INTRO TO HCI

DECISION-MAKING IN HUMAN-COMPUTER INTERACTION

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With some slide contents adapted from Dr. Stephen Gilbert and Yvonne Farah Decision Making 2023 & 2024

LEARNING OBJECTIVES

- Describe the key theories of decision-making relevant to HCI
- Identify how heuristics and biases affect user decisions
- Recognize how emotion influences decision-making
- Apply design principles to support better user decisions

ICEBREAKER – WHAT DID YOU DECIDE TODAY?

- What decisions have you already made today?
- How did you make them?

For example:

- What did you decide to have for breakfast today?
- How did you decide which REU you want to be a part of?
- Did you have to decide between, whether you want to accept your SPIRE REU position or a different internship?

WHAT IS DECISION MAKING & WHY IS IT IMPORTANT IN HCI?

- Decision making is the process of selecting a course of action from **multiple alternatives** based on **specific criteria** and **preferences**.
- Many lenses to define it: psychology, economics, organizational behavior, HCI etc.,

- Why do we care in HCI?
  - As designers, researchers, students, and experts:
    - We **design for user**s. Decisions to enhance **experience, usability**, and **accessibility**.
    - We need to understand how users **make decisions** to support their **cognitive processes** and present information efficiently.
  - As users/consumers, by understanding and developing our decision-making processes, we make more informed decisions.

RATIONAL CHOICE THEORY (RCT)

- In *The Theory of Games and Economic Behavior 1994*, they introduced mathematical models to study **strategic decision making**
- Gary Becker (1950s–1970s) extended RCT principles **to social behaviors like family dynamics and education**
- Georges Homans (1960s) explored RCT in social interactions and **social exchange theory**
- RCT is utility maximization with full information, where you choose based on pros/cons

BOUNDED RATIONALITY

- *Herbert Simon's Theory* proposes that we are limited by our cognitive constraints, time, control over the situation, and incomplete information!
- We "satisfice" — choose what's good enough
- Cognitive limitations, time pressure, incomplete info
- HCI Insight: Make critical info visible/easy to access

NORMATIVE THEORY

- Normative Theory refers to a theoretical approach that focuses on prescribing how things should be rather than how they are.

- Lets Gamble
  - Place your bets

Gamble A:

Outcome	Probability
WIN $10	0.10
LOSE $1	0.90

Gamble B:

Outcome	Probability
WIN $1	0.90
LOSE $10	0.10

NORMATIVE THEORY

- Gamble A:
  - 0.10($10) – 0.90($1) = $1 – $0.90 = $0.10
- Gamble B:
  - 0.90($1) – 0.10($10) = $0.90 – $1 = – $0.10

- Normative Model: people should choose Gamble A …but they don't always

FRAMING EFFECT
(TVERSKY & KAHNEMAN, 1981)

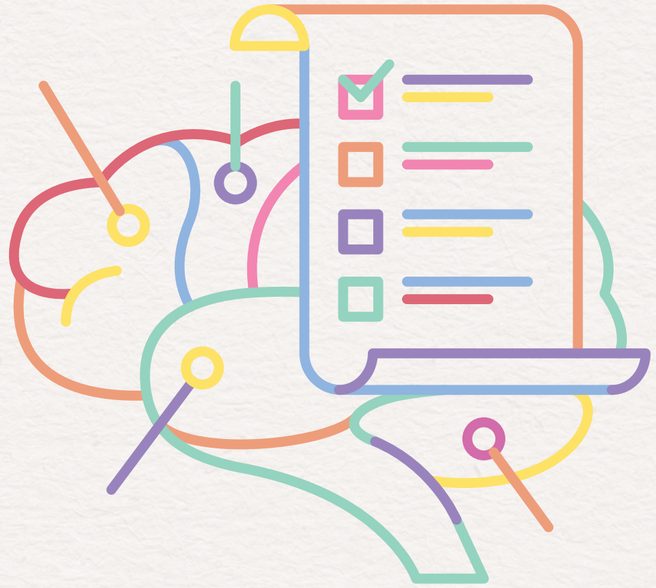
- Same outcome, different wording = different choices
- Vaccine A: 30,000 saved vs Vaccine C: 60,000 die
- Users respond differently to gain vs. loss framing

