MEM1 The multi-store model of memory: sensory register, STM and LTM, coding, capacity and duration

Total Marks

AQA 7182 · Calculators not allowed · about 90 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Atkinson and Shiffrin (1968) proposed the multi-store model (MSM) of memory, made up of three separate stores.

(a) Name the three stores proposed by the multi-store model. **(3)**

(b) Describe the role of attention and rehearsal in moving information between the stores of the multi-store model. **(3)**

(Total for Question 1 is 6 marks)

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2 The sensory register is the first store in the multi-store model.

(a) Describe the capacity and duration of the sensory register. **(2)**

(b) Explain why the coding used in the sensory register is described as modality-specific. **(3)**

(Total for Question 2 is 5 marks)

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3 Baddeley (1966) investigated coding in short-term and long-term memory.

(a) Explain what is meant by 'coding' in relation to memory. **(2)**

(b) Outline the procedure Baddeley (1966) used to investigate coding in STM and LTM. **(4)**

(c) Outline the findings of Baddeley's study and what they suggest about coding in STM and LTM. **(4)**

(Total for Question 3 is 10 marks)

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4 Miller (1956) investigated the capacity of short-term memory.

(a) Outline what Miller (1956) suggested about the capacity of short-term memory. **(3)**

(b) Explain what is meant by 'chunking', and how it can increase the effective capacity of STM. **(3)**

(c) A participant is read the following list to test digit span: '7, 2, 9, 4, 1, 8, 5, 3.' Using Miller's research, explain why the participant might struggle to recall this whole list correctly in order. **(2)**

(Total for Question 4 is 8 marks)

5 Peterson and Peterson (1959) investigated the duration of short-term memory.

(a) Outline the procedure Peterson and Peterson (1959) used to investigate the duration of STM. **(4)**

(b) Outline the findings of Peterson and Peterson's study, and what they suggest about the duration of STM. **(4)**

(Total for Question 5 is 8 marks)

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6 Bahrick et al. (1975) investigated the duration of very long-term memory (LTM).

(a) Outline the procedure Bahrick et al. (1975) used to investigate the duration of LTM. **(3)**

(b) Outline the findings of Bahrick et al.'s study, and what they suggest about the duration of LTM. **(4)**

(Total for Question 6 is 7 marks)

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7 The multi-store model has been supported and criticised using research evidence.

(a) Outline one piece of research evidence that supports the multi-store model's claim that STM and LTM are separate stores. **(3)**

(b) Outline one limitation of the multi-store model. **(3)**

(c) Explain why Peterson and Peterson's study has been criticised for lacking ecological validity, and outline one way this limitation could be addressed. **(3)**

(Total for Question 7 is 9 marks)

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8 A student is trying to memorise a shopping list of 15 unrelated items (e.g. milk, bread, eggs) without writing it down or grouping them in any way. On the way to the shop, they repeat the list to themselves under their breath the whole time.

(a) Using the multi-store model, explain why the student's maintenance rehearsal (repeating the list under their breath) might help some items transfer into long-term memory. **(4)**

(b) The list contains 15 unrelated items, well beyond Miller's estimate of STM capacity. Suggest one memory strategy, based on the concept of capacity in the multi-store model, that could help the student remember the whole list more accurately, and justify your answer. **(4)**

(Total for Question 8 is 8 marks)

9 The multi-store model describes three key features of memory stores: coding, capacity and duration.

(a) Compare the capacity of short-term memory with the capacity of long-term memory, as proposed by the multi-store model. **(3)**

(b) Compare the duration of short-term memory with the duration of long-term memory, as proposed by the multi-store model. **(3)**

(Total for Question 9 is 6 marks)

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10 A researcher wants to test whether the multi-store model correctly predicts that STM relies mainly on acoustic coding.

(a) Suggest a suitable independent variable (IV) and dependent variable (DV) for a study, based on Baddeley's (1966) design, that could test this prediction. **(4)**

(b) Explain what result would support the multi-store model's prediction that STM codes acoustically. **(4)**

(Total for Question 10 is 8 marks)

Mark scheme · MEM1 The multi-store model of memory: sensory register, STM and LTM, coding, capacity and duration

Question 1

- (a) **B1** sensory register
- (a) **B1** short-term memory (STM)
- (a) **B1** long-term memory (LTM)
- **(a) Answer: Sensory register, short-term memory and long-term memory.**
- (b) **M1** attention is needed to transfer information from the sensory register into short-term memory oe
- (b) **A1** verbal rehearsal (repeating information) is needed to keep information active in STM oe
- (b) **A1** sufficient/prolonged rehearsal transfers information from STM into long-term memory oe
- **(b) Answer: Attention moves information into STM; rehearsal maintains it in STM and, if prolonged, transfers it into LTM.**

