Sac 3
VCE Psychology unit 3

Recall and Recognition

An investigation into how the meaningfulness of words influences our ability to recall as well as the effect time & rehearsal has on short- term memory.

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Date of submission:
17/5/13

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Abstract.

This experiment investigates whether words with meaning are more easily recognised than words without meaning, as well as the effect of time and rehearsal on the capacity of short-term memory.
It is expected that the words with meaning will be more easily recognised than the words without, and that the effect of a filled delay, where participant's attention is shifted and rehearsal is prevented, will cause a decrease in the words recognized.
This experiment is lightly based on a study by Lloyd and Margaret Peterson (1959), which concluded that short-term memory has a limited duration when rehearsal is prevented. This is also linked to the theory of trace decay, which argues that if memories aren't rehearsed, the trace of information fades. The results of Peterson and Peterson's experiment also relates to Atkinson and Shiffrin's multi-store model of memory (1968). In particular, the proposal of short-term memory and how it is the 'temporary working memory' that has a limited time capacity.
In this experiment, 20 senior school participants from an independent school between the ages of 16 and 18 were given a list consisting of meaningful and non-meaningful words to examine. Participants were then tested on their ability to recognise the word from the list. The Control group were instructed to circle the words they recognised immediately after studying the words, whilst the Experimental group had to take part in a filled delay for 30 seconds before doing so. Results showed that words with meaning were more frequently recognised over those that didn't, and that the C-group were able to recognise more words than the E-group.
It has been concluded that words with meaning will be more frequently recognised than words without, and that the prevention of rehearsal in addition to time causes a decrease in the capacity of our short-term memory.

Introduction.

Short-term memory is a memory system or subsystem with a limited storage capacity and duration in which information is lost rapidly lost unless rehearsed.
Within cognitive psychology, Peterson and Peterson (1959) conducted an experiment on short-term retention of individual verbal items, which proposed that short-term memories duration is of approximately 12-30 seconds, unless the information is rehearsed. The experiment was conducted with 24 participants who were instructed to recall a trigram (meaningless three-constant syllables e.g. DKT) after a filled delay (tasks that prevented them from rehearsing) that lasted either 3,6,9,12,15 or 18 seconds. These filled delays acted as distracters or interference tasks; in this case it involved participants counting backwards by threes from a random 3-digit number. When participants did not have to take part in the filled delay, their performance was better, possibly because they were rehearsing the item to themselves. Results showed that the longer the filed delay, the less trigrams were recalled. After 15 seconds of filled delay only 20% of the participants could correctly recall the trigrams and after 18seconds an even lower amount-10% of trigrams were recalled.

In conclusion to this study, it was proposed that short-term memory has a limited duration when rehearsal is prevented, and the explanation for this is supported by the theory of trace decay. A trace is a form of physical and/or chemical change in the nervous system- memories leave a trace in the brain. Trace decay is a theory that argues if memories are not rehearsed the 'trace' or pathway to that information begins to fade and eventually no longer exists in our memory. It also explains the reasons why memory is stronger for meaningful information, because the trace or pathway that was made to form a memory may connect to other information and is therefore stronger. This supports the idea that if something is more meaningful to an individual, that individual may be less likely to forget it quickly.

The results of Peterson and Peterson's experiment also relates to the Atkinson and Shiffrin's Multi-store model of memory. This model explains memory as consisting of three main components: the sensory register, the short-term store, and the long-term store. Peterson and Peterson's experiment in particular focuses on the proposal about short-term memory, and how it is the 'temporary working memory' that has a limited capacity. Atkinson and Shiffrin suggested that short-term memory may only hold 5-9 items of information at the same time, and that information can only be held there for about 30 seconds, unless conscious effort is applied. If conscious effort is not applied e.g. rehearsal, displacement or decay will occur and the memory will no longer exist.

In comparison, this experiment investigates whether words with meaning are more easily recognised than words without meaning, as well as the effect of time on the capacity of short-term memory. The experiment is a highly modified replication of Peterson and Peterson's experiment on short-term retention of individual verbal items. Recognition replaces their experiments instructions to recall trigrams, and both meaningful words and non-words are presented on the list of words to learn. The filled delay however remains, it occurs for 30 seconds in order to test Atkinson and Shiffrin's proposal about short term memory, and its limited capacity. The filled delay also allows trace decay to occur, because it prevents the information from being rehearsed.

