A Study to explore word length effect.

Introduction

Memory is the process of storing information over time and pulling on past experiences, using this information in the current time by retrieving stored memory (APA, 2022). Memory is necessary and important in everyday situations; without memory an individual cannot operate effectively in the present. From recalling childhood experiences to remembering a telephone number, our memories help shape who we are. Memory aids in the processing of substantial amounts of data and consists of three components which are encoding, storage, and retrieval. In the short-term memory – STM, knowledge can only be retained for a brief time, whereas in the long-term memory – LTM, it can be stored indefinitely (Frankland and Bontempi, 2005). Initially, it was thought that if a person can remember certain information for extended periods of time in the STM, that knowledge will become stable in the LTM (Atkinson & Shiffrin, 1968). Another argument was made regarding how memory is processed, stating that this was not the length of time people hold information, yet the process in which the knowledge is transmitted and stored that maintains LTM (Craik & Lockhart, 1972). There are numerous theories regarding memory, and conclusions have evolved over time as a result of improved research. One of these theories being the working memory model by Baddeley and Hitch (1974) and yet again with Baddeley (1992), with a lower capacity store for absorbing information for a short amount of time, working as a multi-component system involving the visuospatial sketchpad, which for a short period of time, retains and manages relevant data about the image of items and their location, mentally picturing and comparing two items within the visuospatial sketchpad. The phonological loop, an element that holds and wants to control auditory information over short durations, and the episodic buffer, a short-term multimodal store that integrates information from working memory's phonological loop and visuospatial sketchpad elements of the system to establish and sustain an interconnected, comprehensive picture of a succession of occurrences that can then be stored in long-term memory. Working memory replaced short-term memory, nevertheless, rather than information being filtered into a single store, there are separate systems for distinct types of information (Baddeley et al., 1992).

Explaining the phonological loop and its significance in the study of word length, this component functions as a storage location for primarily word recognition as well as a rehearsal system. The phonological store and the articulatory rehearsal structure are separated. When you hear something, the phonological loop is activated, words can fade away in seconds unless you recite it, explaining why you remember shorter words better than longer words because your STM can store up to approximately 2 seconds (Baddeley et al., 1998). The phonological loop's purpose is to assist us in developing language skills and expanding vocabulary. It stores new and unknown words in the long-term memory as they are introduced. Words can then be stored in the LTM using recital and repetition. Using chunking makes it easier to remember for

example, a person can increase the amount of information they can remember by grouping each individual value into a considerably bigger number, which is most frequently seen when trying to recall phone numbers and helps store this information for a longer life span (Gobet et al., 2001).

In cognitive tests, the word-length effect attributed to the idea that shorter words are usually easier to remember than longer words. The amount of time spent reciting the words impacts short-term retention. The word length effect is the discovery that short words are remembered more than long words on immediate serial recall tests, as well as the hypothesis that the number of words recovered varies with the length of words. It has also been discovered that quick recall for word sequences significantly reduces only with the number of syllables found within the words., The more syllables there are in a word, the longer the phonological loop takes to comprehend and memorise (Baddeley et al., 1975). In bilingual subjects, Welsh values take more time to comprehend than English equivalents, and this difference is mirrored in the discovery that Welsh word span is noticeably shorter than English word span. Variations are caused by differences in bilingual word length. which explains why Welsh children's standards on a memory span test on an Intelligence Scale are significantly lower than those of other individuals speaking English of the same age. Based on these findings, it is predicted that cognitive calculation in Welsh will be more difficult than in English (Ellis & Hennelly, 1980).

The word length study, that has been undertaken for the purpose of this report, is a partial representation of a study done by Baddeley et al in 1975. It is critical to examine the word length effect study to evaluate investigations that revealed people who participated can remember more single syllable words than multi syllable words. It is beneficial to investigate the fact that short words have a longer recall span than long words. The working memory, including the phonological loop, was linked to learning and memory workings in this study. One study of interest is by Miller (1956). The Magic number 7 demonstrates the ability to process information instantly; the average individual has a short-term memory capacity of 5 to 9 items. (Miller, 1956). Miller proposed this concept and termed it the "magic number 7". This evidence is useful when comparing results and findings in the word length study, as according to a subsequent experiment by Cowan (1992), the duration of the spoken word, rather than the number of syllables, was the most principal factor (Cowan, 1992).

