

Week 6 Summary: Paradoxes of choice. Prospect theory. Biases in probabilistic reasoning.

02.229 - Decision Theory and Practice, 2019 Jan-April

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March 4, 2019

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1 Statistics-Related

1.1 Biased Samples

Often, bias arises in sampling methodology

- Psychological biases (e.g. framing effects, question order can influence answers)
- Sample may not be representative

1.1.1 Winner's Curse

This is a good example of sampling from a biased population.

Essentially, in auctions where lots have uncertain value, the winning bids tend to be higher than the unbiased estimates (because of course, the winner is the highest bid, not the most accurate one). Often times, these winners lose money (therefore they are 'cursed' with winning)

1.1.2 Regression to Mean

Anomalous behaviour should not be expected to continue, but rather to regress back to the mean.

1.1.2.1 Slot machine example If a slot machines keeps giving out wins, it'll regress back to the mean of not giving out wins. The 'lucky streak' thing is nonsense, statistically speaking)

1.1.2.2 Why it's a biased sample example We tend to go to restaurants that we had a good experience at, but that experience has a luck factor (it's not just the skill of the chef!). Our habit is thus formed based on data that was likely noised up by positive luck.

1.2 Confounding Conditional Probabilities

I really like the joke example given by Gilboa, so I'll list it here. The essence is that people are generally bad with conditioning probabilities.

1.2.1 Joke (Illustration of lack of noticing independence)

Suppose you are about to board a flight and you fear the plane might be blown up by a bomb. An old joke suggests that you take a bomb on the plane with you, because the probability of two bombs is really low.

Obviously, your choice to bring a bomb or not has no influence over other people bringing a bomb. These things are independent.

1.3 Classical vs Bayesian Statistics

1.3.1 Classical Statistics

- Point estimation
- Interval estimation

- Useful when dealing in "objectivity" (dubious objectivity, but ykwim)

1.3.2 Bayesian Statistics

- Allows for probabilistic treatment of μ (classical does not)
- Characterized by Bayesian updating

2 Prospect Theory

2.1 Misc

- Descriptive
- Kahneman and Tversky's attempt to reconcile readily-observed violations of expected utility

2.2 Prospect Value

$$\sum_{i=1}^n w(p_i) \cdot w(u_i)$$

where u_i is the utility of outcome i , and p is the probability of it arising.

2.3 On the Violations of Transitivity and Completeness

2.3.1 Transitivity

Essentially, May observed cyclical preferences in roughly 20% of study participants (21.5% for the original 306-participant study, 18.5% for another similar one).

For reference, here are the choices.

Table 14.2

	Ticket 1–30	Ticket 31–60	Ticket 61–100
A	\$54	\$0	\$0
B	\$24	\$24	\$0

Table 14.3

	Ticket 1–30	Ticket 31–60	Ticket 61–100
B	\$24	\$24	\$0
C	\$4	\$4	\$4

2.3.2 Completeness

It's suggested that our choices may be inherently probabilistic, which means that they inevitably violate completeness.

The implication is that completeness is descriptively incorrect as a choice of axiom, which is pretty interesting.

2.4 Usefulness of Descriptive Decision Theory

The primary issue is that there's a divorce between the correct thing to do, and what people actually do. This is observable from Hume's law (an **ought** cannot be derived from an **is**).

So the question is: why study descriptive decision theory at all?

1. Instrumental value for people whose outcomes depend on how others act (e.g. politicians. Could act in accordance with normativity, but the descriptive actions of other people is generally out of their control).
2. Intrinsic value (knowing how humans behave is intrinsically important, blah blah. True.)
3. Can help us be aware of what fallacies to avoid, etc

2.5 Bounded Rationality

Some decision theorists argue that rationality is a limited resource. The extreme case of this is to argue that normative decision theory is useless.

While the **bounded rationality** thing makes sense, the discarding of normativity is ridiculous, IMO. Fully agree with Peterson here: normativity gives us a goal post to move towards, and we have the potential to become more rational.