the STM and LTM.

The **independent variable** is the presence or absence of a filler task. There are two experimental conditions: one where recall is immediate and one where recall is after a 30-second filler task; counting back from 30 aloud.

The **dependent variable** is the recall and it is measured by the number of words that have been correctly recalled out of the last 5 words from the list of 20 words.

The **null hypothesis** is that there will be no significant difference in recall (measured by the number of words **correctly** recalled out of the **last 5 words**) between the presence or absence of a 30-second filler task.

The **research hypothesis** is that there will be a significant difference in recall (measured by the number of words **correctly** recalled by the participants out of the **last 5 words**) when there is a presence of the 30-second filler task compared to when there isn't.

Exploration

Design

This experiment used a repeated measures design instead of independent sample design and this allows the **same** 20 participants to be used in both conditions. This helps eliminate participant variables like their recall skills and using the same participant in both conditions will help compare the difference in recall between the presence and absence of the filler task. If an

independent design was used then different participants would be compared for the same recall condition and this would not support the results each participant's mental aptitude **varies**, using a repeated measures design helps keep these variables constant and accurate for comparison.

Sampling Method and Participants

The sampling method which we used to obtain our participants was convenience sampling. This was done as it was the quickest way to obtain participants and no participant was forced to take part in the experiment. The total sample consisted of 20 participants, 13 males and 7 females, ranging from the ages of 16 to 18. All participants of the experiment were international high school students studying the same course, IB. Thus, their English proficiency is of the same level and this helps to ensure that all participants are capable of understanding the words from the wordlist. The participants are also students who haven't studied psychology, which reduces demand characteristics. This ensures that the participants aren't aware of the nature of what the experiment is about and thus won't be able to guess the hypothesis of the experiment. This allows us to get results better results from participants as they are more natural.

Materials

Two 15-word lists were used; one for a condition with the filler task and one for a condition without the filler task, we picked monosyllabic words from the Thorndike-Lorge dictionary as the same was done in the original study. This was done to standardize the words chosen so all of them were simple. This was confirmed by our results from the pilot study to ensure the

participants understood all the words. We used a stopwatch to ensure that the breaks given to the participants between two conditions were consistent.

Control Variables

As a control, we used two different word lists for the different conditions to make the practice effect less relevant. This control helped to eliminate the order effect so that participants aren't used to the word list. Another control was that the same participants were used for both conditions and this helped control the participant variables like individual differences or that one group may have better memory skills than the other. Another control variable used was the time allotted to recall the words which was 2 minutes to recall words onto a paper.

Procedure

All 20 participants were placed in the same classroom and provided with paper and writing material. Then the participants were instructed about what they have to do in the first condition with no filler task. After reading the words out the participants were given 2 minutes to recall. Then a 10-minute break was given to ensure that fatigue effect doesn’t play a role in affecting the results. Then the participants did the second condition with the 30s filler task of counting back from 30 with the second-word list. Participants were given 2 minutes to recall the words.

Ethical Considerations

This experiment was conducted ethically by getting signed consent forms from participants. Before experimenting, we briefed the participants and they were read out the same briefing

instructions and any information that was withheld or not completely stated in the briefing was then revealed to the participants during the debriefing of the experiment.

Analysis

Descriptive Statistics

The raw data collected from the number of words correctly recalled is under appendix 1. To keep anonymity, each participant that took part in the study is represented with a number from 1 to 20. From the data in **appendix 4**, I calculated the mean number of words correctly recalled from the last 5 words and the standard deviation.

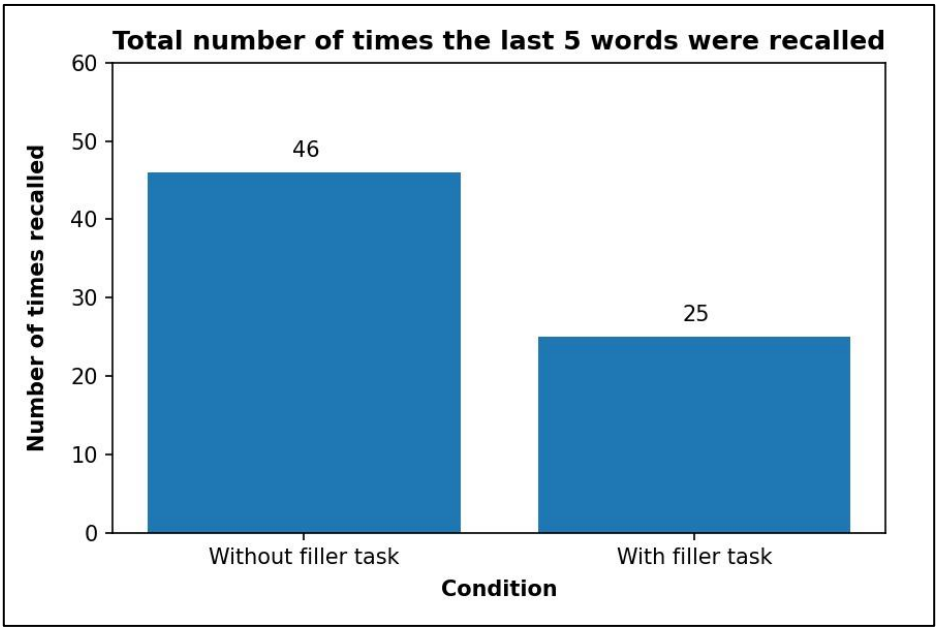
Table 1 – Shows the Mean Number of Words Recalled and the Standard Deviation for words recalled between the presence of the filler task and the absence of it.

