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From Intuition to Analysis
Making Decisions With Your Head, Your Heart, or by the Book

ELKE U. WEBER and PATRICIA G. LINDEMANN

Columbia University

INTRODUCTION

*T*he seemingly effortless, intuitive judgments and decisions made by experts—be they museum curators, stock traders, or chess grand masters—continue to fascinate both academia (e.g., Hogarth, 2001) and the popular imagination (Gladwell, 2005). In this chapter, we propose that expert intuition refers to processes to which the decision maker does not have conscious access either because previously conscious, analytic processes have become automated to a point in which conscious attention is no longer necessary (Goldberg, 2005) or as the result of cumulative, associative learning that has never been conscious (e.g., Plessner, Betsch, Schallies, & Schwieren, chap. 7, this volume). We also argue that nonexpert intuitive decision making is carried out in related ways.

Decision modes are the qualitatively different ways in which people make decisions. Hammond (1996) argued for a continuum of decision modes from analytic to intuitive decision strategies (see also Hamm, chap. 4, this volume). Others have provided a more detailed list of documented decision modes (Goldstein & Weber, 1995) and have proposed three classes of decision modes (Ames, Flynn, & Weber, 2004; Weber, Ames, & Blais, 2005). In this chapter, we argue that a subset of modes in the second and third categories qualify as intuitive decisions.

Although the use of different decision modes does not necessarily lead to different choices, it often does. To predict the outcome of a decision, it typically helps to know how the decision was made. People are aware of the importance of

decision processes. When explaining a decision, people often focus not only on the decision outcome but also on the way they came to their decision. People's opinion of those who helped them is not just determined by the nature and magnitude of the favor but also by how they believe the person who helped them decided to help them (Ames et al., 2004). Despite the apparent importance of decision modes, decision models put forth by economists and operations researchers have tended to address only the outcomes of decisions. Decision research in psychology has shown greater concern for decision processes, using dependent measures such as decision time and confidence judgments as well as process-tracing methodologies such as information acquisition sequences and verbal protocols.

In Payne, Bettman, and Johnson's (1993) adaptive decision maker program, process-tracing techniques document that people tactically employ a wide range of decision strategies in the context of multiattribute choice in which available options can be described on a number of attributes. Each decision strategy has a characteristic way to acquire attribute values and to evaluate, combine, and compare information. The adaptive decision maker framework allows for an assessment of each strategy in terms of effort (number of processing steps required) and accuracy (likelihood of selecting the best option) and shows that decision makers tend to unconsciously select certain strategies in situations where fast and efficient processing is required and others in situations that require greater accuracy.

The adaptive decision maker framework suggests an approach that can be used to think about decision-making strategies in a broader sense, with a wider set of qualitatively different decision modes and a broader set of criteria to evaluate the appropriateness of these modes.

A FUNCTIONAL TAXONOMY OF DECISION MODES

Our functional taxonomy of decision modes is designed to explain why people (explicitly or implicitly) select one or more decision modes. We focus on three modes of decision making: calculation-, affect-, and recognition-based decisions, captured in the chapter title in colloquial terms as decisions made by the head, by the heart, and by the book. Calculation-based decisions involve analytical thought. Affect-based decisions are governed by conscious or unconscious drives or feelings. Recognition-based decisions involve recognition of the situation as one of a type for which the decision maker knows the appropriate action.

As shown in Table 12.1, decision modes differ in their inputs and their cognitive and affective processes. Calculation-based modes include normative models of multiattribute or risky choice as well as their cognitively less demanding variants (e.g., prospect theory or noncompensatory multiattribute models). Their inputs are attribute values and importance weights for multiattribute choice and probabilities and utilities for risky decisions. Psychological processes include the evaluation of outcomes and probabilities and the calculation of overall utilities for each option. These calculation-based processes for making decisions with the head are typically thought of as analytical and driven by reasoning.

TABLE 12.1 Taxonomy of Decision Modes.

Mode	Sub type	Inputs	Processes	Motivational Focus
Calculation	Traditional cost-benefit models (e.g., multi-attribute choice, risky decisions, etc.)	Attributes probabilities	Stage 1: Evaluation of utility, importance weights, decision weights; Stage 2: Calculation/comparison of options	Maximization of material outcomes
	Anticipated emotions	Anticipated emotions	Stage 1: Evaluation of anticipated emotions; Stage 2: Calculation/comparison of options	Maximization of emotional outcomes
Recognition	Case-based	Holistic situation	Stage 1: Implicit categorization/pattern matching; Stage 2: Execution of if-then productions	Efficiency accuracy (for experts)
	Rule-based	Salient situational elements	Stage 1: Explicit categorization; Stage 2: Execution of if-then productions	"Doing the right thing," justifiability-fairness/justice/self-control
	Role-based	Situational elements relevant to social role	Stage 1: Recognition of role-related obligations and rights; Stage 2: Execution of role-related obligations and rights	Connectedness, Affiliation/social identity, self-confidence/self-esteem
Affect	Needs (drives)	Presence of physiological need	Physiological response: instinctive and learned; Learned approach or avoidance response (operant conditioning)	Fulfillment of physiological needs
	Wants	Presence of want	Positive or negative associations (classical conditioning); Learned approach or avoidance response (operant conditioning)	Fulfillment of wants autonomy, self-affirmation
	Immediate emotions	Aroused physiological (emotional) state	Aroused physiological (emotional) state, (operant conditioning)	Autonomy, self-affirmation

