LEVEL 3

PSYCHOLOGY

WORKBOOK

Sam Dudek
Sally Jackson
Nikita Farrow

Teachers of Tawa College

Foreword

The purpose of this workbook is for you to develop a sound understanding of human memory, to evaluate the memory research studies in terms of the research methodology used and to apply your research methodology knowledge through the designing of your own experiment. We hope you have fun and enjoy being cognitive psychology research scientists. Let's get experimenting!

You may have covered some of the information in your psychology lessons; it would be beneficial for you to use the activities in this workbook as a recap or move to the sections that you have not previously covered. The workbook was designed and written by teachers from Tawa College so it can support you in your assessments.

Links to standards and assessment

91873	Analyse the significance of a key piece of research and its impact on society	There are a number of key studies in this booklet that can be used for this standard.
91874	Conduct independent psychological research with consultation	Using the project brief (p60-64) to plan your psychological research.
91875	Analyse how theories are applied within a field of psychological practice	Theories within Cognitive psychology (p29-59) can support this standard.
91876	Analyse a significant issue in psychological practice	Issues in psychology can be found throughout this booklet to support knowledge needed for the external.

Table of Contents

Experimental Research Methods

What is an experiment?

An experiment involves the manipulation (changing) of an independent variable to see what effect it has on the dependent variable (measurement), while at the same time trying to control other variables which might affect the results.

Types of Experiments

There are two main types of experiments:

1. **Laboratory Experiments -** The researcher has strict control over variables and uses standardised procedures in a controlled environment. The researcher manipulates the **Independent Variable.**

Advantages	Disadvantages
Complete control over variables	Loss of validity (Ecological Validity)
Easy to replicate (Reliable)	Demand Characteristics
Quantitative data	Expensive
Able to use scientific equipment	

2. **Field experiments -** The experiment takes place in the subjects own natural environment, but the researcher still manipulates the **Independent Variable.**

Activity 1: Evaluation of laboratory experiment

Using the advantages and disadvantages of laboratory experiments as a guide, fill in the following evaluation table for field experiments.

Field experiments	
Advantages	**Disadvantages**

Activity 2: Evaluation of field experiment

Are the following experiments field or lab experiments? Explain the reason for your choice.

	Lab or field experiment? You need to justify your decision.
Godden and Baddeley (1975) Aim: To investigate the importance of settings for retrieval Procedure: Participants learned a list of words either on land or 15 feet underwater They were asked to recall the words in the same setting that they had learned them or in the opposite setting	

McGeoch and McDonaldson (1931) Aim: To examine the role of interference in forgetting. Procedure: • Participants were brought into a room one at a time to learn a list of words until they could recall them perfectly. • Some of the participants spent 10mins resting while others learned a new list of words. • After 10 minutes all participants had to recall the original list of words.	

Activity 3: The Stroop test

The Stroop test

Procedure

- Find willing participants in your household who consent to take part in an experiment; you can include yourself as a participant.
- Find the Stroop test in the Appendix 1 (p65)
- Participants should state the colour of the word, not what the word says. For example, for the word **Blue**, they should say 'red'. For the word **Brown,** they should say 'brown'.
- Participants should take great care to say the colour correctly and not race against the clock. Mistakes should be corrected
- The experimenter should check if the words are read correctly.
- The experimenter says 'start' to signal to the participant to begin reading the first list
- The participant says 'stop' at the end of the list, so the experimenter can record how long it took to read the list
- Participants should read the practice list first so both participant and experimenter can practise what they have to do (only do this once). Participants should now read **List A Non-conflicting colours, then List B Conflicting colours.**

- You need to record the time taken to complete List 1 and list 2 for each participant and record the results in the table.

Table showing the time taken to read out the word (in seconds).

	Time taken to read list A non-conflicting colours	**Time taken to read list b conflicting colours**
Participant 1		
Participant 2		
Participant 3		
Participant 4		
Total		
Mean score		

The theory behind the Stroop effect

The stroop effect- This is the delayed reaction time that occurs when the colour that the word is written in does not match the semantic meaning of the word. For example, for the word **Blue**, they should say 'red'. It is easier to say **Red** when it is written in the same colour ink as there is no interference. The words themselves interfere with your ability to quickly say the correct colour of the word. There are three theories that help to explain this Stroop effect.

1. **Selective attention theory:** This is the way you focus your attention on a particular item for a selected period of time. In the Stroop effect, naming the actual colour of the words takes more attention than simply reading the text.

Therefore, this theory suggests that our brains process written information instead of the colours themselves.

2. **Automaticity Theory:** In the Stroop effect, the brain likely reads the word because reading is more of an automatic process than recognising colours. Whereas recognising and processing colours may require more attention and time. Therefore reaction times are slowed down.
3. **Speed of Processing Theory:** This theory says that we can read colours much faster than they can name colours. The speed at which we read makes it much more difficult to name the colour of the word after we have read the word.

Psychology in action

While the Stroop test is interesting, it also has incredible uses in the world of psychology and the study of the brain. According to a study published in the National Center for Biotechnology Information, the Stroop test is valuable when assessing interference control and task-set coordinating in adults with ADHD. Also, a study published in 1976 found that it was 88.9 percent accurate in distinguishing between clients who had suffered brain damage and those who had not. Later studies confirmed these findings, and the Stroop test is often used to assess selective attention in traumatic brain injury patients.

Activity 4: Conclusion of the Stroop test

What conclusion can you draw from the results?

Variables in Psychology

Independent (IV) and Dependent Variables (DV)	• When conducting a simple experiment, you will need to have two variables. • *A variable is just a "thing" which varies!* • **An independent variable (IV)** is the term for what is being manipulated/altered/changed. For example, the type of words that are learnt by participants; type of food; type of textbook; type of shampoo. • **A dependent variable (DV)** is the term for what is being measured in a study. For example, the number of words recalled correctly. It is often a numerical value. **Stroop test** IV - **non-conflicting colours or conflicting colours** DV - **time taken to read the word list out loud**

Imagine your teacher wants to investigate whether music improves students' memory. Your teacher decides to play music in your lesson on Monday and then tests your memory with a list of words. On Wednesday, your teacher tests your memory again with a different list of words when no music is playing in the classroom.

The Independent Variable (IV) is whether the teacher is playing music in the classroom or not.
The Dependent Variable (DV) is the number of words you correctly recall from the word list.

Activity 5: Identify the variables

Have a go at identifying these variables

Do students recall more words in the morning or evening?
IV

DV

Do students have better memories for actors' faces when asked to watch a film and recall the faces immediately or after a 30-minute delay?

IV

DV

Does listening to music while revising affect exam performance?

IV

DV

Are reaction times slower for drivers who have had 4 hours sleep or 8 hours sleep?

IV

DV

Will football fans be able to remember a list of football scores better than a group of non-football fans?

IV

DV

Do women read other people's facial expressions better than men?

IV

DV

Will participants complete more press-ups in 2 minutes when in competition with other participants?

IV

DV

Other variables you need to consider when designing a study

Along with identifying the IV and DV, experimenters also need to identify possible extraneous variables. Often an extraneous variable that hasn't been controlled for can become a confounding variable. We do this to improve the validity of the study.

