Cheat Sheet: Memory

Essential Concepts

How Memory Functions

- Memory is a system or process that stores what we learn for future use.
- Our memory has three basic functions: encoding, storing, and retrieving information. Encoding is the act of getting information into our memory system through automatic or effortful processing. Storage is the retention of the information, and retrieval is the act of getting information out of storage and into conscious awareness through recall, recognition, and relearning.
- The idea that information is processed through three memory systems is called the Atkinson-Shiffrin model of memory. First, environmental stimuli enter our sensory memory for a period of less than a second to a few seconds. Those stimuli that we notice and pay attention to then move into short-term memory. According to the Atkinson-Shiffrin model, if we rehearse this information, then it moves into long-term memory for permanent storage.
- Other models like that of Baddeley and Hitch suggest there is more of a feedback loop between short-term memory and long-term memory. Long-term memory has a practically limitless storage capacity and is divided into implicit and explicit memory.

The Brain and Memory

- Beginning with Karl Lashley, researchers and psychologists have been searching for the engram, which is the physical trace of memory. Lashley did not find the engram, but he did suggest that memories are distributed throughout the entire brain rather than stored in one specific area.
- Now we know that three brain areas do play significant roles in the processing and storage of different types of memories: cerebellum, hippocampus, and amygdala. The cerebellum's job is to process procedural memories; the hippocampus is where new memories are encoded; the amygdala helps determine what memories to store, and it plays a part in determining where the memories are stored based on whether we have a strong or weak emotional response to the event.
- Strong emotional experiences can trigger the release of neurotransmitters, as well as hormones, which strengthen memory, so that memory for an emotional event is usually

stronger than memory for a non-emotional event. This is shown by what is known as the flashbulb memory phenomenon: our ability to remember significant life events. However, our memory for life events (autobiographical memory) is not always accurate.

Problems with Memory

- All of us at times have felt dismayed, frustrated, and even embarrassed when our memories have failed us. Our memory is flexible and prone to many errors.
- There are several reasons why forgetting occurs. In cases of brain trauma or disease, forgetting may be due to amnesia. Another reason we forget is due to encoding failure. We can't remember something if we never stored it in our memory in the first place.
- Schacter presents seven memory errors that also contribute to forgetting: transience, absentmindedness, blocking, misattribution, suggestibility, bias, and persistence.
- Sometimes, information is actually stored in our memory, but we cannot access it due to interference.
    - Proactive interference happens when old information hinders the recall of newly learned information.
    - Retroactive interference happens when information learned more recently hinders the recall of older information.
- Memories are malleable and subject to alteration, as the process of retrieving and reconstructing them can introduce inaccuracies and distortions, known as the misinformation effect, which has significant implications for eyewitness testimony and the reliability of memories in legal contexts.

Memory Strategies

- There are many ways to combat the inevitable failures of our memory system. Some common strategies that can be used in everyday situations include mnemonic devices, rehearsal, self-referencing, and adequate sleep. These same strategies also can help you to study more effectively.

Glossary

absentmindedness

lapses of attention or forgetfulness due to a memory encoding failure

acoustic encoding

input of sounds, words, and music

amnesia

loss of long-term memory that occurs as the result of disease, physical trauma, or psychological trauma

anterograde amnesia

loss of memory for events that occur after the brain trauma

arousal theory

strong emotions trigger the formation of strong memories and weaker emotional experiences form weaker memories

Atkinson-Shiffrin model (A-S)

memory model that states we process information through three systems: sensory memory, short-term memory, and long-term memory

automatic processing

encoding of informational details like time, space, frequency, and the meaning of words

bias

when a person's world view or current feelings distort the memory of past events

blocking

memory error in which you cannot access stored information, “tip-of-the-tongue (TOT) phenomenon”

chunking

organizing information into manageable bits or chunks

declarative memory

type of long-term memory of facts and events we personally experience

effortful processing

encoding of information that takes effort and attention

elaborative rehearsal

thinking about the meaning of the new information and its relation to knowledge already stored in your memory

encoding

input of information into the memory system

encoding specificity principle

the hypothesis that a retrieval cue will be effective to the extent that information encoded from the cue overlaps or matches information in the engram or memory trace

engram

physical trace of memory

episodic memory

type of declarative memory that contains information about events we have personally experienced, also known as autobiographical memory

equipotentiality hypothesis

some parts of the brain can take over for damaged parts in forming and storing memories

explicit memory

memories we consciously try to remember and recall

false memory syndrome

recall of false autobiographical memories

flashbulb memory

exceptionally clear recollection of an important event

forgetting

loss of information from long-term memory

implicit memory

memories that are not part of our consciousness

interference

memory obstruction caused by competing information

levels of processing

information that is thought of more deeply becomes more meaningful and thus better committed to memory

long-term memory (LTM)

continuous storage of information

memory

system or process that stores what we learn for future use

memory consolidation

active rehearsal to move information from short-term memory into long-term memory

memory construction

formulation of new memories

memory-enhancing strategy

a technique to help make sure information goes from short-term memory to long-term memory

memory trace

also called an engram, this is the change in the nervous system representing a new memory

memory trace decay

when the physical record of a memory fades. It is important to note that memories are not stored in a single location in the brain, rather they are distributed across multiple regions, and the strength of the connection between these regions can change over time.

misattribution

memory error in which you confuse the source of your information

misinformation effect

after exposure to incorrect information, a person may misremember the original event

mnemonic device

memory aids that help organize information for encoding

proactive interference

old information hinders the recall of newly learned information

procedural memory

type of long-term memory for making skilled actions, such as how to brush your teeth, how to drive a car, and how to swim

recall

accessing information without cues

recoding

taking the information from the form it is delivered to us and then converting it in a way that we can make sense of it

recognition

identifying previously learned information after encountering it again, usually in response to a cue

reconstruction

the process of bringing up old memories that might be distorted by new information

relearning

learning information that was previously learned

retrieval

act of getting information out of long-term memory storage and back into conscious awareness

retroactive interference

information learned more recently hinders the recall of older information

retrograde amnesia

loss of memory for events that occurred prior to brain trauma

self-reference effect

tendency for an individual to have better memory for information that relates to oneself in comparison to material that has less personal relevance

semantic encoding

input of words and their meaning

semantic memory

type of declarative memory about words, concepts, and language-based knowledge and facts

sensory memory

storage of brief sensory events, such as sights, sounds, and tastes

short-term memory (STM)

(also, working memory) holds about seven bits of information before it is forgotten or stored, as well as information that has been retrieved and is being used

storage

creation of a permanent record of information

suggestibility

effects of misinformation from external sources that leads to the creation of false memories

transience

the tendency of memories to fade over time

visual encoding

input of images