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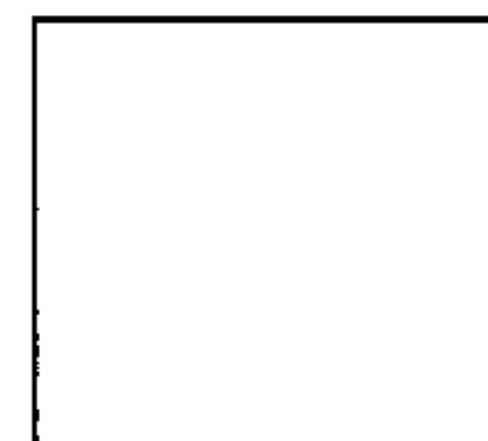
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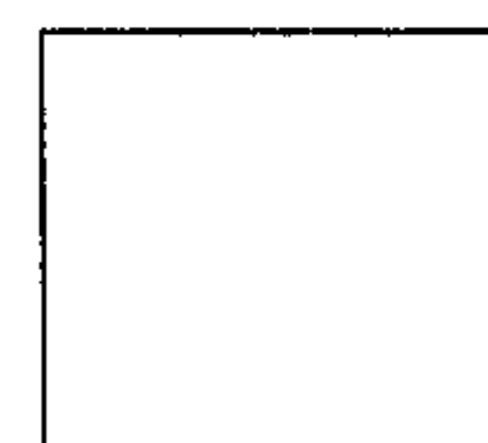
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appear more truthful than when they are not probed. Further, the mere fact of being probed makes senders *appear* more truthful, even when their behavior has not actually changed, perhaps because they seem to hold their own even when challenged by a skeptic. *See also:* AROUSAL; COMMUNICATION; CROSS-CULTURAL SOCIAL PSYCHOLOGY; FACIAL EXPRESSION OF EMOTION; NONVERBAL COMMUNICATION; SELF-MONITORING; SEX DIFFERENCES; SHYNESS; TRUST.

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BELLA M. DEPAULO

decision making Judgment and decision making have been studied by philosophers, economists, and statisticians for centuries, but this field of research has a relatively short history in psychology. A judgment or decision-making task is characterized by uncertainty of information or outcome(s), or by a concern for a person's preferences (values), or both. Generally, tasks therefore have a probability component or a "value" component, or both. For many judgment and decision tasks there may not exist an objective criterion to determine whether a specific judgment or choice is correct, since the response is (partly) based on personal opinions about probabilities and/or values.

Ward Edwards provided the first major review of research on judgment and decision making. He argued that normative and prescriptive models based on economic and statistical theory could be important to psychologists interested in human judgment and decision making. Edwards (1954) introduced SUBJECTIVELY EXPECTED UTILITY theory (SEU), which decomposes decisions or choices in probabilities and preferences, and provides a set of rules for combining beliefs (probabilities) and preferences ("values" or utilities). The theory is normative or prescriptive because it specifies how decisions should be made. If one accepts the axioms upon which it is based, then the most rational choice or decision is the one specified by the theory as having the highest subjectively expected utility. A basic assumption is that people's primary choice criterion is the maximization of subjectively expected utility. Thus, the theory provides rules to reach rational and consistent decisions on the basis of subjective, personal assessments of probabilities and values or utilities. Bayesian decision theory is a related, normative theory of choice based on a combination of probability theory (*see also* BAYES' THEOREM) and expected utility principles. The validity of these prescriptive, normative theories as adequate descriptions of human choice and decision making has been a dominant theme in this research area for some decades. This is partly based on the idea that the study of human decision making requires an approach that focuses on the perceptual and cognitive

factors that cause human choice and decision making to deviate from the predictions of normative models. Normative models such as SEU theory assume extensive information processing capabilities and adopt a rational "homo economicus" model of human decision making. Simon (1957) argued that the limited computational capabilities of decision makers are likely to produce "bounded" rationality, especially in the context of highly complex task environments.

Thus research on judgment and decision making tends to be strongly influenced by formal prescriptive approaches and algebraic representations of information integration processes. Prescriptive or normative decision theory provides a set of principles and rules for combining beliefs (perceived likelihoods or probabilities) and preferences (values or utilities) in order to select an alternative. The distinction between beliefs and preferences is probably the most significant contribution of this research field to the study of human behaviour. Initially SEU models of judgment and decision making dominated research on decision making. However, not all axioms of SEU theory have been accepted, sometimes the theory is applied inappropriately, and sometimes it leads to constraints which make it difficult to represent real-life decision making. A broader approach is to adopt a multidimensional definition of utility. Multi-Attribute Utility (MAU) theory has significantly increased the scope of application of formal decision theory (Von Winterfeldt & Edwards, 1986). It puts more emphasis on the clarification of the preference structure of the individual decision maker. Several models for preference among multi-attribute objects disregard uncertainty about the state of the world and about individual preferences. MAU theory helped to decrease the gap between prescriptive theories and individual decision making. Both SEU theory and MAU theory have had a major impact on ATTITUDE THEORY AND RESEARCH. Theories in this area such as the THEORY OF REASONED ACTION essentially employ a model based on SEU theory and MAU theory, assuming that attitudes are based on the assessment of a variety of positive and negative attributes associated with a specific behavioral alternative or choice.

