2007

# Decision Structuring in Important Real-Life Decisions

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*Research Article*

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ABSTRACT—*Results from five studies of real-life decision making are compared. In these studies, participants consistently constrained the amount of information they considered to relatively few options and to a somewhat larger set of criteria. Over time, the number of options considered shrank, but the number of criteria used did not. People's intuitive "calibration" with the predictions of normative linear models is surprisingly good. Although there are effects of education and ability on the amount of information considered, different decision-making styles correlate mostly with affective reactions to, and subjective descriptions of, the approach to a specific decision. Implications for theoretical models of decision making are discussed.*

The processes by which nonexperts make important real-life decisions is an understudied topic. Much of what we know about people's decision making comes either from studies of experts (e.g., Klein, 1998) or from laboratory studies in which experimental participants receive a series of self-contained, hypothetical decision scenarios, often gambles or games, and are asked to say which of a set of options they would choose (Tversky & Kahneman, 1974, 1981). The assumption is that findings from the laboratory will translate directly to real-world decision making, despite the number of extraneous variables that "contaminate" the "pure" cognitive processes in the real world.

There is good reason to be suspicious of this assumption (Galotti, 1989, 2002). Everyday decision making likely includes processes that simply do not arise in the laboratory, such as searching for relevant information or clarifying goals. Moreover, the existing work on expert decision makers by definition examines people who, over the course of several years, have produced a stored mental library of examples from which to draw when they face an instance of decision making. We still know surprisingly little about what nonexperts do when they make major life decisions. Hence, there is a need for studies of nonexperts making important decisions to complete the picture of real-world decision making.

Five such studies are summarized here (see Table 1 for an overview). Each study recruited people facing a decision they regarded as very important. All studies required participants to describe the options under active consideration and to describe the criteria used to decide among options. Participants rated the holistic "goodness" of each option. Two of the studies (3 and 5) used a structured-interview format; the others used survey instruments. In all studies, participants responded to a survey assessing their affective reactions to the decision-making process (e.g., certainty, enjoyment, stress) and asking them to describe their approach to the specific decision in question.

The first study investigated high school students choosing a college (Galotti, 1995a, 1995b; Galotti & Kozberg, 1996; Galotti & Mark, 1994). The second study followed 1st-year college students as they decided on their college major (Galotti, 1999). The third study (Galotti, 2001; Galotti, Pierce, Reimer, & Luckner, 2000) asked pregnant women about their choice of a birth attendant (e.g., obstetrician, family-practice physician, certified nurse-midwife). The fourth study was a replication of the second that also included individual difference measures to assess the effects of decision-making styles (Galotti et al., 2006). The fifth study tracked parents of kindergarten students over the course of a year as they chose their child's first-grade placement from among eight available options.

The process of decision making involves several phases (Byrnes, 1998; Galotti, 2002). All of the studies summarized here focused on decision structuring—the phase in which the individual considers options and decides on criteria to be used in choosing among those options. The decision-structuring phase seems key to a number of theoretical descriptions of decision making (see Byrnes, 1998, for a review), and it has been asserted that individual differences in decision making are especially likely to emerge during this phase (Scott & Bruce, 1995).

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**TABLE 1**
*Overview of the Five Studies*

| Study | Decision studied | *N* | Population | Primary method | Individual differences studied |
|---|---|---|---|---|---|
| 1 | Choosing a college | 322 (90 in core sample) | High school juniors | Survey | Academic ability (grade point average, standardized test scores) |
| 2 | Choosing a major | 111 (39 in core sample) | 1st-year college students | Survey | None |
| 3 | Choosing a birth attendant | 88 | Pregnant women over age 18 | Interview | Education completed, previous experience |
| 4 | Choosing a major | 133 (67 in core sample) | 1st-year college students | Survey | Decision-making style |
| 5 | Choosing a first-grade placement | 243 (139 in core sample) | Parents of kindergartners | Interview | Decision-making style, education completed, previous experience |

**Note.** For each study, *N* indicates the number of individuals who participated in at least one session, and the core sample includes only those who participated in all phases.

## MODELS OF DECISION MAKING

Three theoretical models frame the present analysis of these studies. The first is multiattribute utility theory (MAUT). In this model, decision makers (a) break a decision down into independent criteria, (b) determine the relative importance of each criterion, (c) list all options under consideration, and (d) rate each option on each criterion. Under certain assumptions (e.g., that all options are listed and that all criteria are independent), MAUT and other so-called linear models of decision making can be shown to be normative, meaning that people who follow these models maximize their own utility so as to best achieve their goals (Dawes, 1982; Keeney, 1992).