When people talk about making decisions with their heart, they describe two uses of emotion in decision making. Using the heart can mean placing value on emotional outcomes and incorporating those values in the decision-making process. Looking for an apartment, you might consider cost, location, amenities, and the way you anticipate feeling in the new apartment. Including emotional consequences can be seen as putting a human face on decision making. A politician who argues for paving a playground to create a much-needed parking lot might be thought of as arguing with his head rather than his heart in the sense of failing to value the happiness of children and their families. Including anticipated emotions into decisions is, however, not qualitatively different from calculation-based decision making; the anticipated emotion is simply an additional input to the calculation.

A qualitatively different type of emotion-based decision making directs behavior when the decision maker focuses on immediate affect (i.e., affective responses experienced at the time the decision is made) rather than anticipated emotions (Loewenstein, Weber, Hsee, & Welch, 2001). Positive emotions when considering a choice alternative (desire or happiness) lead to approach; negative emotions (revulsion or fear) lead to avoidance. The affect-based decision modes we describe are not based on calculation. They include goal-oriented choices associated with drives and basic needs like food, water, shelter, sleep, or safety in which operant conditioning processes provide for the learning of behavior that results in obtaining needed reward. Affect-based decisions also include behaviors associated with the wanting of things that the decision maker has associated with positive feelings as a result of classical conditioning. Affect-based decisions also include behavior that is derived from the immediate emotional content of a situation (Zeelenberg, Nelissen, & Pieters, chap. 11, this volume). A situation that evokes anger may result in aggressive behavior, whereas a situation causing sadness may result in hesitation or withdrawal (Lerner, Small, & Loewenstein, 2004). Affective modes have an intuitive feel. People often experience the attraction–avoidance reaction as "going with their gut" because the processing leading up to this reaction is conducted at an unconscious level.

The final decision-mode category is recognition-based choice. This is decision making by the book in the sense that the decision maker carries out a behavior prescribed by an implicit or explicit rule. The decision maker using this mode is not seeking a novel approach to a problem but is relying on tried-and-true answers. Recognition-based decisions come in different variants. In case-based decisions, the decision maker is typically an expert with a memory store of specific situations in the decision domain and their appropriate associated actions. These mental representations are if–then productions, where the "if" element is a set of conditions that must be met to trigger the action in the "then" part of the production. The expert decision maker is able to unconsciously apply these production rules that have been developed through repeated experience as demonstrated by Klein (1999) with experts such as fire fighters and jet pilots operating in time-pressured, high-stakes decision domains.

Another type of recognition-based decision is rule-based decisions in which the decision maker consciously or unconsciously invokes an explicit rule of behavior.

These rules may be laws (if you are driving and come to a red light, then you must stop) or other types of regulations (parental rules, societal norms, or company rules). A final type of recognition-based decision making is role-based decisions in which the decision context elicits a rule of conduct derived from the decision maker's social role (March, 1994). Roles include positions of responsibility within society (parent or friend), group memberships (Christian or Democrat), and self-defining characteristics (honest or responsible). Each of these roles has associated obligations that can be expressed in terms of if–then productions: As a parent, if your child is very ill, then you must stay home and care for the child.

CONSTRAINED OPTIMIZATION WITH BROADER GOALS AND CONSTRAINTS

The constrained optimization view of decision making depicts decision makers as seeking the alternative that optimizes their objective function under a given set of constraints. Traditional applications define people's goals in terms of the optimization of material consequences. Our framework expands the objective function to include other types of goals. We also broaden the list of constraints that influence decision strategy selection to include factors beyond the cognitive constraints typically considered.

Although the rational-economic view of human nature assumes that people attend only to the material consequences of their choices, personality and motivation research confirms the existence of additional social motives. These include the needs for affiliation and autonomy (Hilgard, 1987; Murray, 1938), for confidence and self-esteem (Larrick, 1993), and for process-related elements such as fairness and justice (Mellers & Baron, 1993), and the justifiability of decisions (Tetlock, 1992). Philosophers also provide multifaceted views of human motivation. Habermas's (1972) taxonomy suggests three complementary types of motives: technical concern with instrumental action, practical concern with social consensus and understanding, and emancipatory concern with self-critical reflection and autonomy. We argue that when making decisions, people not only consider material outcomes but also choose a mode of making their decision that best enables them to meet additional nonmaterial goals.

The specific goals activated in a particular situation will likely vary as a function of the decision maker (personality, culture) and the content (domain) of the decision. Given the evidence for a wide range of human motives and goals as well as evidence that people use a wide range of decision modes, we propose that different decision modes coexist because they are more or less effective ways to achieve different goals. In Table 12.1, we indicate one or more motivational foci for each mode. We believe that each mode is better suited than others to address the listed motive(s). In the following, we first describe the functional significance of each decision mode and then present empirical data in support of our hypotheses.