A number of algebraic models of judgment and decision have been advanced to account for judgments based on multiple sources of information. Anderson's (1981) information integration theory is an example of such a model. Hammond's social judgment theory (based on Brunswik's LENS MODEL) relates judgments to environmental cues by means of correlational analyses (Hammond, Stewart, Brehmer & Steinmann, 1975). Both these models and SEU and MAU models rely on linear combination rules. The central issue is to find a rule (e.g., adding, multiplying, or averaging) that adequately describes judgments based on multiple sources of information. The most commonly observed integration rule is an averaging rule. Averaging could also explain the so-called subadditivity effect, by which the simultaneous offer of two valuable objects is perceived as less valuable than what is predicted on the basis of their individual values.

Theoretically, the most interesting findings in studies using normative models of information integration are the departures from the models' predictions. People do not always behave as normative theories such as SEU theory claim they should. More than three decades of research in cognitive psychology cast serious doubt on the descriptive validity of SEU theory. The theory assumes that people are capable of combining substantial quantities of information. However, when there are many cues or unusual relationships between the cues, people tend to violate decision rules such as those of SEU. Moreover, people find it difficult to learn and use the weighted sum decision rule of SEU theory. An added difficulty is that people find it difficult to think probabilistically. Research has also shown that context effects such as how the options are presented, the number of options presented, and even the presentation of irrelevant information have a significant impact on judgment and decision making. These findings also point to the limitations of normative theories and suggest that the conscious thought preceding a decision may be of a rather simple nature given the difficulty of processing complex information. People seem to rely on simple heuristics for making probability judgments, and seem to use different

decision-making strategies for different situations. As a consequence psychologists became more interested in understanding how people actually make decisions in the real world. This research field tends to develop descriptive models of judgment and decision making, and puts more emphasis on information processing aspects. PROSPECT THEORY attempts to provide a more general theory of decision making under uncertainty and is probably the most comprehensive attempt to meet the various objections to normative theories such as SEU theory. Two lines of research focus on the discrepancies between normative models and actual decision behavior: research on heuristics and biases, and process-oriented research. The first tradition deals primarily with probabilistic thinking, the second puts more emphasis on information search, information integration and decision rules.

HEURISTICS AND BIASES

The study of heuristics and biases tends to be dominated by attempts to expose systematic errors and inferential biases in human judgment and decision making. These errors and biases can improve our insight into the psychological processes that govern judgment and decision making and suggest ways of improving the quality of our thinking (*see also* the entry on REASONING).

Three HEURISTICS that deal with probabilistic thinking have received considerable attention: (1) AVAILABILITY; (2) REPRESENTATIVENESS; and (3) ANCHORING AND ADJUSTMENT. The availability heuristic refers to the tendency to assess the probability of an event based on the ease with which instances of that event come to mind. This heuristic has been investigated in a variety of domains and relates probability estimates to memory access. Generally people overestimate the probability of an event if concrete instances of that event are easily accessible in memory. The representativeness heuristic refers to the tendency to assess the probability that a stimulus belongs to a particular class by judging the degree to which that event corresponds to an appropriate mental model. This heuristic can be associated with a number of

cognitive errors such as insensitivity to prior probabilities and misconceptions about conjunctive probabilities. A well-known example of how ignoring prior probabilities can affect judgment was reported by Kahneman and Tversky (1973). In their study subjects were provided with brief personality sketches, supposedly of engineers and lawyers. Subjects were asked to assess the probability that each sketch described a member of one profession or the other. Half the respondents were told the population from which the sketches were drawn consisted of 30 engineers and 70 lawyers, the remaining respondents were told that there were 70 engineers and 30 lawyers. The findings showed that the prior probabilities were essentially ignored, and that subjects estimated the probability of class membership by judging how similar each personality sketch was to their mental model of an engineer or a lawyer. Anchoring and adjustment refers to a general judgment process in which an initially given or generated response serves as an anchor, and other information is insufficiently used to adjust that response. All three heuristics can lead to the neglect of potentially relevant information. It needs to be added that the adaptive use of heuristics, even though leading to a neglect of some information, can save considerable cognitive effort, and still result in adequate or even good solutions to decision problems. In many situations, however, people do make systematic errors in assessing probabilities. Most of the heuristics seem to operate across a wide range of stimulus materials. Some, however, seem to depend on a combination of judgmental vulnerability and rather clever stimulus designs highlighting this vulnerability. While people may seem to use informal decision rules and simplifying heuristics rather than normative principles, it is far from obvious that it is maladaptive to do so. Cognitive heuristics may not only be functional, but may even be a valid basis for decision making in real-life contexts. An important shortcoming of the existing literature is that many studies of heuristics involve discrete judgmental tasks at a single point in time. In more natural contexts, however, judgments and actions evolve and influence each other continuously over time. Judgments and deci-