The aim of this study is to explore the word length effect to examine whether previous research was correct in its conclusions that shorter words are easier to remember than longer words

Hypothesis

Participants will recall significantly more short words than long words.

Method

Design

A related-subjects design was used for this study. There was one independent variable with two conditions: the length of the words presented; long words and short words. There was one dependant variable: the number of words recalled. Participants took part in both conditions of the experiment, on the same day one list directly after the other.

Participants

An opportunity sample of 26 participants completed both conditions of this study: 26 were female and 0 were male. Ages ranged from 18-49 years (M=29.42 years, SD+3.79 years). Participants were all undergraduate students from West Wales who took part in the study. All participants were naïve to the purpose of the experiment.

Materials

- Computer
- Whiteboard/screen
- Pens and paper for participants
- Stimuli:15 long words, 15 short words, chosen by chief researcher (See appendix 1).
- PowerPoint with list of words.

Short words included e.g., tank, tomb.

Long words included e.g., transaction, physician.

Words were presented on a screen using PowerPoint, with white words on a blue background, font Arial size 72. The words were held on screen for one second each. The next word was shown after a second.

Procedure

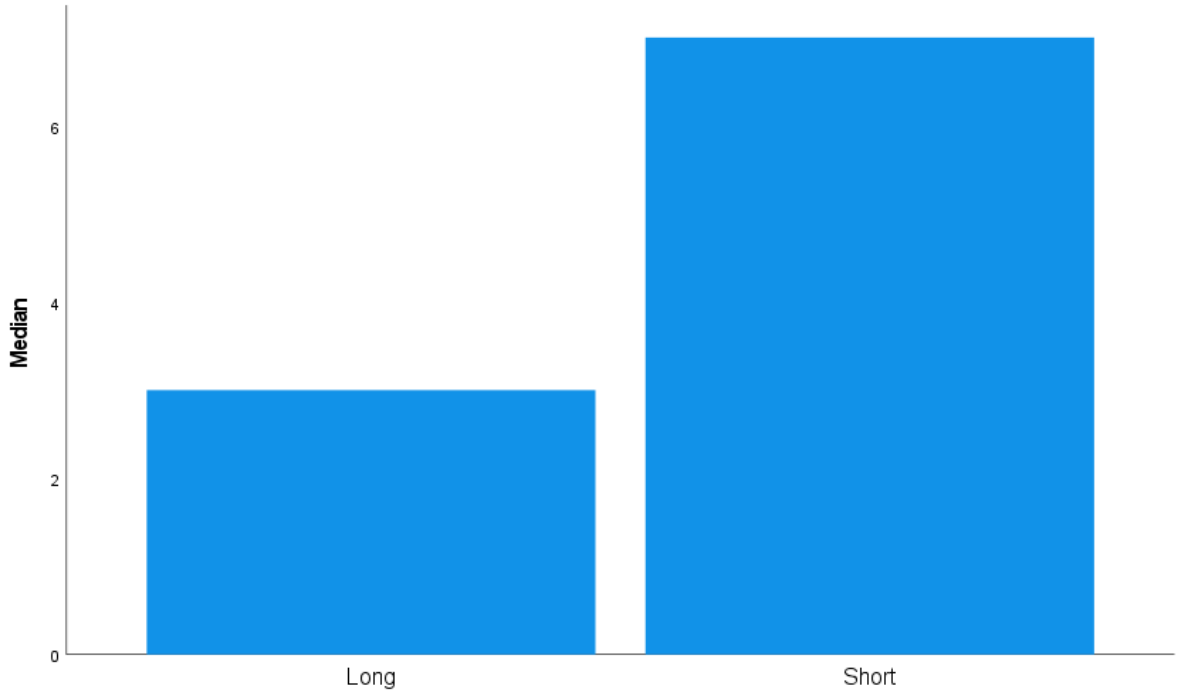
(See appendix 2)

Results

The following results present the findings for the study on word length effect.

Chart 1

Median scores for the long and short words



The chart above shows the median for long words is shorter than short words.

To examine if the median scores for both conditions are significantly differently to the probability of .05, the non- parametric Wilcoxon statistical test was carried out.

A Wilcoxon signed- rank test showed a significant difference between the long and short word conditions (Z=4.136, p=,001). Median recall scores for short were significantly better than for long words (7 and 3, retrospectively).

