

# Cognition PSY307

## Mid Semester and Final Exam Revision Notes

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## Mid-Session Exam Notes

### Chapter 1: Intro to Cognition

- Cognitive psychology: the branch of psychology concerned with the scientific study of the mind.
- Cognition: the mental processes, such as perception, attention, and memory, that are what the mind does.
- Mind: the mind creates and controls mental capacities such as perception, attention, and memory, and creates representations of the world that enable us to function.
- **Donders (1868)**
- Procedure: simple reaction time vs. choice reaction time.
- Results: choice reaction time takes 1/10 seconds longer; therefore, it takes 1/10 second to make a decision.
- Contribution: first cognitive psychology experiment
- Reaction time: how long it takes to respond to presentation of a stimulus
- Simple reaction time: e.g. pressing a button as rapidly as possible when a light goes on
- Choice reaction time: e.g. using two lights and asking subjects to push left button when left light goes on, and right button when right light goes on.
- **Wundt (1879)**
- Procedure: analytic introspection
- Results: no reliable results
- Contribution: established the first laboratory of scientific psychology
- Structuralism: according to this, our overall experience is determined by combining basic elements of experience the structuralists call 'sensations'. Wundt wanted to create a "periodic table of the mind" which would include all of the basic sensations involved in creating experience.
- Analytic introspection: Wundt thought he could achieve this description of the components of experience by using analytic introspection, a technique in which trained subjects described their experiences and thought processes in response to stimuli.
- **Ebbinghaus (1885)**
- Procedure: savings method to measure forgetting
- Results: forgetting occurs rapidly in the first 1 to 2 days after original learning
- Contributions: quantitative measurement of mental processes
- Savings: a measure to determine how much was forgotten after a particular delay. (original time to learn a list of words) – (time to relearn the list after the delay).
- Savings curve: the plot of percent savings versus time. Important as it showed that memory drops rapidly for the first 2 days after initial learning and then levels off. This curve demonstrated that memory could be quantified and that functions lie the savings curve could be used to describe a property of the mind (ability to retain information).
- **Donders and Ebbinghaus**: both studies measured behaviour to determine a property of the mind.
- **James (1890)**
- Procedure: no experiments, reported observations of his own experience
- Results: descriptions of a wide range of experiences
- Contributions: first psychology textbook; some of his observations are still valid today.
  - Nature of attention, the taking possession by the mind, in clear and vivid form, of one out of several simultaneous possible objects or trains of thoughts. It implies withdrawal from some things in order to deal effectively with others.
- **Watson**
- Behaviourism: psychology is a purely objective, experimental branch of natural science. Its theoretical goal is the prediction and control of behaviour. Behaviour, not consciousness is the objective point.

- Classical conditioning: pairing one stimulus with another, previously neutral stimulus, causes changes in the response to the neutral stimulus. – Pavlov’s dog.
- **B.F. Skinner**
- Operant conditioning: focuses on how behaviour is strengthened by the presentation of positive reinforcement (or withdrawal of negative reinforcers).
- Cognitive map: a conception within one’s mind of a layout or information. I.e. developing a cognitive map of your neighbourhood so that if you make a wrong turn one day, you can visualise where you are and what turn to take next to get you back to where you want to go. Not simply “I turn left, left, right, left”.
- Cognitive revolution: a shift in psychology from the behaviourist’s stimulus-response relationships, to an approach whose main thrust was to understand the operation of the mind.
- Information-processing approach: an approach to studying the mind that traces sequences of mental operations involved in cognition. The operation of the mind, according to this approach, can be described as occurring in a number of stages: input – input processor – memory unit – arithmetic unit = output
- Artificial intelligence: making a machine behave in ways that would be called intelligent if a human were so behaving.
- Logic theorists: a computer program created by Newell and Simon that could create proofs for problems in logic – something that up until then had only been achieved by humans. This program was considered a real “thinking machine” because it did more than simply process numbers, it used human like reasoning processes to solve problems.
- Structural models: representations of a physical structure. A model can mimic the appearance of an object (plastic brain), or they can be represented by diagrams that don’t resemble the structure, but instead indicate how different areas are connected (line map of connections in the brain).
- Process models: represent the processes that are involved in cognitive mechanisms, with boxes usually representing a specific process and arrows indicating connections between processes. E.g. Broadbent’s filter model of attention.

## Chapter 2: Cognitive Neuroscience

- Cognitive neuroscience: the study of the physiological basis of cognition
- Feature detectors: neurons that respond to specific stimulus features such as orientation, movement, and length.
- Hierarchical processing: progression from lower to higher areas of the brain.
  - Neurons in the visual cortex: simple stimuli; oriented bars
  - Neurons in the temporal lobe: complex geometrical stimuli
  - Neurons in another area of temporal lobe: faces
- Sensory code: refers to how neurons represent various characteristics of the environment
- Specificity coding: the idea that an object could be represented by the firing of a specialised neuron that responds only to that object.
- Population coding: the representation of a particular object (or face) by the pattern of firing of a large number of neurons.
- Sparse coding: occurs when a particular object (or face) is represented by a pattern of firing of only a small group of neurons, with the majority of neurons remaining silent.
- Localisation of function: one of the basic principles of brain organisation, specific functions are served by specific areas of the brain.
- Cerebral cortex: most of the cognitive functions are served here. A layer of tissue about 3mm thick that covers the brain.
- Neuropsychology: the study of the behaviour of people with brain damage, provided early evidence for localisation of function.
- Broca’s area: an area in the left frontal lobe, specialised for speech, producing language.
- Wernicke’s area: an area of the temporal lobe, comprehension of language.