However, some researchers have argued that people rarely, if ever, use MAUT spontaneously when making important decisions, especially if the relevant information is extensive (Klein, 1998; Payne, 1976; Payne, Bettman, & Johnson, 1993). Other researchers have claimed that people are quite unlikely to use analytical procedures (such as those involved with linear models) when making important decisions (Frisch & Clemen, 1994).

Image theory (Beach, 1993, 1998) is one alternative to MAUT. It locates the heart of decision making in a process known as the *prechoice screening of options*. In this phase, decision makers winnow the number of options to a small number, sometimes one or two. They do this by assessing whether each new goal, plan, or alternative is compatible with three images: the value image (containing their values, morals, and principles), the trajectory image (containing their goals and aspirations), and the strategic image (the ways in which they plan to attain their goals). Options judged incompatible with any image are screened out. Screening may result in only a single option remaining active; in this case, the decision maker's final choice is simply whether or not to accept that option. If there is more than one survivor of the screening phase, the decision maker may use compensatory or other decision strategies to make the final choice. If there are no survivors, the decision maker presumably attempts to discover new options.

Both traditional linear models and image theory focus on nonexpert decision making. Other models of real-life decision making describe how experts with many years of experience make decisions within their domain of expertise, often under time pressure or other types of stress (Zsambok & Klein, 1997). Klein's (1998) recognition-primed decision-making model was derived from observation of experts, including fire commanders, neonatal intensive-care nurses, and military commanders. Klein and his colleagues found that these experts were unlikely to consider multiple options simultaneously. Instead, they quickly categorized a situation, even a novel one, as an example of a pattern or prototype and then implemented the appropriate solution from memory. Thus, the recognition-primed decision-making model predicts that options will be considered serially, with only one under active consideration at a time.

The five studies summarized here all focused on important, real-life, nonemergency decision making by nonexperts. Different decisions were studied because of the claim that people may perform very differently when they face different kinds of decisions (Payne et al., 1993). The research was aimed at providing at least preliminary answers to the following questions:

- How much information do people actively consider when making important decisions?
- How consistent are people in their thinking about an important decision over time?
- How much do people's overall views of the goodness of different options correspond to the values predicted by normative linear models based on people's own criteria, importance weightings, and perceptions of options on those criteria?
- What sorts of individual differences (e.g., in education, experience, or decision-making style) influence people's decision-making processes?

TABLE 2
*Mean Number of Options and Criteria Considered by Participants in Each Study*

| Study | Number of options considered | Number of criteria considered |
|---|---|---|
| 1 | 4.35 | 8.94 |
| 2 | 3.95 | 6.77 |
| 3 | Not assessed | 3.47 |
| 4 | 4.78 | 5.90 |
| 5 | 2.68 | 5.13 |

## RESULTS AND DISCUSSION

Table 2 presents descriptive results for the information participants reported considering when making their decisions. Despite the different samples recruited, the different decisions studied, and the different methodologies used, the results are remarkably consistent. At any given point, people reported considering a small number of options (between two and five) and only a slightly larger number of criteria (between 3 and 9). In making real-life decisions, people appear to constrain the amount of information, and especially the number of options, that they actively consider. This finding is specifically predicted by image theory (Beach, 1998).

Participants in these studies rarely, if ever, reported considering a single option at a time. Thus, they were not behaving like Klein's (1998) experts. The recognition-primed decision-making model, then, may pertain exclusively to expert decision makers operating within their domain of expertise.

Thus, the answer to the question about how much information people actively consider when making important decisions is that they consider more than one option at a time, but only a small fraction of the information potentially available. This conclusion is reminiscent of Perkins's (1985) finding that undergraduate and graduate students who were reasoning informally tended to "underexplore" issues, settling very quickly on lines of reasoning that made superficial sense.

Over time, the number of options under active consideration grows smaller, another finding predicted by image theory. However, the number of criteria in use does not show the same narrowing. In some of the five studies, the number of criteria in use actually rose slightly over time, perhaps as people discovered new dimensions of their decision. Table 3 presents these results. Over a moderate time frame (6 months to about a year), about half the criteria in use changed; the specific options under consideration were more stable. Nonetheless, there was more change in the decision-making process than the raw numbers indicate.