The results indicate that the hypothesis that participants will recall significantly more short words than long words was supported and provided for the word length effect.

References

American Psychological Society. (2022). APA Dictionary of Psychology: Memory. Dictionary.apa.org www.dictionary.apa.org/memory

Atkinson, R. C., & Shiffrin, R. M. (1968). Human memory: A proposed system and its control processes. *Psychology of learning and motivation* (pp. 89-195). Elsevier.

Baddeley, A. (1992). Working memory. *Science, 255*(5044), 556-559.

Baddeley, A. D., Thomson, N., & Buchanan, M. (1975). Word length and the structure of short-term memory. *Journal of Verbal Learning and Verbal Behavior, 14*(6), 575-589.

Baddeley, A., Gathercole, S., & Papagno, C. (1998). The phonological loop as a language learning device. *Psychological Review, 105*(1), 158.

Cowan, N. (1992). Verbal memory span and the timing of spoken recall. *Journal of Memory and Language, 31*(5), 668-684.

Craik, F. I., & Lockhart, R. S. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior, 11*(6), 671-684.

Ellis, N. C., & Hennelly, R. A. (1980). A bilingual word-length effect: Implications for intelligence testing and the relative ease of mental calculation in Welsh and English. *British Journal of Psychology, 71*(1), 43-51.

Frankland, P., & Bontempi, B. (2005). The organization of recent and remote memories. Nature Reviews Neuroscience, 6(2), 119-130. doi:10.1038/nrn1607

Gobet, F., Lane, P. C. R., Croker, S., Cheng, P. C., Jones, G., Oliver, I., & Pine, J. M. (2001). Chunking mechanisms in human learning. *Trends in Cognitive Sciences, 5*(6), 236-243. https://doi.org/10.1016/S1364-6613(00)01662-4

Miller, G. A. (1956). The magic number seven plus or minus two: Some limits on our capacity for processing information. *Psychological Review, 63*, 91-97.

Appendices.

1. Word list
2. Standardised instructions
3. Information sheet and Informed consent form
4. Debrief sheet
5. Raw data (Scores)
6. SPSS results (Wilcoxon)

Appendix 1

Word List Table

Condition 1 – Long Words	Condition 2 – Short Words
Transaction	Desk
Forgiveness	Leap
Physician	Mood
Proximity	Tank
Constitution	Rules
Rationalise	Roof
Interaction	Mend
Deductions	Snap
Representation	Tomb
Impatiently	Slow
Reinstate	Tape
Intimidating	Rack
Disorganised	Snore
Understanding	Lose
Illuminate	Paid

Appendix 2

Standardised procedures

To ensure that all participants have the same experience, researchers should ensure that they are all tested:

1. In the same place, with the same equipment and materials placed in the same way.
1. Under the same conditions, so the level of lighting, noise and heat remains the same for all participants.
1. At roughly the same time of day, as people may behave differently if tested at nine o'clock in the morning rather than five o'clock at night.
1. Given identical standardised instructions in exactly the same way

Standardised Instructions: these are given in the chosen location and there may be more than one set for different (IV) conditions of the investigation. The standardised instructions are important, as each participant must receive the same instructions, so they understand what to do in the study. Also, it ensures that each participant is treated the same and should help eliminate experimenter effects. You can read the instructions to the participant(s) or let them read the instructions themselves.

Standardised procedure for the word length effect study

An opportunity sample of students was used. Presumptive consent was gained.
The following instructions were presented verbally:

1. Participants were asked to sit quietly facing the projector screen situated on the wall in front of them.
1. You will take part in a short memory task.
1. Please ensure that you have a pen and paper in front of you.
1. Can you all see the screen and text on the power point clearly?
1. You will be presented with 2-word lists – consisting of 15 words each.
1. Following the first list – you will be asked to write any words remembered from the list (in any order). The next 15 words were presented in the same way.
1. Participants received the short words first followed by the long words. They had 90 seconds to recall and write down the words from list one and list two.
1. Words were presented in the middle of a blue screen for 1 second.
1. The font was Arial, white, size 72.
1. Participants were thanked for their participation.
1. Participants were fully debriefed regarding the aim and hypotheses of the experiment.

Following the making of the accuracy of recalled words, raw data was analysed using a Wilcoxon signed-rank test on SPSS 26.

