

# THE MEMORY MISSION

*Your mission is to find out all of these things about memory – you can use your textbooks but you may want to research on the internet or in the library. Be thorough in your research as the more you learn now – the easier you will find tasks in class.*

## THE THREE STAGES OF THE MEMORY PROCESS

1. Outline the three stages involved in the memory process and explain the problems that can occur in this process.

2. Find out what is STM and what is LTM and outline the differences between the two.

## CAPACITY OF STM

3. Discover the capacity of the STM by looking at the 'digit span technique'. Test yourself and record the longest sequence of digits that you can remember from this list – using the digit span technique.

1	5	9	3								
3	7	9	2	1							
6	8	3	1	0	2						
4	3	0	4	1	8	6					
5	7	9	2	6	7	3	8				
9	0	7	9	1	3	8	4	7			
3	6	9	2	6	1	8	0	2	3		
5	9	3	6	0	5	1	7	8	3	6	

MY DIGIT SPAN IS  DIGITS!!!

Now look into Miller's (1956) theory into STM capacity which describes the capacity as 'The magical number seven, plus or minus two' – what does he mean by this – is this what you found about yourself (eg, between 5 –9 digits)?

Miller found that it is possible to increase the capacity of the STM. How?

Why does Miller say that it is easier to recall list 1 rather than list 2? Is this what you found?

<b>List 1</b>	<b>454 767 243 354</b>
<b>List 2</b>	<b>291786547237</b>

*Simon says size matters (1948) ..... why?*

Why is list 2 easier to remember than list 1?

<b>List 1</b>	<b>FB – I1 – 21 – RA – FB – BC – BO – GOF</b>
<b>List 2</b>	<b>FBI – 121 – RAF – BBC - BOGOF</b>

Complete the APFCC for Miller (1954) – don't forget to add Simon (1974) as a criticism – and use DREAMS (especially applicability) to squeeze out every last drop of evaluation.

### **THE DURATION OF STM**

4. Brown (1958) and Peterson and Peterson (1959) claimed that information held within the STM disappears within 20 seconds if it is not rehearsed. Try this out with a friend – get them to give you a short list of digits and then read a book for twenty seconds then try and recall – see what happens the second time when you can rehearse the digits for the 20 seconds.

Copy these points into an APFCC for Peterson and Peterson (1959) –

- The findings of the experiment have been replicated
- Without rehearsal the duration of the STM is very short indeed (less than 18 seconds)
- The counting task which acts as a distractor did prevent rehearsal – BUT it also meant that participants had to perform an additional cognitive task. This may have affected their recall scores.
- Participants were read a nonsense trigram (3 letters which have no meaning eg. LTB). Immediately after this they had to count backwards in 3s from a high number for a specified time period between 3-18 seconds. This was a distractor to prevent participants from rehearsing the letters. At the end of the period a tone would sound and participants would have to recall the trigram of letters. They were

tested repeatedly using different sets of letters and different time periods for distraction.

- The study was highly controlled – the use of trigrams meant that participants couldn't impose any meaning onto the letters – so everyone started from the same level.
- Low Ecological validity – the setting and the task was not really representative of learning in real life. You are never asked to learn complete nonsense ... are you!??
- Approximately 90% of the trigrams were recalled after a 3 second interval. Only 10% were recalled after 18 seconds. Letters had to be in exactly the same place in the recalled trigram as in the original.
- It was shown that participants confused later trigrams with earlier ones. This suggests that they still had some memory of the earlier trigrams for *longer* than 18 seconds.

You should be able to add some of your own evaluation to this APFCC using DREAMS.

Make sure you define the 'Brown-Peterson technique' and the 'Brown-Peterson effect'.

*Brown-Peterson technique =*  
*Brown-Peterson effect =*

## ENCODING IN STM

5. Find out what the 3 ways of encoding information are in the STM.

S  
V  
A

Which process of increasing capacity also gives evidence for 'semantic' encoding?

Conrad (1964) suggested that the principle method of encoding in STM is acoustic. This is because as we take information in – we rehearse it – which involves saying it to ourselves. This is a verbal process and it doesn't matter if you hear someone read the letters out or read them yourself. He found that people could recall list 2 easier than list one and that this showed that people encode semantically. Find out why and write a brief APFCC for Conrad's experiment.