	Absence of Filler Task	Presence of Filler Task
Mean number of words recalled from last 5 words	2.3	1.25
Standard Deviation	1.1	0.83

As we can see from the data from the table above, the number of items correctly recalled from the last 5 words without a filler task was about 1.84 times more than those recalled with the filler task. The absence of filler task condition also had a higher standard deviation at 1.1 compared to 0.83 of the presence of filler task. This aligns with the theory as participant variability and

difference in STM capability will be larger with no filler task when compared to the presence of it where the variability is less.

Graph 1 – Visual representation of total number of times the last 5 words have been correctly recalled by the participants between the two conditions (presence and absence of the filler task)



Inferential Statistics

The data of our experiment was **ratio** as we had a sample size of 20 and we used the Wilcoxon signed-rank test as we used repeated measures. The results showed that the data was significant at $p <= 0.05$ for a two-tailed test, as our p-value is 0.003. Based on our findings we can reject the null hypothesis. This suggests that there is a significant difference in the number of words correctly recalled by the participants out of the last 5 words when there is an absence or presence of the 30-second filler task.

Evaluation

The decrease in the mean of the times the last 5 words were recalled correctly can be concluded to the presence of the 30-second filler task. This helps in supporting the MSM, which states that information in the STM can only be stored for 30 seconds, which meant that most if not all of the participants were unable to recall the words from both their STM and LTM as they were unable to encode and rehearse it into their LTM due to the filler activity within the 30-second duration of the STM. Although the experiment supports the theory, it is important to take note that the results we got are only significant at 5% significance in recalling the **last 5 words** of the list.

Design

Repeated measures was used in this experiment as it helped us compare the same individual under different conditions. This was an advantage over the independent measures design as, in that design, the experiment would consist of individuals of different ages, memory capacity, intellect, etc. causing a participant variability which would have been a confounding variable. This means that different people have different characteristics and the comparison wouldn't have been fair. This strength of the repeated measures design in this experiment helped in getting the results.

But repeated measures designs did have drawbacks such as practice and order effect. These were controlled and counterbalanced through the use of different word lists for different conditions. This meant that the participants won't be able to rehearse the list and that their performance will not change from repeated testing.

Sample

Convenience sampling was used to randomly select only IB students who were free and present in the school cafeteria. One strength of the sample is that none of the students used were psychology students, which meant that it reduced the demand characteristics. One limitation is that this was an unrepresentative sample size as the students were all from one grade in one school which doesn't allow us to generalize the sample.

Materials

One limitation that we had was access to a projector. In the original study, they made use of a projector to show the words from the list as they were being read. This meant that the participants had to go by only the reader's pronunciation of the word. Adding on to this, the experiment was conducted during COVID-19, with restrictions in place. From the feedback received by a few participants, they were unable to hear some of the words properly with the muffled voice of the reader through their mask.

Procedure

One strength of the procedure was that it was highly standardized and conducted in a controlled environment, which meant that it helped in reducing the possibility of confounding variables such as the environment interfering with the participants' performance. But, one limitation of the study is that it lacks ecological validity. This is because a classroom with specific single order seating was arranged to prevent any copying of results, which meant that the setting was quite artificial and this makes it very difficult to generalize the study to a real-life setting. Also, the

filler task started immediately after the words were called out, this meant that the participants were not given time to rehearse the words at the end of the list, which helped in showing the fading strength of the recency effect.

One modification that can help in future research is to create a filler task in between the control and the experimental conditions. This will help the participant's minds off what the next condition would entail, which will help get better results for comparing between the control and experiment conditions.

Now we can conclude from the experiment that there is a significant difference in the number of words correctly recalled by the participants from the last 5 words when there is a 30-second filler task compared to when there isn't.

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Appendices

Appendix 1 – Participant Consent Form

LETTER OF CONSENT

Dear Participant,

We are currently working on our Psychology Internal Assessment. In our experiment, you will be shown two series of 15 words and will be asked to recall the words under different circumstances.

