

## **Appearing in *The Handbook for Medical Decision Making* ed. Michael Kattan**

### Developmental Theories

Developmental theories concern changes that occur over the lifespan as a result of maturation and experience. The nature of decision making shifts as children become adolescents and, as more recent research shows, as adolescents become adults and as adults age. Two major theories of decision making are discussed that are also theories of development: the prototype/willingness model and fuzzy-trace theory. When discussing decision making in a medical context, it is important to keep in mind the key concepts of risk perception and informed consent (including issues of autonomy). How these theories address each of these issues and their implications for development and rationality are discussed. In discussing what rationality in decision making is, it is important to note two approaches offered as criteria: coherence and correspondence. The coherence criterion for rational decision making is that a decision is rational if the process used is internally consistent. For example, decision makers use a logical rule to combine their assessments of the costs and benefits of each option. Furthermore, the choice made must reflect the decision makers' goals. This coherence criterion is what is traditionally referred to when a process is described as rational. For the coherence criterion, the outcome of the decision is not involved in denoting a decision as rational. The correspondence criterion argues that outcomes do matter. To the extent that the decisions made correspond with good outcomes in reality (e.g., they cause no harm to the decision maker or to others), the decision can be considered rational. Researchers who focus on the health of children and youth often emphasize positive outcomes. However, coherent reasoning is also relevant for issues such as whether young people are capable of giving informed consent for medical treatments. The two theories discussed here are dual-process theories of decision making. These theories argue that there are two ways in which a decision maker can arrive at a decision. One process is rational (in the traditional sense) and analytic. This process involves the decision maker combining relevant factors using a logically defensible decision rule; behavior resulting from this process is a planned and intentional action. The other process is described as intuitive. This process is quick and does not involve deliberation. Although both theories are similar in that they propose a dual-process distinction, they differ in what is proposed for developing and what is considered rational. Crucially, intuition in prototype/willingness theory is developmentally primitive, whereas intuition in fuzzy-trace theory characterizes advanced thinking.

### Prototype/Willingness Model

A standard dual-process theory, the prototype/willingness model has been applied to many health decisions, such as the decision to smoke or drink, and to health-promoting behaviors, such as cancer screening and family planning. The prototype/willingness model argues that there are two paths to a decision, a reasoned path and a reactive path. For the reasoned path, intentions are the direct antecedent to behavior. In turn, intentions are a function of subjective norms and attitudes. Decisions using the reasoned path are deliberative and planned and characterize more mature decision makers. The reactive path was proposed to capture behavior that is not deliberative and is captured by the construct of willingness. Research has shown that willingness is able to explain unique variance when included in a model with behavioral intentions. For the reactive path, individuals are said to form images of the prototypical person who regularly performs the behavior. What dictates behavior from this process is the reaction that the individual has to this prototype. For instance, producing a prototype of a smoker, an individual can have a positive reaction to the prototype, increasing the probability that the individual will smoke, or a negative reaction to the prototype, decreasing the probability that the individual will smoke. (The theory also holds that a negative image can sometimes be viewed as a cost of

engaging in the behavior.) Furthermore, individuals recognize that the more they do the behavior, the more they will come to be perceived as similar to the prototype. For the prototype/willingness model, development progresses from greater use of the reactive path as children get older to greater reliance on the reasoned path as adults. Therefore, the reasoned path is considered the rational process. Because adolescents are said to be preoccupied with social images and identities, they are more likely to rely on the reactive path than adults. Studies have shown that a positive relationship between intentions and behavior increases with age. Risk perception for the reactive path is defined by the reaction the individual has to the prototype, yet for the reasoned path, it is dictated by the knowledge the individual has of the risk.

### Fuzzy-Trace Theory

A more recent dual-process theory, fuzzy-trace theory is based on studies of memory, reasoning, social judgment, and decision making. The theory has been applied to children, adolescents, younger adults, and older adults as well as to groups varying in expertise, such as medical students and physicians. The phrase *fuzzy trace* refers to a distinction between gist memory representations that are fuzzy (i.e., they are vague and impressionistic) and verbatim memory representations that are vivid. Reasoning gravitates to using gist (or fuzzy) representations, which minimizes errors. Moreover, this adaptive tendency to use gist representations—the fuzzy-processing preference—increases with development as children and youth gain experience. Studies of children (comparing older with younger children) and of adults (comparing experts with novices in a domain of knowledge) have demonstrated that reliance on gist representations increases with development. People make decisions using simple gist representations of information, often processing it unconsciously, and engage in parallel rather than serial processing of that information (leaping ahead based on vague gist impressions of the relations and patterns in information without fully encoding details). This kind of thinking is what is meant by “gist-based intuitive reasoning.” What develops with age and experience, therefore, is a greater reliance on gist-based intuition in decision processes. Fuzzy-trace theory has been used to describe developmental trends in adolescent risky decision making, HIV prevention, cardiovascular disease, and cancer prevention. Specifically, fuzzy-trace theory relies on four basic principles in explaining decision making: (1) parallel encoding, (2) the fuzzy-to-verbatim continua, (3) the fuzzy-processing preference, and (4) task calibration. Parallel encoding states that people extract patterns from the environment and encode them along with exact surface form information. These traces (verbatim and gist) are independent, as previously discussed. The second principle, the fuzzy-to-verbatim continua, states that people encode multiple representations at varying levels of precision. At one end are factual, detailed verbatim representations, and at the other end are simplified, abstracted gist representations. These representations are sensitive to environmental cues, meaning that either could be used in the decision process, depending on which representation is cued in context. Verbatim representations support a quantitative, analytic process, while gist representations support an intuitive/holistic process. Since problems are represented at multiple levels of specificity, the same problem can be approached analytically (verbatim) or intuitively (gist) depending on which representation is retrieved. The third principle, task calibration, states that the lowest level of gist required is used to perform the task. For instance, when deciding between Option A, gaining \$5, or Option B, gaining \$7, one need only remember the ordinal distinction between the two,  $B > A$ , to choose B. Finally, the fuzzy-processing preference states that individuals prefer to operate on the simplest representation (gist) needed to accomplish their goals. For development, studies have shown that young children are more likely to make decisions based on quantitative differences and that what develops with experience is a greater reliance on gist representations, a finding predicted by fuzzy-trace theory. Therefore, consistent with fuzzy-trace theory, gist-based intuitive reasoning has been shown to be the more advanced (and consequently more rational) mode of processing. Risk perception can vary along the fuzzy-to-verbatim