Aim: To test whether words with meaning are more easily recognised than words without, as well as the effect that time, and prevented rehearsal has on the capacity and duration of short-term memory.

Operationalised Hypothesis:
Students from a Victorian independent High school will be able to recognise more words, if they identify them immediately after rehearsing, than the students who take part in a 30 second filled delay (that prevents rehearsal). However both groups that experience the two conditions will recognise more words with meaning over those without, as measured by the amount of words circled on a list containing 20 previously rehearsed words and 30 new words, each of which includes an equal amount of words with meaning (words) and words without meaning (non-words).

Method.

Design:
This experiment is an independent groups design, as two groups of participants are exposed to different experimental conditions. The independent groups design was used as it allowed us to identify the effect of the dependent variable, it also eliminates order effects (when performance in an investigation is influenced by the order in which the conditions are presented) and demand characteristics (cues expressed by the experimenter that communicate what is expected of them), as the participants only partake in one experimental condition. Likewise, this design also offers a less time consuming way of collecting data and random allocation was used to ensure that participants selected for the experiment were equally likely to be placed in either the group 1 (the control group) or group 2 (the experimental group).

Group 1 (the control group) were the participants that were not given the experimental condition. Moreover, they did not receive a filled delay after being instructed to learn the 20 words, and therefore were immediately able to circle the words they recognised on the second list.
Group 2 (the experimental group) were the participants that were given the experimental condition. Moreover, they received a 30-second filled delay where they counted backwards from 100 before being instructed to circle the words they recognised on the second list.

The first list consisted of 20 descriptive words, and non-words. The second list consisted of a total of 50 words, 20 of which were from the first list.

The independent variable was whether the participants had a thirty-second filled delay before recognising the words on the second list. The dependent variable was the amount of words that the participant could correctly recognise on the second list. The experiment took place in silence, in a distraction-free environment in order to minimise extraneous variables, such as distractions. Participants were given the same test, but with different instructions.

All participants gave a statement of informed consent. Participants were briefed before the experiment and informed of the right to withdraw. The participants were debriefed after the experiment to ensure their understanding of the true intention of the experiment. They were also informed of their right to withdraw their results and obtain a copy of their results.

Participants:
Participants were all upper school students of an independent school. The age of participants ranged from 16-18 years. There were 10 males and 10 females. Half of the participants were allocated to the control group (circling the words straight after reading them) and the other half to the experimental group (circling the words after a 30 second filled delay). Convenience sampling was used, as it is time and cost efficient and participants were randomly allocated to either the control or experimental group. All participants volunteered.

Materials:
- Consent form (appendices)
- Instructions (appendices)
- Words to examine (appendices)
- Recalled words to be circled (appendices)
- Timer (to ensure adequate time)
-Pen

Procedure:
The signed consent forms were then collected and the participants were briefed before undergoing the experiment, using the instruction sheet. Names weren't to be written on any page of the experiment to ensure confidentiality, however a capital 'M' or 'F' was written on the front of the experiment to initiate whether the participant was male or female. Each participant was then divided into either group 1 or group 2. Group 1 completed the experiment first, while group 2 waited outside. Once inside the classroom, participants were handed the experiment and asked to keep it face down until directed to flip it over, in order to ensure that everyone had the same amount of time to view the words. Participants were then given 30 seconds to learn the words. Time was measured using a timer. Once finished, group 1 were to go move onto the second list

and recognise as many words as they could from the first list, by circling them with the pen provided. Group 2 was given the same instructions, however, they had a 30 second filled delay, in order to distract them from rehearsing the words. On the conclusion of the experiment, the tests were collected and the participants were debriefed and asked to leave.

Results.

The results of this experiment (as seen in figure 1.0 and 2.0) supported the research hypothesis. The total number of correctly recognised words by participants in the control group was 147, where as participants in the experimental group recognised a far lower total number of words- 78 words, that is in fact less than double the total amount recognised by the control group.