What is a *confounding* or *extraneous* variable?	An **extraneous variable** is one which might interfere with the DV. (These are sometimes referred to as *uncontrolled variables*).Often they are called extraneous when identifying and controlling them. If they are not controlled and may have had an impact on the DV, they become confounding. A **confounding variable** is one which has definitely interfered with the DV, and "confounded" the result.
Some examples of extraneous variables	1. Some Participants are tested in noisy a classroom while others are tested in a quiet room 2. Some Participants are short-sighted while others have good vision 3. Some of the Participants have dyslexia, and some of them are not native English speakers 4. Some Participants take part in the study in a warm room and some of them in a room with no heating 5. The experimenter gives Participants different instructions 6. Participants are tested at different times of day

Extraneous variables

Types of extraneous variables	Control of Extraneous variables
Situational Variables – These are outside influences on the experiment such as time of day, weather, noise, type of room experiment takes place in etc.	Standardisation - All instructions given to participants, procedures followed, scoring techniques and environment must be identical for all participants tested.
Order effects such as practice, boredom and fatigue often occur when a participant is asked to undertake a task more than once (e.g. the control and experimental condition in a repeated measures design experiment).	Counterbalancing - The researcher changes the order of the tasks for each participant or uses the ABBA technique. For example, in an experiment testing the effect of alcohol on reaction times, half of the participants would be tested first without alcohol (A) and then with alcohol (B) and the other half of the participants would be tested first with alcohol (B) and then without alcohol (A). This technique controls for order effects.
Participant Variables are individual differences between participants such as levels of intelligence, age, gender, social class.	A researcher can do little to control these, but careful selection of participants can reduce these. Repeated measures designs eradicate participant variables, but lead to order effects.

Activity 6: Identify extraneous and confounding variables

Thinking about the Stroop test you conducted, what extraneous variable could have affected the results and were there any confounding variables (variables that definitely impacted your results).

Possible extraneous variables	Definite confounding variables

Reliability and Validity

Reliability and validity are closely related but they mean different things. A measurement can be reliable without being valid. However, if a measurement is valid, it is usually also reliable. Reliability refers to how consistently a test measures something, whereas validity refers to how accurately a test measures what it is intended to measure.

Reliability- The term reliability refers to how consistently a test or research measures something. in psychological research refers to the consistency of a research study or measuring test. If findings from research are replicated consistently, they are reliable.

Internal reliability refers to the consistency within a test.

Split- half method: This is to compare a person's performance on two halves of a questionnaire or test. If the test is assessing the same thing in all its questions, then there should be a close correlation in the scores derived from both halves of the test.

External reliability refers to the ability to produce the same findings every time the test is carried out.

Test-retest reliability- Where a person is given a questionnaire/interview/test on one occasion, and then this is repeated again after a reasonable interval (e.g. a week or a month). If the measure is reliable, the outcome should be the same every time.

Inter-rater reliability- This can be assessed by measuring the extent to which different observers achieve similar results when observing and scoring the same participants. Observers record their own data individually, and then the sets of data from each observer are correlated to establish the degree of similarity in the scores to see if they are consistent. Inter- observer reliability is achieved if there is a significant positive correlation between the scores of the different observers.

Validity.- Refers to whether a psychological test is measuring what it claims to measure. For example, a test of intelligence should measure intelligence and not something else (such as memory).

Internal validity: This is concerned with what is happening inside a study. This refers to whether the dependent variable was due to the manipulation of the independent variable and not some other factor. In-other-words there is a causal relationship between the independent and dependent variable. Internal validity can be improved by controlling extraneous variables, using standardized instructions, counterbalancing, and eliminating demand characteristics and investigator effects.

Face Validity: Refers to whether the test appears (at face value) to measure what it claims to.

Concurrent Validity-measures how well a new test compares to a well-established test.

External validity: refers to the extent to which the results of a study can be generalized to other settings (ecological validity), other people (population validity) and over time (historical/temporal validity) outside of the study. External validity can be improved by setting experiments in a more natural setting and using random sampling to select participants.
Population Validity- The extent to which we can generalise to different people or populations.

Ecological Validity- The extent to which we can generalise to different contexts (i.e. real life, other experiments).
Mundane realism: Does the experiment 'mirror' the real world and resemble events in normal everyday life?

Psychological/experimental realism: Are the psychological processes being measured the same as occur in everyday life?

Historical/temporal validity- The extent to which we can generalise to different periods in time, e.g. is a study from the 19050s really applicable to behaviour displayed today?

Activity 7: Discuss the validity and reliability of the Stroop test.

Thinking about the Stroop test you conducted, Discuss whether it was high/low in internal validity.
Discuss whether external validity is high or low, referring to ecological, population and historical validity (where relevant).

Discuss whether it had high or low reliability

Activity 8: Mix and match validity

Match the description and example to the key term, by writing the correct numbers and letters in the key terms box.

FACE VALIDITY	1. Refers to the extent to which the results of a study can be generalised to other settings.	a. A study into television advertising in the seventies and eighties may not be *** valid today because of the many television channels available nowadays compared with the few channels that were available back then.
HISTORICAL VALIDITY	2. This refers to the degree to which different raters give consistent estimates of the same behaviour	b. A test on simple addition and subtraction appears to test mathematical skills in primary school pupils
TEST RETEST	3. Refers to the extent to which the results of a study can be generalised to other people	c. A new personality test might be compared with an older but similar test known to have good validity.
POPULATION VALIDITY	4. Individuals are asked to take the test of interest and then take the same test again at a	d. Suppose we are studying the impact of listening to Mozart on intelligence. So we decide that

	later date. The scores are then compared. If the results are very similar, then it is reliable	we are going to use a sample of people with high IQs. However, this sample would have low *** validity because the sample is extremely limited.
INTER RATER RELIABILITY	5. Is simply whether the test appears (at face value) to measure what it claims to.	e. Two psychologists are asked to observe aggressive play in a small group of children. After the observation, they compare notes to see if they agree on the number of aggressive acts witnessed.
CONCURRENT VALIDITY	6. Does a new test give similar results to an old test? This old test is considered to be valid.	f. A person takes an intelligence test consisting of 30 questions. The first 15 questions indicate that he is of average intelligence, but the second 15 questions suggest he is of high intelligence. The test is therefore thought to lack reliability.
ECOLOGICAL VALIDITY	7. Refers to the extent to which the results of a study can be generalised and overtime.	g. A person takes a personality test during January, and it reveals that he is an optimist. He then retakes it in March, and it reveals once more that he is an optimist.
SPLIT HALF METHOD	8. Measures the extent to which all parts of the test contribute equally to what is being measured. This is done by comparing the results of one half of a test with the results from the other half.	h. A test of driving is conducted using a driving simulator rather than a real car on a real road. His has low *** validity.

Hypotheses

A hypothesis is a statement or prediction of what results you expect to find after your experiment. In psychology, you must write two different types of hypothesis, a null and alternative hypothesis.

1) **Null Hypothesis** predicts that there will be no difference between the variables. For example**, The Stroop Experiment null hypothesis** could say '*there will be no significant difference between the number of words stated in conflicting colours and non-conflicting colours'.*
2) **Alternative hypothesis –** there are two types of alternative hypothesis directional and non-directional hypothesis, both are saying that there will be a significant difference between the variables. You must always include either a directional or non-directional hypothesis in a lab report as well as your null hypothesis.

- **Directional hypotheses** are predictions that state the direction the results will go in (such as bigger, faster, stronger, more, older etc). This is also known as a one-tailed hypothesis.