EMOTION IN DECISION-MAKING

- Affects attention, memory, and perception of risk
- Emotional content gets prioritized
- The Pollyanna Principle (Matlin & Gawron, 1979)
  - The Pollyanna principle, also known as the positivity bias, is the tendency for people to focus on and remember positive experiences and information more vividly than negative ones. This bias influences how individuals perceive the past, present, and even anticipate the future, often leading to an optimistic outlook.
  - Pollyanna came from this 1960 Disney film

HEURISTICS

- Mental shortcuts to ease decision-making
- Useful, but can cause errors (biases)
- Common in everyday and digital decisions



For Example: Availability Heuristic

- Decisions based on easily recalled examples
- E.g., "I saw a cooking video, I tried it last week and failed, never attempting that recipe again, I'll just eat my usual go to mac n cheese"

MORE HEURISTICS

Representativeness Heuristic:

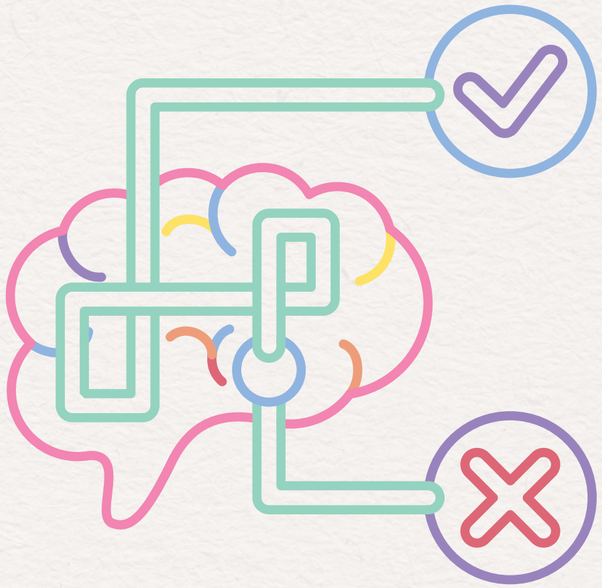
- Judging the probability of something based on how similar it is to a stereotype or a known category.
  - *For example, assume you see an eccentrically dressed person reading poetry. Would you guess this person is a poet or an accountant?*

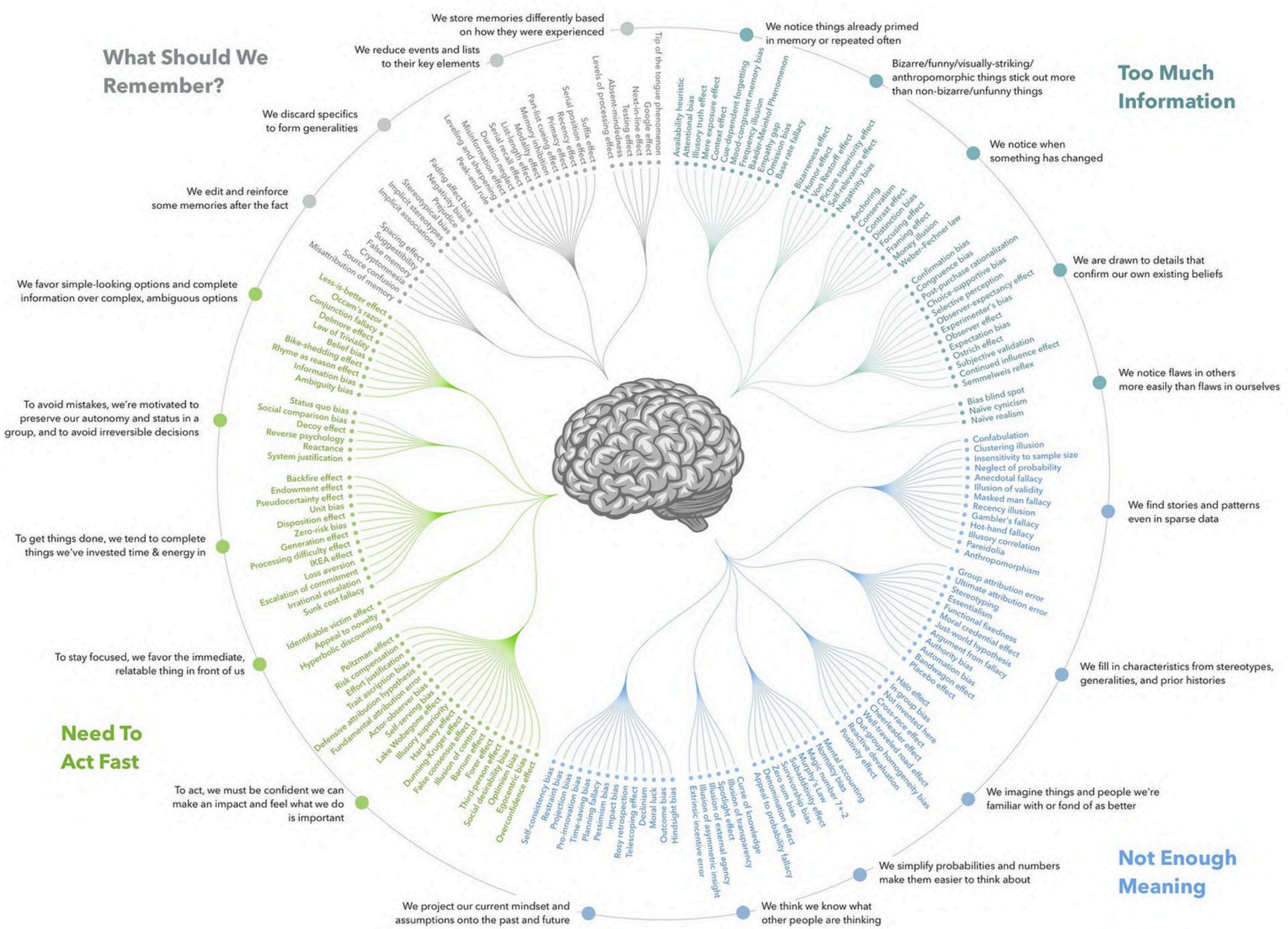
Anchoring and Adjustment:

