Topic 4
Explanations of forgetting in short-term memory

Specification content

Explanations of forgetting in short-term memory (e.g. decay and displacement)

Since the word 'explanations' is in the plural, this indicates that candidates must know at least two. Two possible explanations (**decay** and **displacement**) are given as examples, but since these are given as examples only, no questions could be specifically set about these. You can study any two (or more) explanations you wish.

Examination focus

There are a number of predictable examination questions that can be asked on this part of the specification. It may be helpful to bear these in mind when considering what needs to be covered in each lesson.

What is meant by the term 'forgetting'? *(3 marks)*

Describe **two** *factors that influence forgetting in short-term memory.* *(3 + 3 marks)*

Describe **one** *explanation of forgetting in short-term memory.* *(6 marks)*

Outline findings of research into forgetting in short-term memory. *(6 marks)*

Outline conclusions of research into forgetting in short-term memory. *(6 marks)*

AO1/AO2-type question:
Give a brief account of **one** *explanation of forgetting in short-term memory and describe its strengths and limitations.* *(18 marks)*

Topic focus

This is the first topic on forgetting and focuses on explanations of forgetting in short-term memory. Two explanations are provided as examples in the specification and probably are the best two to focus on: decay and displacement. Candidates should be able to describe these and also have an awareness of some strengths and limitations (two of each is sufficient). There is no need to cover more than two explanations, though it may be beneficial when evaluating such explanations in an AO1/AO2 question. Of course, for AO2, comparisons can always be made with explanations of forgetting in long-term memory (but only if the latter are offered as contrasts). These are covered in Topic 5.

Learning outcomes

Students should be able to:
- define/explain *two* explanations of forgetting in short-term memory — decay and displacement
- show an awareness and understanding of the strengths and limitations of these explanations

- use these explanations to describe factors that affect forgetting in short-term memory
- describe and evaluate psychological research related to explanations of forgetting in short-term memory
- link explanations of forgetting in short-term memory to explanations of forgetting in long-term memory, as covered in Topic 5

Lesson notes

1 Worksheet Ws1: trace decay in STM ($\frac{1}{2}$ hour)

Aim To consider how trace decay theory might explain forgetting in short-term memory, using the Brown–Peterson technique first described in lesson 1. This experiment also demonstrates the duration of STM.

Information sheet IS1 provides instructions for the teacher. You will need to prepare trigram cards.

Ws1 should be given to students *after* the experiment.

2 Worksheet Ws2: explanations of forgetting in STM ($\frac{1}{2}$ hour)

Aim To acquire information about two explanations for forgetting in STM. To consider relevant research support and some evaluations of the models.

Students should use their own textbooks to complete **Ws2**.

3 Worksheet Ws3: displacement theory class experiment ($\frac{1}{2}$ hour)

Aim To gain insight into the displacement theory of forgetting and to achieve greater understanding of the serial probe technique by using it.

Information sheet IS2 provides instructions for the teacher about an experiment based on Waugh and Norman's (1965) serial probe technique to test displacement in STM. You will need to prepare stimulus materials. Students will need some paper to write on.

Ws3 should be given to students.

Discussion points can be raised in the class or may be incorporated into written work.

4 Worksheet Ws4: analysis, evaluation and application ($\frac{1}{2}$ hour)

Aim To consider the application of memory research in a real-life setting.

Ws4 sets out a real-life scenario (why do people forget what their doctor tells them to do?). Students may like to work in groups to set up a doctor–patient role-play scenario. Alternatively, students could produce a leaflet advising Dr Cureall (and other GPs) what action to take to increase the probability that patients will remember the advice given.

5 Worksheet Ws5: student assignment

Ws5 supplies material for homework. Teachers might set aside 10 minutes to discuss with students how much they are expected to write and how long it should take them, bearing in mind the requirements of the AO1/AO2 question.

Trace decay in STM

This is a repeated measures experiment, with 10 trials.

Trace decay theory in STM relates to the theory that information in STM will only be retained for a short duration. STM can hold information for less than 30 seconds, unless it is rehearsed. Note that this is the same as investigating the duration of STM; therefore, this experiment is relevant to Topic 1.

In the first part of this topic, the class conducts an experiment based on the Brown–Peterson technique (using **nonsense trigrams**, as described in Topic 1 (**Information sheet IS4**).

Stimulus materials

Prepare a set of **trigram cards**, one for each of the trigrams below.

(1) FGT	5 second delay	(2) MNW	10 second delay
(3) KLD	15 second delay	(4) PJS	20 second delay
(5) MCD	25 second delay	(6) SWQ	30 second delay
(7) HVY	35 second delay	(8) WPB	40 second delay
(9) DJR	45 second delay	(10) HSP	50 second delay

Procedures

> **Ethics briefing**
> * You do not have to participate.
> * You may withdraw at any time.
> * This experiment looks at one aspect of memory.
> * There will be *no* long-term effects.