This is a range of dispersion of 69 words, which is a 53% decrease in recognition for the E-group. It proposes that, as hypothesised the experimental group- where rehearsal was prevented through the use of filled delay recognised less words then the control group- who were able to imediatley complete the recognition task after rehearsal.

The measure of central tendency chosen to appropriately justify the results was the mean; it provides a simplistic and easily comparable view of the result in the C-group and the E-group. The mean was significantly higher in the control group, with an average of 14.7 words recognised. When compared to the average of 7.8 words recognised in the experimental group, it is clear that the independent variable had a large effect on the average amount of words recalled in both groups.

Percentage was chosen to show the difference between the amount of words recognised that were words and non-words. As seen in figure 1.1 and figure 2.1, 121 or 53.7% of the words recognised were real words and 104 or 46.2 % of words were non-words. Although this is only a dispersion range of 17 or 7.5% it still suggests that words with meaning are more frequently recognised, and supports the hypothesis.

Figure 1.0- table of words recognised

Table of the Total & Mean number of words recognised following the control and experimental conditions

	Group	
Participant	**Control**	**Experimental**
1	19	9
2	18	6
3	15	12
4	17	9
5	14	12
6	17	7
7	16	4
8	13	9
9	11	6
10	7	4
Total correct	147words	78words
Percentage out of 200 possible words recalled	73.5%	39%
Mean	14.7words	7.8words

Key:
Control group- participants who undertook the recognition process immediately after reading the list of words.
Experimental group- participants who undertook the recognition process following a 30second delay after reading the first list of words.