continua in that it can be precise, for example, remembering the exact risk that was conveyed if the surgery were done, or it can be fuzzy, for example, remembering that there is a risk with surgery but not the exact number. Fuzzy-trace theory explains and predicts the major findings in risk perception and risk taking—for example, that risk perceptions vary greatly depending on how they are elicited. The theory also predicts reversals in the relation between risk perception and risk taking depending on whether people use gist-based intuition or verbatim-based analysis. Paradoxically, adolescents often take risks that compromise health because they logically analyze the details of decisions. Adults avoid unhealthy risk taking by considering the gist, or bottom line, of the decision. Fuzzy-trace theory also explains most of the biases and fallacies exhibited in judgment and decision making (ratio bias, framing effects, hindsight bias, base-rate neglect, conjunction fallacy, disjunction fallacy, and others). Many of these biases and fallacies have been demonstrated in medical decision making by patients and healthcare professionals. Fuzzy-trace theory also predicts (and this prediction has been borne out by data) that many biases increase from childhood to adulthood because they are caused by gist-based intuition.

### Informed Consent

Recently, there has been an emphasis on increasing the role the patient has in his or her medical decisions. The patient-practitioner relationship has been steadily growing from paternalism to egalitarianism. Evidence has shown that involving patients in their own medical decisions has a positive effect on their well-being. One of the central issues of this move centers on the concept of informed consent. Informed consent involves a decision, or authorization, given without coercion and involves the decision maker having a fundamental understanding of the risks and benefits. Informed consent is given with volition and is usually assumed to involve an underlying rational process. Given that it is rational, it is assumed that to give fully informed consent, the decision maker must be intellectually competent and mature. In discussing the matter of young children, the issue is not one of consent, in that it is clear that children are not considered on par in maturity and cognitive capacity with adults. For young children, decisions are left up to the parent or guardian. However, the case of whether or not an adolescent is capable of providing informed consent is still an ongoing debate. Evidence supporting both sides of the issue has been found. For instance, older adolescents were found to perform on par with adults in a task involving hypothetical medical scenarios. These adolescents were able to select options based on logical reasoning and give valid evidence for their choices, and they had a clear understanding of the costs and benefits of the options. However, other studies have shown that real differences between adults and adolescents do exist. For example, adolescents' goals are more likely than adults' to maximize immediate pleasure, adolescents take more risks in the presence of peers than adults, and the brain is still not fully mature in adolescence. Therefore, the issue of autonomy in adolescence and of whether adolescents can make a rational decision is still unresolved. How each theory handles consent is important with respect to medical decision making. Prototype/willingness does not specifically address the concept of consent. For the prototype/willingness model, however, using the reasoned path is considered the preferred process. Therefore, deliberating about details and precise knowledge of the options involved in the process matter greatly. For fuzzy-trace theory, making an informed decision requires a grasp of the bottom-line meaning of the situation (e.g., there is a fatal risk involved in the surgery), not simply regurgitating the minutia. For example, imagine that two patients are informed that the risk of death from surgery is 2% and each is later asked to recall what the risk they were informed is. One patient says 0% and the other 10%. Although the patient reporting 0% is objectively more correct (2% off is closer than 8% off), the patient reporting 10% is more informed because he or she understands that the surgery does have some risk. Research has shown that patients often cannot recall the details of surgical risks and that consent is driven instead by their understanding of the gist of the options. People low in numeracy, the ability to understand and use numbers, have difficulty getting the gist of health information, which impairs informed medical decision making. In sum, developmental

differences related to age, experience, and knowledge determine informed consent and the quality of medical decisions.

*Steven Estrada, Valerie F. Reyna, and Britain Mills*

See also Dual-Process Theory; Fuzzy-Trace Theory; Intuition Versus Analysis; Risk Perception

#### Further Readings

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