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## Final Exam Notes

### Chapter 6: Long-Term Memory / Structure

- Long-term memory is an archive of information about past experiences in our lives and knowledge we have learned. It coordinates with working memory to help our ongoing experience.
- The primacy and recency effects that occur in the serial position curve have been linked to long-term memory and short-term memory respectively.
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- Visual and auditory coding can occur in both STM and LTM
- Semantic coding has been demonstrated in STM by Wickens, by demonstrating release from proactive inhibition.
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- Semantic coding has been demonstrated in LTM by Sachs, using a recognition memory procedure
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- Auditory coding is the predominate type of coding in STM, while semantic coding is predominately used in LTM.
- Neuropsychological studies have demonstrated a double dissociation between STM and LTM, which supports the idea that STM and LTM are caused by different independent mechanisms.
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- The hippocampus is important for forming new LT memories. Brain imaging experiments have shown that the hippocampus is also involved in holding novel information over short delays.
- According to Tulving, the defining property of the experiences of episodic memory is that it involves mental time travel (self-knowing or remembering). The experience of semantic memory (knowing) does not involve mental time travel.
- The following evidence supports the idea that episodic and semantic memory involve different mechanisms:
  - Double dissociation of episodic and semantic memory in patients with brain damage
  - Brain imaging, which indicates that overlapping but different areas are activated by episodic and semantic memories.
- Even though episodic and semantic memories are served by different mechanisms, they are connected In the following ways:
  - Knowledge (semantic memory) can influence the nature of experiences that become episodic memories
  - Autobiographical memories include both episodic and semantic components.
- The remember/know procedure is based on that idea that recollection is associated with episodic memory, and familiarity is associated with semantic memory.
- Over time, memories lose their episodic nature. This is called that semanticization of remote memories.
- There is a link between the ability to remember the past and the ability to imagine the future. This has been demonstrated in both neuropsychological and brain imaging experiments, and has led to the proposal that a function of episodic memory is to help anticipate future needs and guide future behavior.
- Explicit memories, such as episodic and semantic memories, are memories we are aware of. Implicit memory occurs when learning from experience is not accompanied by conscious remembering. Procedural memory, priming, and classical conditioning involve implicit memory.
- Procedural memory, also called skill memory, has been studied in amnesiac patients. They are able to learn new skills, although they do not remember learning them. Procedural memory is a common component of many of the skills we have learned.
- Priming occurs when the presentation of a stimulus affects a person's response to the same or a related stimulus when it is presented later. The implicit nature of priming has been demonstrated

in both amnesiac patients and non-amnesiac subjects. Priming is not just a laboratory phenomenon but also occurs in real life. The propaganda effect is one example of real-life implicit memory.

- Classical conditioning occurs when a neutral stimulus is paired with a stimulus that elicits a response, so that the neutral stimulus then elicits the response. Classical conditioned emotions occur in everyday experience.
- Memory loss has been depicted in movies in a number of ways, some of which bear at least a resemblance to actual cases of amnesia, and some of which are totally fictional conditions.
  - 50 first dates: a woman who saw this movie later decided she has this condition – did the movie effect of subconsciously so that she perceived her issue to be similar to that of Drew Barrymore's?!

## Chapter 7: Long-Term Memory / Encoding, Retrieval & Consolidation

- Encoding is the process of acquiring information and transferring it into long-term (LTM).
- Retrieval is transferring information from LTM into working memory
- Some mechanisms of encoding are more effective than others in transferring information into LTM. Maintenance rehearsal helps maintain information in STM but is not an effective way of transferring information into LTM. Elaborative rehearsal is a better way to establish long-term memories.
- Levels of processing theory states that memory depends on how information is encoded or programmed into the mind. According to this theory, shallow processing is not as effective as deep processing. An experiment by Craik and Tulving showed that memory was better following a deep processing than following shallow processing.
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- The idea of levels of processing, while influential, suffers from the problem of circularity, because it is difficult to define the depth of processing independently of memory.
- Evidence that encoding influences retrieval includes research looking at the effect of:
  - Forming visual images:
  - Linking words to yourself:
  - Generating information (the generation effect):
  - Organizing information:
  - Relating words to survival value:
  - Practicing retrieval (the testing effect):
- Retrieving long-term memories is aided by retrieval cues. This has been determined by cued recall experiments and experiments in which subjects created retrieval cues that later helped them retrieve memories
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- Retrieval can be increased by matching conditions at retrieval to conditions that existed at encoding. This is illustrated by encoding specificity, state-dependent learning, and matching type of processing (transfer-appropriate processing).
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- The principle of encoding specificity states that we learn information along with its context. Godden and Baddeley's diving experiment and Grant's studying experiment illustrates the effectiveness of encoding and retrieving information under the same conditions.