MOTIVATIONAL FOCI OF DECISION MODES

Although calculation-based modes are best suited to addressing the traditional motive of maximizing material consequences, other modes are better suited to other goals. People wanting to justify their decisions to a supervisor would be well-served by making their decision in a rule-based fashion (e.g., following standard operating procedure) if the appropriateness of the rule is widely acknowledged. Role-based decisions, on the other hand, serve to satisfy the motive of connectedness because they activate representations of the decision maker's place in society and thus generate feelings of affiliation. Depending on the individual's personality and culture, enhancement of role identity may also increase the individual's self-confidence and self-esteem (Markus & Kitayama, 1991). The need for autonomy, counterpart to the need for affiliation and connectedness, is best met by using an affect-based decision mode. Affect-based decision making affirms that one's personal desire for an action suffices without any need to justify the decision to oneself or others.

Rule- and role-based decision making may also function as mechanisms for assuring fairness. Whereas calculation-based processing may lead the individual to act with self-interest, roles place the individual in a social context that dictates responsibilities to which individuals must adhere. For many social roles—such as friend, coworker, or community leader—the responsibilities may include placing fairness and equity over self-interest. Rules, like the categorical imperative, can promote fairness because they dictate appropriate behavior in an impartial manner.

BROADENING OF CONSTRAINTS

Simon (1956) and collaborators pioneered the addition of psychological constraints to substantive constraints, in particular, constraints provided by cognitive information-processing limitation (i.e., bounded rationality). Calculation-based decision rules that require less comprehensive and effortful processing are adaptations to information-processing constraints. More recent work has shown that emotional resource limitations further constrain optimization, preventing the operation of otherwise rational hedonic editing (Linville & Fischer, 1991). Work on mental accounting (Thaler, 1985) and precommitment strategies (Ainslie, 1975) shows that people are, at least implicitly, aware of their cognitive as well as affective shortcomings (e.g., self-control problems). Emotional constraints may restrict the selection of decision modes to those that can be reasonably implemented when self-control is an issue as, for example, the use of rules that facilitate self-control when you want to stick to your diet.

In the following, we report four studies designed to test our functional hypotheses of decision-mode usage. In two studies, we examined self-reported decision modes for scenarios that differed in situational constraints (e.g., importance and familiarity) and motives. In two additional studies, we examined dependent measures (using an explicit and implicit memory task) that can provide more circumstantial but also more objective evidence of decision-mode usage.

STUDY 1

A total of 33 Columbia University students in a decision-making class read 12 brief decision scenarios related to three content areas (relationship, school, and ethical). For example, one scenario read, "Jane has a 9 a.m. class. She woke up late and is trying to decide whether to rush over and get to class or skip it." This scenario was followed by the statement, "If I were Jane, I would:" and three possible options (mode names were not shown):

1. (Affect): Base my decision on my immediate feelings. I'd go if I feel like going and not go if I don't feel like going.
2. (Calculation): Consider how important this class will be, how likely the material is to be on the exam, how likely I am to fall asleep in class, and/or any other factors that are relevant to the decision. Then I would assess which option is better.
3. (Recognition): Recognize that it is my responsibility as a student to go to class, and so I would go.

Respondents rated their likelihood of using each strategy by distributing 6 points across the three options. Any distribution of the 6 points was allowed so long as all 6 points were used.

Finally, participants used a Likert-scale to rate each scenario on three situational characteristics (familiarity, importance, and degree of conflict experienced by the decision maker) and on two motivational characteristics—need to justify the decision to yourself and the need to justify the decision to others.

Previous studies have found that decision content influences strategy selection for reasons that include domain-related variations in information presentation (Goldstein & Weber, 1995), mental representation (Rettinger & Hastie, 2003), and social norms (Ames et al., 2004).

Based on prior research, we expected school decisions to induce calculation-based decision making because these decisions involve material consequences in terms of grades (in the short term) and career (in the long term). Relationship decisions contain an emotional element that was expected to disproportionately elicit affect-based decision making. For the ethical decisions, prior work provided less guidance. Using our taxonomy of decision-mode selection, we reasoned that ethical questions often have deontological solutions related to social roles (religious or other social identities). Consequently, we hypothesized that ethical decisions would activate strong usage of role-based decision making.

As shown in Figure 12.1, the pattern of mode-use across the three content domains confirmed our expectations. Calculation-based processing was most frequent for the school domain, whereas affect-based processing was most frequent for the relationship domain and role-based decisions most frequent for the ethics domain.

