5.5 The Cognitive Approach: Schema, Inference and Cognitive Neuroscience

AQA 7182 · about 60 minutes · Write-in edition

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions.

1 Define the term 'schema' as used in the cognitive approach to psychology, naming its origin from experience and its organising role.

(Total for Question 1 is 2 marks)

2 State one limitation of using computer analogies and computational models when studying human cognition in natural settings, and suggest one way researchers might reduce this limitation.

(Total for Question 2 is 3 marks)

3 State one limitation of using inference to study internal mental processes, and explain why this limitation matters for cognitive psychology.

(Total for Question 3 is 2 marks)

4 Explain how schema can affect attention and therefore influence what information is encoded into memory. Give one developed reason.

(Total for Question 4 is 4 marks)

5 Outline two scientific strengths of the cognitive approach that support its status as a scientific psychology.

(Total for Question 5 is 2 marks)

6 Outline what psychologists mean by 'inference' when studying internal mental processes in cognitive psychology.

(Total for Question 6 is 2 marks)

7 Define 'cognitive neuroscience' and state one method it uses to link brain activity to mental processes.

(Total for Question 7 is 2 marks)

8 Outline how theoretical models are used in the cognitive approach, and give one brief example of a theoretical model used in cognitive psychology without describing its internal structure.

(Total for Question 8 is 3 marks)

9 Outline how schemas can lead to distortions in memory or judgement. Give one concrete example in your answer, not involving eyewitness testimony.

(Total for Question 9 is 2 marks)

10 Outline one advantage of using fMRI in cognitive neuroscience research to investigate which brain areas are active during a memory task.

(Total for Question 10 is 3 marks)

11 Outline one way in which theoretical models and computer models differ in cognitive psychology, with a short example of each type.

(Total for Question 11 is 3 marks)

12 Evaluate the strengths and limitations of the cognitive approach. In your answer discuss scientific rigour and explanatory power, and contrast these with limitations such as inference from behaviour, machine reductionism and ecological validity. Refer to evidence or examples where relevant.

(Total for Question 12 is 12 marks)

13 Explain the role of computer models in cognitive psychology. In your answer, describe how the computer analogy is used and one strength and one limitation of this analogy.

(Total for Question 13 is 6 marks)

Mark scheme · 5.5 The Cognitive Approach: Schema, Inference and Cognitive Neuroscience

Question 1

a mental framework or cognitive structure used to organise knowledge and expectations about the world oe	**B1**
built from past experience and used to interpret new information oe	**B1**

Answer: A schema is a mental framework built from past experience that organises knowledge and expectations and helps interpret new information.

Question 2

identifies a limitation, e.g. low ecological validity or ignoring emotion/embodiment oe	**M1**
suggests a practical way to reduce it, e.g. complement computational models with field studies or incorporate affective variables into models oe	**A1**
explains briefly why the suggestion helps, e.g. increases real-world relevance or captures more aspects of human cognition oe	**A1**

Answer: A limitation is low ecological validity and neglect of emotion or embodied factors. This can be reduced by combining computational models with field studies or by building affective and embodied components into models, increasing real-world relevance.

Question 3

identifies a limitation, e.g. inference is indirect and relies on assumptions about the link between behaviour and cognition oe	**B1**
explains why it matters, e.g. incorrect assumptions can lead to wrong conclusions about internal processes, reducing validity oe	**B1**

Answer: Inference is indirect, relying on assumptions about how behaviour reflects internal processes; this matters because wrong assumptions can lead to incorrect conclusions and lower the validity of cognitive explanations.

Question 4

states that schemas guide attention towards schema-consistent information and away from inconsistent information oe	**M1**
explains that focused attention increases likelihood information is encoded into memory oe	**A1**
gives a specific example or consequence, e.g. at a conference a person may attend more to details that fit their 'expert' schema and not notice conflicting points oe	**M1**
explains why this matters, e.g. selective attention due to schema can bias what is remembered and create systematic memory distortions oe	**A1**

Answer: Schemas direct attention to schema-consistent information and away from inconsistent details; because attention increases encoding, schema-consistent information is more likely to be stored. For example, an attendee who identifies as an 'expert' may focus on confirming details and miss contradictory points, producing biased memory.

Question 5

identifies a strength, e.g. use of controlled experiments to test precise hypotheses oe	**B1**
identifies a second strength, e.g. development of testable computational models and use of brain-imaging to link cognition to neural activity oe	**B1**

Answer: Strengths include use of controlled experiments to test precise hypotheses, and development of testable computer models plus brain-imaging techniques that link cognitive theories to neural data.

Question 6

inference is drawing conclusions about unobservable mental processes from observable behaviour or performance oe	**B1**
it involves using experimental tasks or behaviour as indirect evidence about cognition oe	**B1**

Answer: Inference is drawing conclusions about unobservable mental processes from observable behaviour or task performance, using behaviour as indirect evidence of cognition.

Question 7

cognitive neuroscience is the study of the neural basis of mental processes oe	**B1**
names a brain-scanning method such as fMRI or EEG as an example oe	**B1**

Answer: Cognitive neuroscience studies the neural basis of mental processes, for example using fMRI to measure brain activity linked to cognition.

Question 8

theoretical models are simplified representations used to explain and predict mental processes, often breaking cognition into component parts oe	**M1**
they guide research by suggesting testable hypotheses about how mental processes operate oe	**A1**
gives an example such as the multi-store model as an example of a theoretical model (example named only) oe	**A1**

Answer: Theoretical models are simplified representations used to explain and predict cognitive processes and to generate testable hypotheses; an example is the multi-store model, named only as an example of a theoretical model.