sions in everyday life are typically made on a data base that is redundant rather than randomly generated, and that can constantly be updated. Moreover, correction through feedback may give rise to contingent decision making, resulting in adequate decisions (*see, e.g., Hogarth, 1990*). This is less likely in tasks that require once-and-for-all judgments.

As argued by Payne, Bettman, & Johnson (1992) the question is no longer *whether* biases exist, but *under what conditions* relevant information will or will not be used to arrive at a probability judgment. Payne et al. (1992) review research on the use of prior probabilities or base-rate information and conclude that research should not focus on the question of whether people are good or bad statisticians but on understanding the cognitive factors that determine the type of inference rule being employed. Generally, people seem to use a variety of approaches in their attempts to solve probabilistic reasoning tasks. How individuals use these methods contingently has hardly been investigated.

The heuristics discussed in this section deal primarily with the assessment of probabilities. In many tasks, subjective perceptions of probabilities can often be compared with an objective standard. As argued before, decisions also have a value component. Questions of value, however, are typically subjective. Abelson and Levi (1985) rightly point out that research on the judgment of values has not led to a list of distorting factors as is the case for probability judgment. They list several ways in which values might be inadequately considered. For instance, relevant values may be overlooked, one may not really know one's values, and the context or frame of the decision problem may affect the perception and weighting of values.

DECISION RULES

Other research on decision making has paid attention to the decision rules people use when they are confronted with complex decisions. Since cognitive overload provokes a need for simplification, especially when combining relevant information about probabilities and values, it can be expected that people also use decision rules that require less cog-

nitive effort than normative theories such as SEU theory. PROCESS TRACING is one of the methods that provided insight into the use of decision rules that serve a simplifying function, and help to avoid complicated trade-offs between good and bad features of decision options. When confronted with a choice between alternatives that can be described in terms of several attributes, people can use a variety of decision rules. Most of these require less cognitive effort than a complete cost-benefit analysis of the available alternatives. Five simplifying decision-rules are discussed below, all of which apply to decision problems with certain outcomes.

The dominance rule states that alternative A_1 should be chosen over A_2 if A_1 is better on at least one attribute and not worse than A_2 on all remaining attributes.

The conjunctive decision rule requires the decision maker to specify a criterion value for each attribute. If an alternative does not meet this minimally required value on one or more attributes the alternative is dropped from the list of remaining possible alternatives.

The disjunctive decision rule is the mirror image of the conjunctive rule, and also requires a set of criterion values of the attributes. In this case, a chosen alternative must have at least one attribute that meets the criterion while all remaining alternatives do not meet any of the criterion values.

The lexicographic decision rule prescribes a choice of the alternative which is most attractive on the most important attribute. If two alternatives are equally attractive in terms of the most important attribute the decision will be based on the next most important attribute, etc.

The elimination by aspects rule is often interpreted as a combination of the lexicographic rule and the conjunctive rule. First, the most important attribute is selected. All alternatives that fail to meet the criterion on this attribute are eliminated. This procedure is repeated for each of the remaining attributes.

Especially the last four decision rules require less cognitive effort than the decision rule

required by SEU and MAU models, i.e., the maximization of expected value or utility. This latter principle requires a compensatory decision rule (negative scores on one attribute can be compensated by positive scores on another attribute). The simplifying rules discussed in this section are used quite often in everyday decision making and can provide adequate short-cuts in complex decision environments.

FORMULAS VERSUS INTUITIVE DECISION MAKING

One of the aims of decision-making research is to improve our understanding of how a decision maker searches for information and of how this information is combined or processed. The process of information integration "in the head" is often called clinical judgment, and compared with the use of a formula or model. The latter can be based on experts' decision rules, or empirically assessed relationships between predictors (e.g., the presence of symptoms, scores on tests) and outcomes (e.g., having a specific disease or the ability of a job candidate). A substantial amount of research has shown that judgments are generally better if they are made using a formula (Dawes, 1988). This applies especially to diagnostic judgments in which a limited number of indicators can lead to adequate prediction. Some organizations use formulas instead of clinical judgment for specific decision problems. The use of statistical judgment based on formulas as opposed to clinical decision making is, however, more the exception than the rule.

