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Chapter 7: Efficiency in Inference and Decision Making

Presenter: Michael, RUNQUAN YU *Michael*

Undergraduate Student,
Center for Cognitive and Brain Sciences,
Department of Psychology,
University of Macau

A.N.D. Lab

Personal Email: yurunquan020428@gmail.com



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1. Outline/Background.

- Heuristics (启发式) are Decision Shortcuts that Compromise between Efficiency and Accuracy
- Beyond Heuristics: Decision Shortcuts Often Create Errors and Biases
- Judgments over Time Add Biases

The social perceiver often makes complex judgments under conditions of uncertainty.

— — A person must decide if a safe and reasonably satisfying romantic relationship should be abandoned for a new, exciting fling, the future of which is risky.

Assume that people make decision by consider the Pro and Con.

— — Theory: Expected Utility: Worth come possibility, calculate the outcome and waste. (Benefit)

Information: Some information is unlimited, but useless. → Sometimes limited information interrupt decision making accuracy.



1. Outline

Time constraints, complexity or volume of the relevant information, and uncertainty about the quality of the evidence – social perceivers cannot realistically use exhaustive strategies for making judgments.

The **social perceiver** is a satisficer who makes adequate inferences and decisions rather than an optimizer who reaches the best ones possible (March & Simon, 1958).



2. Heuristics are Decision Shortcuts that Compromise BETWEEN Efficiency and Accuracy

(1) Experiment: Tversky and Kahneman (1974)

Heuristics people use for judgments under uncertainty, shortcuts that reduce complex problem solving to simpler judgmental operations, to meet the pressing demands of the environment.

(2) Textbook gives 2 kinds:

- Enjoy the general use. (Mental simulation)
- Idiosyncratic 特質性的 (Writing long and apparently thoughtful letters of recommendation in a brief period of time).



3. Representativeness Heuristic

(1) representativeness, generates inferences about probability. (從概率的角度來看)

For example: How **likely** is it that person or event A is a member of category B?

(2) The representativeness heuristic is basically a relevancy judgment (How well do these attributes of A fit category B?) that produces a probability estimate (How probable is it that A is an instance of category B?). Judgment → estimate.

(3) However, when using the representativeness heuristic, a person may be insensitive to other factors independent of judged relevancy that affect actual probability of occurrence (Kahneman & Tversky, 1973).



Who is he / she? What his/her job/occupation?



(Chi.agromassidayu.com. N.D.)

Statement from Textbook:

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.
(Tversky & Kahneman, 1974, p. 1124)

3. Representativeness Heuristic

(1) Factors:

A: **Prior probability of outcomes** 结果的预测概率 (Town with lots of chicken farmers and only a few librarians, Steve may a farmer)

B: However, sometimes people will ignore the factor A, and just directly reaction.

ignore prior probabilities and instead base their judgment.

C: Ignore Simple Size: 抽样理论认为，从大样本得出的估计值比从小样本得出的估计值更可靠。



3. Representativeness Heuristic

Table 7.2 Early investigations of availability

Participants' task	Ps' response	Correct answer & reason
<p>"A path in a structure is a line that connects an element in the top row to an element in the bottom row, and passes through one and only one element in each row. In which of the two structures are there more paths?"</p>		
1. Consider structures A and B, displayed below.	85% pick A	Same in both: $8^3 = 2^9 = 512$
(A)	(B)	Paths in A are more available:
x x x x x x x x	x x	(a) A's more columns, easy paths;
x x x x x x x x	x x	(b) A's paths crossing columns are more distinctive, less confusable;
x x x x x x x x	x x	(c) A's paths are shorter, easier to visualize
	x x	
	x x	
	x x	
	x x	



3. Representativeness Heuristic

- | | | |
|---|--|--|
| <p>2. Consider the letter R in English words. Is R more likely to appear in</p> <ul style="list-style-type: none">– the first position?– the third position? | <p>69% pick first</p> | <p>Third position more likely. Five consonants (K,L,N,R,V) appear third more than first, but first is easier to bring to mind.</p> |
| <p>3. A bus has ten stations along a route between Start and Finish. Consider a bus that travels, stopping at exactly r stations along this route.
START _____ FINISH
What is the number of different patterns of r stops that the bus can make? (r varies from 2–8)</p> | <p>As r increases, the number of estimated different patterns decreases: 2 stops seem to offer more patterns than, say, 5 or 8 stops.</p> | <p>5 stops offer the most patterns, 252; 2 and 8 offer the least</p> |



3. Representative Heuristic

(1) The representativeness heuristic is a quick, though occasionally fallible, method of estimating probability via judgments of relevancy.

(2) Most Basic Heuristic.