  Stroop experiment directional hypothesis: *participants will read the non-conflicting colour list faster than participants read the conflicting colour list.*

- **Non-directional hypotheses** are predictions that do not state the direction the results will go in. This is also known as a two-tailed hypothesis.

  Stroop experiment non-directional hypothesis: *there will be a significant difference in the speed in the reading of the non-conflicting colour list compared to reading the conflicting colour list.*

Activity 9: Directional or non-directional hypothesis?

Decide whether the following hypotheses are directional or non-directional hypotheses?

	Is the hypothesis directional or non-directional?
Alcohol significantly affects reaction time.	
Men who have beards are perceived as significantly older than men who are clean shaven.	
The quality of beer has a significant effect on bar takings.	
Boys are significantly more aggressive than girls.	
Anxiety has a significant effect on blood pressure.	
Individuals are significantly more likely to conform when in groups of five than when in pairs.	

Now rewrite all of the hypothesis so that the directional hypothesis become not and non-directional and vice versa:

Alcohol significantly affects reaction time.	

Men who have beards are perceived as significantly older than men who are clean shaven.	
The quality of beer has a significant effect on bar takings.	
Boys are significantly more aggressive than girls.	
Anxiety has a significant effect on blood pressure.	
Individuals are significantly more likely to conform when in groups of five than when in pairs.	

Experimental design

There are two main types of experimental design that psychologists use to conduct their research – each has their own strengths and weaknesses.

1. **Independent measures design -** different participants take part in the experimental conditions
2. **Repeated measures design -** the same participant take part in all experimental conditions

Activity 10: Experimental design experiments

If you have two or more people in your household, you can conduct the following experiments See Appendix 2 and 3 (p68 -69) for the lists for both experiments

Experiment 1

Repeated measure design experiment instructions

- Everyone is going to take part in both experimental conditions.
- You will be given a list of pictures and then a minute to learn them. You must then turn them over when the experimenter tells you and recall as many pictures as you can.
- You then do the same again with the next list but, this time with a list of words instead of pictures.

Experiment 2

Independent measure design experiment instructions

- Half of the participants in this investigation will be given a list with rhyming words, and the other half of the participants will receive a list of non-rhyming words.
- When you are given the list of words, you have a minute to learn them.
- You must then turn the list over when the experimenter tells you to and recall as many words as you can.

Activity 11: Evaluation of experimental design

Using the statements complete the table, evaluating the differences between the experimental designs.

There will be participant variables	More participants are required	No participant variables	Less participants required
There is a risk of order effects	A reduced risk of demand characteristics	No order effects	There is a greater risk of demand characteristics

	Strengths	Weaknesses
Independent measures design		
Repeated measures design		

Activity 12: Identify the experimental design

Which experimental design was used for each of these famous studies? (circle your choice)

1. Loftus & Palmer (1974) took 45 students from a Californian university. They all watched a film clip of two cars colliding. Then they were split into 5 groups of 9. Each group was asked a question – "About how fast were the cars going when they hit/smashed/bumped/collided/contacted each other?" Estimates of speed were found to vary according to which verb had been used in the question.

Was it Independent measures design or repeated measures design?

2. **Nisbett & Wilson** divided students into 2 groups. They watched 2 different videos of the same lecturer. In one he gave advice to students in a warm and friendly manner; in the other video, he said exactly the same words but in a cold and aloof way. Students were asked to score him on likeability. The ones who had seen the warm and friendly video scored the lecturer higher, but they didn't know why!

Independent measures design or repeated measures design?

3. **Stroop (1935)** gave 70 college undergraduates a sheet of paper to read where the words matched the colour of the ink in which they were printed (e.g. 'pink' was printed in pink ink). The Participants were asked to name the ink colour. They were also asked to read a sheet where the words did not match the ink colour (e.g. 'pink' would be printed in blue ink). Participants were asked to name the ink colour. He found that responses were slower when ink and word did not match. Counterbalancing was used to eliminate order effects.

Independent measures design or repeated measures design?

4. **Bandura, Ross and Ross (1961)** tested 74 preschoolers. They were put into groups: a control group, single sex groups who saw a violent model of either same sex or different sex and single-sex groups who saw a non-violent model of either the same sex or different sex. Children who saw a model who was violent were more likely to replicate violent acts, especially if the model was the same sex as them

Independent measures design or repeated measures design?

5. **Kiecolt-Glaser (1984)** took blood samples from 75 first year medical students a) one month before their final examinations (relatively low stress), and (b) during the examinations (high stress). She found that they had reduced immune systems during times of stress.

Independent measures design or repeated measures design?

Activity 13: discuss the external validity of two experiments

Select two of the research studies above and discuss whether external validity was high or low (referring to ecological, population and historical validity where relevant).

Research Study	Evaluation of study in terms of validity

Sampling

When we carry out research, we need people to take part, these are called participants.

The **target population** is the group of people from whom the sample is drawn. For example, if the sample of participants is taken from colleges in Wellington, the findings of the study can only be applied to that group of people and not all college students in the NZ and certainly not all people in the world.

It is not usually possible to test everyone in the **target population,** so therefore psychologists use sampling techniques to choose people who are representative (typical) of the population as a whole. If your sample is representative, then you can generalise the results of your study to the wider population.

Sampling techniques

We will now examine some of the techniques used by psychologists to obtain participants for their sample;

- Random sample
- Opportuning sample
- Volunteer sample (aka self-selecting)

Opportunity sampling is the sampling technique most used by psychology students. It consists of taking the sample from people who are available at the time the study is carried out and fit the criteria you are looking for.

Random sampling is a sampling technique which is defined as a sample in which every member of the population has an equal chance of being chosen. This involves identifying everyone in the target population and then selecting the number of participants you need in a way that gives everyone in the population an equal chance of being picked.

Volunteer sampling (or self-selected sampling) consists of participants becoming part of a study because they volunteer when asked or in response to an advert.

Strength and weaknesses of sampling techniques

	Strength	Weakness
Random sample	For very large samples it provides the best chance of an unbiased representative sample.	For large populations, it is time-consuming to create a list of every individual.
Opportunity sample	Quick, convenient and economical. A most common type of sampling in practice.	Very unrepresentative samples and often biased by the researcher who will likely choose people who are 'helpful'.
Volunteer sample	Relatively convenient and ethical if it leads to informed consent.	Unrepresentative as it leads to bias on the part of the participant. E.g. a daytime TV advert would not attract full-time workers.

Activity 14: Sampling methods

What is the target population in the following studies?

a. In investigation into who donates money into a collection bucket in Auckland CBD.

b. A study investigating teenage sleepwalkers

c. An observation of anti social behaviour at soccer games.

Can volunteer samples be truly representative of the target population, explain your answer fully?

If a psychologist wanted to conduct a study on a school to investigate stress levels across staff and students;

How would the psychologist select a random sample from the school?

