The Development of Judgment and Decision Making During Childhood and Adolescence

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Abstract

Research on adult judgment and decision making has focused on deviations from normative models, demonstrating biases and reliance on heuristic shortcuts, thus presenting a very different picture than developmental theories that describe a unidirectional progression toward greater logic and efficiency. Recent research related to this apparent contradiction indicates that children develop competencies to reason effectively and make normative decisions, but also develop biased judgment strategies that are used inappropriately in some situations. We suggest potential explanations for the findings, highlighting the need to consider models that incorporate development in both experiential and analytic information processing systems.

Keywords

development; decision making; judgment heuristics; reasoning

Adolescents are often characterized as poor decision makers by teachers, parents, and policymakers who point to teen pregnancy, drug use, and delinquency as evidence of faulty judgment. Despite widespread interest in how youths make decisions and numerous programs to improve their decision making, little research has focused on the basic processes that underlie the development of judgment and decision making. A search of the seven leading developmental textbooks revealed merely three references to decision making, each focusing on research rooted in traditional models that may not be appropriate for understanding the development of judgment and decision making.

Most traditional theories regard cognitive development as a unidirectional progression either from intuitive thinking to logical, scientific reasoning (e.g., Piaget) or from an initially inefficient state to a state of greater efficiency (e.g., information processing). Although different in many respects, recent perspectives on cognitive development adhere to the same core assumption that development can be characterized as a progression from states of limited understanding...
and complexity to more advanced understanding and computational complexity. Traditional theories also emphasize competence, rather than performance, leading researchers to go to great lengths to optimize testing conditions in an effort to discern underlying cognitive potentials.

The result of the emphasis on reasoning competence as the basis for decision making is reflected in research from the 1980s (see Jacobs & Ganzel, 1993) that compared adolescents’ and adults’ decision making in the context of unfamiliar, hypothetical scenarios. Most of these studies indicated that adults and adolescents performed similarly on some judgment and decision tasks, such as systematically searching for information, attending to relevant information, and generating solutions. By contrast, other studies indicated differences between younger and older adolescents in decisions that involved making inferences, perceiving risk, considering consequences, and planning. These discrepancies may have arisen because one set of studies focused on judgments rooted in prior experiences about real-world issues, whereas the other investigations were concerned with performance under optimal conditions. Studies that focus exclusively on discerning age differences in competence may indicate only what children can do under ideal conditions, rather than what they do under more realistic conditions when personal goals, beliefs, and prior experience are added to the decision-making equation.

DEVELOPMENTAL RESEARCH

A large body of literature in social and cognitive psychology suggests that adults are reasonably accurate in many everyday judgments, but that they often over- or underapply particular rules or use shortcut “heuristics” instead of relying on normative rules. To examine the developmental antecedents of these adult shortcomings, researchers have adapted the procedures used in adult decision-making research for use with children.

One judgment bias that has been studied by developmentalists is the representativeness heuristic, defined as predicting the likelihood of an uncertain event by relying on information that represents salient characteristics of the sample rather than the true base rates of events, behaviors, or attitudes—for example, predicting that a particular outgoing, perky girl is a cheerleader and not in the band on the basis of her resemblance to cheerleaders rather than the fact that there are more girls in band than in cheerleading. One of the first studies on the development of judgment heuristics (Jacobs & Potenza, 1991) used this and other examples to show that even first graders exhibited the same judgment biases as adults, relying on the representativeness heuristic and ignoring base-rate information to make social judgments. Use of this heuristic increased throughout the elementary-school years and increased further between sixth grade and college. Paradoxically, on parallel problems that did not involve social content, the use of base-rate information increased over this same age range.

Similar developmental trajectories have been found for other judgment biases that have been observed in adults. For example, Davidson (1995) found that susceptibility to the conjunction fallacy (i.e., judging the probability of a conjunction of events as greater than the probability of either event alone) increased during the elementary-school years. Reyna and Ellis (1994) found that framing effect (greater risk seeking when the outcome is a possible gain than when the outcome is a possible
loss) is not seen in children until they reach the fifth grade. Recent studies of reasoning (Markovits & Dumas, 1999) report age increases in biases on transitive inference problems (i.e., \( A = B \) and \( B = C \), therefore \( A = C \)) in situations with particular social content, even though the competencies that underlie normative inferences are improving over this same age range.

The studies we have just mentioned document age-related increases in some judgment biases; however, most studies also show that children can in fact use statistical information to make judgments about a sample. Four-year-olds can use base rates to make judgments about familiar social categories, second through sixth graders can use information about sample size and variability to make inferences (Jacobs & Narloch, 2001), and elementary-school children can accurately estimate base rates of classmates’ behaviors and attitudes, although their accuracy improves throughout the elementary-school years (Jacobs, Greenwald, & Osgood, 1995).

