MODULE 33

FORGETTING, MEMORY CONSTRUCTION AND MEMORY IMPROVEMENT
FALSE MEMORIES

The Bunny Effect (Elizabeth Loftus)

https://www.youtube.com/watch?v=eZlPzSeUDDw&feature=relmfu
FORGETTING

WHY DO WE FORGET?

Reasons:

- Memory loss due to severe and permanent damage (H.M.)
- Encoding failure
- Storage decay
- Retrieval failure
- Interference

“Someday we’ll look back at this time in our lives and be unable to remember it.”
FORGETTING

FORGETTING AND THE TWO-TRACK MIND:

- **Anterograde amnesia**: (H.M.) [https://www.youtube.com/watch?v=KkaXNvzE4pk](https://www.youtube.com/watch?v=KkaXNvzE4pk)
  - an inability to form new memories.

- **Retrograde amnesia**:
  - an inability to retrieve information from one’s past.

- Some people are incapable of recalling new facts and forming explicit memories, however they are able to learn nonverbal tasks due to the different brain structures involved.

- Able to learn tasks without awareness of learning them
  - Examples: Where’s Waldo, find their way to bathroom
THEORIES OF FORGETTING

- **Proactive interference (forward acting):**
  - old information interferes with recall of new information

- **Retroactive interference (backward acting):**
  - new information interferes with recall of old information

- **Encoding failure:**
  - a lot of what we sense, we never notice, and what we fail to encode, we will never remember. (absent mindedness: texting in class..missing important details)

- **Decay theory:**
  - memory trace fades with time

- **Motivated forgetting:**
  - involves the loss of painful memories (protective memory loss)

- **Retrieval failure:**
  - the information is still within LTM, but cannot be recalled because the retrieval cue is absent
FORGETTING

EXAMPLES OF INTERFERENCE:

- **Proactive interference (forward acting):**
  - Happens when previously stored info prevents learning and remembering new info.
  - Calling your new boyfriend by your old boyfriend’s name.

- **Retroactive interference (backward acting):**
  - Occurs when newly learned information prevents the retrieval of previously learned material.
  - Getting a new address and forgetting your old address

Mnemonics?
FORGETTING

EXAMPLES OF STORAGE DECAY:

- If we encode something well enough, we can forget it.
- Without rehearsal, we forget things over time.
- Why? Possible reasons:
  - forgetting curve is a gradual fading of the physical memory trace.

Ebbinghaus’s forgetting curve:
- The course of forgetting unused info is initially rapid, followed by a declining rate of loss, then leveling off with time.

FORGETTING

EXAMPLES OF MOTIVATED FORGETTING:

- We sometimes revise our own histories.
- Memory is an “unreliable, self-serving historian.”
- Where did all the cookies go? “I don’t know, I seriously only ate one.”
FORGETTING

MOTIVATED FORGETTING: Why does it exist?

- One explanation is REPRESSION:
  - in psychoanalytic theory, the basic defense mechanism that banishes anxiety-arousing thoughts, feelings and memories from consciousness.

- Freud says we repress painful or unacceptable memories to protect our self-concept and to minimize anxiety. Popular in the mid-twentieth century.

- Today however, psychologists believe we forget neutral things like where we placed our keys, and hardly ever forget emotional events.
You go to the Cheesecake Factory for dinner. You are seated at a table with a white tablecloth. You study the menu. You tell the female server you want Avocado Egg Rolls, extra sauce, Roadslide Sliders, Thai Lettuce Wraps, and Chino-Latino Steak (medium). You also order a Cherry Coke from the beverage list. A few minutes later the server returns with your Avocado Egg Rolls. Later the rest of the meal arrives. You enjoy it all, except the Chino-Latino Steak is a bit overdone.
Cheesecake factory

How did you order the steak?
Was the red tablecloth checkered?
What did you order to drink?
Did a male server give you a menu?
MEMORY CONSTRUCTION ERRORS

MEMORY CONSTRUCTION

- Memory does not function like a video recorder!
- We sometimes alter memories as we encode or retrieve them.
- Your expectations, schemas, and environments may alter your memories.
MEMORY CONSTRUCTION ERRORS

FALSE MEMORIES

- Loftus and Palmer 1974

- Eyewitnesses reconstruct their memories after a crime or accident and then answered questions about what they had seen.

https://www.youtube.com/watch?v=Rg5bBJQOL74


“Memory is insubstantial. Things keep replacing it. Your batch of snapshots will both fix and ruin your memory. You can’t remember anything from your trip except the wretched collection of snapshots.” -Anne Dillard 1988
MEMORY CONSTRUCTION ERRORS

MISINFORMATION AND IMAGINATION EFFECTS

- Misinformation effect (Elizabeth Loftus):
  - incorporating misleading information into one’s memory of an event.