In regression analyses, we examined which situational and motivational factors (assessed independently for each decision scenario) determined use of each of the three decision modes and whether decision domain predicted decision mode usage above and beyond these situational and motivational factors. We coded domain
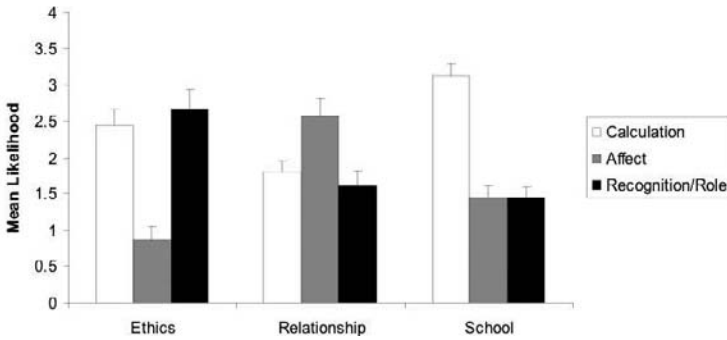
FIGURE 12.1   Likelihood of making calculation-, affect-, and recognition/role-based decisions in ethical, relationship, and school-related decisions in Study 1.

by two contrasts (relationship and ethics), with school decisions as the reference category.

Table 12.2 shows that use of the calculation-based mode is strongly influenced by situational variables: Importance and decision difficulty (i.e., degree of conflict experienced by the decision maker) increases its likelihood, whereas familiarity with the decision situation decreases it. Important decisions may focus the decision maker on their material outcomes and consequences, thereby creating a motivational state well served by calculation-based decision making. Difficult decisions may be difficult, in part, because the more intuitive (and easier) recognition and affective modes of decision making do not arrive at a satisfactory conclusion, thus necessitating more

TABLE 12.2   Regression Analysis: Likelihood of Mode Use in Study

Predictor	Calculation		Affect		Recognition/Role	
	Beta	**Sig.**	**Beta**	**Sig.**	**Beta**	**Sig.**
Situational Factors						
Importance	0.13	0.04 *	−0.08	0.21	−0.06	0.36
Degree of Conflict	0.13	0.03 *	−0.01	0.90	−0.13	0.03 *
Familiarity	−0.15	0.01 *	0.00	0.97	0.16	0.01 *
Motivational Factors						
Self-Justify	−0.09	0.21	−0.04	0.55	0.13	0.06
Other-Justify	−0.08	0.23	−0.09	0.13	0.16	0.01 *
Domain						
Relationship	−0.34	0.00 *	0.28	0.00 *	0.07	0.25
Ethical	−0.23	0.00 *	−0.08	0.17	0.30	0.00 *

Notes: Three separate regressions were conducted (for calculation-, affect-, and recognition/role-based modes) on situational factors, motivational factors and domain. Shown are regression coefficients (beta) and their significance level. Asterisks mark coefficients that are significantly different from zero at the .05 level.

effortful calculation-based processing. Familiar decisions, on the other hand, can be handled by the less effortful and seemingly intuitive recognition-based mode.

For the recognition-based mode, both situational and motivational factors come into play. As predicted, familiarity was a significant positive predictor, as it invokes if–then rules that typically develop over time with experience in a decision situation. As predicted in Table 12.1, recognition-based decision making was positively related to self-justification and especially, other-decision justification.

None of the situational and motivational factors influenced use of the affect mode, which was however more frequently found for relationship decisions as already illustrated in Figure 12.1. Above and beyond the influence of situational and motivational factors that differed across domains, the calculation-based mode was still more frequent for school decisions and recognition/role-based mode more frequent for ethical decisions.

Although Study 1 was exploratory research, it was also used as a teaching exercise, and the decision-mode structure was simplified for this reason by restricting the recognition mode to role-based decision making, the calculation mode to standard cost–benefit analysis, and eliminating the anticipated-affect mode. In Study 2, we used a broader range of decision modes and also allowed respondents to rate their likelihood of using each mode independently, making it possible to express strong preferences for multiple modes.

STUDY 2

A total of 57 Columbia undergraduate students were recruited by campus fliers and paid for their participation. First, respondents read descriptions of five decision modes: cost–benefit and anticipated affect (calculation-based modes), rule and role (recognition-based modes), and the affect-based mode. Then, participants used a Likert scale to rate their likelihood of using each decision mode in 12 different decision scenarios, answering questions such as "How likely would you be to make this decision based on your *immediate feelings* or *gut reaction* to the situation?" We told participants that they could endorse multiple modes (or no mode) for each scenario. As a separate dependent measure, they also indicated which single mode they would use if they had to choose only one mode. Finally, respondents rated each decision scenario on three situational factors (importance, familiarity, and emotionality) and two motivational factors (need to self-justify and need to justify to others).

A new group of scenarios was used for this study, which represented five content domains: consumer, work/school, relationship, ethical, and routine/everyday decisions. Many of the scenarios drew from two or more content domains. These mixed content scenarios were meant to emulate real-life decisions in which modes may be in conflict as when a student must choose between hanging out with friends (relationship domain, likely to result in affect-based processing) and studying for exams (work/school domain, likely to result in calculation-based processing).