(1) Display a trigram card for 3 seconds.

(2) After each display, there is a delay (starting at 5 seconds and increasing by 5 seconds for each card in sequence — as indicated above).

(3) During each delay, the students should start counting backwards from 50 in threes (to prevent rehearsal).

(4) At your signal (after each delay), ask the students to write down the trigram.

Displacement theory class experiment

This is an independent groups design laboratory experiment.

If, as proposed, STM has limited capacity when the system is full, the oldest material should be displaced by incoming material. Waugh and Norman (1965) designed an experiment to test this theory. This is known as the **serial probe experiment**.

Stimulus materials

You will need to prepare two sets of number cards:

Condition 1: 16 cards, each displaying a *single* number

15	7	12	9	14	2	3	8

1	10	6	11	16	5	13	4

Condition 2: 4 cards, each displaying 4 numbers

15 7 12 9	14 2 3 8

1 10 6 11	16 5 13 4

(Make sure that the 16 numbers are the same in both sets.)

In addition, you need two sets of probe cards:
Probe 1 (early) displays the number 7
Probe 2 (recent) displays the number 5

Procedures

> **Ethics briefing**
> • You do not have to participate.
> • You may withdraw at any time.
> • This experiment looks at one aspect of memory.
> • There will be *no* long-term effects.

Allocate students randomly to condition 1 or condition 2.

Procedure for condition 1 (one number per second)

Display each of the number cards for 1 second — the students attempt to memorise the 16 numbers. When the last card has been displayed, show probe card 1 and ask students to write down the *number* that followed the probe number during the display. Then show probe card 2 and ask students to write down the number that followed that probe.

Procedure for condition 2 (four numbers per second)

Display the four number cards each for 1 second (four numbers per second) — the students attempt to memorise the 16 numbers. When the fourth card has been displayed, show probe card 1 and ask students to write down the *number* that immediately followed the probe number. Then show probe card 2 and ask students to write down the number that followed that probe.
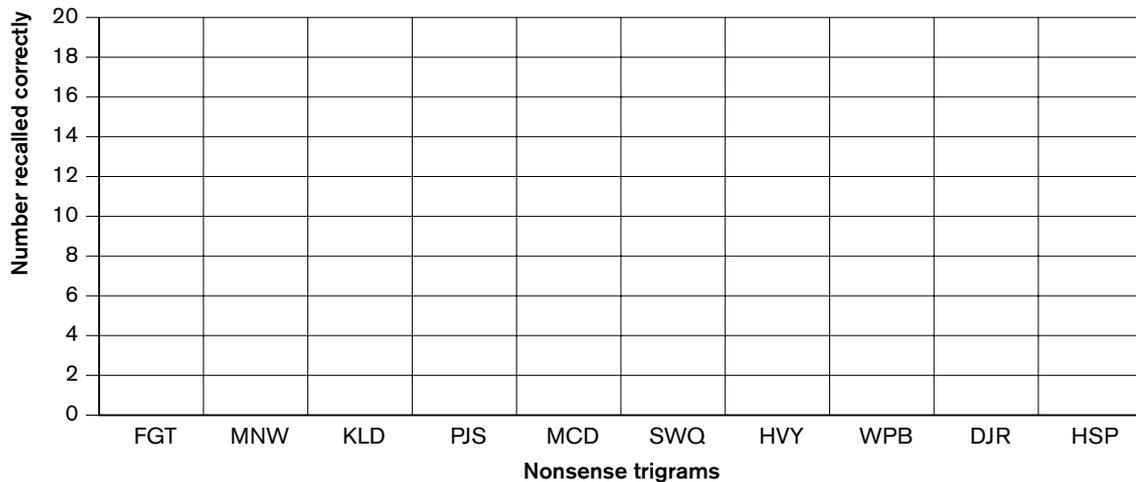
Reference

Waugh, N. C. and Norman, D. (1965) 'Primary memory', *Psychological Review*, Vol. 72, pp. 89–104.

Trace decay in STM

The findings

Record on this graph how many people recalled each trigram correctly.

If students recall the later trigrams better than the earlier ones (longer delay), then **trace decay** has been demonstrated (as well as demonstrating the duration of STM).

Trace decay theory in STM relates to the theory that information in STM will be retained only for a short duration. STM can only hold information for between 15 and 30 seconds, unless it is rehearsed.

The technique used in this experiment is called the **Brown–Peterson trigram technique.**

Focus on research methods (optional)

1 What were the IV and DV in this experiment?

2 Outline *two* advantages of this research method.

3 Outline *two* limitations of using this method.

4 Outline *one* advantage of using trigrams as opposed to using 'real' words.

5 Explain whether the trigram task represents a valid measure of human memory.

6 Write a non-directional hypothesis for this experiment.

7 Write a null hypothesis for this experiment.

8 In the class experiment, all the participants were A-level students. Why may the results not be applicable to other populations?

work**s**heet

WS**2**

Explanations of forgetting in STM

There are two main explanations for forgetting in STM: **decay** and **displacement**.