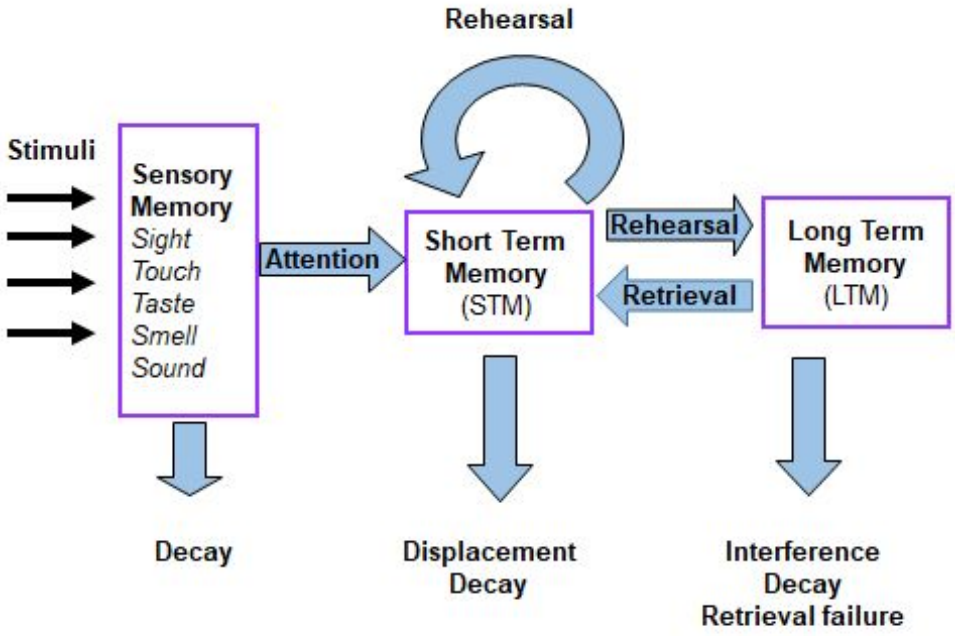
How would an opportunity sample be selected?

What would the psychologist do to use a volunteer sample and how could you ensure a large number of participants?

iii. Which is the best sample to use, explain you answer fully?

Cognitive Psychology: Memory

Atkinson and Shiffrin's Multi Store Model (MSM) of memory (1968)

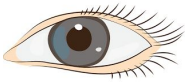


THEORY:

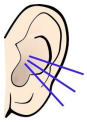
Atkinson and Shiffrin's Multi Store Model of Memory (MSM) suggests that we have multiple memory stores. It's easy to think of these as separate boxes that store information for different periods of time. The MSM suggests that there are three memory stores: Sensory Memory Store, Short Term Memory Store (STM), and a Long Term Memory Store (LTM).

In order for information to reach the Long Term Memory (LTM) it must first pass through the Sensory Memory and Short Term Memory (STM) in that order. Information is passed from the Sensory Memory to STM when it is attended to, and then encoded from STM to LTM when it is rehearsed sufficiently.

The five senses



Sight



Hearing

Smell

Taste

Touch

Sensory memory is the initial memory store; it instantly takes in information from our senses without us even realising. The function of sensory memory is to retain information long enough for us to decide whether or not it is worthy of processing. The duration of sensory memory is 150-500 msec for visual information and 1-2 sec for auditory information. Its capacity to hold information is considered to be very large.

Once we decide that the information in the sensory memory is important we pay attention to it and pass it onto our Short term memory (STM), if we do not pay attention to it, the information is forgotten. Information stays in the STM for a short period of time, if it is rehearsed (think about something again and again) it stays in STM for a longer period of time. If information is rehearsed enough times, the information is passed onto Long term memory (LTM), where it stays.

The LTM has an unlimited capacity. Its duration is unlimited, and the main form of encoding is semantic (meaning). Information is forgotten by interference, retrieval failure due to lack of cues or decay.

Activity 15: Evaluation of the MSM

Identify if the studies below provide evidence in support or against the MSM and explain your reasons fully.

Study	Evidence in support or criticising MSM? Justify your choice.
Shallice and Warrington (1970) reported the case of KF. As a result of a motorbike accident, he had an extremely poor STM (only one or two items).	

Yet his LTM for events after the accident was normal. However, KF's deficit in STM was only for verbal information. His STM for visual and acoustic material was normal. This suggested the existence of more than one type of STM, which is not what the MSM suggests.	
Bekerian and Baddeley (1980) investigation found that people didn't know the changes to the BBC radio wavelengths despite hearing the information, on average, well over a thousand times.	

When investigating the MSM psychologists are often interested in the encoding, capacity and duration of the STM and LTM stores. In this booklet, we will be looking at the capacity and duration of STM

Capacity of STM

RESEARCH STUDY:

Jacobs (1887) and Miller (1956) studied the capacity of STM. Miller discovered that most participants could only recall between 5-9 items, in mathematics, this is represented as 7 + or – 2 or an average of 7 items, hence Magic 7. The capacity of STM is limited to between 5-9 items, but it can be increased by chunking. Chunking is when you take smaller pieces of information and combine them into more meaningful

wholes. For example, if you need bananas, eggs, Nutella, and tea from the supermarket, you can create ONE word out of the first letters of each item you need- BENT. Therefore, instead of remembering 4 items, you now only need to remember one unit of information.

Activity 16: Capacity of STM

What does it mean by chunking? Give an example of when you can use chunking in your life.

What does this study suggest about the capacity of STM?

Activity 17: Replicating Jacobs study

Let's replicate Jacobs study.
Procedure:

1. Find willing participants in your household who consent to take part in an experiment, you can include yourself as a participant.
2. You read the number out loud to the participants one line at a time.
3. Once you have read the line, your participant must immediately write down the number sequence they remember.
4. Read out the same sequence again and the participant checks if they got it right.
5. If a participant gets a number wrong, they are no longer participating in the test. They must count how many numbers are in the last sequence they got right. This is now their total.

6. Read out the next sequence and continue until everyone has stopped.
7. Fill in the data table below and calculate the mean average capacity of the STM.

Numbers for memory test.

1,5,6

6,3,7,1,

4,8,6,3,6,

7,0,8,3,5,6,

2,5,9,7,0,8,4,

6,4,7,1,0,8,5,3

2,4,1,9,7,0,3,6,8,

3,6,2,8,4,9,3,7,1,5

8,5,3,8,2,0,1,4,7,1,9,

Family member	Number of digits able to be recalled.
Mean average number of digits recalled.	

Activity 18: Application of research methods

Using the Jacobs (1887) study identify the following:

What was the IV :

What was the DV :

Identify factors that may affect the capacity of STM.

Duration of STM

RESEARCH STUDY:

Peterson & Peterson studied the duration of STM. Peterson and Peterson (1959) carried out a lab experiment. 24 Psychology students were presented with sets of trigrams (nonsense three letter words such as MJR), which they were asked to recall in order after a delay of 3, 6, 9, 12, 15, 18 seconds. During the delay before recall participants were asked a distraction task to prevent rehearsal, they were asked to count backwards by 3 (this is called the Brown-Peterson technique) The percentage recall was: After 3 seconds: 80%, After 6 seconds: 50%, After 18 seconds: less than 10%.

Activity 19: Application of research methods

Peterson & Peterson

What was the IV :

What was the DV :

Write an experimental hypothesis:

Is the experimental hypothesis directional or non-directional?

What experimental design was used?

Give reasons why this experimental design was used and justify why it was the most appropriate experimental design to use.

What experimental method was used:

What conclusion can you draw from these results?

This study was a laboratory experiment. Discuss a strength of using a laboratory experiment in the context of this study. Justify why this method was chosen.

This study was a laboratory experiment. Discuss a weakness of using a laboratory experiment in the context of this study.