Payne et al. (1992) note that two questions are of importance in this context. First, what factors influence the use of a statistical, automated decision procedure? Second, how can we reach a situation in which clinical and automated decision making complement one other, rather than compete? The modest use of automated decision procedures could be related to limited knowledge about their benefits, experienced difficulties in applying the rules to individual decisions, and overly optimistic beliefs in the accuracy of clinical judgment. Integration of the two decision procedures could also enhance the use of formulas.

For instance, one could aggregate the judgment by formula and the judgment in the head to reach an overall solution.

CONCLUSIONS

Some four decades after the seminal work of Edwards, decision-making research is becoming more prominent in psychology textbooks and a clear and separate research area has emerged, generally referred to as Behavioral Decision Research. An important characteristic of this field of inquiry is that it adopts an interdisciplinary approach. Concepts, models and methods from economics, statistics and social and cognitive psychology can all be found in decision-making research. A second characteristic of this field of inquiry is that it often proceeds by testing the descriptive quality of normative theories of judgment and decision making. Unlike research on many social psychological issues such as aggression, helping behavior, conformity and personal relationships, research on decision making pays considerable attention to the discrepancies between normative models and actual behavior. Most of the research attempting to account for these discrepancies has focused on the information processing strategies, or heuristics, that people use when making judgments or decisions. A final and third characteristic of this field of research is that many concepts and methods are being widely adopted in applied areas. Payne et al. (1992) mention applied areas such as environmental research, accounting, marketing, consumer behavior, finance, law, medicine, and policy decision making.

See also: ATTITUDE THEORY AND RESEARCH; HEURISTICS; PROSPECT THEORY; REASONING.

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JOOP VAN DER PLIJGT

deindividuation Classically defined, deindividuation describes a state of reduced SELF-AWARENESS or even "loss of self" associated with immersion and anonymity within a group. This state results in deregulated and disinhibited behavior prey to the vagaries of immediate environmental cues and unresponsive to social NORMS and standards (see Diener, 1980; Zimbardo, 1969). It has been employed to explain aspects of mass behavior, and has long been associated with negative psychological and social consequences of the crowd (e.g., suggestibility, disinhibition, AGGRESSION, etc.; see CROWD PSYCHOLOGY). Recent definitions try to separate the effects of anonymity from reduced awareness as well as further delineating the effects of different dimensions of self-awareness (Prentice-Dunn & Rogers, 1989). However, these "refinements" also reveal the slippery nature of the phenomenon if not the whole concept of deindividuation. Although it has sometimes struggled to meet the challenge of empirical test, developments in social psychological theory have been used to rejuvenate as well as question its status as a predictive and explanatory concept.

The idea underlying deindividuation can be traced back to the theorizing of LeBon in the last century and has its roots in pioneering work in social psychology. According to LeBon, in the crowd the otherwise "rational" individual becomes taken over by the collective racial unconscious, and returns to a primitive state (see CONTAGION). Although metaphysical notions of group mind were rejected on the grounds of their unscientific basis by Floyd Allport and subsequent deindividuation theorists, these later psychologists shared the idea that the crowd had the effect of stripping away the veneer of social constraint, revealing the individual's "natural" instincts. The result was largely the same: a basic irrational response which was atavistic and asocial in nature (Reicher, 1987). If not a blueprint, then, these early writings certainly helped to steer the direction of subsequent theorizing and research.

Within contemporary social psychology, the classic study by Festinger, Pepitone, and Newcomb (1952) gave deindividuation its name, and marked the first in a long line of empirical studies of this phenomenon. Following the legacy of LeBon, Festinger et al. reasoned that "submergence in the group" could produce a state of deindividuation defined in terms of reduced identifiability, with the consequence that behavior becomes less inhibited. The concept of deindividuation was further refined in subsequent work, notably by Zimbardo (1969) and Diener (1980). In this line of research the theme of anonymity in the group became emphasized and was usually operationalized by disguising participants in masks and overalls, with the prediction that subjects so deindividuated would display more antisocial or antinormative behavior (such as delivering electric shocks to a confederate). Although much early evidence was supportive, some studies also showed evidence of more prosocial behavior under deindividuating conditions (see Diener, 1980; Zimbardo, 1969). By the early 1980s theorizing began to reflect new developments in self-awareness theory. Specifically, Prentice-Dunn & Rogers (1989) applied the distinction between private and public self-awareness to the deindividuation paradigm. They argued that anonymity was