

Doubting Yourself

- The hallmark of an enlightened mind
- The key to being a good critical thinker and skeptic
- Really hard to actually do!



The Logically Illogical Brain

- We often think and act in an understandable, but nonetheless irrational, way
- Knowing the various ways we can make poor decisions is crucial to being a critical thinker
- The biggest factors are *cognitive biases* and *mental heuristics*

Cognitive Biases

- Predictable patterns of judgmental deviation that occur in specific situations
- These then cause inaccurate interpretations or perceptions of information
- In other words, these are regularly occurring ways that our brain misinterprets evidence

Heuristics

- Mental shortcuts or rules of thumb that significantly decrease the mental effort required to solve problems or make decisions
- Often lead to an oversimplification of reality that can cause us to make systematic errors that can then become cognitive biases

Not All Bad

- Just because we make these mistakes doesn't mean humans always make terrible decisions
- In many cases relying on heuristics can be adaptive and useful
 - "Less is more" effect
 - Ecological rationality
 - "Good enough" decisions

Most Common Biases & Heuristics

- Confirmation bias
- Belief perseverance
- Hindsight bias
- Representativeness heuristic
- Availability heuristic
- Anchoring and adjustment heuristics

Confirmation Bias

- The tendency of individuals to favor information that confirms their beliefs or ideas and discount that which does not
- When confronted with new information, we tend to do one of two things

Confirmation Bias

- If it confirms what we already believe, we...
 - Unreservedly accept it, and are happy to have been shown it
 - Forgive and forget problems
 - Are more likely to recall this information later



Confirmation Bias

- If it contradicts what we already believe, we...
 - Immediately discount it
 - Nitpick potential flaws
 - See it fade from our memory more quickly



Confirmation Bias

- A primary reason why the scientific method of needed to be developed
 - We naturally try to *prove* our beliefs, but we need to try and *disprove* them
- The more emotionally charged or deeply held a belief is, the stronger the CB becomes

Belief Perseverance

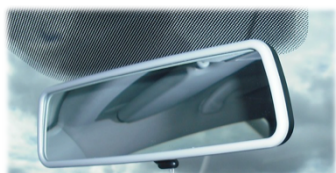
- The tendency to stick with an initial belief, even after receiving contradictory or disconfirming information about that belief
- Three main kinds
 - Self-impressions
 - Social impressions
 - Naïve theories

Belief Perseverance

- Beliefs stay believed for numerous reasons:
- Illusory correlations
 - Seeing a relationship between two things when there is not actually one
- Distortions of evidence
 - Remembering the hits, forgetting the misses

Hindsight Bias

- Occurs when we overestimate how confident we are in an outcome after the outcome is already known



Hindsight Bias Types

- Memory distortions
 - We inaccurately recall our earlier estimate of something occurring, which in turn distorts our current estimate
- Inevitability form
 - When one believes a past event was predetermined for some reason

Hindsight Bias Types

- Foreseeability form
 - happens when you think that you could have foreseen something that has already occurred as occurring
- We are all susceptible to each, but certain ones are more likely in different situations

Representative Heuristic

- A form of stereotyping, where we take a highly salient feature of someone and then overgeneralize it inappropriately



- For example, what does a "good" student look like?

Representative Heuristic

- We misjudge people for several reasons:
 1. Ignoring base rates, or how common something is in a particular population
 2. Drawing conclusions from very small sets of data (e.g., personal experience)

Availability Heuristic

- When we make judgments about how likely something is to occur based only on how easily it is brought to mind
- How often you are exposed to something, regardless of how often it truly occurs, skews the frequency with which you think it happens

Availability Heuristic

- Often activated when you've recently been exposed to something
- Having just heard a news report of a mass shooting makes you think they are more likely to occur than their actual rate



Anchoring & Adjustment Heuristic

- Our estimates of various things are highly influenced by how a question is "anchored"
- "Is the percentage of bald Americans more or less than 15%?" versus "What is the percentage of bald Americans?"