Using your textbook, work alone or in pairs to answer the following questions. It may be helpful to discuss your answers afterwards with the whole class.

The decay theory of forgetting

1 Explain the decay theory of forgetting in STM.

2 Describe *two* limitations of this theory.

3 Explain how the Peterson and Peterson experiment on the duration of STM can be used as evidence for decay theory.

4 Outline *one other* study that can be used to support the decay theory (focus especially on the findings and conclusions).

5 Suggest *one* criticism of this theory.

The displacement theory of forgetting

1 Explain the displacement theory of forgetting in STM.

2 Describe *two* limitations of this theory.

3 Explain how the multi-store model can be used to support the displacement theory.

4 Outline *two* studies that can be used to support the displacement theory (focus especially on the findings and conclusions).

5 Explain how the Peterson and Peterson experiment on the duration of STM can be used as evidence for displacement theory. (*Hint* Think of speed.)

6 Suggest *one* criticism of this theory.

7 Which explanation (decay or displacement) is a better explanation for forgetting in STM? Why?

Displacement theory class experiment

The findings

For each student, place a tick in the correct column to show whether the number following the probe was correctly or incorrectly recalled.

	Serial Position	**Correctly recalled**	**Incorrectly recalled**
Condition 1 (one number per second)	Early probe (14 numbers after probe)		
	Late probe (2 numbers after probe)		
Condition 2 (four numbers per second)	Early probe (14 numbers after probe)		
	Late probe (2 numbers after probe)		

According to displacement theory, if the probe is one of the first numbers to be displayed, the probability of remembering the number that followed is small, because later numbers have pushed the early ones out. If the probe is one of the last numbers to be displayed, the probability of remembering the number that followed is high, since the most recent numbers are still stored in STM.

Analysing the findings

- Draw a bar chart showing the findings of the serial probe experiment.
- What conclusions could you draw from this?

Discussion

- Are the findings consistent with the idea that earlier information is pushed out by later information?
- Waugh and Norman found that recall was better in the faster display condition (4 numbers per second). Do the class findings support this?
- Why might a faster display counteract the displacement effect?
- Do the findings of this experiment support the idea that *chunking* information increases the capacity of STM? If so, how?
- Do the findings of this research tell us much about 'real-life' forgetting?

Follow-up activity

Use the word cards prepared for the primacy/recency experiment in Topic 2 (**Information sheet IS2**).

house	light	book	entry	sock	trick	bird
mouth	tree	spoon	cabin	banjo	horse	cake
paper	music	plate	chair	smile	prune	chimp

Set up an experiment where the 21 words are each displayed for 3 seconds, following which the two word probes (an early probe and a recent probe) are displayed as triggers for the 'following' words. For example:

- probe word for early probe = **light**, correct answer = **book**

- probe word for recent probe = **smile**, correct answer = **prune**

Are the results the same as for the numbers? Do the results support the Waugh and Norman findings?

Analysis, evaluation and application

Application of memory and forgetting research — advising Dr Cureall

Dr Cureall was a busy GP. Each day he saw many patients and each consultation lasted approximately 8 minutes. He was a diligent doctor who always referred to patient notes to prompt his memory as to why he last saw them. He noticed that many patients kept returning with the same complaint, so he decided to do a survey to find out (a) whether patients always followed his advice and took their medicines properly and (b) whether patients were happy with his treatment.

A significant number of patients reported 'not understanding' the advice they had been given or 'not remembering' what the doctor had said. Although most patients judged Dr Cureall to be kind and caring, many felt he did not explain treatments clearly.

As a result of the survey, Dr Cureall employed a cognitive psychologist to make recommendations to ensure that patients remember his treatment advice.

Use evidence from psychological research into human memory (STM) to answer the following:

● Describe why patients may not remember Dr Cureall's treatment advice.

● Giving reasons for your answer to part (a), make suggestions about what can be done to improve the effectiveness of Dr Cureall's consultations.

Hint You should be able to describe at least *two* factors that, given a verbal stream of incoming information, may influence the encoding of that material in memory. What would Miller say? What would Atkinson and Shiffrin say? What would Baddeley and Hitch say?

WS**5**

Student assignment

Try to complete these questions without referring to your notes. Afterwards, you may check your notes and fill in missing information.

1 What is meant by the terms 'memory' and 'forgetting'? *(3 + 3 marks)*

2 Describe *two* factors that influence forgetting in STM. *(3 + 3 marks)*

3 Describe *one* explanation of forgetting in STM. *(6 marks)*

4 Outline findings of research into forgetting in STM. *(6 marks)*

5 Outline conclusions of research into forgetting in STM. *(6 marks)*

6 'Psychologists have proposed many different accounts of forgetting in STM, though these are often based on experiments conducted in a laboratory.' To what extent do theories of forgetting in STM reflect real life? *(18 marks)*