

Heuristics and Biases

Heuristics are used to reduce mental effort in decision making, but they may lead to systematic **biases** or errors in judgment.

1. Representativeness heuristic
2. Availability heuristic
3. Anchoring and adjustment
4. Decision framing
5. Deciding by thinking, feeling, acting

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Representativeness Heuristic

Used to judge membership in a class
Judge similarity to stereotypes

People are insensitive to prior probability of outcomes
They ignore preexisting distribution of categories or base rate frequencies

People are insensitive to sample size
They draw strong inferences from small number of cases

People have a misconception of Chance: Gambler's Fallacy
They see a 'normal' event and think it 'rare':
they think chance will 'correct' a series of 'rare' events

People have a misconception of Regression:
They see a 'rare' event and think it 'normal':
they deny chance as a factor causing extreme outcomes

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Representativeness Examples (1)

Susan is very shy and withdrawn, invariably helpful, but with little interest in people, or in the world of reality.

A meek and tidy soul, she has a need for order and structure, and a passion for detail.

Is Susan a Librarian, a Teacher, or a Lawyer?

Tversky, Amos, and David Kahneman. 1974. Judgment Under Uncertainty: Heuristics and Biases. *Science* 185:1124-1131.

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Representativeness Examples (2)

Linda is 31 years old, single, outspoken, and very bright.

She majored in philosophy.

As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations.

Is Linda a Bank Teller?

Is Linda a feminist Bank Teller?

Tversky, Amos, and David Kahneman. 1974. Judgment Under Uncertainty: Heuristics and Biases. *Science* 185:1124-1131.

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Availability Heuristic

Used to judge likelihood or frequency of event, occurrence

People tend to be biased by information that is easier to recall:
they are swayed by information that is vivid, well-publicized, or recent

People tend to be biased by examples that they can easily retrieve:
they use these search examples to test hypotheses

People tend to correlate events that occur close together

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Availability Examples

Consider these pairs of causes of death:

Lung Cancer vs Motor Vehicle Accidents

Emphysema vs Homicide

Tuberculosis vs Fire and Flames

From each pair, choose the one you think causes more deaths in the US each year.

| Causes of Death | People's Choice | Annual US Totals | Newspaper Reports/Year |
|-------------------|-----------------|------------------|------------------------|
| Lung Cancer | 43% | 140,000 | 3 |
| Vehicle Accidents | 57% | 46,000 | 127 |
| Emphysema | 45% | 22,000 | 1 |
| Homicides | 55% | 19,000 | 264 |
| Tuberculosis | 23% | 4,000 | 0 |
| Fire and Flames | 77% | 7,000 | 24 |

(Combs & Slovic 1979,
see also Kristiansen 1983)

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Anchoring and Adjustment

Used to estimate value or size of quantity
Start from initial value and adjust to final estimate

People are influenced by an initial anchor value
anchor may be unreliable, irrelevant
adjustment is often insufficient

People overestimate probability of conjunctive events
People underestimate probability of disjunctive events

Anchors may be qualitative:
people form initial impressions that persist and are hard to change

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Anchoring Example

Real estate agents

All inspected house

Given 10-page information pack: features, footage, prices of other houses in area, ...

| | |
|---------------------------|-----------|
| Given asking price = | \$119,900 |
| Predicted | |
| Appraisal value = | \$114,204 |
| Listing price = | \$117,745 |
| Purchase price = | \$111,454 |
| Lowest acceptable offer = | \$111,136 |

| | |
|---------------------------|-----------|
| Given asking price = | \$149,900 |
| Predicted | |
| Appraisal value = | \$128,754 |
| Listing price = | \$130,981 |
| Purchase price = | \$127,318 |
| Lowest acceptable offer = | \$123,818 |

Changed asking prices swayed valuations 11-14%

Effects of asking price remarkably large,
given that so much other information on the house was given.

(Northcraft and Neale 1987)

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Bayesian Example

Probability of disease in population is 0.5%

10,000 tests are done each year

Test is 98% accurate

You tested positive

What is your chance of actually having the disease?

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Framing Example (1)

A rare disease has broken out, which is expected to kill 600 people. There are two possible programs to combat it, but they cannot both be used. The consequences of each are known:

A. 200 saved with certainty

B. 600 saved with a probability of .33

Which would you choose? Why?

A rare disease has broken out, which is expected to kill 600 people. There are two possible programs to combat it, but they cannot both be used. The consequences of each are known:

A. 400 die for certain

B. 600 die with a probability of .67

Which would you choose? Why?

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Framing Example (2)

Which would you choose:

- A. Sure gain of \$10,000
- B. 50% chance of getting \$20,000

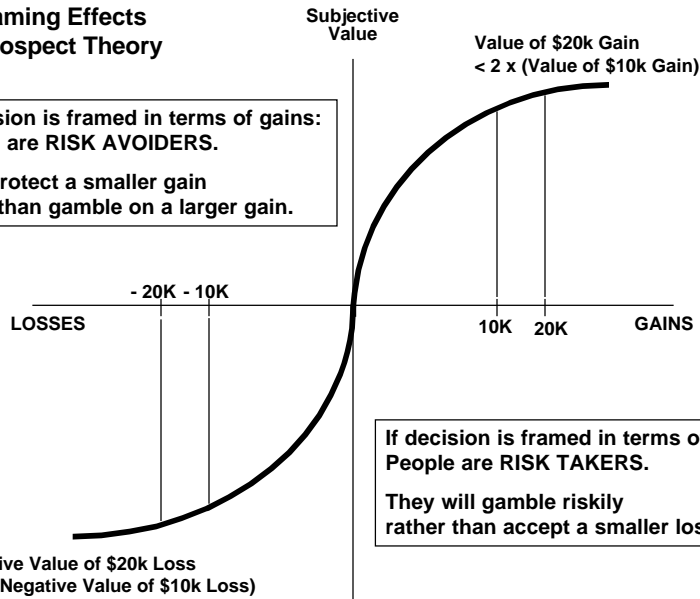
Which would you choose:

- A. Sure loss of \$10,000
- B. 50% chance of losing \$20,000

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Framing Effects & Prospect Theory

If decision is framed in terms of gains:
People are **RISK AVOIDERS**.
They protect a smaller gain rather than gamble on a larger gain.