(3) Less cognitive work need to accomplish a task. (bottom –up processing). (Page.335)

4. Availability Heuristic

- (1) Evaluates an event's likelihood based on **how quickly instances** come to mind (Tversky & Kahneman, 1973).
- (2) When examples or associations are readily accessible, this inflates estimated likelihood.
- (3) Use cognitive work (Compare to Representative task).
Top-down processing.
- (4) However, biasing factors can alter the accessibility of some classes of phenomena without altering their overall number.
- (5) A category with easily retrieved instances will seem more numerous than will an equally frequent category with less easily retrieved instances (Gabrielcik & Fazio, 1984).



4. The impact of availability:

- (1) The ease of recall.
- (2) Content of recall. If you can imagine instances easily, you will probably also have more instances in mind, which may actually lead to the errors associated with availability.
- (3) Memory accessibility facilitates the availability heuristic (C. MacLeod & Campbell, 1992).
- (4) Use of the availability heuristic also increases under high memory load, such as a person thinking about several things simultaneously.



5. Simulation Heuristic 模拟启发

- (1) Run events through in their mind chronologically to assess likely consequences.
- (2) The simulation heuristic addressed a variety of tasks, including **prediction** and **causality**. 因果关系

Example: Consider how you would answer the question, “What is your dad going to think when he finds out you have smashed up the car?”

You may think of what you know about your father and his reactions to crises, run through these events in your mind, and generate several possibilities. The ease with which a particular ending comes to mind seems to predict what is likely to happen in real life. Your father could refuse to pay your college tuition next term, or he could ignore the whole thing, but you most easily imagine that he will insist that you find a job so that you can help pay for the car.



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Using Mental Simulation:

- (1) Simulating how events may happen provides a window on the future by helping people envision possibilities and develop plans for producing those possibilities (S. E. Taylor et al., 1998)
- (2) They may envision the future as filled with bountiful possibilities, what some call wishful thinking or **fantasy** (Oettingen & Mayer, 2002)
- (3) Focus on the steps need to take to achieve a future that is desired.
- (4) If you are an avid reader of self-help books, you know that this advice- filled genre urges people to envision actively the state they hope to achieve in the future. Yet research suggests that this idea is misleading.



Experiment: L. B. Pham & Taylor, 1999

College students studying for an exam either envisioned their satisfaction and celebration in achieving a good grade (outcome focus) or envisioned themselves studying so as to produce a good grade (process).

Control Group: Student do not have the mental simulation.

Experimental Group: People have the experimental simulation and get good grades.

Outcome: Actually, the control group students grade is better than the experimental group.

Thus, if you want to use the mental simulation to reach your goals, better not engage in wishful think and fantasy, but to focus your simulations clearly about what you will need to do get there.



Anchoring: (Seek reference thing) 寻找参照物

- (1) When judging under uncertainty, people sometimes reduce ambiguity by starting with reference point, or anchor, and adjusting it to reach a final conclusion.
- (2) Anchoring heuristic: Activation in the medial prefrontal cortex fits the self-as-anchor account (Tamir & Mitchell, 2010).
- (3) Anchors include irrelevant details, but suggest a beginning reference point.
- (4) Mechanism underlies the anchoring effect?

First, people anchor on an initial value and then insufficiently adjust away when making an inference (Epley & Gilovich, 2001). Second, anchoring is determined by anchor plausibility and how much people know about both anchor and target.



Decision Framing Effects: Perspectives from Prospect Theory

决策框架效应。前景理论的视角

- (1) Judgments are affected by the initial decision **framing**, that is, the description of the background context of the choice (Kahneman & Tversky, 1984; Tversky & Kahneman, 1981)
- (2) People failed to recognize that the underlying structure of problems are similar to each other; Distracted by surface characteristics concerning how the problems are presented. — — The presentation of the problem is called the decision frame. Seemingly minor alterations in such representations can exert major effects on decisions.
- (3) The **common frame** is whether a decision describe the gains and losses. (Kahneman & Tversky, 1982).
— — people cautious for losses and more likely to take chances in gains.
- (4) Robust principle in decision making: **Risk Aversion**: People tend to avoid risks when they are dealing with people gains. **Risk Seeking**: tend to seek risks when they are dealing with possible losses.
- (5) Framing can interact with personal dispositions to affect choices or decisions.