Activity 20: Replication of Peterson and Peterson's experiment

Instructions:

- Find willing participants in your household who consent to take part in an experiment, you can include yourself as a participant.
- Practise: Look at 3 random letters/trigrams, e.g. MQT.
- Then count backwards in 3's from a large number, e.g. 847 for 3 seconds.
- You will be timed for 3 seconds then asked to recall the 3 letters in the correct order.
- You need to record the number of participants who correctly recalled the trigram.

Start:

- **KMN** Count backwards in threes from 768. After 3 secs tell the participants to stop and recall the 3 letters in the correct order.
- **RSW** Count backwards in threes from 543 until instructed to stop. After 6 secs tell the participants to stop and recall the 3 letters in the correct order.
- **TRM** Count backwards in threes from 693 until instructed to stop. After 9 secs tell the participants to stop and recall the 3 letters in the correct order.
- **HVQ** Count backwards in threes from 294 until instructed to stop. After 12 secs tell the participants to stop and recall the 3 letters in the correct order.
- **NGV** Count backwards in threes from 418 until instructed to stop. After 15 secs tell the participants to stop and recall the 3 letters in the correct order.
- **CPW** Count backwards in threes from 528 until instructed to stop. After 18 secs tell the participants to stop and recall the 3 letters in the correct order.

No. of seconds spent counting backwards.	No. of participants who correctly recalled trigram.
3	
6	
9	
12	
15	
18	

Research investigating the existence of multiple memory stores.

For psychologists to have confidence in a theory, it must be tested. The following studies investigate the existence of multiple memory stores.

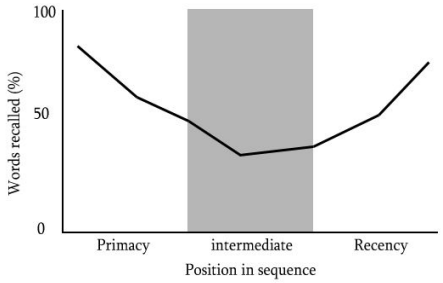
RESEARCH STUDY:

Murdock (1962)

- Aim: - To investigate whether STM and LTM are different memory stores.
- Procedure: - Participants were given a list of 21 common words to memorise for two mins; they were then asked to recall as many as possible.
- Results: - Participants remembered more words on average from the beginning (Primacy) and end (Recency) of the list than the middle. This is known as the serial position effect.

THEORY:

The Serial Position Effect: Participants remembered more words from the beginning of the list (primacy effect) because they had been transferred by rehearsal to the long-term memory. Words at the end of the list (recency effect) were recalled because they were still in the STM. Words in the middle were forgotten because of the limited capacity of STM (7+ or – 2 (Miller)).



Activity 21: Application of research methods

Murdock 1962

What was the IV :

What was the DV :

Write a null hypothesis:

If you were to replicate the Murdock study, what extraneous variables would you need to identify and control to improve the validity of your study?

Activity 22: Replication of Murdock study

Aim: To investigate whether the position of a word in a list affects the likelihood of its recall.

Procedure

1. First, you need to think about the ethics. See Appendix 7 page 76 for a copy of NZ Ethics. Note down which issues are relevant and how you will deal with them.

2. Next, you need to create a list of 20 words. Think about what sort of words are best.

3. Thirdly, write a consent form - See Appendix 5 page 74 for an example of how to write a consent form.

4. Now write a procedure. This is a set of standardised instructions so that each participant is doing exactly the same task.

5. Now, carry out the study on members of your whanau/bubble.

6. Record your data in the data table and present your results in a graph. Don't forget to give your graph a title and label the axes.

Position of word in list	The number of participants who correctly recalled it
1	
2	
3	
4	
5	

6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

Using your results create a graph on the grid below. Remember to add a clear title and label the axis.

Title:

7. **Describe your graph**

8. **Does your study support Murdock's theory, explain your answer fully**

9. **Discuss the reliability of your experiment**

Activity 23: Description of the MSM

Use this word bank to complete this description.

Semantic	Decay	Sensory information	Coded	Displacement
Unlimited	30 seconds	Unlimited	Decays	Interference
Acoustically	Decay	0.5 seconds	5-9 units of information	

- **Atkinson and Shiffrin's** theory describes memory as a flow of information through an information processing system.
  Information passes from one store to another in a fixed sequence. There are 3 stores, sensory memory, short term memory and long term memory.

- The information from the environment
  (e.g.....) first enters our sensory register.

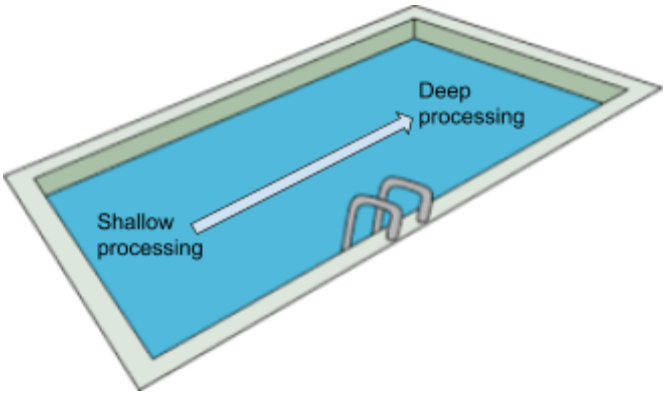
- **Sensory register** refers to the first and most immediate form of memory you have. It has a duration of……
  and …….. Capacity. The information is c……. in its original form.

- If it is relevant to us and we pay attention to it, it enters our STM. If we don't pay attention to it, it d……..

- The STM has a capacity of..... The duration is.....if not rehearsed. The main form of coding is a…….. (sound). The information is forgotten by d…… or d…….

- The LTM has an unlimited capacity. Its duration is.....
  The main form of encoding is s…….. (meaning). Information is forgotten by i…….. or d…….
- Therefore, for information to get to long term memory, it has to first flow through sensory register and short term memory

Levels of Processing Model of memory (Craik and Lockhart, 1972)



THEORY:

In comparison to the multi-store model, this theory states that memory is a by-product of the depth of processing of information,the deeper information is processed, the longer a memory will last. Therefore, instead of concentrating on the separate stores involved (i.e. short term memory & long term memory), think of your memory as a swimming pool with a deep and shallow end. This theory concentrates on how information is processed. We can process information with;

Shallow Processing	Deep processing
Structural processing (appearance) which is when we encode only the physical qualities of something. E. Was the word written in capital letters?	Semantic processing, which happens when we encode the meaning of a word and relate it to similar words with similar meaning and link to prior knowledge. For example 'Does the word go in this sentence . . . . ?
Phonemic processing – which is when we encode its sound. For example 'Does the word rhyme with . . .?	

As well as creating the model of memory Craik and Tulving provide evidence for the theory

RESEARCH STUDY:

Craik and Tulving (1975)

Aim: To investigate how deep and shallow processing affects memory recall.

Method:24 Participants were presented with 60 words about which they had to answer one of three questions. They were not told that they would be asked to remember these. Some questions required the participants to process the word in a deep way (e.g. semantic) and others in a shallow way (e.g. structural and phonemic). Participants were then given a long list of 180 words into which the original words had been mixed. They were asked to pick out the original words. Recall was 17% for words processed structurally, 36% for words processed phonetically, and 65% for words processed semantically.

Conclusion: Semantically processed words involve elaboration rehearsal and deep processing which results in more accurate recall. Phonemic and visually processed words involve shallow processing and less accurate recall.