- Making estimates or decisions by starting with an initial value (the anchor) and then adjusting it, often insufficiently.
  - *For example, negotiating a price based on an initial offer.*

Recognition Heuristic:

- Choosing the option that is more recognizable when making a decision.
  - *For example, choosing a well-known brand over an unfamiliar one.*





ALGORITHMIC LAYOUT + DESIGN BY JM3 · JOHN MANOOGIAN III // CONCEPT + METICULOUS CATEGORIZATION BY BUSTER BENSON // DEEP RESEARCH BY WIKIPEDIANS FAR + WIDE

REPRESENTATIVENESS & CONFIRMATION BIAS

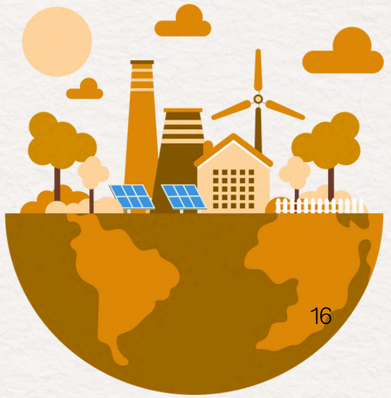
- Heuristics can lead to biases
- Biases are unconscious and automatic processes designed to make decision-making quicker and more efficient
- Confirmation bias: interpreting new information to confirm our pre-existing opinions
- Examples:
  - Researchers selectively interpret data and ignore unfavorable data to support initial hypotheses.
  - Social media reinforces confirmation bias by showing us stories that we are likely to agree with
  - If we decide that X is good for us (whatever X is), we might seek information to confirm our decision.

THE RECOGNITION PRIMED DECISION MAKING (RPD)

NATURALISTIC DECISION MAKING

GARY KLEIN

- How do people make decisions in demanding, real-world situations?
- Challenges: multiple decision makers, dynamic, uncertainty, constraints, unclear goals
- The field mostly focuses on professionals/experts who rely on their: expertise, intuition and knowledge to make decisions



GROUP ACTIVITY – DESIGN FOR HEURISTICS

- Choose 1 heuristic
- Choose 1 design principle
- Describe how it would show up in a real product

For Example:

- Heuristic: Familiarity
- Design Principle: Consistency
- Application: Use consistent icons across all app pages

KEY TAKEAWAYS

- Decision-making is complex and multi-faceted
- Influenced by heuristics, biases, emotions, context
- HCI can support users through smart, empathetic design