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RASTAFARIANISM. See **Religion: African Diaspora.**

RATIONAL CHOICE. People constantly make choices or decisions in an uncertain world: should I buy life insurance, marry, change jobs? Rational decision making is an important topic in the social sciences, cognitive science, and philosophy, and for many years classical decision theory has dominated competing accounts of decision making.

Classical Decision Theory

Most of classical decision theory was developed over the first sixty years of the twentieth century. The theory focuses on instrumental rationality, that is, on reasoning about how agents can best achieve their desires in light of their beliefs. Decisions take place under three conditions: certainty (outcomes of actions are certain), risk (outcomes are not certain but their probabilities are known, as in some games of chance), and uncertainty (probabilities of outcomes are unknown). There are various ways of handling decision-making under uncertainty, but it is usually reduced to decision-making under risk by using the agent's subjective probabilities, and it will be the focus here.

Figure 1.

	Outbreak	No outbreak
Shot	No flu, sick one day	No flu, sick one day
No shot	Flu, sick for a week	No flu, not sick

SOURCE: Courtesy of the author

Building blocks of the classical theory. The following example is illustrative: Tom must decide whether to get a flu shot. Allergic to the vaccine, he realizes that getting the shot means he will be sick for a day. He also believes there may be an outbreak of flu that would make him very sick for a week.

Actions, conditions, and outcomes. Decision theory starts with three fundamental concepts:

1. **Actions.** These are the options an agent ponders (here getting a flu shot or not). Actions are often represented by rows in a table.
2. **Conditions.** These are how things turn out independently of actions (e.g., whether there is a flu outbreak or not). Conditions are represented by columns.
3. **Outcomes.** These are the states that result from actions under various conditions (e.g., getting sick for a day in the absence of a flu outbreak).

Desires and beliefs. Classical decision theory represents agents as having preferences over outcomes that capture their desires. For example, Tom prefers health to illness, and less illness to more. Preferences are mathematically represented by subjective utility functions, subject to certain constraints (e.g., the expected utility of one outcome is greater than that of a second only if the agent prefers the first to the second). $U(A,S)$ is the utility of the outcome of action A in condition S . Many sets of numbers can reflect the same preferences, as long as the intervals among them reflect analogous relationships among intensities of desires.

Classical decision theory also represents agents as having degrees of belief about conditions. For example, Tom might believe that a flu outbreak is less likely than not. Degrees of belief are mathematically represented by subjective probability func-

Figure 2.

	Outbreak	No outbreak
Shot	(.4)(1)	(.6)(-1)
No shot	(.4)(-6)	(.6)(3)

SOURCE: Courtesy of the author

tions that specify how likely the agent thinks various outcomes would be. $P(S|A)$ represents an agent's degree of belief that condition S will come about given that he performs action A . For example, Tom might surmise that $P(\text{flu outbreak} | \text{shot})$ is 0.4. Probabilities are represented by the first member of a pair of numbers in a cell, and utilities by the second number in Figure 2 (which has a hypothetical set of numerical values).

Expected utility. The subjective expected utility of each action is the sum of products in each cell in the action's row.

- Shot (row one): $(.4)(1) + (.6)(-1) = (.4) + (-.6) = -.2$
- No shot (row two): $(.4)(-6) + (.6)(3) = (-2.4) + (1.8) = -.6$

Here the first action has a higher expected utility than the second (in symbols): $EU(\text{shot}) > EU(\text{not shot})$, and decision theory reveals that getting a shot is the rational thing to do. There is often a compromise between beliefs and desires; for example, it is frequently often more rational to do something likely to lead to a moderate payoff than to pursue a higher payoff with less chance of success.

There can be more than two actions or situations, and the general formula is:

$$EU(A) = \sum_i P(S|A) \times U(A, S_i)$$

The fundamental claim of decision theory is that a rational decision is one with the highest subjective expected utility (there may be more than one due to ties). And the centerpiece is a representation theorem proving that any agent whose beliefs and desires conform to certain plausible constraints (e.g., whose preference ranking is transitive) behaves as if she were maximizing expected utility.

Interpretations of classical decision theory. Some see utility maximization as a descriptive claim; people in fact behave pretty much as the theory says they should. Others see it as a normative claim: a rational person should choose a utility maximizing action.