How normatively good is people's real-life decision making? To address this question, I examined the degree to which people's holistic and intuitive appraisals of options were correlated with the predictions of different linear models, including MAUT. For each model considered, I predicted a value for each option—a measure of the overall goodness that option ought to have, given the model's particular way of combining ratings on the various criteria. These predicted values were correlated with participants' overall impressions of the options they were considering.

Predictions of three linear models were examined. The first was MAUT. This model incorporated all the information a participant provided. The importance weighting of a given criterion was multiplied by the subjective rating of each option on that criterion, and the products for each option were summed over all

TABLE 3
*Consistency in Information Considered Over Time, by Study*

| Study | Times of assessment | Number of options considered | Number of criteria considered | Percentage overlap across sessions: Options considered | Percentage overlap across sessions: Criteria considered |
|---|---|---|---|---|---|
| 1 | Time 1: April of junior year | Time 1: 4.57 | Time 1: 9.02 | Times 1–2: 48 | Times 1–2: 49 |
| | Time 2: October of senior year | Time 2: 3.99 | Time 2: 9.64 | Times 2–3: 69 | Times 2–3: 52 |
| | Time 3: April of senior year | Time 3: 3.50 | Time 3: 9.47 | Times 1–3: 43 | Times 1–3: 48 |
| 2 | Time 1: winter of freshman year | Time 1: 4.18 | Time 1: 6.64 | Times 1–2: 51 | Times 1–2: 44 |
| | Time 2: spring of sophomore year (just before declaration) | Time 2: 2.94 | Time 2: 6.48 | | |
| 4 | Time 1: winter of freshman year | Time 1: 4.73 | Time 1: 6.12 | Times 1–2: 84 | Times 1–2: 50 |
| | Time 2: spring of sophomore year (just after declaration) | Time 2: 3.82 | Time 2: 7.09 | (option types[a]) | |
| 5 | Time 1: fall of child's kindergarten year | Time 1: 2.59 | Time 1: 5.97 | Times 1–2: 72 | Times 1–2: 47 |
| | Time 2: spring of child's kindergarten year | Time 2: 2.89 | Time 2: 4.35 | | |

**Note.** This table reports results for the core samples only. Study 3 is not included because there was no longitudinal component in that study.
[a]In this study, options were categorized by division, rather than by specific major. The categories used were "natural science," "social science," and "humanities."

**TABLE 4**

*Correlations Between Participants' Overall Ratings of Options and Predictions of Three Normative Linear Models*

| | Study | | | | |
|---|---|---|---|---|---|
| Model | 1 | 2 | 3 | 4 | 5 |
| MAUT | .69 | .70 | .90 | .64 | .67 |
| Equally weighted criteria | .67 | .62 | .90 | .65 | .66 |
| Top criterion | .53 | .76 | .86 | .58 | .60 |

**Note.** MAUT = multiattribute utility theory.

criteria listed. Thus, each potential option received a summary score. These scores were correlated with participants' overall impression (holistic) ratings of the options. Positive correlations indicate better calibration with MAUT predictions.

The full MAUT model makes the questionable assumption that people's assessments of weights make use of true ratio scales. Some evidence suggests that self-reported weights are not good predictors of the true weights people assign to criteria (Reilly & Doherty, 1989). Therefore, I also examined predictions from two simpler linear models that did not make use of subjective importance weights. One was an equally-weighted-criteria model. In this case, the expected value for each option was computed by giving all criteria equal weight (i.e., the participant's own importance weights were ignored); the subjective ratings of a given option on each criterion were summed to calculate the expected value for that option. Expected values were correlated with participants' holistic ratings of all the options.

The second alternative to the MAUT model was the top-criterion model. For this simple model (which is very similar to Gigerenzer and Goldstein's, 1996, "take the best" algorithm), predicted value of an option was calculated by using only the rating on the criterion to which a participant had given the highest importance weighting. If a participant had given more than one criterion the highest weight, then the average rating on all such criteria was computed as the predicted value of that option. Expected values were correlated with participants' holistic ratings of all the options.

Table 4 presents the calibration coefficients for each study. Overall, people's holistic assessments of options correlated substantially with the predictions of linear models derived from normative theories of decision making (correlations were in the range from .53 to .90). Thus, as measured by arguably normative models of decision making, people's overall intuitions show a surprisingly good degree of rationality.

The final question I address concerns the degree to which individual differences affect decision making. For example, formal schooling presumably reinforces skills of abstract thinking and encourages analytical thinking, and so could encourage people to consider more information or to combine it in more complex ways. The same might be true of intelligence or general cognitive ability, or of experience making a particular decision.