Some things we would like you to know for your understanding,

1. Your responses will be anonymous.
2. You have the right to withdraw or choose not to continue at any point if you feel uncomfortable.
3. You can feel free to approach the students carrying out the experiment at any time.
4. At the end of the experiment, we will be explaining to you the aim and purpose of our chosen study.

I (participant), _____ , hereby give informed consent and agree to participate voluntarily in this experiment.

Participant's signature: _____

Date: _____

Please get this signed if you are below the age of 15:

I (parent/guardian) _____ parent of (participant) _____ hereby understand the nature of the experiment and give permission for my son/daughter to take part in this study.

Parent/Guardian signature: _____

Appendix 2 – Briefing and Directions

Briefing Notes

Dear all,

Welcome to our Psychology IA Experiment. Before we get started, we will brief you about what you will be doing today. Firstly, we will hand over a piece of paper and a pen for you to write down words. Please do not copy from others as this isn't a test of who has the most number of words. My fellow group member will read out the words from the list one by one and please don't write anything until we ask you to do so.

Now we will give you all a break for 10 minutes. Please be back in the room by then.

Noted Between the Two Conditions

Now turn over your page and be ready for our instructions. This time around of the experiment, after we recite the words, and say start, you will have to count out the numbers from 30 to 1 aloud. After that, we will say start again and then you will have the 2 minutes to write down the words you remember.

Debriefing Notes

Now that the experiment is complete we will let you know what we were testing from this experiment. We wanted to find the difference in recall of words between when you immediately recall the words and when you recall the words after 30 seconds. Hope you understood this. Thank you for participating in our experiment and please as you leave pass on the sheet of paper to one of the group members. Thank you!

Appendix 3 – Materials

Word List: Control Condition (No Filler Task, Condition 1)

Start

Lump

Peel

Mean

Calm

Glimpse

Space

Snake

Sniff

Look

Queen

Torch

Right

Good

Move

Word List: Experimental Condition (30s Filler Task, Condition 2)

Night

Lease

Mind

Raise

Wind

Scene

Lost

Nose

Chance

Hike

Thought

Drill

Straw

Part

Paint

Appendix 4 – Raw Data

Condition 1 - Control (No filler task)		
No.	Words	Total number of recalls
1	Start	16
2	Lump	14
3	Peel	13
4	Mean	10
5	Calm	8
6	Glimpse	9
7	Space	11
8	Snake	10
9	Sniff	6
10	Look	9
11	Queen	10
12	Torch	8
13	Right	9
14	Good	6
15	Move	13

Condition 2 - Experimental (30s filler task)		
No.	Words	Total number of recalls
1	Night	20
2	Lease	7
3	Mind	6
4	Raise	6
5	Wind	8
6	Scene	8
7	Lost	4
8	Nose	11
9	Chance	4
10	Hike	2
11	Thought	4
12	Drill	10
13	Straw	3
14	Part	4
15	Paint	6

Number of Words Correctly Recalled (Participant Wise)

No.	Condition A (No task)	Condition B (With 30s task)
1	3	2
2	3	2
3	2	1
4	1	0
5	1	2
6	4	2
7	1	1
8	2	2
9	1	1
10	2	1
11	2	0
12	2	2
13	5	0
14	1	2
15	3	2
16	2	0
17	2	0
18	2	1
19	3	2
20	4	2
Total	46	25

Appendix 5 – Inferential Statistics Calculations

Treatment 1	Treatment 2	*Sign*	*Abs*	*R*	*Sign R*
3	2	1	1	5.5	5.5
3	2	1	1	5.5	5.5
2	1	1	1	5.5	5.5
1	0	1	1	5.5	5.5
1	2	-1	1	5.5	-5.5
4	2	1	2	13	13
1	1	n/a	0	n/a	n/a
2	2	n/a	0	n/a	n/a
1	1	n/a	0	n/a	n/a
2	1	1	1	5.5	5.5
2	0	1	2	13	13
2	2	n/a	0	n/a	n/a
5	0	1	5	16	16
1	2	-1	1	5.5	-5.5
3	2	1	1	5.5	5.5
2	0	1	2	13	13
2	0	1	2	13	13
2	1	1	1	5.5	5.5
3	2	1	1	5.5	5.5
4	2	1	2	13	13

Significance Level:

- ○ .01
- ◉ .05

1 or 2-tailed hypothesis?:

- ○ One-tailed
- ◉ Two-tailed

Result Details

W-value: 11
Mean Difference: 0.38
Sum of pos. ranks: 125
Sum of neg. ranks: 11

Z-value: -2.9474
Mean (*W*): 68
Standard Deviation (*W*): 19.34

Sample Size (*N*): 16

Result 1 - *Z*-value

The value of *z* is-2.9474. The *p*-value is .00318.

The result is significant at $p < .05$.

Result 2 - *W*-value

The value of *W* is 11. The critical value for *W* at $N = 16$ ($p < .05$) is 29.

The result is significant at $p < .05$.