Descriptive Interpretations of Decision Theory

Descriptive interpretations of classical decision theory are supposed to provide (at least some) information about how people actually behave. These interpretations lie at the heart of modern economics and related social sciences.

Arguments for descriptive interpretations. Many arguments for descriptive interpretations of classical decision theory are based on the claim that the theory provides sound normative guidance, together with the view that human beings are pretty good at making decisions. Moreover, it is sometimes added, natural selection should favor creatures that are more rational than their dimmer conspecifics, so that bit by bit the human species has become more rational.

Objections and replies. One objection to empirical interpretations is that people simply cannot do what the classical

theory requires. People rarely have definite probabilities and utilities, and even if they did, their working memory and computational capacities are too limited to perform the required calculations (or even to run through processes that would allow them to behave as if they performed such calculations). Moreover, while natural selection may favor better reasoning over worse, there is little reason to suppose it could attune individuals to the subtleties of calculating expected utilities.

Another objection to empirical interpretations is that people behave in ways that are inconsistent with the classical theory. Every history book chronicles follies that are dreadful by the agents' own lights. Furthermore, decades of intense empirical investigation suggest that people simply do not act in the way descriptive decision theory says they do. For example, people's preferences are highly sensitive to how options are described, even where the theory says they should not be.

One response to these criticisms is that people sometimes have something close to definite utilities and probabilities and the relevant calculations are not always too demanding, so people are sometimes capable of maximizing utility. Another response is to scale back the claims made for decision theory. Many economists, for example, hold that it predicts well enough at the aggregate level, even if it only approximates individual behavior.

Normative Interpretations of Decision Theory

Normative interpretations of classical decision theory are supposed to show how people should behave. A rational person, in this view, will take the action with the highest expected probability.

Arguments for normative interpretations. Many arguments for the claim that decision theory is a good normative model for decision making portray irrationality as self-subversion. If an agent violates the theory, he will, over the long run, act in ways that undermine his very own desires. For example, if someone's subjective probabilities do not conform to probability theory, he will be susceptible to "Dutch book" (a series of bets he is guaranteed to lose, no matter how things turn out).

Objections and replies. It has been pointed out that Dutch book arguments and their kin rely on unrealistic assumptions and that there are other ways to avoid self-subversion besides conforming to classical decision theory. There is also a problem suggested by difficulties that beset empirical interpretations. Utility maximization cannot be an appropriate prescription if one lacks the cognitive capacities to follow it. One reply to these criticisms is that even if researchers fall short of classical decision theory's guidelines, rationality requires that is is necessary to get as close to them as possible.

Another criticism is that some of the principles of the classical theory do not make sense as normative guidelines. For instance, they would enjoin people to prefer a chance at something with a high payoff to a smaller guaranteed payoff where the former had a higher expected utility, but it often seems quite rational to prefer the sure thing. Cases like this are intended to

show that rationality does not always require utility maximization. Advocates of the classical account counter that intuitive “violations” of the theory often result from simplistic (mis)applications of its principles. These issues remain a matter of controversy.

Extensions and Alternatives

There are various friendly amendments to classical decision theory; for example, there is now more focus on the role of causation in decision making and on plans and sequences of decisions. Other work involves larger departures. For example, some behavioral decision theorists argue that desires and beliefs are not captured by the classical account. Tversky’s and Kahneman’s prospect theory, the pioneer behavioral account, replaces utilities and probabilities with value functions and decision weights, both of which are constructed to capture the behavioral evidence. A competing approach, due to Gigerenzer and his coworkers, is based on “fast and frugal heuristics”; he holds that human behavior results from the application of a number of simple rules that are adapted to the situations people typically face and that this allows them to achieve good results with minimal use of computational resources. Alternative normative accounts of rationality have also been proposed, many of which demand less than do normative interpretations of the classical decision theory.

See also *Economics; Game Theory; Probability*.

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RATIONALISM. In the final section of the *Critique of Pure Reason*, Immanuel Kant distinguishes empiricism and rationalism:

In respect of the origin of the modes of “knowledge through pure reason,” the question is as to whether they are derived from experience, or whether in independence of experience they have their origin in reason. Aristotle may be regarded as the chief of the empiricists, and Plato as the chief of the noologists [rationalists]. Locke, who in modern times followed Aristotle, and Leibniz, who followed Plato . . . have not been able to bring this conflict to any definitive conclusion. [Kemp Smith, trans.]