Activity 24: Application of research methods

Craik and Tulving (1975)

- Write a null hypothesis:

- Discuss the external validity of this study- refer to population and ecological validity:

Explanations for Forgetting

The three explanations for forgetting we will investigate are interference theory, retrieval cues and state-dependent.

THEORY: Interference theory

Interference occurs when similar memories interfere and disrupt each other. Interference can be proactive: - older memories interfering with newer ones (forwards interference) or retroactive: - newer memories interfering with older ones (backwards interference). Interference is much more likely when memories are similar. For example, if you change your phone number, the old number can interfere with the new one making it likely you will forget the new one – proactive interference.

For example, imagine you have learned to drive a car in NZ, you will have learned to drive on the left hand side of the road.

You then fly to the USA for your holidays and hire a car. Driving out of the car rental place, you nearly cause an accident because you failed to drive on the right. This is one example of interference.

You return to NZ and, driving out of the driveway, you find yourself in the right hand lane. This is another example of interference.

Activity 25: Proactive or retroactive interference?

Can you identify which is the proactive interference and which is retroactive interference?

Give an example of when you have been affected by proactive or retroactive interference

RESEARCH STUDY: McGeoch and McDonald (1931)

Aim: To test the effects of similarity in retroactive interference

Procedure: They studied retroactive interference by changing the amount of similarity between two sets of materials. 12 participants had to learn a list of 10 words until they could remember them 100% accurately. They then learned a new list.

There were six groups of participants who had to learn different types of lists.

- Group 1 – Synonyms – words with the same meanings of the originals.
- Group 2 – Antonyms – words with the opposite meanings of the originals.
- Group 3 – Words unrelated to the original ones.
- Group 4 – Nonsense Syllables.
- Group 5 – three-digit numbers.
- Group 6 – No new list – these participants just rested.

Findings

The results show that the highest recall was in group 6, followed by group 5, group 4 , group 3 and so on. The lowest recall was in group one when the words had the same meanings as the original list of words. This group had significantly lower levels of recall.

Activity 26: Write a conclusion

Conclusion: Write a conclusion about the results suggest about the effects of similarity on interference.

Activity 27: Application of research methods

Write a directional hypothesis for the McGeoch and McDonald study

If you were to run this study in your school using 50 students, what type of sampling method would you use and why?

Activity 28: Design an experiment

Design an experimental hypothesis investigating the effects of interference in real life.

Eg. The hypothesis is that it will take them a lot longer to write a message on an unfamiliar phone than on a familiar phone because their knowledge of the familiar phone interferes with using an unfamiliar one.

Psychology in action

Implications on the reliability of eyewitness testimonies- Elizabeth Loftus is a cognitive psychologist and has investigated factors affecting eyewitness memory. Due to the reconstructive nature of memories, misinformation supplied and post event discussion after the event can change someone's memory. For example, if you witnessed a car crash and then the next day others were talking to you about their perspective and what they saw, this new information may interfere with or disrupt your personal memories of the crash. Resulting in the memory being inaccurate. This has implications on the accuracy of eyewitness testimonies and the legal system.

Creating False Memories

False memories are when you confidently experience things that have never happened. It is not about forgetting or mixing up details of things that have happened.

Research Study: Roediger & McDermott, 1999

Participants hear lists of 15 words, and then later participants are given a test in which they are shown a list of words and asked to pick out the ones they'd heard earlier. This second list contains some words from the first list and some words not from the list but which are related/ associated to the words in the original list. When participants were tested, 10% of the participants falsely recalled king, 61% falsely recalled sleep and 65% falsely recalled Window. The words on the lists were associates of window, sleep, and king, respectively. i.e., words that people are likely to produce as immediate associations to that word.
This is because they activate the schema- and use this to fill in missing information.

Activity 29: Replicate Roediger & McDermott, 1999

Procedure:

1. Find willing participants in your household who consent to take part in an experiment. Remind them that they have the right to withdraw at any time.
2. In the Appendix 4 page 72 you will have 3 different lists of 15 words.
3. Show the first word list to the participants for 2 mins for them to try to remember as many words as they can.
4. Ask the participants to recall as many of the words as they can, the order is not important. They have two minutes to recall.
5. Record these words onto their paper.
6. Show the second word list to the participants for 2 mins for them to try to remember as many words as they can.
7. Ask the participants to recall as many of the words as they can; the order is not important. They have two minutes to recall.
8. Show the third word list to the participants for 2 mins for them to try to remember as many words as they can.
9. Ask the participants to recall as many of the words as they can; the order is not important. They have two minutes to recall.
10. Record the results in the table below. Ask the participants to look at list one and count the number of participants who falsely recalled 'window'?

11. Ask the participants to look at list two and count the number of participants who falsely recalled ‘sleep’?
12. Ask the participants to look at list three and count the number of participants who falsely recalled ‘king’?

False Word	**Number of participants who recalled this word**
Window	
Sleep	
King	
Total number of Participants	

THEORY: Retrieval cues

To access information stored in our LTM we need retrieval cues. These can be sights, sounds, smells or emotions. For example, your teacher may give you mnemonics or teach memory strategies like acronyms to help give you cues to retrieval.

This theory proposes that when we learn the information, we also encode:

- The context (external cues) in which we learn the information and
- The mental state we are in (internal cues).

These can act as cues to recall.
Forgetting, according to this theory is due to lack of cues (triggers).

Context-Dependent Forgetting

Context-dependent forgetting can occur when the environment during recall is different from the environment you were in when you were learning.

For example you may go to another room to get something you need, but when you get to that room, you forget what you went there for. When you go back to the first room, you remember what it was that you needed.

Evidence for context dependent forgetting can be found in an unusual study using deep sea divers.

RESEARCH STUDY:

Godden and Baddeley (1975)

Aim: To investigate the effect of environment on recall, 18 divers from a diving club in Scotland were asked to learn lists of 36 unrelated words of two or three syllables

4 conditions :

1. Learn on beach recall on beach (same context)
2. Learn on beach recall underwater (different context)
3. Learn underwater recall on beach (different context)
4. Learn under water recall under water (same context)

Results:

	Learn on beach	Learn under water
Recall on beach	13.5	8.5
Recall under water	8.6	11.4

Conclusion: This shows that context acted as a cue to recall as the participants forgot more words when they learnt and recalled the words in different environments than when they learnt and recalled the words in the same environment. Abernathy (1940) also found that students performed better in tests if the tests took place in the same room as the learning of the material had taken place, and were administered by the same instructor who had taught the information.

Activity 30: Application of research methods

What were the characteristics of the sample and the sampling method used?

What could be some possible extraneous variable that Godden and Baddley could have encountered?

Discuss this study in terms of both internal and external validity

Activity 31: An Investigation into the Role of Context in Forgetting

Replicate the Godden and Baddley study using different spaces at home and write up your results in the form of a lab report.

Introduction:

One theory of why people forget is that they have encoded information in a different context to which they have to recall it. Context is the general setting or e…….. where in which activities happen. We need the c…… of the same environment to help us recall. Without this cue, we will forget.

Hypothesis:

Participants who l……. and r…… a list of words in the same c…….. will recall more w……. than p…… who learn and recall a list of words in d……. contexts.