Figure 1.1- Table of total and percentage of words recalled

Table of Words and Non-words- total and percentage

	Total	Percentage
Words	121	53.7%
Non-words	104	46.2%

Figure 2.0- Graph of central tendency

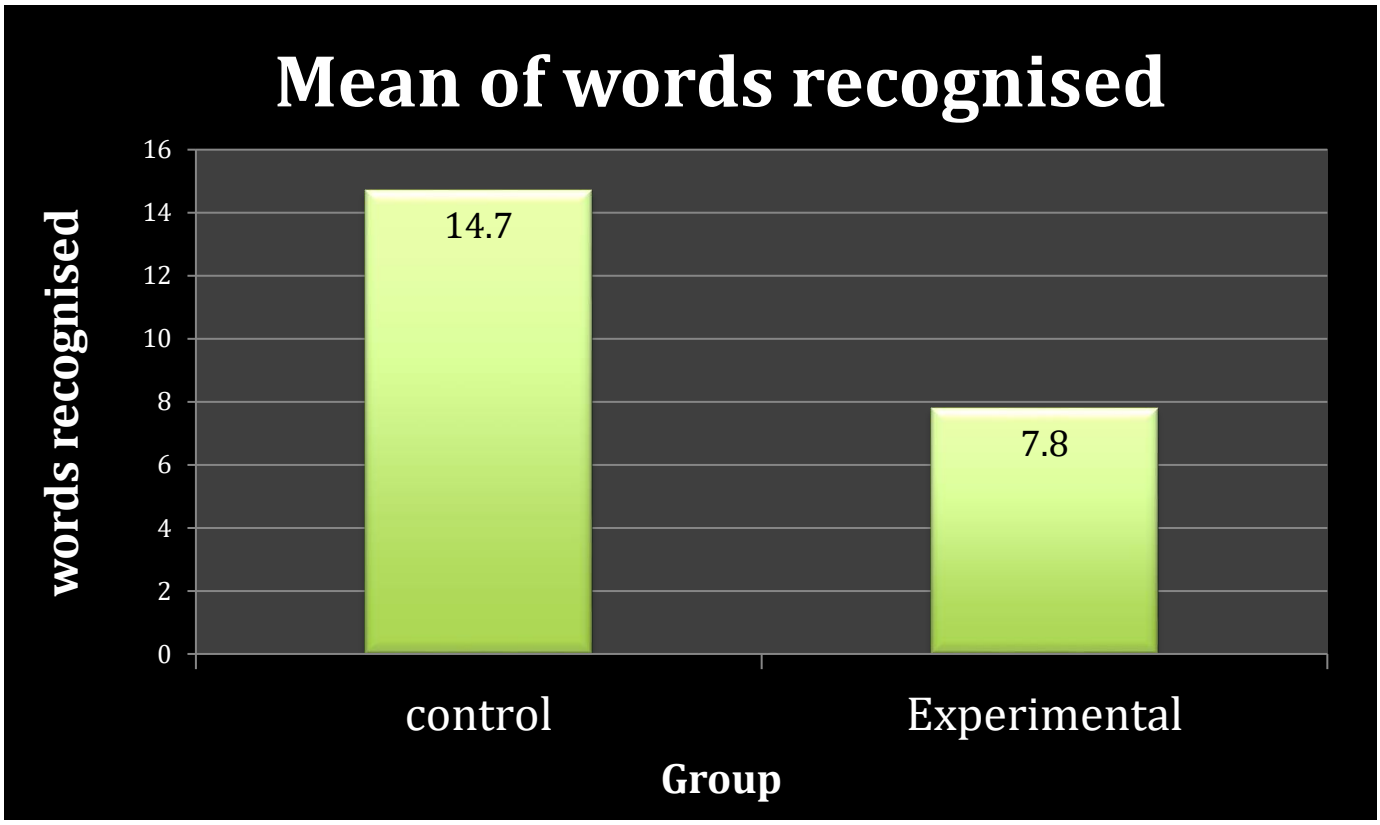
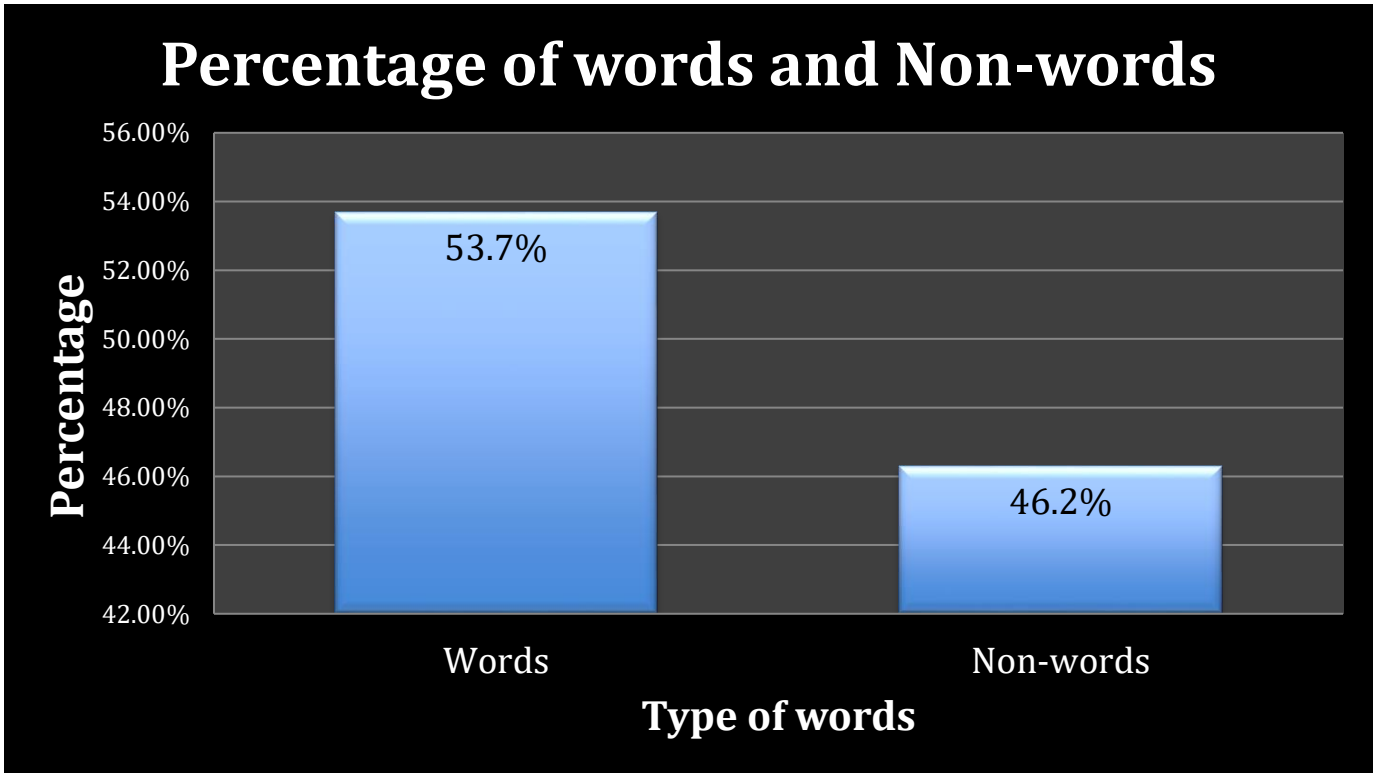