Decision-making styles might also affect performance. In some of the studies summarized, I adopted Scott and Bruce's (1995) taxonomy of decision-making styles, which incorporates five styles that are treated as distinct stylistic dimensions: *rational* (characterized by a thorough search for and logical evaluation of alternatives), *intuitive* (characterized by a reliance on hunches and feelings), *dependent* (characterized by a search for advice and direction from other people), *avoidant* (characterized by attempts to avoid decision making), and *spontaneous* (characterized by a sense of immediacy and a desire to complete the process quickly). The original instrument Scott and Bruce developed to assess decision-making styles was found to have good to excellent psychometric properties in samples of undergraduates, graduate students, and military officers (Loo, 2000), but had not been tested during episodes of actual decision making.

Table 5 presents results regarding individual differences, summarizing observed relations with measures of cognitive performance, self-reported affective reactions to the episode of decision making being examined, and participants' descriptions of their approach to that specific decision. The table shows some effects of individual differences in education and academic ability; there were also some small effects of scores for rational, intuitive, dependent, and avoidant style, especially in the case of affective reactions and subjective descriptions of the approach to decision making. These results suggest that emotional reactions may mediate the role of stylistic individual differences in decision making, although this conclusion is speculative at this time.

Psychological theories of decision making have frequently embraced the concept of bounded rationality, which includes the idea that people typically use only a small subset of available information to make decisions, even important ones (Brandstätter, Gigerenzer, & Hertwig, 2006; Payne et al., 1993; Simon, 1957). Similarly, studies of expert decision makers suggest that they restrict their focus to only some of the relevant information (Cooksey, 1996; Zsambok & Klein, 1997). Thus, it is not surprising that the nonexperts in these five studies also restricted the data they collected and considered. Presumably, they adopted techniques and shortcuts to minimize their cognitive load. Nonetheless, as measured by traditional normative yardsticks of different linear models, they seemed to perform surprisingly well. More work is needed to identify the specific strategies people adopt as they confront decisions in new contexts, as well as to assess the generality of these strategies across different types of decisions.

*Acknowledgments*—Portions of the work reported here were supported by the Spencer Foundation, the National Institutes of Health Academic Research Enhancement Award program

**TABLE 5**
*Effects of Individual Differences, by Study*

| Study | Individual differences in cognitive measures | Individual differences in affective and descriptive measures |
|---|---|---|
| 1 | Higher-ability students listed more criteria in early rounds than lower-ability students<br>Higher- and average-ability students (but not lower-ability students) had higher calibration coefficients with the MAUT and equally-weighted-criteria models than with the top-criterion model | None found |
| 2 | Not assessed | Not assessed |
| 3 | Women with more education described more criteria than women with less education<br>Women with more education were rated as more knowledgeable about the decision than women with less education | Women with more education reported less anxiety than women with less education<br>Women in second and subsequent pregnancies reported greater autonomy and confidence than women in first pregnancies |
| 4 | Students with higher rational decision-making styles had higher calibration coefficients with linear models<br>Students with higher avoidant decision-making styles had lower calibration coefficients with linear models | Students with higher rational or intuitive decision-making styles reported more positive feelings toward the process<br>Students with higher avoidant or dependent decision-making styles reported more negative feelings toward the process<br>Students with higher rational or intuitive decision-making styles reported making decisions more in accordance with their overall values and goals<br>Students with higher avoidant decision-making styles were significantly less likely to report making decisions in accordance with their overall values and goals |
| 5 | Parents with higher avoidant decision-making styles considered fewer options and used fewer criteria in the second round of data collection | Parents with higher dependent decision-making styles had a more negative feeling toward the decision-making process<br>Parents with higher rational decision-making styles reported less use of intuition<br>Parents with higher intuitive decision-making styles reported using more intuition<br>Parents with experience making this decision reported less use of intuition than parents without experience |

**Note.** MAUT = multiattribute utility theory.

(HD-28177-R15), the National Science Foundation (Research in Undergraduate Institutions Grant 0111585), the Howard Hughes Foundation, and the Dean of the College Office, Carleton College. I thank Seth Greenberg, Reid Hastie, and an anonymous reviewer for comments on an earlier draft.

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(RECEIVED 3/15/06; REVISION ACCEPTED 8/10/06;
FINAL MATERIALS RECEIVED 8/15/06)