Respondents also completed a questionnaire developed by Kruglanski et al. (2000) that evaluates self-regulatory motivation on two orthogonal dimensions: locomotion and assessment. People high in locomotion are motivated to approach
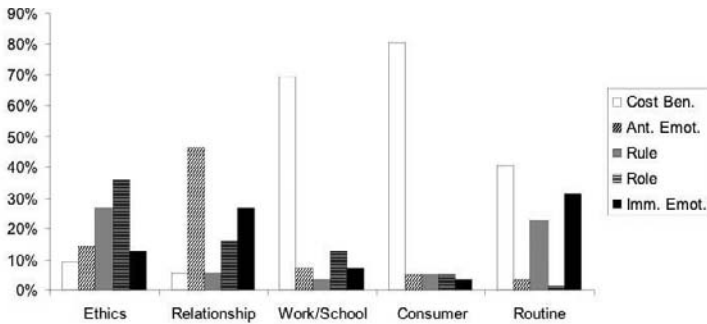
FIGURE 12.2   Percentage of participants selecting indicated decision mode for single content domain scenarios in Study 2. Ben. = benefit; Ant. Emot. = anticipated emotion; Imm. Emot. = immediate emotion.

problems quickly and efficiently to move on. People high in assessment are interested in careful evaluation to select the optimal alternative. Field data suggested that personality differences on these measures may be related to differences in preferred decision modes, making people more or less comfortable with quick intuitive versus effortful analytic decision modes (Hansen, Marx, & Weber, 2004).

Results for the first dependent measure, the mode respondents would select if they could choose only one mode, are shown in Figure 12.2 for the scenarios that relate to only one content domain. None of the ethics questions fell purely within the ethics domain, and so data from the question that most strongly emphasized the ethics domain is presented. As in Study 1, recognition-based (role- and rule-based) processing is dominant in the ethics domain. In the relationship domain, affective processing continues to be critical, although it is now divided between anticipated affect and immediate affect. For the work/school domain, standard cost–benefit approaches are dominant. Consumer decisions show the strongest pattern of preference for the cost–benefit decision mode, whereas routine decisions are made by relying on three different strategies—cost-benefit calculation, rule, and immediate affect. Immediate affect may be evoked by these routine decisions (e.g., which toothpaste to buy, which route to take to class) because they are of low importance and may provide the opportunity to "give in" to whims in a way that is not acceptable for less routine matters.

For scenarios involving multiple domains, we hypothesized that different aspects of the scenario would invoke different modes, leading to the use of more decision modes than single-domain scenarios. We coded mode ratings of 4 or higher (above midpoint) as indicating mode use, and we counted the number of modes used for a given scenario. A paired t test comparing the number of modes used for single-domain versus multiple-domain scenarios confirmed our hypothesis. For single-domain decisions, respondents indicated using on average 2.56 modes; but for multiple-domain decisions, they used on average 3.12 modes, $t(56) = 6.01$, $p \ll .01$.

Regression analyses of the second dependent measure—namely, the likelihood-of-use ratings for each mode—are presented in Table 12.3. Situational factors, the

TABLE 12.3   Regression Analysis: Likelihood of Mode (or Sub-Mode) Use in Study 2

| | Calculation | | | | Recognition | | | | Affect | |
| | Cost Benefit | | Anticipated Emotion | | Rule | | Rule | | Immediate Emotions | |
Predictor	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.	Beta	Sig.
Situational Factors										
Importance	0.30	0.00 *	–0.05	0.30	0.07	0.24	0.11	0.05 *	–0.43	0.00 *
Emotionality	–0.05	0.27	0.07	0.07	–0.01	0.76	0.04	0.29	0.15	0.00 *
Familiarity	–0.28	0.00 *	0.44	0.00 *	–0.01	0.87	0.16	0.01 *	0.48	0.00 *
Motivational Factors										
Self-Justify	0.15	0.01 *	0.01	0.91	–0.08	0.19	0.00	0.95	0.08	0.16
Other-Justify	0.05	0.30	–0.04	0.47	0.28	0.00 *	0.21	0.00 *	–0.09	0.07
Assessment	0.09	0.03 *	0.06	0.11	–0.10	0.02 *	0.05	0.23	0.00	0.96
Locomotion	-0.01	0.83	–0.01	0.76	0.13	0.00 *	–0.08	0.03 *	–0.05	0.20
Domain										
Relationship	–0.14	0.01 *	–0.01	0.87	–0.08	0.20	0.00	0.95	0.01	0.85
Work/School	0.05	0.41	–0.05	0.40	0.06	0.33	0.23	0.00 *	–0.07	0.25
Ethics	–0.26	0.00 *	–0.04	0.54	0.04	0.59	0.16	0.02 *	0.02	0.75
Routine	0.07	0.16	–0.25	0.00 *	0.13	0.02 *	0.02	0.66	–0.12	0.01 *
Consumer	0.10	0.04 *	–0.07	0.14	–0.02	0.71	0.02	0.63	–0.09	0.08

Notes: Separate regressions were conducted for each mode or sub-type—calculation (cost-benefit and anticipated emotions), recognition (rule and role), and affect (immediate emotions). Likelihood of using each mode was regressed on situational factors, motivational factors, and decision domain. Shown are regression coefficients (beta) and their significance level. Asterisks mark coefficients that are significantly different from zero at the .05 level.

first set of predictors, included the newly added variable emotionality as well as decision importance and familiarity. Almost as a manipulation check, degree of emotionality predicts use of the two affective modes and reduces use of the cost–benefit mode, which confirmed the notion that matters of the heart are typically not ruled by reason. More emotionality was also associated with an increase in role-based decision making, which suggested that the need for affiliation hypothesized to trigger role-based decision making had an affective component. Decision importance again increased use of the calculation-based mode but also of the role-based mode, which suggested that nonmaterial needs can rank high in importance. Decision importance decreased use of the immediate-affect mode. Contrary to prediction and Study 1, familiarity did not lead to a significant increase in recognition-based processing but instead increased use of both the immediate- and anticipated-affect modes, which suggested that a broad set of decision scenarios from different domains ought to be used to obtain stable results.