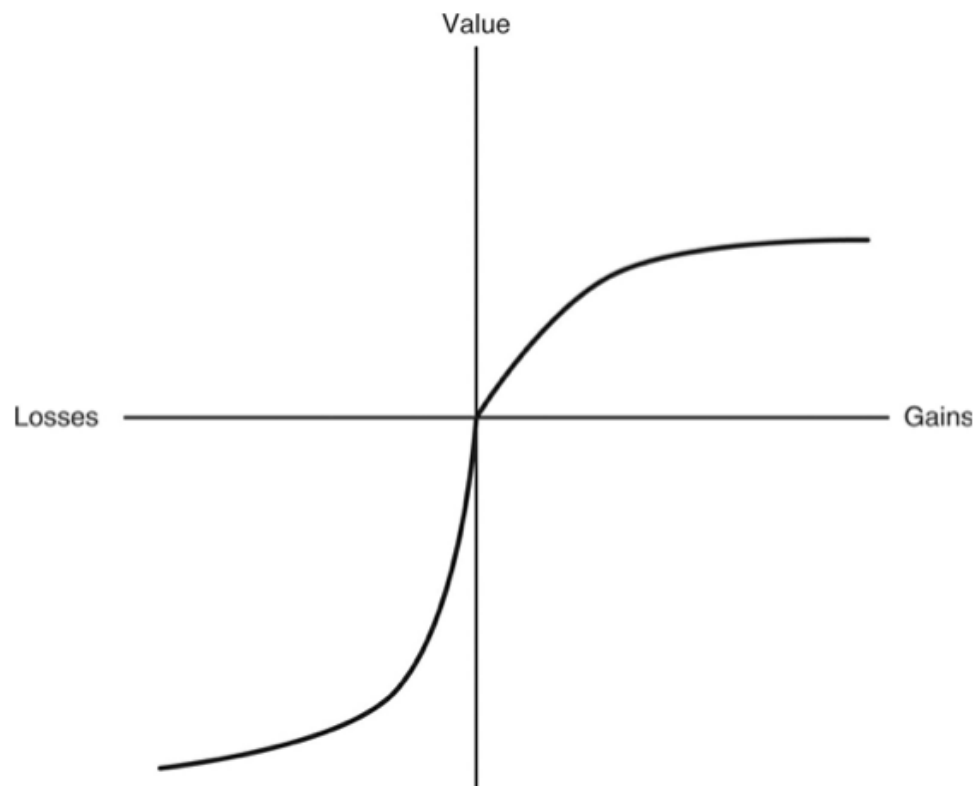


Prospect Theory:

1. **Prospect theory** (Kahneman & Tversky, 1979; Tversky & Kahneman, 1981) describes the decision processes involved when people **make comparisons between options**.
2. As for the 2 important components: **Frame of reference and subjective value function**.
3. Select a reference point is crucial to evaluating options. A **reference point**: Internal standard that people use to compare the objective value of an option.
 - (a) A positively framed option decreases one's evoked reference point, whereas the same information framed negatively increases the evoked reference point (Abelson & Levi, 1985; Highhouse & Paese, 1996).
 - (b) Framing the alternatives positively (200 people saved) would evoke a reference point comparison of zero people (Reference Point) being saved; When the same problem is framed negatively (400 people will die), people adopt a reference point presupposing that no lives are lost.
4. Subjective value function: (Reference point orients): is expressed as positive and negative deviations from a neutral point. The value function is a S-shaped, concave for gains (risk aversion) and Convex for loss (reflect risk seeking).



Figure 7.2 The subjective value function of prospect theory



Source: From Kahneman & Tversky (1979). Copyright 1979 by The Econometric Society. Adapted with permission



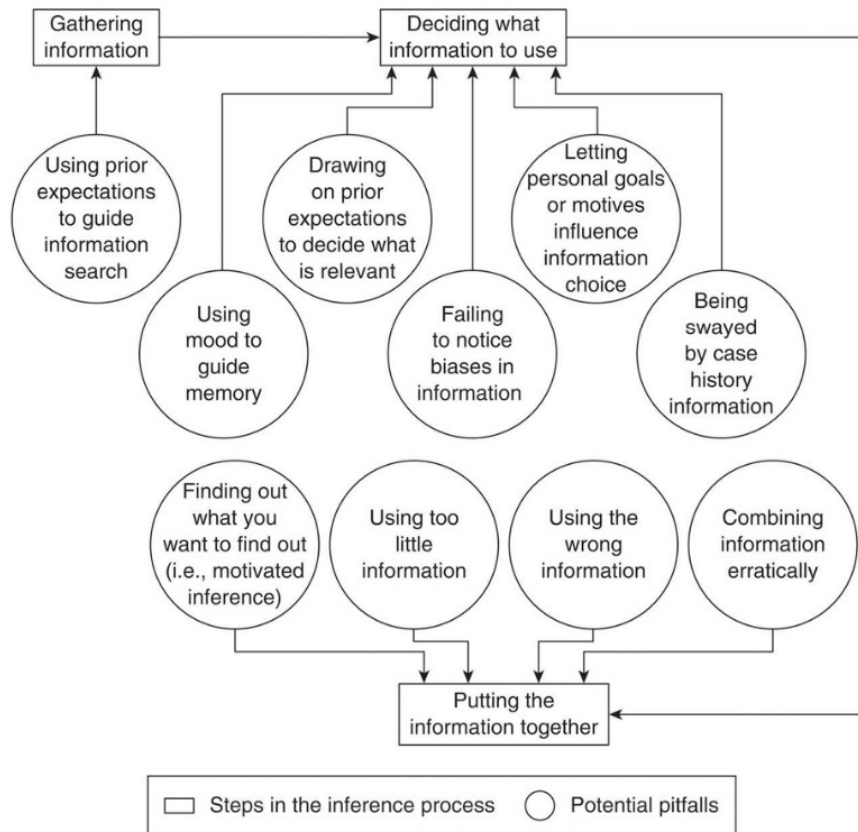
Exactly why the subjective interpretation of objectively presented information varies with gain or loss is not clear, but the effects are robust.