Question 2

- (a) **B1** very large capacity (all information that reaches the senses) oe
- (a) **B1** very brief duration, less than half a second for visual (iconic) input oe
- **(a) Answer: Very large capacity but a very brief duration (under about half a second for visual information).**
- (b) **M1** there is a separate sensory store for each sense, e.g. iconic memory for visual information and echoic memory for auditory information oe
- (b) **A1** each store codes information in the form specific to that sense (e.g. iconic memory codes visually) oe
- (b) **A1** so the coding depends on which sense the information entered through, rather than one single code for all information oe
- **(b) Answer: Each sense has its own sensory store, coding information in that sense's own form (e.g. visual for iconic memory).**

Question 3

- (a) **B1** the format/form in which information is stored in a particular memory store oe
- (a) **B1** e.g. acoustic coding (by sound), visual coding (by appearance) or semantic coding (by meaning) oe
- **(a) Answer: Coding is the format in which information is stored, e.g. acoustically, visually or semantically.**
- (b) **M1** participants were given word lists that were either acoustically similar, acoustically dissimilar, semantically similar, or semantically dissimilar oe
- (b) **M1** acoustically similar words sound alike (e.g. man, cap, can, map); semantically similar words have similar meanings (e.g. big, large, huge, wide) oe
- (b) **A1** recall of the lists was tested immediately, to assess STM oe
- (b) **A1** recall was also tested after a delay (with an interference task), to assess LTM oe
- **(b) Answer: Word lists (acoustically/semantically similar or dissimilar) were recalled immediately (STM) and after a delay (LTM).**
- (c) **M1** immediate (STM) recall was worse for the acoustically similar list, since participants confused the similar-sounding words oe
- (c) **A1** this suggests STM relies mainly on acoustic coding oe
- (c) **M1** delayed (LTM) recall was worse for the semantically similar list, since participants confused words with similar meanings oe
- (c) **A1** this suggests LTM relies mainly on semantic coding oe
- **(c) Answer: STM recall was worse with acoustically similar words (STM codes acoustically); LTM recall was worse with semantically similar words (LTM codes semantically).**

Question 4

- (a) **M1** Miller reviewed research using digit-span type tasks and concluded that STM can hold around seven items oe
- (a) **A1** with a normal range of plus or minus two items (i.e. between about five and nine items) oe
- (a) **A1** this is often referred to as 'the magic number seven, plus or minus two' oe
- **(a) Answer: STM capacity is around 7 items, with a normal range of about 5 to 9 items (plus or minus 2).**
- (b) **M1** chunking is the process of grouping individual pieces of information together into larger, meaningful units (chunks) oe
- (b) **A1** e.g. grouping the digits 1-9-4-5 into the single meaningful chunk '1945' oe
- (b) **A1** since STM capacity is limited by the number of chunks rather than individual items, chunking allows more total information to be held in STM oe
- **(b) Answer: Chunking groups items into larger meaningful units, so more information fits within STM's fixed number of 'slots'.**
- (c) **M1** the list contains 8 unrelated digits, which is at (or beyond) the upper end of Miller's suggested STM capacity of about 7, plus or minus 2, items oe
- (c) **A1** since the digits cannot easily be chunked into fewer, meaningful units, the participant is likely to be close to or over their STM capacity, so recall of the full ordered list may fail oe
- **(c) Answer: 8 unrelated digits are near the top of Miller's 7 (plus or minus 2) capacity estimate, so recall of the whole ordered list is likely to be unreliable.**

Question 5

- (a) **M1** participants were given a trigram, a meaningless three-consonant syllable (e.g. 'XQR'), to remember oe
- (a) **M1** participants then had to count backwards in threes from a given number, to prevent verbal rehearsal of the trigram oe
- (a) **A1** after varying retention intervals (e.g. 3, 6, 9, 12, 15 or 18 seconds), participants tried to recall the trigram oe
- (a) **A1** this was repeated across many trials with different trigrams and intervals oe
- **(a) Answer: Participants recalled a trigram after counting backwards (to prevent rehearsal) for a varied interval of a few seconds.**
- (b) **M1** accuracy of recall declined rapidly as the retention interval increased oe
- (b) **A1** very few trigrams were correctly recalled once the interval reached around 18 seconds oe
- (b) **A1** this suggests that, without rehearsal, information is lost from STM very quickly oe
- (b) **A1** indicating STM has a short duration of roughly a matter of seconds oe
- **(b) Answer: Recall fell sharply as the interval increased, showing STM has a short duration (a matter of seconds) without rehearsal.**

Question 6

- (a) **M1** American participants of a wide range of ages were tested on their memory for former high-school classmates oe
- (a) **A1** using yearbook photographs, participants' recognition of names and faces was tested at different lengths of time after graduation oe
- (a) **A1** participants' free recall of classmates' names (without photo cues) was also tested oe
- **(a) Answer: Participants of varying ages were tested on recognition and free recall of former classmates' names/photos using yearbooks.**
- (b) **M1** recognition of photographs remained highly accurate even many years after graduation oe
- (b) **A1** free recall of names, without photo cues, was less accurate than recognition and declined more with time oe
- (b) **A1** this suggests LTM for some types of personally meaningful information can last for a very long time oe
- (b) **A1** and that the method used to test memory (recognition versus free recall) affects how much forgetting appears to have occurred oe
- **(b) Answer: Photo recognition stayed highly accurate for decades, while unaided name recall declined more, showing LTM can be very long-lasting and that test method affects apparent forgetting.**