Motivational factors were the second set of predictors. The need for other justification increased use of the rule- and role-based modes. Although our taxonomy emphasizes rule-based decision making as useful for justifying decisions to others, role-based decision making seems to serve the same purpose. Interestingly, self-justification needs predicted increased use of cost–benefit processing. The newly added personality traits of assessment focus and locomotion focus affected decision-mode use as predicted. Individuals higher in assessment were more likely to use cost–benefit analysis and less likely to use recognition-based decision making. Locomotion-oriented individuals were more likely to use recognition-based decision making.

The final set of predictors were dummy-coded variables indicating content domain of the decision: relationship, work/school, ethics, routine, or consumer decisions. Included in the regression, these variables showed whether decision domain predicts mode use above and beyond the effects of situational and motivational factors that vary between domains. Consistent with Study 1, we found such effects. The cost–benefit mode was more likely for consumer decisions and less likely for relationship and ethics decisions. Rule-based decision making was more likely for routine decisions with ample opportunity to develop a rule. The role-based mode was more frequent for work/school decisions (in which respondents could be expected to identify closely with the student role) and ethics decisions (for reasons we outlined earlier).

Studies 1 and 2 clearly indicate that decision-mode usage is related to situational and motivational factors; however, even when we take these factors into consideration, content domain still exerts a strong effect. Social norms for handling different types of decisions are in part responsible for this (Ames et al., 2004). Thus, people believe that large consumer purchases should be made with the head and that social decisions should be made with the heart or by social roles. It appears to be inappropriate to calculate material costs and benefits in social situations, although calculating emotional costs and benefits to oneself and to others is perfectly acceptable.

In the next two studies, we attempted to provide nonsubjective evidence of decision-mode use given that self-reports of cognitive processes are often unreliable (Ericsson & Simon, 1980). Reliance on introspection alone as a source of evidence is questionable. Thus, we sought an alternative and more objective method of diagnosing mode usage in the form of explicit or implicit memory tests. Using the cloud-chamber metaphor of particle physics in which elementary particles cannot be directly observed, but their presence can be inferred from the trail they leave behind in cloud chambers, we designed Study 3 to test whether use of a particular decision mode would detectably change the representation and subsequent memory of a decision. To do this, we asked participants to use specific decision modes to make substantive decisions—modes that were sometimes incompatible with the content domain of the decision. We then used memory measures to assess memory representations. Our unanticipated results indicate that participants resisted using assigned decision modes that were incompatible with decision content, which highlighted the importance of social norms for decision-mode use.

STUDY 3

We randomly assigned 39 Columbia students (paid for their participation) to one of three decision modes (calculation-, role-, or affect-based decision making) and told them to role-play a person who makes their decisions in the assigned mode (which was described to participants). Participants read three richly detailed decision problems that included multiple details relevant for each of the three decision modes: information about outcomes, social obligations, and experienced emotions. We hypothesized that participants assigned to use of a specific mode would focus on mode-relevant information, leaving it more accessible than other information, with manifestations in a subsequent recall task. Because the memory task was a surprise, each respondent only made one of the three decisions.

The scenarios came from different domains: a career decision in which a graduating student was deciding whether to pursue music or medicine, an ethical decision in which a woman was deciding whether it was right to place her mother in a nursing home, and a consumer decision in which a middle-aged father was deciding between a practical minivan and an exciting sports car. In hindsight, it should have been clear to us that social norms suggest different modes as most appropriate for the three decisions: calculation-based decision making for the career and consumer scenario and role-based decision making for the ethical scenario.

After making their decision in their assigned mode, respondents were asked to write a letter telling a friend about the decision (the memory task). These letters were coded for predominantly calculation-, role-, or affect-based informational details by two independent coders who were blind to the experimental conditions and hypotheses and had high interrater agreement (92%). Contrary to our initial hypothesis, there was no association between assigned mode and the mode judged to predominate in the subsequent tell-a-friend account, $\chi^2(4, N=39)=4.89, p \gg .10$. However, as shown in Table 12.4, tell-a-friend accounts differed significantly by scenario in the direction expected by social norms about domain-specific mode usage, $\chi^2(4, N = 39) = 11.26, p \ll .05$; the calculation-based mode was modal for the career and consumer scenarios, and the role-based mode was modal for the ethical scenario.

Implicit decision-mode selection based on overlearned social norms seems to have overridden explicit task instructions about mode usage in those cases in which

TABLE 12.4   Predominant Mode Used in Tell-a-Friend Responses in Study 3

Predominant Mode in Tell-a-Friend	Career Scenario	Ethical Scenario	Consumer Scenario	Total
Calculation	10	4	8	22
Role	4	7	0	11
Affect	1	1	4	6
Total	15	12	12	39

Notes: Number of responses falling within each mode category (calculation-, role-, and affect-based) for each scenario is indicated.

we tried to induce participants to adopt domain-incompatible modes. In Study 4, we provided an additional test of the hypothesis that use of a specific decision mode leaves behind a memory trail.