— — Note that the frame-of-reference effects imply that the same outcome framed positively or negatively produces different subjective values.



1. **The Conjunction Error:** People often make more extreme predictions for the joint occurrence of events than for a single event. → This error is termed the conjunction fallacy (Abelson & Gross, 1987; Tversky & Kahneman, 1983).
2. Integrating Information: People take shortcuts too when bringing information together and combining it into a judgment, which is problematic when evaluated against the normative model.
 - (1) Assessing Covariation: 评估共变性
Covariation: How strongly two things are related or correlation.
 - (2) Illusory Correlation: People overestimate the correlation, but none exist.





(1) Assessing Covariation: 评估共变性

Figure 7.3 The assessment of covariation and its pitfalls: Do blondes have more fun?



When do we use heuristics and other shortcuts?

1. When is the social perceiver most likely to cut corners?

— — People experience approach emotion (anger, fear, depression, etc.), distrust the information under consideration.

2. **Judgement overtime Add Biases:** 判断的时间过长产生的偏差:

(1) Expected Utility (EU) theory: maintain that choices are guided by the probability and value of options.

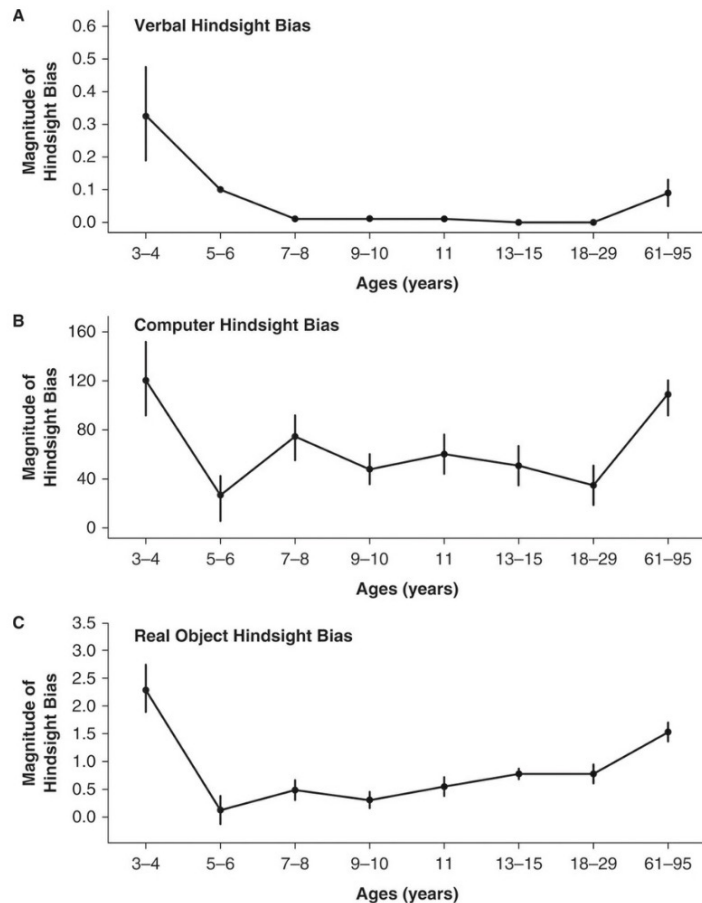
(2) ****The discounted utility (DU) Model makes the additional point that the utility of any given diminishes as consequences are spread over time.

(3) E.G: Long-term choices are often determined by people's knowledge of their own preferences and how those preferences may change over time. For example, given a choice between \$10 today and \$11 in a week, most people will choose \$10 immediately. But given the choice between \$10 in a year and \$11 in a week and a year, most people will choose the \$11 (Frederick et al., 2002).

(4) DU can mix attitude about the future. → Can add bias into questions.



Learning from the past:



People are preferred to have an attention on the past thing. Especially at the old stage.

人们存在意识，关于学习先前发生的事件，学习先前内容的经验。

事后诸葛亮的现象。

Source: Bernstein, Erdfelder, Meltzoff, Peria, & Loftus (2011)





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