

Exam 2 Study Guide

Evolved Function of Multiple Memory systems

1) Evolutionary Functions of Memory

- Recognition & Context Setting
 - People, places, things, predators
 - Example: Status Hierarchies
 - Example: Vampire bats and the memory needed for cooperation
- Prediction (based on what happened already)
 - Reward availability (like food, mates)
 - Food toxicity (Garcia Effect) & other avoidance learning mechanisms
 - Predictive cues to presence and intrusion by predators
 - Challenging for status and mates
- Spatial mapping and Foraging (how to return somewhere)
- Skill Learning (aka automating tasks) through repetition
 - Example: Running, throwing, sewing, carving, speaking

2) Evidence Supporting the Multiple Memory Systems View

- The Debate: Is memory a singular, unitary system or multiple systems?
 - The Answer: Memory and learning mechanisms are multiple adaptive specializations shaped by selection to solve specific problems in the environment.
- Functional Incompatibility
 - This specialized nature prohibits some memory systems from solving problems they were not specialized to solve
 - Adaptations that serve one function can not solve other functions because they are too specialized
- Functional Incompatibility in Bird Memory Systems
 - Songs must be learned because they enable organisms to attract mates and defend breeding territories
 - What gets in: Only songs of conspecifics are copied
 - Swamp sparrows won't learn from closely-related song sparrows
 - When it gets in: Song learning only occurs in critical periods of development (2-10 weeks, depending on species)
 - How it gets retained (and for how long)
 - No songs produced until roughly 1 year old (next breeding season, months later, without initial practice)
 - Songs of other territorial birds can be recognized without replacing sung songs
- Functionally Incompatible: Song Learning Mechanisms and Foraging Mechanisms
 - Chickadees

- May store several hundred food items per day over a wide range
 - Never reuse sites
 - Re-collect food several days later
 - Differs from Song Learning:
 - What gets in: No restrictions on what kinds of locales can be mapped and learned (as opposed to very specific songs)
 - Sensitive Periods: No special memory for locales mapped earlier in life: new learning is constant over lifespan
 - Retention and Unlearning: Where as songs resist decay for months and years, food cache “maps” decay after as much as one unsuccessful revisiting. There is incredible turnover.
- Conclusion
 - Because the two memory systems seem to have very different rules for what gets retained, for how long, and when, they should be considered separate memory systems
 - We see the same multiple memory system architecture in humans
- Memory Systems I & II in Humans
 - Gradual & Incremental Learning (Implicit/Procedural; System I)
 - Recollection of specific events is not required:
 - Learning to type, play piano, juggle
 - Learning and Remembering language
 - Mirror drawing in amnesics
 - Pattern learning and recognition (chess players, the card game “Mao”)
 - Habits and addiction cues
 - Goal is to automate behaviors and responses across a wide variety of nonspecific circumstances
 - Thus, specific cues about time, place, context SHOULD be ignored during this kind of learning
 - Rapid, One-shot Learning (Declarative, Episodic: System II)
 - Goal is to differentiate and remember contextual details that uniquely mark that experience of knowledge
 - Episodic memory for 9/11
 - Autobiographical memory for a fight with you significant other
 - Semantic memory for the state capitals
 - Enables finely-tuned predictions and experience simulations when planning behavior

Short-term Memory

- 1) Span of Short-Term Memory: STM is the term for short-term storage of information with no manipulation or organizational element

- Time span (without rehearsal)
 - Short term memory seems to last roughly 12 seconds without rehearsal
 - Duration: How long does short term memory last?
 - The Brown-Peterson Technique:
 - I will read you 3 letters to remember, then a number
 - Once you hear the number, count backwards by 3's from that number
 - Stop counting when I say "Recall"
 - When I say "Recall" write the letters down
 - This technique showed that our memory is fragile for material stored for just a few seconds
 - Holding information in Short Term Memory
 - We hold info in STM through Maintenance Rehearsal:
 - The process of continually attending to and mentally 'repeating' information to keep it in short term memory
 - If we are unable to rehearse new information, we have very poor memory for it (it decays)
 - Also, as new information interferes with working memory rehearsal, info is rapidly lost (Example: the primacy-recency effect)
 - Capacity (With rehearsal)
 - Capacity: How much can we store at one time?
 - Originally tested by Waugh & Norman using the digit-span test
 - Digit span
 - Hear the string of number
 - Write them down
 - We add a number each time and test when capacity is maxed out
 - Chunking: Small units can be combined into larger meaningful units
 - Chunk: Strongly associated collection of elements
- 2) Working Memory: refers to the structures and processes used for temporarily storing and manipulating information
- Executive control system – planning, initiating, and integrating information – high cognitive abilities
 - Example: Doing mental math in your head...like what is 24 X 12?
 - Two subordinate systems that carry out Maintenance Rehearsal:
 - Articulatory or phonological loop- rehearses verbal information – auditory and semantic coding
 - Visual-spatial sketchpad – maintains images and spatial representations – visual coding