

1 ☐ *Recap*

Estimating an option's value

- ✓ Expected value
 - Value * Probability of occurrence
- ✓ Expected utility
 - Utility * Probability of occurrence
- ✓ Prospect theory
 - “Value” * Decision weight (subjective prob.)
- ✓ MAUT and co.
 - Value of attributes * Their respective importance
- ✓ Heuristic determination
 - Gigerenzer, Brunswik, factors like mere exposure

2 ☐ Open issue - Estimating probability, likelihood, frequency

- ✓ Probabilities are sometimes known and will affect decisions in a systematic although peculiar way
 - Prospect theories decision weights
- ✓ In most everyday reasoning, you don't know the explicit probabilities or frequencies.
 - So, you must *estimate* them
 - This requires using heuristics.

3 ☐ Rules of thumb

- ✓ Heuristics are a compilation of years of experience.
- ✓ We use them because they have some validity in real life.
 - They conform to the “structure of the environment.”
- ✓ Experiments that examine their use point out their fallibility
 - Keep in mind that they derive a correct answer in many real world circumstances.

4 ☐ Representativeness heuristic

- ✓ The Problem for which it is most relevant.
 - What is the probability that object A belongs in class B?
 - Example: What is the probability that someone who is good with people, helpful, and caring is a psychologist?
 - Example: How likely is it that a kindergarten student who talks a lot, can't sit still, and has trouble reading is ADD or ADHD?

5 ☐ The Heuristic

- ✓ Judge probability by the degree to which Object A is similar to or “representative” of members of Class B or the “stereotype” of that class.
 - Note, stereotypes may be misinformed (computer scientist, engineer, librarian, musician, recreation major...)

6 ☐ Example 1

- ✓ Dick is a shy and quiet man who has a need for order. He has a passion for detail and structure, is helpful, but not outgoing.

- What is the likelihood that Dick is an actor, engineer, psychologist, accountant, teacher, librarian....?
- People are much more likely to choose accountant or librarian than actor or teacher
- Representative of the stereotype.

7 ☐ Example 2

- ✓ There are 2 programs in a high school. Equal # of classes in each program.
- ✓ Boys are a majority in program A (65%) and a minority in program B (45%).
 - You enter a class at random and observe that there are 55% boys. Which program?
 - 67/89 Ss choose program A. In actuality its slightly more likely to be program B.
 - Representative of majority

8 ☐ Example 3

- ✓ All families of 6 children in a city were surveyed. In 72 families the exact order of births of boys and girls was G B G B B G
 - What is your estimate of the # of families in which the exact order of births was:
 - B G B B B B
 - Median estimate of Ss in study was 30 - should be about 72
 - Not representative of typical half boys/half girls.

9 ☐ Example 4

- ✓ The average height of American college men is 175 cm. Three files are drawn at random from SIUC's records. Which of the following is more likely?
 - A: Mike - 178 cm, Tyrone - 170 cm, and Horace - 176 cm
 - B: Mike - 177 cm, Tyrone - 177 cm, and Horace - 177 cm
- ✓ Real answer?
 - B is twice as likely
- ✓ People's judgments?
 - 95% chose A, 5% B.

10 ☐ How strong is the influence of representativeness?

- ✓ It outweighs the influence of prior probabilities.
- ✓ It creates insensitivity to sample size.

11 ☐ Outweighs the influence of prior probabilities

- ✓ Judged likelihood that a given (stereotyped) description was a lawyer or an engineer in a sample of 100 lawyers and engineers.
- ✓ Half of the subjects told the 100 were 70 lawyers and 30 engineers, half told they were 30 lawyers and 70 engineers.
 - Subjects responded the same way in both conditions.

12 ☐ Ignoring priors, continued.

- ✓ Exception
 - If no description given, then they responded appropriately (70% probability lawyer in first condition, 70% probability engineer in second).
 - **But**, if an uninformative description was given (didn't fit either stereotype), they responded "50%" probability for both conditions!!!
 - Worthless evidence also caused them to ignore the prior probabilities.

13 ☐ Creates insensitivity to sample size

✓ People should be sensitive to the size of a sample in making judgments about the population.

14 ☐ Example 1

✓ Imagine an urn filled with balls, 2/3 of one color and 1/3 one another.

- One person draws 5 balls and gets 4 red and 1 green.
- Another person draws 20 balls and gets 12 red and 8 green.

✓ Who should feel more confident that the urn contains 2/3 red and 1/3 green rather than vice versa?

- 2nd person should be twice as confident. People choose 1st.

15 ☐ Example 2

✓ The mean IQ of population of 8th graders is **known** to be 100.

✓ You select a sample of 10.

✓ The first person you measure has an IQ of 150. What is the likely average IQ of the sample of 10 students?