Question 7

- (a) **M1** Baddeley's (1966) finding that STM and LTM are affected by different types of similarity (acoustic versus semantic) supports the idea that they are two different stores with different coding oe
- (a) **A1** if STM and LTM were really just one single store, both types of similarity would be expected to affect recall in the same way oe
- (a) **A1** the fact that they do not supports the multi-store model's separation of STM and LTM oe
- **(a) Answer: Baddeley's finding that acoustic and semantic similarity affect STM and LTM differently supports treating them as separate stores.**
- (b) **M1** the model is oversimplified, treating STM and LTM each as a single, unitary store oe
- (b) **A1** whereas later research (e.g. case studies of brain-damaged patients, and models such as the working memory model) suggests STM is made up of several different components, not one single store oe
- (b) **A1** so the multi-store model may not fully capture the true structure of short-term memory oe
- **(b) Answer: The model treats STM (and LTM) as single unitary stores, when evidence suggests a more complex, multi-component structure.**
- (c) **M1** recalling meaningless trigrams while counting backwards is an artificial task that does not resemble everyday memory use oe
- (c) **A1** so the findings may not generalise well to how memory duration works for meaningful, everyday information oe
- (c) **A1** this could be addressed by repeating the study using meaningful material (e.g. words, sentences or real-life events) in a more naturalistic setting oe
- **(c) Answer: The artificial trigram/counting task may not reflect everyday memory, limiting ecological validity; using meaningful material in a more natural setting could address this.**

Question 8

- (a) **M1** the multi-store model proposes that continued rehearsal keeps information active/circulating in STM oe
- (a) **A1** and that sufficient/prolonged rehearsal is the mechanism by which information is transferred from STM to LTM oe
- (a) **M1** by repeating the list continuously, the student is rehearsing the items for an extended period rather than letting them fade oe
- (a) **A1** so, according to the model, at least some of the repeatedly rehearsed items are likely to be transferred into LTM oe
- **(a) Answer: Continuous rehearsal keeps the items active in STM long enough for the model's rehearsal mechanism to transfer some of them into LTM.**
- (b) **M1** suggests chunking the 15 items into smaller, meaningful groups, e.g. by shop aisle or meal (dairy items together, breakfast items together) oe
- (b) **A1** justifies this using the concept of capacity: STM capacity is limited by the number of chunks rather than the number of individual items oe
- (b) **A1** so grouping 15 items into, for example, 4 or 5 meaningful chunks brings the effective load within Miller's estimated capacity of about 7 (plus or minus 2) oe
- (b) **A1** making the whole list more manageable to hold in STM (and rehearse into LTM) than 15 separate, unrelated items oe
- **(b) Answer: Chunking the 15 items into a smaller number of meaningful groups brings the load within STM's capacity limits.**

Question 9

- (a) **B1** STM has a limited capacity, around 7 (plus or minus 2) items/chunks (Miller, 1956) oe
- (a) **B1** LTM has a much larger, and potentially unlimited, capacity oe
- (a) **B1** so the multi-store model proposes a clear difference in capacity between the two stores oe
- **(a) Answer: STM capacity is limited (about 7, plus or minus 2, items); LTM capacity is very large/potentially unlimited.**
- (b) **B1** STM has a short duration, lasting only a matter of seconds without rehearsal (Peterson and Peterson, 1959) oe
- (b) **B1** LTM can last for a very long time, potentially a lifetime (Bahrick et al., 1975) oe
- (b) **B1** so the multi-store model proposes a clear difference in duration between the two stores oe
- **(b) Answer: STM duration is short (seconds without rehearsal); LTM duration can be very long/potentially lifelong.**

Question 10

- (a) **M1** IV: type of word list presented, e.g. acoustically similar versus acoustically dissimilar words oe
- (a) **A1** clearly operationalised, e.g. specifying that both lists contain the same number of words, matched for length/frequency, differing only in acoustic similarity oe
- (a) **M1** DV: number of words correctly recalled (in the correct order) immediately after presentation oe
- (a) **A1** clearly operationalised, e.g. out of a fixed total, such as a 10-word list oe
- **(a) Answer: IV: acoustic similarity of the word list (similar vs dissimilar). DV: number of words correctly recalled immediately, out of a fixed total.**
- (b) **M1** if STM genuinely relies on acoustic coding, similar-sounding words should be more easily confused with one another in STM oe
- (b) **A1** so immediate recall should be worse (fewer words correctly recalled) for the acoustically similar list than for the acoustically dissimilar list oe
- (b) **A1** this pattern would mirror Baddeley's (1966) original finding for immediate/STM recall oe
- (b) **A1** if no such difference were found, this would not support the prediction that STM codes mainly acoustically oe
- **(b) Answer: Worse immediate recall for the acoustically similar list (compared with the dissimilar list) would support acoustic coding in STM.**