STUDY 4

We selected respondents from among the participants in Study 1. We used their responses to that study to determine their chronic disposition to operate in an affect-based or a calculation-based mode (i.e., we tallied the number of points each respondent allocated to each of the two modes across the 12 scenarios). We placed the top analytic responders ($n = 4$) in the calculation-based group, and we placed the top affective responders ($n = 5$) in the affect-based group. We told participants of their classification and instructed them to make the ensuing decision in their naturally preferred and assigned mode (either calculation or affect).

We presented a decision scenario as an audio recording of a dialogue interspersed with narration. Participants listened to the audio recording while viewing slides of the decision maker, the decision maker's conversational partners, and other relevant elements of the story. We used this audiovisual presentation to bring the situation to life. The decision situation was an expanded version of the career decision from Study 3 in which the relationship and emotional elements of the story were heightened so that both the affect-based mode and the calculation-based mode might be considered legitimate. The male student in the story was torn between the more practical career choice of attending medical school, the option his parents wished him to pursue, and the less practical path of taking a small part in a traveling theatre production to pursue his dream of becoming an actor. The dialogue reflected a strong heart versus head conflict, with the student's feelings pulling him toward acting and analysis suggesting that medicine was the right path.

Respondents viewed this information with the instructions to make the decision in their naturally preferred and assigned mode (either calculation or affect) and had to subsequently justify it in writing. They then completed an implicit memory task in an unrelated-task paradigm, which we designed to assess differential activation of respondents' semantic memory as the result of differences in their assigned/preferred decision mode. Respondents saw a list of 40 word prompts (equated for word frequency in the English language), each followed by a blank, and we asked them to write down the first word that came to mind after reading each prompt. Some prompts were known to trigger more calculation-based associations ("cost," "buying," "demand"), others more affect-based associations ("pleasure," "loss," "wish"), whereas others were expected to do neither ("become," "carpet"). The cloud-chamber metaphor suggests that the process of making a decision in a calculation-based mode should leave concepts and constructs associated with this mode more accessible, thus increasing the likelihood of making calculation or cost–benefit related associations, especially to those prompts designed to trigger calculation-based associations. In contrast, we expected to see a larger number of affective associates in those respondents who had been asked to make the decision using an affect-based mode.

Two raters naïve to the experimental hypotheses and conditions coded the content of the free associations produced by the 9 respondents as related to cost–benefit calculation, affect, or neither. The two raters agreed 97% of the time and resolved their small number of disagreements by discussion. The results suggest that the prescribed decision mode did indeed activate mode-consistent constructs in memory, $\chi^2(1, N = 111) = 12.31$, $p \ll .001$. Of the 49 affect-related associates (e.g., "love," "happy," "feel," "grief," "hurt"), 71% were generated by respondents who had been asked to make the decision in the affect-based mode. Of the 62 cost–benefit-related associates ("supply," "money," "cost," "probability"), 65% were generated by respondents who had been asked to make the decision in the calculation-based mode.

This result suggests that evidence of mode-specific processing can be obtained that is more objective than self-reports (e.g., implicit memory tests such as the one just described or possibly functional MRI measures of differential brain activation in regions known to be associated with different modes of processing). Unlike self-reports, such measures do not depend on introspection and will allow us to further validate our hypotheses about the functions of different decision modes summarized in Table 12.1.

CONCLUSIONS

The first two studies we described in this chapter suggest that people are well aware of possessing a repertoire of decision modes ranging from quick intuitive responses based on either affective reactions or overlearned associations at one end of the continuum to the more or less automatic application of rules of conduct or social obligations and to the effortful calculation of relative costs and benefits at the other end of the continuum. Reported decision-mode use followed clear and consistent patterns that were guided by both abstract decision characteristics (importance and familiarity) and the domain of the decision. Reported differences in mode use and social norms about domain-appropriate mode use reported elsewhere (Ames et al., 2004) were consistent with the hypothesized differences in motivational foci of the decision modes. Different human motives are activated to different degrees in different content domains. Maximization of material outcomes is a much greater priority in consumer or financial decisions than in social decisions. To the extent that calculation-based decision making is best suited to satisfy this objective, we should expect to find more calculation-based decisions in these domains.

Personality differences or cultural differences on variables known to increase the chronic salience of different motivations have also been shown to be associated with differences in the use of decision modes that are better equipped to satisfy those motivations. Thus, respondents with a greater chronic need for locomotion (making a decision quickly) were more likely to use quicker intuitive decision modes, whereas respondents with a greater need for assessment (making careful and optimal decisions) were more likely to use effortful analytic decision modes. Weber et al. (2005) showed that decision makers in a collectivist culture (China) with its emphasis on affiliation were more likely to make role-based decisions,

whereas decision makers in an individualist culture (United States) with its emphasis on autonomy were more likely to make affect based decisions.