<b>List 1</b>	<b>B T C P G E D</b>
<b>List 2</b>	<b>F T Z Q W R N</b>

Baddeley (1966) provides further evidence of acoustic encoding in the STM - he presented words verbally to subjects. There were four categories of words: *semantically similar, acoustically similar, semantically distinct and acoustically distinct.*

Write in the blank column below which category the words in the right column belong to –

	<b>MAN MAP CAN CAP FAN FAT</b>
	<b>TRY PIG HUT PEN GOT CUP</b>
	<b>GREAT BIG HUGE WIDE LARGE</b>
	<b>RUN EASY BRIGHT COTTON</b>

### ENCODING IN STM AND LTM

6. Use this to complete the APFCC for Baddeley (1966)

### CAPACITY IN LTM

*UNLIMITED* ..... so vast it is impossible to measure!!!  
*'no human yet exists who can use all the potential of his/her brain'*  
 (Anokhin, 1973) Why not attempt to be the first??!!

### DURATION OF LTM

A memory can last a lifetime – so the duration of LTM just depends on how long you live. Material in the STM that is not rehearsed is forgotten – luckily this is not so for the LTM or else we'd have to keep repeating our name over and over again!

7. Transfer to your LTM the APFCC for Bahrick et al (1975)

### SUMMARY

8. Complete this table by adding the correct study to the theory –

	<b>STM</b>		<b>LTM</b>	
	<b>THEORY</b>	<b>STUDY</b>	<b>THEORY</b>	<b>STUDY</b>
<b>ENCODING</b>	Mainly acoustic (sound)		Mainly semantic (meaning)	
<b>CAPACITY</b>	Small (7+/- chunks of information)		Unlimited	No study
<b>DURATION</b>	Short (less than 20 seconds)		30 seconds to a lifetime!	

9. Investigate the 'serial position effect' – make sure you understand the 'primacy effect' and 'recency effect' and explain why this is evidence of the 2 memory stores (STM and LTM).

10. There is also evidence to support the theory that there are two parts to the memory (STM and LTM) – this comes from studies into brain damage. Read the two cases studies of HM and KF. Summarise the findings. See if you can find anything about Clive Wearing and do the same.

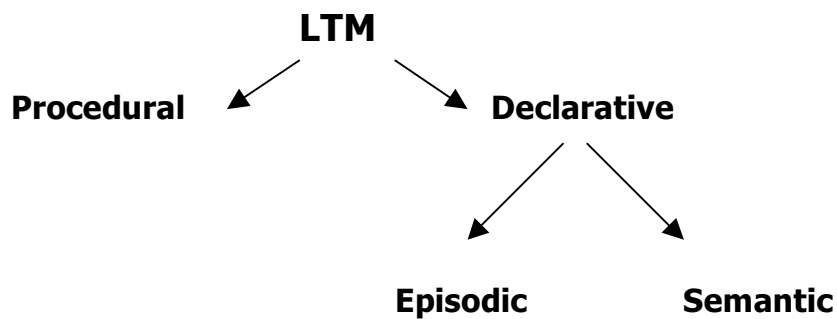
## **MODELS OF MEMORY**

11. Explain what is a 'model of memory' and specifically what is a 'multi-store model of memory'

12. Read and make notes about the (use a separate sheet of paper)

- The multi-store model of memory
- The levels of processing model
- The working memory model

13. Investigate the theory of the LTM as made up of components or subsystems and explain these systems –



Explain each of these systems and give supporting evidence.

## Miller (1954)

Aim	<i>To investigate .....</i>
Procedure	<i>In a laboratory study, a group of adult participants were presented strings of digits of increasing length and asked them to recall these immediately in the correct order (the “digit span technique”). This was repeated with three-letter chunks of digits.</i>
Findings	<i>Participants were able to recall between 5 and 9 units of information. He also found that STM could hold 7 +/- 2 “chunks” of information</i>
Conclusion	<i>STM has a limited capacity of 7 +/- 2</i>
Criticism	<i>Study has been replicated many times which makes it reliable and has helped establish strong evidence for a separate STM.</i>