Question 9

states that schemas can fill gaps in memory or bias interpretation of information, leading to distortions oe	**B1**
gives one concrete example, e.g. remembering details of a restaurant visit as fitting the schema for 'fine dining' when it was actually a casual cafe oe	**B1**

Answer: Schemas can fill gaps or bias interpretation so memory or judgements fit expectations; for example, someone might later recall a casual cafe meal as more formal because it is fit to their 'fine dining' expectations schema.

Question 10

identifies an advantage such as good spatial resolution allowing localisation of brain activity oe	**M1**
explains that this helps link specific cognitive processes to particular brain regions, improving understanding of neural basis of cognition oe	**A1**
could mention non-invasive measurement as an additional benefit oe	**A1**

Answer: fMRI has good spatial resolution so it can localise which brain areas are active during a memory task, helping link cognitive processes to specific neural regions; it is also non-invasive.

Question 11

states a difference, e.g. theoretical models are conceptual, often diagrammatic summaries, while computer models are formal, implemented simulations oe	**M1**
gives a brief example of a theoretical model, e.g. the multi-store model named only, and a computer-model example, e.g. a simulated neural network that models pattern recognition oe	**A1**
explains why the difference matters, e.g. computer models can produce quantitative predictions that can be tested against data oe	**A1**

Answer: Theoretical models are conceptual summaries (e.g. the multi-store model named only) while computer models are formal simulations (e.g. a neural-network simulation of pattern recognition); computer models can generate quantitative predictions that can be tested.

Question 12

Level 4 Knowledge of the cognitive approach is accurate and detailed, showing clear understanding of its assumptions and methods. Evaluation is thorough and well developed, discussing multiple strengths and limitations interactively, with reasons and evidence. Issues such as scientific methods, inference, model usefulness and ecological validity are integrated. Specialist terminology is used accurately and the answer is coherent and balanced.	**10-12**
Level 3 Knowledge and understanding are clear but may be less detailed. Evaluation addresses both strengths and limitations with some development and supporting examples or evidence. Discussion is balanced but may be less wide ranging or less deeply justified. Terminology is used appropriately and the answer is mostly well structured.	**7-9**
Level 2 Knowledge is present but limited. Evaluation is superficial or one-sided, with limited justification or few examples. The answer may list points rather than develop them and links between claims and evidence may be weak. Organisation is limited and terminology may be used inconsistently.	**4-6**
Level 1 Very limited knowledge or relevance. Evaluation is minimal or absent, points are simplistic and unsupported. The answer lacks structure and specialist terms are largely absent.	**1-3**
Level 0 No creditable content.	**0**

Indicative content:

- AO1: The cognitive approach assumes internal mental processes can be studied scientifically by creating controlled tasks and using inference from observable behaviour.
- AO1: It makes use of theoretical models and computer models to generate testable hypotheses and formal predictions, and cognitive neuroscience uses brain-scanning methods to link mental processes to neural activity.
- AO3 strength: Scientific rigour, including controlled experiments, precise operationalisation of tasks, and computational modelling, allows falsifiable, replicable hypotheses. This increases reliability and cumulative theory-building.
- AO3 strength: Cognitive neuroscience provides converging evidence, for example fMRI localisation studies that support cognitive theories, strengthening explanatory power by linking mind and brain.
- AO3 limitation: Inference from behaviour to internal processes is indirect and relies on assumptions; if these are wrong the conclusions may be invalid. This raises concerns about construct validity.
- AO3 limitation: Machine reductionism and the computer analogy may oversimplify human cognition by ignoring emotion, motivation and embodied factors, limiting the approach's ability to explain whole-person behaviour in natural settings.
- AO3 limitation: Laboratory tasks can lack ecological validity; highly controlled tasks may not reflect real-world complexity, so findings may not generalise to everyday cognition.
- AO3 balance and application: Where appropriate, researchers mitigate limitations by triangulating methods, using more naturalistic tasks, improving models to include affective components, and combining behavioural, computational and neuroscientific data to build stronger explanations.
- AO3 evaluation of evidence: Cite examples where computational models made precise predictions successfully, and where brain-imaging evidence supported cognitive theories, but also note cases where laboratory findings failed to generalise or where inference produced competing interpretations.

Question 13

describes the computer analogy: likening the mind to an information processor with inputs, stores and outputs oe	**M1**
explains how models use this analogy to produce precise, testable theories and simulations of cognitive processes oe	**A1**
identifies a strength: encourages formalisation and precise predictions, making cognition testable with experimental tasks oe	**M1**
explains why this strength matters, e.g. it increases scientific rigour and allows computational modelling to generate measurable predictions oe	**A1**
identifies a limitation: machine reductionism, treating cognition as purely computational and neglecting emotion, motivation or embodied factors oe	**M1**
explains why this limitation matters, e.g. it may oversimplify human cognition and reduce ecological validity of models oe	**A1**

Answer: The computer analogy likens the mind to an information processor with inputs, stores and outputs; computer models use this to formalise cognitive processes and generate simulations. A strength is precise, testable predictions that increase scientific rigour and allow computational modelling to make measurable predictions. A limitation is machine reductionism, which can ignore emotion, motivation and embodied aspects of cognition, potentially oversimplifying human mental processes and reducing ecological validity.