- About how fast were the cars going when they SMASHED into each other? (higher speed estimates and glass)

- About how fast were the cars going when they hit each other? (lower speed estimates)
About how fast were the cars going when they _______ each other?

Verb: smashed into
Estimated mph: 40.8

Verb: hit
Estimated mph: 34.0

Verb: contacted
Estimated mph: 30.8

Original information

External information
About how fast were the cars going when they SMASHED INTO each other?

The “memory”
MEMORY CONSTRUCTION ERRORS

EYEWITNESS TESTIMONY

- Shown to be unreliable.

- Eyewitnesses can only remember what they perceive. The more people you tell the story to, the better the chance of distortion.

- Recall for events may be influenced by what they heard or constructed after incidents.

- Memory is reconstructed.

- Memories are not stored like snapshots, but are instead like sketches that are altered and added to every time they are called up.
Elizabeth Loftus has shown subjects who are given false information about an event or scene tend to incorporate it into their memories, and "recall" the false information as a part of their original memory even two weeks later.

Loftus gives the example of the sniper attacks in the fall of 2002. "Everybody was looking for a white van even though the bad guys ended up having a dark Chevy Caprice." That's because some people reported seeing a white van at the scene of the crime. "Witnesses overhear each other," says Loftus, and police may also unintentionally influence people's memories when they talk about a crime.
SOURCE AMNESIA (MISATTRIBUTION)

- attributing to the wrong source an event we have experienced, heard about, read about, or imagined.

- Frailest part of memory is its **source**.

- Along with the misinformation effect, is the heart of many false memories.

- Author and songwriters sometimes suffer from it, thinking they came up with something and end up plagiarizing.
deja vu: “already seen”
HOW TO IMPROVE MEMORY

▸ Study repeatedly
▸ Make material meaningful
▸ Activate retrieval cues
▸ Use mnemonic devices
▸ Get adequate sleep
▸ Self test!
MODULE 34-35

THINKING, CONCEPTS, AND CREATIVITY

SOLVING PROBLEMS AND MAKING DECISIONS
What is cognition and what are the functions of concepts?

Concepts:
- mental grouping of similar objects, events, ideas, or people.
- representations of categories of items or ideas, based on experience.
- simplify our thinking
- I.E. The concept “fish” includes specific creatures such as an eel, goldfish, and a shark.

Prototypes:
- an ideal or most representative (best example) of a conceptual category.
- concepts are formed by developing prototypes.
- E.G. Penguin vs. Robin or Goldfish vs. Eel
Creativity: the ability to produce novel and valuable ideas

Convergent thinking:
- Narrows the available problem solutions to determine the single best solution.
- Intelligence tests that require a single direct answer
- Converge “come together to ONE point”

Divergent thinking:
- Expands the number of possible problem solutions (creative thinking that diverges in different directions)
- Creativity tests require divergent thinking
- Diverge “to separate into multiple points”
- E.G. How many uses can you think of for a brick?
STRUCTURE OF COGNITION: PROBLEM SOLVING STRATEGIES

▸ **Algorithms:**
  - methodical, logical rule or procedure that guarantees solving a particular problem.
  - problem solving procedures or formulas that guarantee a correct answer
  - E.G. Calculating your GPA, searching EVERY isle for an item in market.

▸ **Heuristics:**
  - a simple thinking strategy that often allows us to make judgments and solve problems efficiently.
  - cognitive strategies or “rules of thumb” used as shortcuts to solve complete mental tasks.
  - usually speedier, but more error-prone than algorithms.
  - E.G. When in doubt, on a multiple choice question you select “C,” searching for hot cocoa mix- check the breakfast, beverage and baking supply aisles.
Sometimes, no problem-solving strategy seems to work and we arrive at a solution through....

Insight (Wolfgang Kohler)

a sudden and often novel realization of the solution to a problem.