- Real answer? 105
- Given answer? 100

16 ☐ Gambler's fallacy

✓ I've had 5 heads in a row, the next one's *got* to come up tails. Why?

- Because then the sequence would look more random. In fact the probability is still 50/50.
- If I had a coin come up heads 10 times in a row, I'd be more likely to predict it would come up heads again rather than be biased towards tails!

17 ☐ Gambler's fallacy and slot machines

✓ If you've pulled that slot machine 100 times and lost 100 times I'd go seek a game with better odds.

✓ We'll return to the issue of judgments of randomness later....

18 ☐ The problem with the gambler's fallacy

✓ People view chance as a “self-correcting process” in which a deviation in one direction induces a deviation in the opposite direction to restore the “equilibrium.”

✓ In fact, deviations are not “corrected” as a chance process unfolds, they are merely *diluted*.

19 ☐ Availability heuristic

✓ The Problem for which it is most relevant

- How likely is an event or combination of events?
 - What is the probability that someone who is good with people, helpful, and caring is a psychologist?
 - Same type of question for which representativeness applied.
 - What is the likelihood of getting cancer, of passing this class, or of aliens landing?

20 ☐ The Heuristic

✓ Judge probability by assessing availability to memory.

- Life-long experience has taught us that:
 - Instances of common classes are recalled better and faster than instances of less frequent classes,
 - Likely occurrences are easier to imagine than unlikely ones,
 - When two events frequently co-occur, the association between them is likely to be stronger.

21 ☐ The Heuristic, cont.

- Thus, we conclude that:
 - Things that are recalled better or faster are more likely to be common.
 - Things that are easily imagined are more likely to be common.
 - Strong associations are likely to indicate a strong history of co-occurrence.

22 ☐ Ease of recall

23 ☐ Example 1

✓ Kahneman & Tversky (1973)

- Subjects listened to one of two lists of names.
 - List A. 19 famous women, 20 less famous men
 - List B. 19 famous men, 20 less famous women
- Did the list contain more lists of men or women?
 - 80/99 people chosen women for List A and men for List B.

24 ☐ Example 2

✓ How about a sportscaster who is watching an incredibly bad performance of a quarterback?

- He's much more likely to now recall other bad performances than other good performances.
 - The current bad performance serves as a good retrieval cue for other bad performances, not good ones.
 - This memory bias will make the sportscaster more likely to overestimate the quarterback's bad performances.

25 ☐ Example 3

✓ Judgment of the number of times that an instructor used the pronouns “he” vs. “she” (Chrysler, 1995).

- Men and women overestimated the use of the word “she” by the instructor.
 - Even a small number of uses of the pronoun “she” rather than “he” stood out in their memory.

26 ☐ Factors affecting ease of recall

✓ Frequency of occurrence

- The assumption behind the heuristic...

✓ Distinctiveness

- Remember the judged likelihood of looking at the clock when it says 11:11?

✓ Number of times you've heard about an event in the media

- Earlier discussion of memory biases – Halloween candy, child abductions...

27 ☐ Factors affecting ease of recall, cont.

✓ Depth of processing

- For example, how much do you attend to reports on increase in diabetes rates vs. increases in homicides?

✓ Recency

- You will judge the likelihood of an accident to be higher when you have recently had one of your own or

seen one happen.

- Don't you slow down when driving on ice or in the snow after seeing a car in the ditch?

28 Strong association

29 Example 1

- ✓ Consider a psychotherapist who must judge whether a certain depressed client will commit suicide.
 - She recalls the 4 patients who did commit suicide and each had depression, so she judges the probability of suicide as fairly high.
 - The suicide instances come much more readily to mind.

30 Example 2

- ✓ People's judgment of the effectiveness of a fertilizer
 - It's strongly influenced by their memory of fertilizing followed by good growth.
 - Memory is poorer for incidences of good growth without fertilizer, and poor growth with and without fertilizer.

31 Strong associations are based on two events co-occurring

- ✓ People are less likely to consider one event occurring without the other or neither one occurring
- ✓ This memory bias affects judgments of covariation and causality (discussed later in the course).

32 Ease of imagination/generation (the Simulation heuristic)

33 Example 1

- ✓ How many seven letter words are there with 'n' in the 6th position? xxxxxnx
- ✓ How many seven letter words are there ending with 'ing'? xxxxing

34 Example 2

- ✓ How many committees of 2 can be formed from a group of 10 people?
- ✓ How many committees of 8 can be formed from the same group?

