Section 3: Judgement, Heuristics and Biases

This section covers Judgement, Heuristics and Biases and how this topic relates to textbook models of choice under uncertainty and value. The section outlines what is meant by heuristics; discusses theories of why they may be adaptive; outlines the idea of bias and how this relates to heuristics; examines the main Kahneman and Tversky literature and looks at examples of experiments on availability, representativeness and anchoring; examines overconfidence and planning fallacy; examines the role of emotions in guiding probability judgments and risk perception; discusses limitations of the literature on heuristics and biases; discusses the implications of use of heuristics for economic theory and policy.

What are heuristics?

This article by Kahneman and Tversky (1974) is still a classic description of the main heuristics that people use to judge probability and frequency. Heuristics can be thought of as mental 'rules of thumb' that people employ for all kinds of judgements. For example, if you want to share a cake among 5 people, rather than optimise the size of each slice depending on each person's unique preferences, level of hunger, etc you might employ a 1/n heuristic and give everyone an equal 1/5th slice. Or if you see dark clouds forming on your way to work, you might decide to bring a raincoat. To paraphrase Kahneman & Tversky, "*People rely on heuristic principles to reduce the complex tasks of assessing probabilities to simpler judgmental operations*." The paper discusses three heuristics.

a. Anchoring heuristic: *Making estimates by starting from an initial value that is then adjusted to get the final answer. The adjustment is usually insufficient*

Participants were asked to estimate various quantities in percentages - for example what percentage of countries in the UN are from Africa?. Before answering, participants watched as a (rigged) wheel of fortune was spun to produce either the number 10 or 65. They were then asked whether the answer to the UN question was higher or lower than the number on the wheel of fortune. They then gave their estimate by moving up or down from that number. The arbitrary numbers shown on the wheel of fortune had a marked effect on estimates. The median estimates of the percentage of African countries in the United Nations were for 25% and 45% for groups that received 10 and 65, respectively, as starting points. Payoffs for accuracy did not reduce the anchoring effect.

This paper by Ariely et al. (2004) is important as it documents how people are influenced by the anchoring heuristic when making judgements of the value of goods.

b. Availability heuristic: *Judging the probability of an event or the frequency of a class based on the ease instances can be brought to mind.*

When people are asked whether it is more likely that a word randomly sampled from an English text begins with 'r' or has 'r' as its third letter, they begin by recalling words that begin with 'r' (road) and words that have 'r' in the third position (e.g. car). Because it is easier to mentally search for words by their first letter than by their third letter, most people judge words that begin with a given consonant to be more numerous than words in which the same consonant appears in the third position. This is true even for consonants, such as 'r' or 'k', which are more frequent in the third position than in the first

c. Representativeness heuristic: *Probabilities are evaluated by the degree to which A is representative of B - by the degree to which A resembles B. For example, when A is highly representative of B, the probability that A originates from B is judged to be high. On the other hand, if A is not similar to B, the probability that A originates from B is judged to be low.*
Participants were shown brief personality descriptions of several individuals, supposedly sampled at random from a group of 100 engineers and lawyers. An example description was "*Steve is very shy and withdrawn, invariably helpful, but with little interest in people, or in the world of reality. A meek and tidy soul, he has a need for order and structure, and a passion for detail.*"

For each description like the one above, participants were asked to judge the probability that it belonged to an engineer rather than to a lawyer. In one condition, subjects were told that the group from which the description had been drawn consisted of 70 engineers and 30 lawyers. In another condition, subjects were told that the group consisted of 30 engineers and 70 lawyers. The probability that the description belonged to an engineer rather than a lawyer should therefore be higher in the first condition. Regardless of the condition, the subjects produced the same probability judgements. The subjects evaluated the probability that the description referred to an engineer rather than a lawyer based on the description's representativeness to the two stereotypes and did not take into account the prior probabilities of each category.

Scope neglect: *The inability to scale valuation of a problem as its size increases*
Desvousges et al. (1993) asked participants in an experiment this question: "(2,000 / 20,000 / 200,000) migrating birds die each year by drowning in oil ponds. These deaths could be prevented by covering the oil ponds with nets. How much would you be willing to pay to provide the nets?" The results found a non-linear increase in willingness to pay as the size of the problem increased. People were willing to spend $80 to save 2,000 birds, but only $8 more to save 200,000 birds. The unfortunate problem is that although there are 100x more birds at risk, we do not feel 100 times more alarmed or upset.

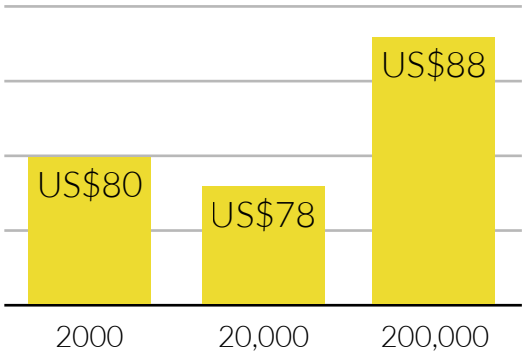

Fig 1. WTP to save X number of birds

Implications of heuristics for policy

Some question whether the results that have been found are "important" enough to be taken seriously for public policy. These effects are very interesting but it could be the case that something found in small-scale experiments with trivial examples might not extend to real-world and important decisions. The Ariely paper on the biases and heuristics reading list shows that, for example, anchoring occurs even when the goods are consumer goods rather than just random questions like in the original Kahneman and Tversky article. Also, this Gigerenzer paper indicates that many people lost their lives after 9-11 because they switched to driving, wrongly believing due to the availability heuristic that driving was safer than flying.
If judgement biases are leading to large death tolls like this, then there are obviously many good policy reasons to try to take them into account when communicating risk.

Readings

Kahenman & Tversky (1974), Judgment under Uncertainty: Heuristics and Biases, Science.

Ariely, Loewenstein & Prelec (2004), "Coherent Arbitrariness": Stable Demand Curves Without Stable Preferences, QJE

North & Denzau (1994), Shared Mental Models: Ideologies and Institutions, Kyklos

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Beshears et al. (2008), How are Preferences Revealed, NBER Working Paper