E.G. The Candle Solving Problem

Before the Aha! moment, frontal lobes (involved in attention) were active.

The Aha! moment to word problems show a burst of right temporal lobe activity
Sometimes cognitive tendencies lead us astray....

**Confirmation bias:**

- a tendency to search for information that supports our preconceptions and to ignore or distort contradictory evidence.
- we eagerly seek out and favor evidence verifying our ideas than evidence refuting them.

**Hindsight bias:**

- a tendency, after learning about an event, to believe you could have predicted the event in advance.
PROBLEM SOLVING: STRATEGIES AND OBSTACLES

STRUCTURE OF COGNITION: OBSTACLES

- **Fixation:**
  - an inability to see a problem from a fresh perspective.

- **Mental set:**
  - the tendency to approach a problem with the mind-set of what has worked for us previously.
  - predisposes how we think, and can become an obstacle

- **Functional Fixedness:**
  - the inability to perceive a new use for an object associated with a different purpose.
  - E.G. Searching all over the house for a screwdriver when you could have just used a dime.
FORMING GOOD AND BAD DECISIONS AND JUDGMENTS

STRUCTURE OF COGNITION: JUDGEMENT AND DECISION MAKING

- Is it worth the bother to take a jacket? Can I trust this person? Should I sleep with this person? Should I shoot the basketball or pass to the player who’s hot?

- People make the most of their decisions on the basis of limited information. They take shortcuts.

- We usually follow our Intuition:
  - our fast, automatic, unreasoned feelings and thoughts.

- When we need to act quickly, we use mental shortcuts called: Heuristics
  - Sometimes these generally helpful shortcuts can lead us into dumb decisions.
FORMING GOOD AND BAD DECISIONS AND JUDGMENTS

STRUCTURE OF COGNITION: JUDGEMENT AND DECISION MAKING

- Heuristics in Decision Making

- Representative Heuristic:
  - judging the likelihood of things in terms of how well they seem to represent, or match, particular prototypes; may lead us to ignore other relevant info.
  - enables us to make snap judgements about events according to the populations of events that they appear to represent.
  - form of stereotyping
  - influences many of our daily decisions.
  - E.G. A person who is slim, intelligent, and likes to read poetry, is a professor of classics at an Ivy League University or a truck driver?
Heuristics in Decision Making

**Availability Heuristic:**

- estimating the likelihood of events based on their availability in memory; if instances come readily to mind, we presume such events are common.

- can lead us astray in our judgements of things and others.

- What makes things “pop” into our mind? vividness & recency.

- E.G. Airline crashes, casinos signaling wins with bells and lights
Sometimes our judgments go bad because we are more confident than correct.

Overconfidence:

- the tendency to be more confident than correct to overestimate the accuracy of our beliefs and judgments.

E.G. history is full of leaders who were more confident than correct and classrooms are full of overconfident students who expect to finish assignments ahead of schedule.

“Don’t believe everything you think.” -Bumper Sticker
Sometimes we cling to our beliefs even when there is contrary evidence.

Belief perseverance:

- clinging to one’s initial conceptions after the basis on which they were formed has been discredited.

E.G. Pygmalion Effect

“When you know a thing, to hold that you know it; and when you do not know a thing, to allow that you do not know it; this is knowledge.” - Confucious
The way we present an issue, sways our decision and judgments.

Framing:

- the way an issue is posed; how an issue is framed can significantly affect decisions and judgments.
- the influence or wording, or the context in which info is presented may impact decision making.
- E.G. 95% fat free, 10% chance of dying vs 90% chance of survival
  - organ donors
THINKING AND LANGUAGE

MODULE 36
WHAT ARE THE STRUCTURAL COMPONENTS OF A LANGUAGE?

Language:
our spoken, written, or signed words and the ways we combine them to communicate meaning.

3 building blocks for spoken language:

Phoneme:
- the smallest distinguishable sound units in a language.
- English uses about 40 phonemes. E.G. Chat (ch,a,t) 3 phonemes
- Consonants carry more information than vowels.
- E.G. The treth ef thes stetment shed be evedent frem thes bref demenstretien.

Morpheme:
- the smallest unit that carries Meaning; may be a word or part of a word.
- usually whole words or meaningful parts of a word such as prefixes and suffixes.
- E.G. prefix pre- in preview
WHAT ARE THE STRUCTURAL COMPONENTS OF A LANGUAGE?