35 Example 3

- ✓ Estimate the product of the following sequence of numbers within 5 sec:
 - $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8$
 - Median estimate: 512
 - $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$
 - Median estimate: 2,250
 - Real answer: 40,320

36 Example 4

- ✓ A chess player or athlete considers what an opponent might do.
 - We tend to attribute less initiative and less imagination to our opponents than we do to ourselves.
 - Remember the Lake Wobegon effect?
 - It's well established that people consider many more possibilities when they switch sides
 - For example, by turning the chessboard around.

37 ☐ Example 5

- ✓ Judgments of the turning point in an athletic contest (Ross & Sicoly, 1979).
 - Players on 12 intercollegiate basketball teams (male and female) asked to briefly describe one important turning point in their team’s last game.
 - 119 players recalled a turning point precipitated by their own team.
 - 13 recalled one viewed as caused by both teams.
 - 16 recalled one viewed as caused by the other team.

38 ☐ Ego-centric bias

- ✓ It is easier to imagine and remember the actions of your own team than that of the others.
 - You know your team’s strategies and players better than that of the opponent.

39 ☐ Ego-centric bias, cont.

- ✓ Two people write book together and estimate their own contributions (Taylor, 1989)
 - Percentages invariably add to more than 100.
- ✓ Spouses asked to estimate their percentage of household chores performed (Ross & Sicoly, 1979)
 - Again, added to more than 100% (~ 140%).
- ✓ Phenomenon creates problem in negotiations
 - For example, during a strike, each side believes they have conceded more (Thompson & Loewenstein, 1992).

40 ☐ Plausible scenarios are easier to generate than implausible ones

- ✓ This is especially problematic in light of hindsight bias.
 - After the fact, an event that occurred is now more plausible and easier to imagine thus increasing its judged likelihood.

41 ☐ Kahneman & Tversky (1979)

- ✓ Participants read a description of someone who was killed in a car accident after being struck by a teenager driving under the influence.

42 ☐ Two versions

- On the day of his accident, Mr. Jones left the office at the regular time. He sometimes left early to take care of home chores at his wife’s request, but this was not necessary on that day. Mr. Jones did not drive home by his regular route.
- On the day of the accident, Mr. Jones left the office earlier than usual to attend to some household chores at his wife’s request. He drove home along his regular route.

43 ☐ People asked to complete the sentence “if only....”

- ✓ Much more likely to mention taking the normal route in the first version and leaving at the normal time in the second.
- ✓ Why not say things like “if only he had quit his job, divorced his wife, got drunk, blew off work and went to the beach...?”
 - Lower plausibility

44 ☐ Fluency vs. exemplar memory

✓ Hertwig et al. (2005)

- Assessed people’s judgments of risk frequencies for various causes of death.
- Found that “fluency” (e.g., how readily recognized the word “cancer” is) correlated with risk judgments.
- BUT, found *stronger* correlation with “availability-by-recall”:
 - How many deaths due to the risk was the participant able to recall had occurred within their social circle.

45 ☐ Availability heuristic versus Recognition heuristic

✓ They both involve memory, but...

- Availability heuristic is based on ease or speed (fluency) of recall and/or number of exemplars recalled.
 - Availability used to judge likelihood only.
- Recognition heuristic is based on recognition (is or is not recognized) – a binary decision.
 - Recognition used to judge likelihood *plus* value (e.g., stock, product), population, etc.
 - However, there are degrees of recognition!

46 ☐ Recognition heuristic

✓ The Problem for which it is most relevant

- Which of two objects has a higher value on some scale (e.g., faster, higher, stronger, bigger, *more frequent, more likely*)?
 - Which of two cities is larger?
 - Which of two basketball players has a higher scoring average?
 - Which of two English soccer teams will win?
 - Which of two hospitals has the largest inpatient capacity?

47 ☐ The Heuristic

✓ If one of two objects is recognized and the other is not, then infer that the one that is recognized is the strongest, fastest, biggest, best, more likely, occurs more frequently, etc.

- Graded form: Degrees of recognizability.

✓ Example of value: Who is the better basketball player?

- Shaquille O’Neal or Wally Sczerbiak?
- Shaquille O’Neal or Kobe Bryant?

✓ Example of likelihood: Which is more likely?

- New York Giants will win Super Bowl or Baltimore Ravens?

48 ☐ Marketers take advantage of buyers’ use of recognition heuristic

✓ Advertising

- Get name recognition and your share will increase.
 - Benetton advertising campaign used shocking images to grab attention and improve memorability.
 - Campaign was a smashing success.

✓ Politics

- Get name recognition and you’ll win office.
- Put up lots of signs to gain name recognition, even if they don’t know who you are.

49 ☐ Conclusions

✓ Due to cognitive and time limitations, people often use heuristics.

✓ Many heuristics are good approximations

- They can generate “good” solutions in most ‘environments.’

- ✓ Heuristics can be highly fallible under certain circumstances.
 - Our heuristics do not conform to the environment under all circumstances.