Appendix 3

Study Information sheet and Informed consent form

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Centre for Psychology and Counselling

Study Information Sheet

This document provides key information regarding the study and provides details about what will be expected of you as a participant. Therefore, please read this information carefully before providing consent to take part.
During this study you will be required to do the following:

- Watch a slide show via a large screen, of 15 short words, which can be held on a screen for one second each.
- You will be given 90 seconds to recall as many of the short words as you can remember, using the pen and paper provided.
- Further instructions on how to complete this will be provided at the beginning of the experiment.

- You will then be presented with a list of 15 long words on the computer screen, each word will be presented individually for one second,
- Your task is to simply read the word in your head and will be given 90 seconds to recall at the end.

- At the end of the study, you will be debriefed by the researcher, and you will be provided with the study debrief sheet.

If you feel you would be uncomfortable answering personal questions about your anxiety levels, you are advised not to take part in this study.
If you have any questions, please ask the researcher now.
If you are happy to take part in this study, please read and sign the consent form.

Informed Consent form

Centre for Psychology and Counselling

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University of Wales
Trinity Saint David

Study Consent Form

I understand that this research study is being carried out by a 1st year Psychology Student for their Research study, and that taking part in this study will involve a memory test of word recall.
This study will take approximately 10 minutes to complete.
I understand that participation in this study is voluntary, and I am free to withdraw participation during or at the end of the study without giving a reason. I understand that once I leave the study, I will not be able to withdraw my data, as it will be anonymised. I am aware that if I have concerns about the study, I can discuss these concerns with the researcher at any time during or after the study. I understand that I will be provided with the contact details of the research supervisor at the end of the study, should I have any concerns.
I understand that the information provided by me will be held confidentially, with a code assigned in place of my name. These data will be stored indefinitely in accordance with the Data Protection Act.
I also understand that at the end of the study I will be provided with a debrief form and the opportunity to discuss any issues with the researcher.

I, _____(NAME) consent to participate in the study conducted by *Emma Williams*, Centre for Psychology and Counselling, University of Wales Trinity Saint David, under the supervision of Charlotte Greenway.

Participant Signature: _____
Date: _____
Name and signature of researcher taking consent
_____

Appendix 4

Debrief Sheet

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Study Debrief Sheet

Word length effect

Thank you for taking part in the study.

The aim of this study was *to explore whether the word length effect truly exists and whether is effects memory.* We specifically wanted to find out whether *participants would recall short words easier than long words.*

If you wish to withdraw your data from the study, you must tell the researcher now. After this point, all of your data will be anonymised, and we will not be able to trace it back to you.

If taking part in this study has raised any questions, please speak to the researcher on Emma Williams 2107833@student.uwtsd.ac.uk or contact the academic supervisor *Charlotte Greenway c.greenway@uwtsd.ac.uk.*

Thank you once again for taking time to participate in this study.

Emma Williams
BSc Applied Psychology,
University of Wales Trinity Saint David

Appendix 5

Raw Data

Participant	Long Words	Short Words
1	3	7
2	3	5
3	4	6
4	4	7
5	2	3
6	3	9
7	3	7
8	4	7
9	4	9
10	2	7
11	3	6
12	6	8
13	3	7
14	5	7
15	4	7
16	5	4
17	3	8
18	3	3
19	6	8
20	3	4
21	4	7
22	4	3
23	2	3
24	1	3
25	2	2
26		

Appendix 6

SPSS Results

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles 25th	50th (Median)	75th
Long	26	3.58	1.391	1	7	3.00	3.00	4.00
Short	26	6.00	2.173	2	9	3.75	7.00	7.25

Ranks

		N	Mean Rank	Sum of Ranks
Short - Long	Negative Ranks	2[a]	3.00	6.00
	Positive Ranks	22[b]	13.36	294.00
	Ties	2[c]		
	Total	26		

a. Short < Long
b. Short > Long
c. Short = Long

Test Statistics[a]

	Short - Long
Z	-4.136[b]
Asymp. Sig. (2-tailed)	<.001
Exact Sig. (2-tailed)	<.001
Exact Sig. (1-tailed)	<.001
Point Probability	.000

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks.

A Wilcoxon signed-rank test showed a significant difference between the long and short words conditions (Z = -4.136, p = .001). Median recall scores for short words were higher than those of long words.