- **Grammar:**
  - a system of rules that enables us to communicate with and understand others.
  - Grammatical rules guide us in deriving meaning from sounds (semantics) and in ordering words into sentences (syntax).

- **Syntax:** system of rules that governs how words can be meaningfully arranged to form phrases and sentences.

- **Semantics:** the set of rules we use to derive meanings from morphemes.
MILESTONES IN LANGUAGE DEVELOPMENT

- First birthday to high school graduation - about 60,000

- Receptive Language:
  - the ability to understand what is said to and about them.
  - Infants start without language (in fantis- not speaking)
  - 4 months of age: babies can recognize differences in speech sounds, can read lips
MILESTONES IN LANGUAGE DEVELOPMENT

- **Productive Language:**
  - *Crying*- happens immediately

- **Babbling stage:**
  - occurs at about **4 months**, stage of speech development where infant utters various sounds unrelated to household language.
  - ALL infants produce sounds that resemble many diff languages.
    - includes sounds used in all human languages, not just the language heard by the infant.

- **One-word stage (holographic speech):**
  - stage in speech development usually beginning from about **1 year of age**, during which a child speaks mostly in single words.
  - single words that can express complex meaning. “doggy” “ball”
Two-word stage (telegraphic speech):

- beginning about *age TWO*, the stage in speech development during which a child speaks mostly in two-word statements.

- At about 18 months, children’s word learning explodes from a word per week to a word per day.

- Children’s language still follow rules of syntax. Seen across cultures, (nouns follow adjectives)

- They utter two word sentences in *telegraphic speech*.
  - “go car” “want juice”
How do we acquire language?

Theories of Language Acquisition:

- **B.F. Skinner:**
  - language depends on the environment. Language is acquired through association, imitation, and reinforcement.

- **Noam Chomsky (Nativist theory):**
  - argues that human brains have a built in language acquisition device (LAD), an innate mechanism or process that allows children to develop language skills.
  - **Critical period hypothesis:** language must be learned by a certain age, if not- the rules of language pass you by.

- **Benjamin Whorf (linguistic relativity hypothesis):**
  - language determines the way people think, and shapes a person’s basic ideas.
  - language is dependent on culture.
  - E.G. Hopi Indians of Northern Arizona have no past tense for verbs, therefore they cannot think about the past. Eskimos have numerous words for snow.
How do we acquire language?

Theories of Language Acquisition:

- **Benjamin Whorf (linguistic relativity hypothesis):**
  - language determines the way people think, and shapes a person’s basic ideas.

- **linguistic determinism:**
  - Whorf’s hypothesis that language determines the way we think.
  - language is dependent on culture.

- English has a rich vocab for self-focused emotions such as anger, Japanese have more words for interpersonal emotions such as sympathy. (Markus & Kitayama)

- E.G. Hopi Indians of Northern Arizona have no past tense for verbs, therefore they cannot think about the past. Eskimos have numerous words for snow.
MRI scans show that different neural networks are activated by nouns and verbs, or objects and actions.

fMRI scans show that jokes that play on meaning are processed in a different brain area than jokes that play on words.

- “Why don’t sharks bite lawyers?”
- “What kind of lights did Noah use on the ark?”

In language processing: the brain operates by dividing its mental functions—speaking, perceiving, thinking, remembering—into subfunctions.
The brain and language

Brain areas involved in language processing and speech

- During language processing, there is brain activity in Broca’s and Wernicke’s area.

- **Aphasia:**
  - impairment of language, usually caused by left-hemisphere damage either to Broca’s area (impairing speaking) or to Wernicke’s area (impairing understanding).

- **Broca’s area:**
  - controls language expression - an area of the frontal lobe, usually in the left hemisphere, that directs the muscle movements involved in speech.
  - a person would struggle to speak words while still being able to sing familiar songs and comprehend speech.

- **Wernicke’s area:**
  - controls language reception - a brain area involved in language comprehension and expression; usually in the left temporal lobe.
  - after damage to an area of the left temporal lobe people could speak only meaningless words.

- E.G. Describe a picture of two boys stealing cookies behind a woman’s back.
  - “Mother is away her working her work to get her better, but when she’s looking, the two boys looking the other part.”