Situational characteristics and the needs and motives of the decision maker thus combine to determine the implicit choice of one or more modes by which a decision gets made (see also C. Betsch, chap. 14, this volume). Future research will determine the relationship between the use of multiple decisions modes with common or conflicting conclusions and people's confidence in their decision. The last two studies we reported in this chapter point the way to more objective diagnostics of decision-mode use that can be enlisted to provide additional support for the proposed functional framework of decision-mode selection.

Our results show that intuitive decisions that are reached without any conscious deliberation (based on immediate affect or an automatically triggered if–then rule) can be expected to occur in certain types of situations (in social decisions more likely than career decisions) and for certain types of decision makers (for people who have a lot of familiarity with the decision in question, i.e., domain experts, and for decision makers oriented toward locomotion and with low needs for assessment). In other situations, one can expect to see greater evidence of more effortful analytic modes of decision making.

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REFERENCES

Ainslie, G. (1975). Specious reward: A behavioral theory of impulsiveness and impulse control. *Psychological Bulletin, 82,* 463–496.

Ames, D. R., Flynn, F. J., & Weber, E. U. (2004). It's the thought that counts: On perceiving how helpers decide to lend a hand. *Personality and Social Psychology Bulletin, 30,* 461–474.

Ericsson, K. A., & Simon, S. (1980). Verbal reports as data. *Psychological Review, 87,* 215–251.

Gladwell, M. (2005). *Blink: The power of thinking without thinking.* New York: Little, Brown.

Goldberg, E. (2005). *The wisdom paradox: How your mind can grow stronger as your brain grows older.* New York: Gotham Books.

Goldstein, W. M., & Weber, E. U. (1995). Content and its discontents: The use of knowledge in decision making. In J. R. Busemeyer, R. Hastie, & D. L. Medin (Eds.), *Decision making from a cognitive perspective: The psychology of learning and motivation* (Vol. 32, pp. 83–136). New York: Academic.

Habermas, J. (1972). *Knowledge and human interests* (J. Shapiro, Trans.). London: Heinemann.

Hammond, K. R. (1996). *Human judgment and social policy.* New York: Oxford University Press.

Hansen, J., Marx, S., & Weber, E. U. (2004). *The role of climate perceptions, expectations, and forecasts in farmer decision making: The Argentine Pampas and South Florida* (Tech. Rep. No. 04–01). Palisades, NY: International Research Institute for Climate Prediction.

Hilgard, E. R. (1987). *Psychology in America: A historical survey.* New York: Harcourt Brace Jovanovich.

Hogarth, R. M. (2001). *Educating intuition.* Chicago: University of Chicago Press.

Klein, G. (1999). *Sources of power: How people make decisions.* Cambridge, MA: MIT Press.

Kruglanski, A. W., Thompson, E. P., Higgins, E. T., Stash, M. N., Pierro, A., Shah, J., et al. (2000). To "do the right thing" or to "just do it": Locomotion and assessment as distinct self-regulatory imperatives. *Journal of Personality and Social Psychology, 79,* 793–815.

Larrick, R. P. (1993). Motivational factors in decision theories: The role of self-protection. *Psychological Bulletin, 113,* 440–450.

Lerner, J. S., Small, D. A., & Loewenstein, G. (2004). Heart strings and purse strings: Effects of specific emotions on economic transactions. *Psychological Science, 15,* 337–341.

Linville, P. W., & Fischer, G. W. (1991). Preferences for separating and combining events: A social application of prospect theory and the mental accounting model. *Journal of Personality and Social Psychology, 60,* 5–23.

Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, E. (2001). Risk as feelings. *Psychological Bulletin, 127,* 267–286.

March, J. G. (1994). *A primer of decision making: How decisions happen.* New York: The Free Press.

Markus, H. R., & Kitayama, S. (1991). Culture and self: Implications for cognition, emotion and motivation. *Psychological Review, 98,* 224–253.

Mellers, B. A., & Baron, J. (Eds.). (1993). *Psychological perspectives on justice: Theory and applications.* New York: Cambridge University Press.

Murray, H. A. (1938). *Explorations in personality.* New York: Oxford University Press.

Payne, J. W., Bettman, J. R., & Johnson, E. J. (1993). *The adaptive decision maker.* Cambridge, England: Cambridge University Press.

Rettinger, D. A., & Hastie, R. (2003). Comprehension and decision making. In S. L. Schneider & J. Shanteau (Eds.), *Emerging perspectives on judgment and decision research* (pp. 165–200). New York: Cambridge University Press.

Simon, H. A. (1956). Rational choice and the structure of the environment. *Psychological Review, 63,* 129–138.

Tetlock, P. E. (1992). The impact of accountability on judgment and choice: Toward a social contingency model. *Advances in Experimental Social Psychology, 25,* 331–376.

Thaler, R. H. (1985). Mental accounting and consumer choice. *Marketing Science, 4,* 199–214.

Weber, E. U., Ames, D., & Blais, A.-R. (2005). How do I choose thee? Let me count the ways: A textual analysis of similarities and differences in modes of decision making in China and the United States. *Management and Organization Review, 1,* 87–118.