Method:

Design

- The independent variable for this study was ……
- The dependent variable was ……
- The research method used was a……..
- The participant design was …….. as different participants were used in each condition.
- One thing that we did to control the experiment was ……
- This study was made ethical by ……

Participants

- A sample of …… participants were selected
- The sampling technique was …… as we used…… ……

Materials *list the equipment that you used in this experiment.*

-
-
-
-
-
-

Procedure *write down everything that happened including: where, when, reading out the brief, whether participants were tested alone or in a group, reading out the standardised instructions, how the words were presented and for how long, timings before recall, changing context, recall, how long you allowed them to recall, and reading out the debrief.*

……

……

……...

……

……..……

……

……

……

……..……

……..……

Results:

Title of table

	Learned and recalled in the same environment	Learned and recalled in a Different environment
Percentage recalled		

The data is also presented in a bar chart (don't forget to label the axis)

Title:……

Describe what the graph shows

Discussion:

Conclusion

……

……..……

……

……..……

……..

Evaluation

This study had low ecological validity because……..……

……

……

This study had low internal validity. There were some extraneous variables such as

……

……

……

This study had low population validity. The sample was not representative because……

……

……

Extension work:

If I were to carry out this experiment again I would improve it by

……

……

Discuss the psychological ideas relating to the research based on the findings.

……

……

THEORY: State-dependent forgetting

State-dependent forgetting occurs when your mood or physiological state during recall is different from the mood you were in when you were learning.

RESEARCH STUDY:

Goodwin et al (1969)

The aim was to investigate the effect of state on recall. Forty-eight male medical students participated on day 1 in a training session and on day 2 in a testing session.

They were randomly assigned to four groups.

- Group1: (SS) was sober on both days.
- Group 2: (AA) was intoxicated both days.
- Group 3: (AS) was intoxicated on day 1 and sober on day 2.
- Group 4: (SA) was sober on day 1 and intoxicated on day 2.

The results showed that more errors were made on day 2 in the AS and SA condition than in the AA or SS conditions. The SS participants performed best in all tasks. This supports the state-dependent memory theory as the performance was best in the participants who were sober or intoxicated on both days.

Activity 32: Application of research methods

Goodwin et al (1969)

What was the IV :

What was the DV :

What experimental design was used

What experimental method was used:

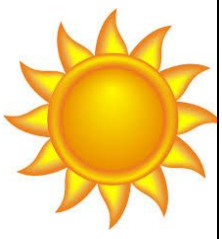
What are characteristics of the sample:

Psychology in action:

How to become a better learner!!
We need to encode information deeply by linking it to knowledge we already have and make meaning. We also need to use effective cues to retrieve the memories. Here are some examples of strategies that we can use to improve our memory.

1) **Peg word Technique-** You come up with a set of peg words that you can " hang" memories onto by forming a visual image with the peg word to provide excellent cues.

You start by making the pegs, the easiest way to do this is to use rhyming words, For example, One is Sun, Two is shoe, Three is tree, Four is door…

	1	2	3	4	5
Peg	**Sun** 	**Shoe** 	**Tree** 	**Door** 	**Dive** 
	6	**7**	**8**	**9**	**10**
Peg	**Stick** 	**Heaven** 	**Gate** 	**Vine** 	**Pen** 

Then if you have a list of items you need to remember you visualise the item with the peg word eg. **cereal, bread, Nutella, baking soda** are items that I need for my grocery list.
So I will visualise a box of **cereal** I might think of the a bowl of **cereal** with the milk going sour in the sun (number 1 as its the first item on my list and it the first peg word so the grocery item has to link to sun), then you visualise a loaf of **bread** (next item on my grocery list) and imagine finding a slice of **bread** inside a

shoe (shoe is number 2 as in second item on list), then visualise **nutella** jars hanging around a tree instead of **nutella** nuts, and **baking soda** splashed onto a door.

2) **Method of Loci-** Simon Reinhard developed mental "journeys" so that you can visualise the items that you need to recall with the location in your journey. For example, Use your house and different locations in your house that you know well and they need to associate the different items on the list with the locations on their "journey".

Activity 33: Put into practice

Ask someone in your house to give you 5 random items for a grocery list and write the story linking peg words with the grocery list

Activity 34: Links to Levels of Processing theory

Explain how the peg technique supports the Level of Processing theory and retrieval cues theory

Activity 35: Conduct your own experiment

Now is your chance to design and conduct your own experiment to demonstrate a different factor that can improve memory. You will need to link it to a theory and discuss how the memory strategies might be applied to help you to "Become a better learner".

These can include:

- Levels of processing
- Organisation
- Imagery

- Repetition
- Cued recall
- Method of Loci

The theory I will test is:

Experimental Method Project Brief

Aim of your experiment:	
Hypothesis	*Null* *Alternative*
Design	
Method	Circle one: Lab Experiment Field Experiment
	Describe the reasons for the choice of the method used and justify why it was the most appropriate method
Design	Circle one: Independent Measures Repeated Measures
	Describe the reasons for the choice of the experimental design used and justify why it was the most appropriate design

Identify the variables:	Independent Variable & conditions: Dependent Variable:
Identify the extraneous variables, and what you will do to control them:	

Ethical guidelines: Informed consent, Protection from harm, Confidentiality, Privacy, Right to withdraw, Deception.

Ethical guideline	Principle	Describe how you will meet the guideline

Participants	
Target population	
What will your sample look like?	
Sample	Volunteer sample Opportunity sample Random sample
	Describe the reasons for the choice of the sampling method used and justify why it was the most appropriate method

List the materials you will need:

Experiments require standardised procedure, so you have to plan what you will say and do down to the last detail.	
Outline your step-by-step procedure	
What will you say during your debrief?	

Draw what your data collection table will look like	
Consider the good and bad points of your research design and what you might have changed. 1. The sample – would you get the same results with a different sample? Explain why. 2. Controls – are there other things that should have been controlled? What effect might this have had? 3. The way used to measure memory – you used a real-life reported incident but did participants behave like they would have in everyday life? 4. Standardised instructions – did you give the same information to all participants or did you have to add further information?	

5. The attention paid to ethics – were participants in any way affected by taking part in the study?

6. The application of results – are there problems with generalising from these results?

7. Are there any other improvements that could be made?

References

Abernethy, E. M. (1940). The effect of changed environmental conditions upon the results of college examinations. The Journal of Psychology: Interdisciplinary and Applied, 10, 293–301.

Atkinson, R. C., & Shiffrin, R. M. (1968). Chapter: Human memory: A proposed system and its control processes. In Spence, K. W., & Spence, J. T. The psychology of learning and motivation (Volume 2). New York: Academic Press. pp. 89–195.

Bandura, A., Ross, D. & Ross, S.A. (1961). Transmission of aggression through imitation of aggressive models. Journal of Abnormal and Social Psychology, 63, 575-82.

Bekerian, D. A., & Baddeley, A. D. (1980). Saturation advertising and the repetition effect. Journal of Verbal Learning & Verbal Behavior, 19(1), 17–25.

Craik, F. I. M., & Tulving, E. (1975). Depth of processing and the retention of words in episodic memory. Journal of Experimental Psychology: General, 104(3), 268–294.

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

Godden, D. R., & Baddeley, A. D. (1975). Context-dependent memory in two natural environments: On land and underwater. British Journal of Psychology, 66(3), 325–331. https://doi.org/10.1111/j.2044-8295.1975.tb01468.x

Goodwin, D. W., Powell, B., Bremer, D., Hoine, H., & Stern, J. (1969). Alcohol and recall: State-dependent effects in man. Science, 163(3873), 1358–1360

Jacobs, J. 1887 Experiments on" prehension". Mind, 12, 75-79.