Figure 2.1- Graph of percentage of words and non-words



Discussion.

The mean number of words correctly recognised by the C-group was 14.7 out of the possible 20. The mean number of words correctly recognised by the E-group was 7.8 out of the possible 20. These values indicate that more words were in fact recognised if the participants immediately identified them after rehearsal, instead of taking part in a 30second filled delay that was initiated to prevent rehearsal. 53.7% of the words recognised were real words and 46.2% were non-words, these results indicate that there were more words recognised that had meaning and therefore the hypothesis is supported is both areas.

The results resemble those from Peterson and Peterson's (1959) experiment 'Short-term retention of Individual verbal items', where fewer words were recalled when rehearsal was prevented. Peterson and Peterson found that after 18seconds of filled delay only 10% of trigrams were recalled, by comparison, in this experiment after a 30 second filled delay 39% of the words were recognised in the second list.
Although this percentage is larger, it has to be kept in mind that the experiments were very different. Instead of instructing the participant to remember a trigram, they were to learn a list of 20 words and non-words, they also were instructed to **recognise** the words on another list rather then recall them. The decision to have participant recognise the words rather than recall them, was to test how these two methods of identification differed. Through this evidence it could be suggested that recognition of short-term memory is perhaps more easily preformed than recalling if rehearsal has been prevented.
Peterson and Peterson's experiment's results showed that after a 3 second filled delay, 80% of the trigrams were recalled. In comparison, a much closer 73.5% of words were recognised, this is only a 6.5% difference from the two experiments results.
This proposes that if rehearsal is **not** prevented then recognition and recall is similar in terms of an individuals memory.
Atkinson and Shiffrin's multi-store model of memory (1968) suggests that short-term memory has a limited capacity of 5 to 9 items and duration of around 30seconds. The accuracy of this theory is supported by the results obtained in this experiment. Participants in the C-group were able to recognise 53% more words than participants in the E-group. This suggests that because of the 30second filled delay that prevented rehearsal, only around 5-9 words should have been recognised. This indeed was evident, the mean number of words recognised for the E-group, was 7.8, which sits in the 5 to 9 item bracket.

A major strength of this experiment is that it supported the results of Peterson and Peterson's experiment (1959), where they also found that after a filled delay participant were less likely to be able to recall the information that they rehearsed. The Atkinson and Shiffrin's model of memory, particularly the proposal about short-term memory, and its limited capacity and duration is again supported. In this experiment, an equal amount of males and females were used to avoid gender bias and the identity of the participants was not exposed to ensure confidentially.
Another strength shown is the use of random allocation to assign each participant to either group, by doing so similar groups are obtained before the independent variable is administrated so that the effect can be accurately measured. The experimental procedure chosen was the independent groups design, where each participant was allocated to one group only, either the control or experimental group. Through using this design, an order effect, that is when results are affected by the order at which the conditions (experimental and control) took place, were eliminated, because the participants did not take part in both conditions.
Limitations of this experiment include; the sample size of only 20 participants, that were all from the same socio-cultural environment (school and community) and that the age of the participants only ranged from 16-18. These extraneous variables do not allow the results to be generalised to the population, as well as being culturally and age bias. Another potential extraneous variable is the fact that the experiment took place in the afternoon, therefore participants had experienced a whole day of school and may have been tired or fatigued. Demand characteristics, (cues that inform the participants about the purpose of the experiment and the expectations of the experimenter) may have occurred, as some participant might have been aware of what was being tested and therefore tried harder on their test than others.