Anchoring & Adjustment Heuristic

- Our estimates stay too close to the original anchor, even if it is absurd
- We fail to take into account other sources of information that may provide us a better answer
- Our estimates are off by more than they would be *sans* anchor since we stop once we reach the edge of a plausible range for the estimate

Something from Nothing

- We frequently see or hear things that aren't actually there, because that is what we expect to see or hear
- This is frequently due to priming and the confirmation bias

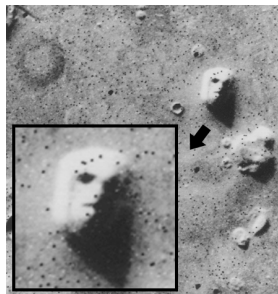
The Devil's Music

- Uproar among concerned parents in the 1970s and 1980s about Satanic messages in rock music
- These were supposedly inserted via [backmasking](#)



The Face of a Martian

- In 1976, the Viking I sent back photos of the surface of Mars
- One showed what seemed to be a 2.5 km long face



Religious Imagery

- People frequently report seeing images related to their religion in unusual locations
- Virgin Mary on underpass walls, Jesus on burned toast, Arabic for "Allah" on sheep



Sports Curses & Jinxes

- The "Madden Curse" refers to how most of the football players shown on the cover have done poorly the next season
- Also a *Sports Illustrated* curse, supposedly dating back to the first issue



Seeing Because of Believing

- The human brain is spectacularly good at misperceiving information in a biased way
- *Pareidolia* is the tendency to interpret random or ambiguous stimuli as being something particular

Seeing Because of Believing

- We tend to experience pareidolia for human faces and religious imagery in particular
- Also highly present in situations where the confirmation bias can come into play
- Happens because of *priming* and *patternicity*

Priming

- An implicit, nonconscious form of memory
- Being exposed to stimuli in one context changes your behavior in another, often making you more likely to recognize, recall, or otherwise pay attention to similar stimuli





Patternicity

- The overall tendency for humans to find meaningful patterns in meaningless stimuli, or to believe something is real when it is not
- Goes hand in hand with *agency* – seeing something as causing for those patterns

Putting It Together

- Our cognitive biases, ability to be primed, and tendency towards patternicity and agenticity combine to make us see things that aren't actually there



An Example

- You are a parent concerned about the dangers of rock music influencing your children
- You begin listening to records and are *primed* to hear certain words



An Example

- Your brain, prone to *patternicity*, picks out such words from ambiguous sounds
- You assume *agenticity* behind these "findings," and blame the musicians
- This fits your confirmation biases and is accepted quickly and easily



Backmasking Unmasked

- Two questions to answer
 - Were the musicians purposefully inserting such messages?
 - Could such messages have any impact on a person's behavior?
- Answer the first appears to be "no" for Satanic or occult messages

Backmasking Unmasked

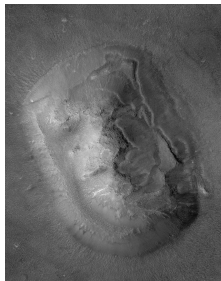
- Research has shown that, if speech is played backwards, people can typically tell if it's a male or female speaking...and that's it!
- Only if purposefully primed to hear phrases are people able to detect them
- So, there is no influence on your behavior from "backmasked" sounds

Jesus, Martian, and Joseph!

- From religious icons on toast to faces on Mars, this is a great example of our biases at play
- For the Mars "face," NASA actually explained *why* the mesa looked like a face in 1977
- It was due to shadowing based on the angle of sun at the time the picture was taken

Jesus, Martian, and Joseph!

- High-resolution photos from late 1990s missions show no face at all!
- Evidence is easily ignored once a belief is imbedded



Statistical Unjinxing

- The Madden Curse and SI Jinx can be examined statistically to see if they are true
- Results found that players were in two less games a year after being on the cover, on average
- But, this average was due almost entirely to one person breaking his leg and missing almost the whole the season

Statistical Unjinxing

- Results also found that the post-cover year performance was the same as the two years *before* they got on the cover
- So the “cover” season was the statistical anomaly...and why they got on the cover!
- Classic example of *regression to the mean*

Statistical Unjinxing

- For the SI Jinx, we would need to see how many times the “jinx” has happened compared to how many covers there are
- Across the first 60 years there were 3069 issues, and 115 incidents of “bad luck”
- Is 3.8% high enough for a “jinx”?

Conclusions

- Our brains are very, very good at fooling us
- We can’t rid ourselves of cognitive biases, but we can decrease their effects
- First step is via awareness-raising, which can mostly help you see them in others

Conclusions

- This can also lead to an increase in self-doubt, but you also need to purposefully use critical thinking skills to examine your own beliefs
- Using tools like the scientific method to make decisions can also decrease the impacts