The foregoing discussion suggests that there are two forms of developmental change. First, there are clear improvements in many reasoning competencies from early childhood through adolescence and adulthood. Second, an increasing number of heuristics is acquired over the course of development, and these heuristics are used with increasing frequency. The second developmental trend is less clear and more complex than the first, however, because studies have not uniformly found the same pattern. For example, a set of studies using problems adapted from the adult literature (Klaczynski, 2001a, 2001b) showed improvements from early through late adolescence in statistical reasoning, counterfactual reasoning, and decisions based on sunk costs (i.e., irretrievable investments in prior decisions), but also developmental declines in various nonnormative judgment and decision tendencies. Despite improvements with development, performance was far from optimal. In all age groups, normative decisions were made no more frequently than would be expected by chance, and most older adolescents and young adults committed the gambler’s fallacies and conjunction fallacies. They also made decisions based on small samples of vivid evidence rather than larger samples of pallid evidence, and made judgments about the quality of decisions based on their outcomes rather than on prior probabilities (e.g., a decision to have surgery that had a 98% chance of success but resulted in death might be judged a bad decision if one focuses on the outcome rather than on the probability of success when the decision was made).

Developmentalists’ preoccupation with discerning underlying competencies has resulted in sparse attention to social, motivational, and affective influences on everyday cognitive activities. In attempting to fill this void, recent research has shown that the use of shortcut judgment strategies, like heuristics, is often determined by motivation and prior beliefs. For example, one study (Klaczynski, 2000) showed that the motivation to protect favored beliefs (e.g., religious beliefs) biased children’s and adolescents’ judgments and reasoning, so that they vacillated between heuristics and normative reasoning, depending on which type of reasoning supported their prior beliefs.

Fluctuations between analytic competencies and use of heuristics have also been observed in studies of “classic” decision-making tasks. For instance, in an unpublished study examining the effects of investments in prior decisions (sunk costs) and choices that serve as the basis for future decisions (precedent setting), Klaczynski found that 9-, 12-, and 15-year-olds showed age-related increases in normative decisions. Most participants relied on heuristics; however, after they heard arguments that provided reasons for using normative strategies on the decision scenarios, decision making on precedent-setting problems improved at all ages, but decisions on sunk-cost problems improved only for the 12- and 15-year-olds. After the participants heard arguments that supported biased reasoning related to the decision problems, however, normative decision making declined for the 9- and 12-year-olds, but not the 15-year-olds. These findings further illustrate the complexity of developmental paths of decision making, suggesting that there is variability in the ages at which different decision-making abilities develop and at which biased arguments can be resisted.

**WHAT DEVELOPS?**

The preceding discussion presents an image of the development of judgment and decision-making skills that runs contrary to that painted by traditional developmental theories. What conclusions can be drawn from this research literature? First, even young children use many of the same rules of thumb, or heuristics, that adults use in their decisions and are susceptible to many of the same judgment biases observed in adults. Second, children in the early elementary grades are able to use base-rate information and other types of statistical information to make social judgments. This ability increases across childhood and adolescence. Third, judgment heuristics and other biases appear to be linked to increases in knowledge (e.g., stereotypes) and to preservation of social beliefs (e.g., religious
beliefs). Thus, the number of heuristics and the situations in which they are applied increase with age. As different social concepts are acquired and become consolidated, children use social-category information as judgment heuristics in much the same way as adults. Fourth, there appear to be gradual and rather modest improvements in monitoring and thinking about the decision process (e.g., metacognition), so that when heuristics are activated, adolescents are better able than younger children to resist implementing them without first assessing their applicability.

The development of decision making, therefore, cannot be characterized as a progression along a single trajectory, despite the fact that problem solving, memory strategies, and other cognitive competencies improve with age. To conclude that heuristic use increases with age while higher-order cognitive ability simultaneously improves, however, would present an overly simplistic description of development. Rather, children begin to use particular heuristics and they acquire specific reasoning abilities at different ages. They also vary in their applications of these approaches as a function of task characteristics, motivation, beliefs, and social contextual factors (e.g., peer influences, time pressures). Together, acquisitions of heuristics, biases, and reasoning competencies create an increasingly diverse repertoire of approaches to judgment and decision situations and, concomitantly, the potential for increasingly flexible judgments and decisions.

We suggest that changes in children’s use of the progressively diverse arsenal of judgment and decision strategies and the conflicting developmental trends we have described can best be accounted for by models that incorporate developments in two information processing systems: an experiential system and an analytic system. Although social and cognitive psychologists often invoke dual-process explanations, developmental psychologists have not yet thoroughly embraced the assumptions on which these theories rest.