If decision is framed in terms of losses:
People are **RISK TAKERS**.
They will gamble riskily rather than accept a smaller loss.

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Custody Case (1)

Imagine that you are serving on the jury of an only-child custody case following a messy divorce. The facts of the case are complicated by ambiguous economic, social, and emotional considerations, and you choose to base your decision entirely on the following observations. To which parent would you AWARD custody of the child?

Parent A

Average income
Average health
Average working hours
Stable social life
Reasonable rapport with child

Parent B

Above average income
Minor health problems
Lots of work-related travel
Extremely active social life
Very close relationship with child

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Custody Case (2)

Imagine that you are serving on the jury of an only-child custody case following a messy divorce. The facts of the case are complicated by ambiguous economic, social, and emotional considerations, and you choose to base your decision entirely on the following observations. To which parent would you DENY custody of the child?

Parent A

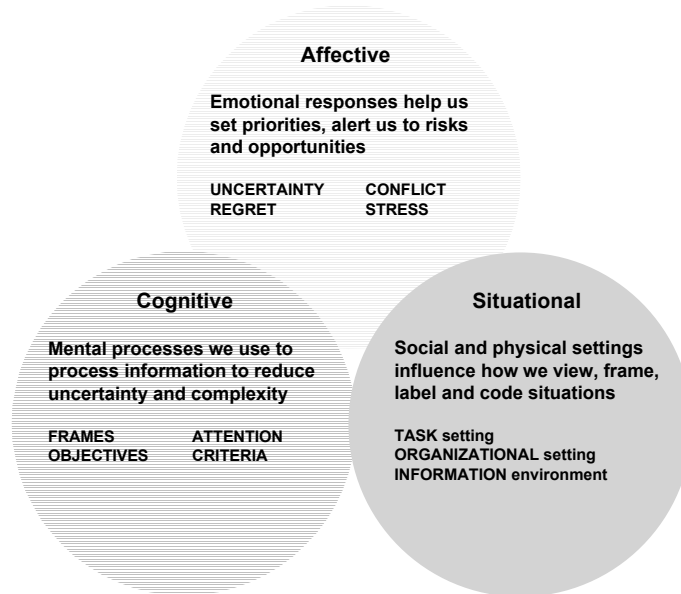
Average income
Average health
Average working hours
Stable social life
Reasonable rapport with child

Parent B

Above average income
Minor health problems
Lots of work-related travel
Extremely active social life
Very close relationship with child

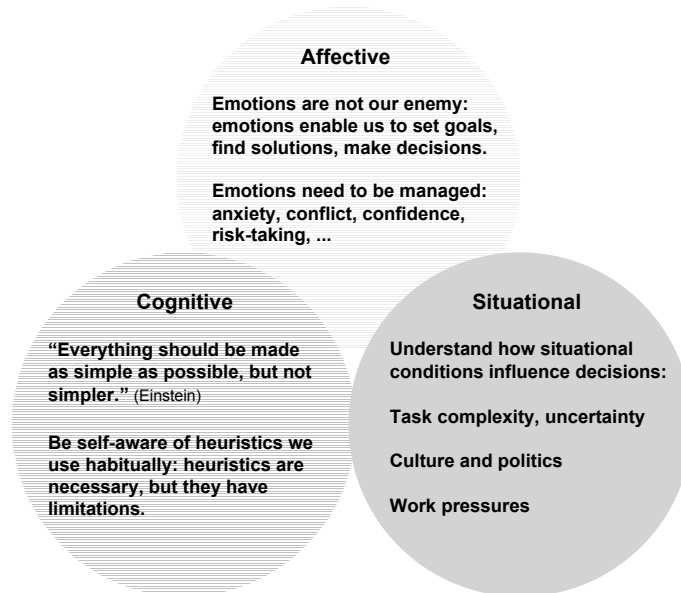
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Deciding by Thinking, Feeling, Acting: Cognitive, Affective, Situational Effects



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Vigilant Information Processing: Implications for Practice



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Vigilant Information Processing: Implications for Practice (2)

Cognitive Effects

“Everything should be as simple as possible, but not simpler.”(Einstein)

The human mind craves for order, patterns, simplicity, but we live in an increasingly complex, volatile world.

Be self-aware of heuristics we use habitually. Heuristics are necessary, but they have limitations.

Intuitions are domain-specific, powerful but persistent.

Affective Effects

Emotions are not our enemy.

Emotions are necessary to help us set goals and plans:
without emotions we cannot make decisions.

Emotions need to be managed.

Understand how emotions can affect our judgment:
anxiety, conflict, regret, overconfidence, attitudes toward risk ...

Situational Effects

Recognize that situational conditions can influence decision making: task complexity and uncertainty; group norms and practices; culture and politics.

Recognize situations in which information use might be distorted or constrained.

Highly pressurized situations as well as highly routinized situations can undermine vigilant information processing.

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Guarding Against Biases

- **Be aware of cognitive biases**
- **Evaluate decision frames**
- **Act as Devil's Advocate**
Question assumptions, challenge conclusions
- **Consider the improbable or the unpopular**
- **Make incremental decisions**
Collect feedback, use options approach
- **Use probability and statistics**
- **Use frameworks and models**
Derived from theory or proposed by experts

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