Kiecolt-Glaser, J. K., Garner, W., Speicher, C., Penn, G. M., Holliday, J., & Glaser, R. (1984). Psychosocial modifiers of immunocompetence in medical students. Psychosomatic Medicine, 46(1), 7-14.

Loftus E.F., Palmer J.C. (1996) Eyewitness Testimony. In: Introducing Psychological Research. Palgrave, London

McGeoch, J. A., & McDonald, W. T. (1931). Meaningful relation and retroactive inhibition. The American Journal of Psychology, 43, 579–588.

Miller, G. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. The psychological review, 63, 81-97.

Murdock, B. B., Jr. (1962). The serial position effect of free recall. Journal of Experimental Psychology, 64(5), 482–488.

Nisbett, R. E., & Wilson, T. D. (1977). The halo effect: Evidence for unconscious alteration of judgments. Journal of Personality and Social Psychology, 35(4), 250–256.

Peterson, L., & Peterson, M. J. (1959). Short-term retention of individual verbal items. Journal of Experimental Psychology, 58(3), 193–198.

Shallice, T., & Warrington, E. K. (1970). Independent functioning of verbal memory stores: A

neuropsychological study. The Quarterly Journal of Experimental Psychology, 22(2), 261–273.

Stadler, M. A., Roediger, H. L. III, & McDermott, K. B. (1999). Norms for word lists that create false memories. Memory & Cognition, 27(3), 494–500.

Stroop, John Ridley (1935). "Studies of interference in serial verbal reactions". Journal of Experimental Psychology. 18 (6): 643–662.

Appendix

In this section you will find all the raw materials to carry out the experiments.

Appendix 1: Stroop Test

Note continues onto next page

Practise list	List A Non-conflicting colours	List B Conflicting colours
Brown	Red	Brown
Green	Blue	Red
Red	Green	Brown
Purple	Brown	Purple
Red	Purple	Green
Brown	Blue	Purple
Green	Red	Brown
Blue	Brown	Brown
Red	Green	Red
Blue	Red	Purple
Purple	Purple	Green
Red	Red	Brown

Purple	Blue	Green
Green	Brown	Red
Purple	Purple	Blue
Red	Red	Purple
Green	Green	Red
Red	Purple	Green
Purple	Blue	Red
Green	Purple	Blue
Purple	Brown	Green
Blue	Green	Brown
Green	Brown	Blue
Brown	Red	Purple
Blue	Green	Blue
STOP	STOP	STOP

Appendix 2: Experiment 1 images vs written words

WORDS LIST

HOUSE	**PHONE**	**CLASSROOM**	**CAMERA**
PLASTER	**GLUE**	**BUCKET**	**TENNIS RACQUET**
ICECREAM	**MICROWAVE**	**PAN**	**BOWL**
BAG	**DRESS**	**PENCIL**	**BOTTLE**
BANANA	**SCREWDRIVER**	**GLOVE**	**BRUSH**

IMAGE LIST

Appendix 3: Experiment 2 rhyming vs non rhyming words

RHYMING WORDS LIST

LIST	**MIST**	**FIST**	**GIST**
HISSED	**KISSED**	**MISSED**	**TWIST**
WRIST	**INSIST**	**ASSIST**	**CONSIST**
DISMISSED	**ENLIST**	**PERSIST**	**RESIST**

NON RHYMING WORDS LIST

CUP	**FAN**	**COFFEE**	**GAME**
TELEVISION	**BOOK**	**SMOOTHIE**	**SHOE**
HEAD	**DRESS**	**JEANS**	**CHOCOLATE**
FLOWER	**DOOR**	**HOUSE**	**BOTTLE**

Appendix 4: Experiment 3 replication of Roediger & McDermott, 1999

List One

door	glass	pane
shade	ledge	sill
house	open	curtain
frame	view	breeze
sash	screen	shutter

List Two

bed	rest	awake
tired	dream	wake
snooze	blanket	doze
slumber	snore	nap
peace	yawn	drowsy

List Three

queen	England	crown
prince	George	dictator
palace	throne	chess
rule	subjects	monarch
Royal	leader	reign

Appendix 5: Example of consent form

My name is . . . . . and I am carrying out a study into . . . . . The details of what the study will involve are:

. . . . . .
. . . . . .

Your results will remain anonymous and the data that you provide will be kept confidential.

If at any point in the study you do not want to carry on, please tell me and I will stop the study and withdraw your results.

At the end of the study, I will debrief you and explain what happened in the study.

Have you got any questions?

Thank you for your time.

If you do wish to participate in my study - thank you for agreeing to help.

Please sign below if you agree to take part.

Name . . . . . .

Date.

Appendix 6: BPS Code of Ethics

Key Ethical Guideline/Concept.	Definition
Deception	When participants are not told the true nature/reasons of the study.
Right to Withdraw	When participants are able to leave the research at any time.
Informed Consent	When the participants are given accurate information about the research and then consent (agree) to be a part of the research.
Protection from Harm	Participants are kept safe from psychological and physical harm.
Confidentiality	When participants' results and details are kept confidential (private/secret) so others cannot find out their results. e.g. using another name for case studies.
Debrief	When participants are talked to by the researchers or someone after the research to make sure they are okay and provide support.

Appendix 7: NZ code of ethics

Principle 1: Respect for the Dignity of People and Persons

Purpose/Ideas

To ensure that all people are treated with dignity and respect, regardless of their age, race, socioeconomic status, sex gender or sexuality. Psychologists must be aware of differences and vulnerabilities caused by inclusion in cultural groups and must take these into consideration when treating clients and conducting research.

Actions to take under this principle

- Keeping information confidential of participants/clients that are being worked with.
- Participants have the right to withdraw from research at any time.
- Respect human rights and the mental and physical well-being of participants.
- Special protection and acknowledgement of Maori culture. Follow the principles of the Treaty of Waitangi – protection, participation and partnership.
- Get informed consent of participants before conducting research.

Principle 2: Responsible Caring

Purpose/Ideas

To ensure that psychologists treat their clients/participants with the care and that they take into consideration other factors that may impact on clients/participants. To protect the mental and physical well-being of participants/clients.

Actions to take under this principle

- Not using procedures which may cause serious harm to the participants (psychologically or physically).
- Recognizing that not all participants are the same and they need to be treated appropriately.
- Follow the law.
- Debrief participants after research to ensure they are okay and provide support.

Principle 3: Integrity in Relationships

Purpose/Ideas

To ensure that psychologists are honest and respectful in their relationships with participants. This helps to keep people who psychologists work with safe from harm and respected.

Actions to take under this principle

- Maintain professional boundaries with participants and do not have dual relationships (i.e. do not do research with someone who you know of).
- Avoid deception of participants. However, if the research cannot be carried out without deception, then a psychologist may inform participants that they will not tell them the true nature of the research. Participants may then consent to still do the research. They must be debriefed after the research and told the truth.

Principle 4: Social Justice and Responsibility to Society.

Purpose/Ideas

To make sure social Justice is involved and acknowledged by psychologists when they are working with people. The research should benefit society and contribute to the welfare of society.

Actions to take under this principle

- Research benefits should outweigh the costs.
- Psychologists are accountable for their actions and research i.e. they are responsible for their actions and cannot say they were 'following orders'.
- Psychologists should make sure that research findings are not used in a negative way by society. E.g. used to justify cruel actions.