In brief, the experiential processing system (Epstein, 1994) has its basis in implicit memory (i.e., remembering information without consciously trying to remember). Experiential processing occurs with minimal awareness and requires little cognitive effort; thus, heuristics, judgment biases, and nonnormative decision strategies that are often activated and utilized with little consideration of their relevance, utility, or consequences are likely to be the result of experiential processing. Experiential processing is context sensitive in the sense that specific features of the immediate context (e.g., evidence about strongly held beliefs) activate specific biases and tendencies and decision heuristics. Developmentally, experiences with the social world may drive the induction of general heuristics, and because these rules are abstracted from experience, they will be correct some of the time. The developmental path for acquisition and use of heuristics may resemble the acquisition of certain rule-based skills, such as language, in which “logical” errors occur (Jacobs & Ganzel, 1993) as a result of overgeneralizing rules that are typically beneficial. Once stored as simple rules, heuristics and biases may be activated by specific conditions, and repeated use will increase the probability that heuristics will be applied automatically or with minimal conscious awareness.

The development of experiential processing is accompanied by the development of an analytic processing system. Whereas the experiential system relies heavily on the contents of memory for judgments and decisions, analytic processing is based on the acquisition and application of abilities that are important for normative reasoning and decision making. Thus, in comparison to experiential processing, analytic processing is more effortful and deliberative, and, consequently, is relatively slow and less cognitively economical. Unlike the highly contextualized experiential system, the analytic system requires decontextualization, that is, the process of separating the underlying structure of a problem from superficial contents that invite the use of heuristics.

It remains to be determined precisely how the analytic and experiential systems interact and how (and if) the nature of these interactions changes with age. The most likely catalyst for developmental changes in analytic-experiential interaction involves metacognitive abilities for monitoring, evaluating, and controlling information processing. Although experiential processing appears to be the default processing system, age-related progressions in these metacognitive skills may allow children and adolescents to consciously override the predominance of this system. As illustrated by several of the developmental studies reviewed here and the literature on adults’ decision making, however, such metacognitive competencies are not always used or fully developed. Thus, in a variety of situations, children and adolescents, like adults, fall prey to judgment biases and decision heuristics.

**FUTURE DIRECTIONS**

We have suggested that previous developmental research on decision making has fallen victim to its own biases by looking for unidirectional sequences of development, resulting in the expectation that
improvements in competence with age will translate into better decision making across situations. This flies in the face of what is known about the biases documented in adults, as well as concerns expressed by parents, educators, and policymakers about adolescent risk taking and faulty decision making. The evidence reviewed here suggests that even as children develop the competencies to reason effectively and make normative decisions, they also develop shortcut and biased judgment strategies that are used inappropriately in some situations.

The two-process model we have presented allows researchers to go beyond describing information processing competencies to examine questions that have implications for teaching adolescents to overcome judgment biases and for creating policies that are sensitive to the judgment limitations of children and adolescents. For example, judgment heuristics are particularly likely to be used in situations in which self-interest, prior beliefs, or uncertainty are involved. These may well be the decision-making contexts in which children and adolescents take risks and make poor decisions. Further, metacognitive competencies that allow children and adolescents to inhibit reliance on heuristics and experiential processing improve with age, suggesting that educators may want to focus on helping children enable those skills.

A number of topics in the decision-making literature have not yet been tackled developmentally. For example, future research should address the relationships among age, emotions, and the processes of decision making. Also absent from the developmental literature is research on the contributions of socializers (e.g., parents, peers) and changes in the opportunities children have to make decisions as they mature. A last missing topic is research on the role of prior experiences with specific decisions; such work could investigate how feedback from prior decision outcomes is used to inform children’s future approaches to similar decisions.

Research on the development of judgment and decision making is in its infancy. New models that extend research questions and methods, as well as the scope of study, will clarify how both judgment biases and normative reasoning develop and the contexts in which each will be used. Answering the questions we have raised is important for teaching children and adolescents to take their places as citizens and decision makers in an increasingly complex world.

**Recommended Reading**


Stanovich, K.E. (1999). (See References)

**Notes**

1. Address correspondence to Janis Jacobs, The Pennsylvania State University, 201 Old Main, University Park, PA 16802.

2. Normative rules refer to those historically advocated by logicians, philosophers, and decision theorists. Nonnormative reasoning includes a variety of heuristics, biases, and errors that have no basis in formal reasoning (see Klaczynski, 2001b, or Stanovich, 1999, for detailed discussions of normative vs. biased reasoning).

3. The gambler’s fallacy is a belief that the next event in a series of events will compensate for a prior sequence in which an outcome occurred with greater-than-expected frequency. For example, after a coin toss yields heads 15 times in a row, the gambler’s fallacy would result in a belief that there is a greater than 50-50 chance that the next toss will yield tails, despite the fact that each coin toss is independent and the probability of either outcome is .50.

**References**