Improvements that should be applied, if this experiment was to be repeated include, using a larger sample size, of all ages, sex's and cultural backgrounds. The use of stratified sampling rather than convenience sampling, would allow the sample to be more representative of the population. In addition, rather than using an independent groups design the repeated measures design-where each participant takes part in both conditions, would eliminate participant variables causing the individual participant differences balance out equally. However, to eliminate order effects (which occur from the repeated measures design), counterbalancing- where half the participants first perform the task administered to the experimental group and then perform the task administered to the control group, whilst the other half complete the tasks in reverse order, could be applied. Also to eliminate experimenter effect- where the experimenter interprets the results according to their hypothesis, a double blind procedure could be applied, that is where the participant & the experimenter are unaware of which condition the participants were exposed to (the C-group or the E-Group).

In conclusion to this study, it is suggested that more words are recognised if participants can immediately identify them and rehearsal isn't prevented and that there is a higher likelihood that words with meaning will be more easily recognised than those without. However, because of confounding variables mentioned above, the findings from this experiment cannot be generalised to the population.

References.

Peterson, L&M. (1959). 'Short-term retention of individual verbal items', experimental psychology, 58, pp. 193.

Edwards, R. (2011). Oxford psychology. Melbourne: Gary Underwood.

Grivas, J. (2010). VCE psychology units 3 and 4 (4th ed.) Melbourne: Macmillan Education Australia.

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Appendices

Instructions: (control group)

1. Look at the list of words on the first sheet of paper.
2. You will have 30 seconds to learn the words.
3. When time is up, place the first page on the ground.
4. Now look at the larger list of words.
5. Circle the words that you remember being on the previous page.
6. You will have30 seconds to do so.
7. Time is up
8. Please leave you page on the table
9. Thankyou for participating

Instructions: (experimental group)

10. Look at the list of words on the first sheet of paper.
11. You will have 30 seconds to learn the words.
12. When time is up, place the first page on the ground.
13. Count down in your head from 100 (experimenter times 30second)
14. Now look at the larger list of words.
15. Circle the words that you remember being on the previous page.
16. You will have 30 seconds to do so.
17. Time is up
18. Please leave you page on the table
19. Thankyou for participating

6/5/2013

VCE psychology

STATEMENT OF INFORMED CONSENT

For study on memory

As part of a year 12 VCE psychology research study, we are investigating memory.
If you give consent, you are committing to taking part in a 10-minute experiment, which will requires you to recall a series of words.
If at any time you wish to stop taking part in the experiment, you are free to discontinue participating, and may leave the room.
You are also permitted to remove your results from the experiment but keep in mind that all personal details will be held confidential and your identity will not be exposed in the reporting of results.

Name of Participant:

_____

Participant's Signature:

_____

Parent's Signature (if 16 or under)

_____

If you have any queries or concerns after the experiment, please see Georgia Hunter or Allira Sher, both year 11

students at St Leonard's College, or Mrs Gambino, Psychology Teacher at St Leonard's College.

List 1

Yalmat
Funny
Shallow
Dozart
Active
Stomig
Capable
Gamiot
Trustworthy
wobjah
ofcoote
Lazy
xvbyys
Happy
yoddlef
Interesting
Travctop
Loyal
Awkward
socnap

List 2

Classic	Cretfield	Socnap
Loyal	lazy	rebinal
Yummy	Fantastic	Funny
Rewkible	Ofcoote	Dozart
Indiscreet	Capricious	Hyperactive
Capable	Upella	energetic
Sulky	Happy	rattle
shallow	Louyw	Gamiot
Cutipil	Trustworthy	Active
Caterpillar	Tibyal	Xvbyys
Utensil	Nincopple	crazy
Interesting	Wobjah	Yoddlef
Yalmat	Trew	Rebellious
Wonderful	Sexy	Travctop
stomig	Awkward	webjhf
Jump	Toddow	Exciting
hjasdvh	Yorkshire	