## Peterson and Peterson (1959)

Aim	
Procedure	
Findings	
Conclusion	
Criticism	



## Conrad (1964)

Aim	
Procedure	
Findings	
Conclusion	
Criticism	

# Baddeley (1966)

<b>Aim</b>	<i>To investigate .....</i>
<b>Procedure</b>	<p><i>Participants were presented with 4 word lists which were either-</i>  <i>List A a..... s.....(such as .....</i>  <i>List B a..... d.....(such as .....</i>  <i>List C s..... s..... (such as .....</i>  <i>List D s..... d..... (such as .....</i></p> <p><i>75 participants heard 1 list repeated 4 times. Immediately after this test (to test STM) they were given a list with all the original words but in the wrong order. Their task was to rearrange the words in the correct order.</i></p> <p><i>To test LTM the same procedure took place but a 20 minute interval was given where participants conducted another task – this ensured that recall would involve LTM.</i></p>
<b>Findings</b>	<p><b>STM</b> - <i>Those participants given list A performed the worst (recall of 10%). Recall for the other lists was good (between 60-80% - list B being the highest)</i></p> <p><b>LTM</b> - <i>Those participants given list C performed the worst. Recall for other lists was better (70-85%)</i></p>
<b>Conclusion</b>	<p><b>STM –</b></p> <p><b>LTM -</b></p>
<b>Criticism</b>	<p>+ <i>Results make cognitive ‘sense’ – if you had to remember a shopping list you would probably repeat it aloud (acoustic rehearsal) as you walked to the supermarket (STM) and if you try to remember a film you watched a while ago – you’ll probably remember the content (meaning) but not the actual words (acoustic)</i></p> <p>+ <i>Easy replication and findings are consistent</i></p> <p>- <i>We also use visual images (for example remembering faces) this doesn’t occur acoustically!</i></p> <p>- <i>There are many different types of LTM eg. procedural (knowing how to do something – ride a bike), episodic memories (personal memories of events or places) and flashbulb memories. These are not covered in lab studies.</i></p> <p>- <i>LTM doesn’t only use semantic coding – songs must be encoded acoustically and what about smells and tastes – it is hard to see how they can be encoded by meaning. LTM must involve a large, long-lasting and flexible system.</i></p> <p>- <i>Doesn’t account for individual differences eg. age. Other factors may also influence the encoding in LTM such as the nature of the material – concrete words such as ‘beach’ are likely</i></p>

*to be visually encoded – but abstract words such as ‘hate’ are likely to be more semantic.*

## **Bairick et al (1975)**

<b>Aim</b>	<i>To investigate the existence of very long term memories (VLTM) using real-life memories.</i>
<b>Procedure</b>	<i>400 participants ranging in age from 17-74 were asked to remember the names of their classmates from their high school (Free recall). They were also shown a set of photos and a list of names, some of which were their ex-school friends. They had to identify their ex-school friends (a recognition task).</i>
<b>Findings</b>	<i>Those who’d left school within the previous 15 years recalled 90% of the faces and names in the recognition task. Those who’d left 48 years previously recalled 80% of the names and 70% of the faces. Free recall of the names was poor in comparison.</i>
<b>Conclusion</b>	<i>Recognition is easier than free recall. This suggests that we possess a lot of information in our LTM – but we need clues or cues in order to access it. People do possess VLTM, although these decline over time.</i>
<b>Criticism</b>	<i>+There is other experimental evidence to support this. +This experiment has high ecological validity as it involves people’s real life memories rather than nonsense trigrams. - The study lacked some important controls – for example participants may have been in contact with friends or looked at school photos since they had left high school. - The study only found existence of VLTM with recognition <u>not</u> recall. Also – they were only testing 1 form of LTM the visual element.</i>

## Case studies of patients with brain damage

The following case studies describe patients with amnesia. Retrograde amnesia refers to loss of memory for events leading up to an accident. Anterograde amnesia refers to loss of memory for items which follow an accident. HM suffers from anterograde amnesia. This can also occur in patients with Korsakoff's syndrome, shown by some long-term alcoholics.

<sup>1</sup>Milner (1966) reports the case of a young man known as "HM" who underwent an operation to help prevent severe epileptic seizures which were interfering with his life so severely that he had been forced to give up work. Drugs were not successful in controlling these seizures, so it was decided to operate on his brain to remove the hippocampus (a structure of the brain which appeared to be at the seat of these seizures). The operation dramatically reduced HM's epilepsy, but it also had an unexpected effect on his memory. Although his personality and intellect remained intact, his memory was severely impaired.

He was still able to talk and recall the skills he had previously known, suggesting that semantic memory was unimpaired. He was still able to form short-term memories, but could not lay down new long-term memories. If he was asked to memorise a number, he could recall it still after 15 minutes but, after being distracted, he had no recollection of this at all. He could read the same magazine over and over without realising that he had read it before. Similarly, when told of the death of a favourite uncle he reacted with the same level of grief on each occasion.

HM had moved house after his operation and had great difficulty learning the new route home. After 6 years he was eventually able to find his way around the house. This indicates that he did have some memory capacity.

Warrington and Shallice (1972) reported on the case of KF, a young man who had suffered brain damage following a motorcycle accident. Although his long term memory was intact, and he had no difficulty in transferring information from STM to LTM, KF had a digit span in STM of only 1 or at most 2, items. Furthermore, he was more likely to forget auditory stimuli (letters and digits read out loud) than visual stimuli (pictures and images). Also, he was able to remember meaningful sounds (e.g. a cat mewing) but not verbal material (letters, words). The authors conclude that KF's problems centred on what they termed the "auditory-verbal short-term store".

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<sup>1</sup> Taken from Eysenck & Flanagan *Psychology for AS* p37  
www.psychlotron.org.uk