Week 12.1

Reasoning and decision making

11/14/2018
Roadmap

• Decision making
• Cost and benefits in decision making
• Reasoning and decision making
• Framing of outcomes
• Reason-based choice
• Factors affecting decision making
Learning objectives of the day

1. Why making a decision induces both cost and benefits?
2. What’s the role of reasoning in decision making?
3. How does framing influence decision making?
4. Why framing of outcomes may support the idea that language affects thought?
5. What is reason-based choice? How does it differ from utility maximization?
6. What are the factors that may affect decision making?
Study of decision making

- Behavioral science
- Psychology
- Neural science
- Politics
- Economics
- Business administration
- Public health
Decision making
Decision in daily life

- Am I hungry?
  - Yes: Have I 25$?
    - Yes: Go to restaurant
    - No: Buy a hamburger
  - No: Go to sleep

https://becominghuman.ai
Decision in business

https://www.decision-making-solutions.com
Cost and benefits when making a decision

What are the cost and benefit of each?

1. Working three part-time jobs while still attending school
2. Get lunch at Douglas instead of Danforth
3. Solve hard problems first on an exam
4. Give up quizzes and only focus on the big exams
Cost and benefits when making a decision

How do you make a decision?
• Weighing between cost and benefits

• Utility maximization
  ➢ Utility: value you can get from an outcome
Reasoning and decision making

What’s the rationale of solving hard problems first on an exam?

• Do you have a hypothesis for why you solve hard problems first?

• Are you using deductive or inductive reasoning (or both)?
Imagine the United States is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows.

If Program A is adopted, 200 people will be saved.
If Program B is adopted, there is a 1/3 probability that 600 people will be saved, and a 2/3 probability that no people will be saved.

Which program would you choose? Why?
Imagine the United States is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows.

If Program A is adopted, 400 people will die. If Program B is adopted, there is a $\frac{1}{3}$ probability nobody will die, and a $\frac{2}{3}$ probability that 600 people will die.

Which program would you choose? Why?
Assume yourself richer by $300 than you are today. You have to choose between:

A. A sure gain of $100
B. 50% chance to gain $200 and 50% chance to gain nothing

Which option will you choose?
Assume yourself richer by $300 than you are today. You have to choose between:

A. A sure loss of $100
B. 50% chance to lose nothing and 50% chance to lose $200

Which option will you choose?
Framing of outcomes: Influence of language on thinking

Problem/stimulus

Framing of outcome/percept
Reason-based choice

• Are we always guided by my utility (value) of the choices?

• Justification of choice instead of maximizing utility

→ Need a “reason” for the decision

• Should I get married?

→ The value? The reason?
Reason-based choice

Can also be *framed*

- Should I get married?
  - look for advantages of marriage
  - look for a reason for the decision of getting married

- Should I not get married?
  - Look for disadvantages of marriage or advantages of being single
  - look for a reason for the decision of NOT getting married
How is decision making tested?

- The Iowa Gambling Task (IGT) (Bechara et al. 1994)
- Each deck either reward or penalize
- Good and bad decks

Tamburin et al. (2014)
Other factors affecting decision making

Age
• Younger → riskier decisions?
• Older → more conservative decisions?
• Negative correlation between age and cognitive functions (memory, processing speed)

→ Negative correlation between age and quality of decision making (Henninger et al. 2010)
Other factors affecting decision making

Substance abuse and the IGT task
- Each block = 20 cards
- Why no diff. among 3 groups in block 5?
Other factors affecting decision making

Emotion control

• Impaired orbitofrontal cortex