Discussion of
Behavioral Decision Theory: Processes of
Judgment and Choice

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Q: What are you doing?
A: I am working hard.
Q: What should you be doing?
A: Doing the best I can.
Q: Why aren't you doing that?
A: But, I am! I am working hard doing the best I can.

Our purpose here is to comment on some of the implications of the Einhorn and Hogarth (EH) synthesis for accounting research. We limit our comments to three issues raised in their synthesis. The first is the general issue of the “reasonableness” of normative models of decision making. Is it reasonable to ask the question “what should you be doing?” The second is the issue of the “reasonableness” of expected utility theory as a descriptive model of choice. Is it reasonable to use this model to characterize “working hard?” The third is the issue of how individuals tend to frame and make decisions. Did the way we asked the question affect the answer? We conclude with some speculations about possible implications for accounting research.

The Reasonableness of Normative Models

The typical distinction between descriptive and normative models is reflected in the above sequence of questions and answers. “What are you doing” reflects a descriptive orientation, an attempt to predict what actions will be reflected in “working hard.” “What should you be doing”
reflects a normative orientation, an attempt to characterize or specify what actions should be reflected in “doing the best I can.” EH question the reasonableness of normative models. Such models offer conditional prescription, with judgment being a nontrivial source of the conditioning specification. Thus, when we observe an inconsistency between prescribed and actual behavior, it is unclear that the latter should be labeled in error or irrational. This leaves us, they argue, “... on the horns of a dilemma. Given the complexity of the environment, it is uncertain whether human responses or optimal models are more appropriate ... . Optimal models have been suggested to overcome intuitive shortcomings. However, in the final analysis the outputs of optimal models are evaluated by judgment.”

We completely concur in the observation that optimal or normative models are conditioned by the exercise of judgment. At the same time, however, we do not see a very sharp distinction between the normative and the descriptive. The two are probably better viewed as complementary approaches to the study and practice of choice. To be somewhat pedantic, axiom discovery and testing is an important task in the descriptive world just as documentation of, say, risk aversion is in the normative world. March [1978, p. 588] is particularly eloquent on this point:

... behavioral and normative theories have developed as a dialectic rather than as separate domains. Most modern behavioral theories of choice take as their starting point some simple ideas about rational human behavior. As a result, new developments in normative theories of choice have quickly affected behavioral theories ... . It is equally obvious that prescriptive theories of choice have been affected by efforts to understand actual choice behavior.

Two recent accounting papers illustrate this dialectic.¹ Moreover, current approaches to the search for improved choice behavior exploit normative models. We encourage and teach the systematic analysis of choice based on a normative model.² Specialists at such exercises exist and survive in the consulting market. Decision aids have become an important academic and commercial subindustry. Nevertheless, as March [1978, p. 587] observes, the engineering of rational choice raises “... the possibility that processes of rationality might combine with properties of human beings to produce decisions that are less sensible than the systematized actions of an intelligent person, or at least that the way in which we might use rational procedures intelligently is not self-evident.” However, not to be labeled a heretic, he concludes [1978, p. 588]:

¹ Hilton [1980] provides an integration of the normative information economics model with various descriptive models of human information processing. In particular, he enriches the information economics model to include such concepts as expenditures of information-processing effort, information load, and utilization—important attributes in various descriptive human information-processing models. Feltham [1978] compares expectancy theory, a descriptive theory of worker behavior, with the expected utility model and demonstrates how the former can be interpreted as a special case of the latter.

² See Schlaifer [1969], Holloway [1979], or any recent CMA or CPA examination.
I do not share the view . . . that microeconomics, decision science, management science, operations analysis, and the other forms of rational decision engineering are mostly manufacturers of massive mischief when they are put into practice. It seems to me likely that these modern technologies of reason have, on balance, done more good than harm, and that students of organizations, politics, and history have been overly gleeful in their compilation of disasters. But I think there is good sense in asking how the practical implementation of theories of choice combines with the ways people behave when they make decisions, and whether our ideas about the engineering of choice might be improved by greater attention to our descriptions of choice behavior.

Are normative models reasonable? How do we (or should we) interpret a discrepancy between prescribed and observed choice? In our opinion, it is the dialectic that is important at this stage. Unaided human response is hardly to be trusted in all choice situations, just as the most elegant normative model possible is not to be trusted in all such situations. Normative models are human creations which reflect the human cognitive capabilities that also drive and limit human response.

The Reasonableness of the Expected Utility Model

EH also question the reasonableness of the expected utility model as a descriptive theory of “working hard.” They refer to it as a “confronting, compensatory” model and describe it in the following terms:

(a) the rule says that the evaluation of a gamble is a weighted average of future pleasures and pains, where the weights are the probabilities of attaining these outcomes;  
(b) the evaluation is solely a function of utility and probability, there being no utility or disutility for gambling per se;  
(c) the rule assumes that payoffs are independent of probabilities; i.e., wishful thinking (optimism) or pessimism are not admissible;  
(d) there is no inconsistency or error in executing the rule . . . Moreover, choice is assumed to follow evaluation by picking the alternative with the highest E(U).

However, it is important to remember that this model is a numerical representation of a well-chosen and regularized relational system. Though numerous representation theorems are available, we will briefly recall the most simple von Neumann and Morgenstern [1947] setting. We envision a finite set of generic prizes $X = \{x_1, x_2, \cdots, x_m\}$ and the set of all probability measures thereon:

$$P = \left\{ (p_1, p_2, \cdots, p_m) \in \mathbb{R}^m : \sum_{i=1}^m p_i = 1 \quad \text{and} \quad p_i \geq 0 \ \forall \ i = 1, \cdots, m \right\}.$$ 

Next, we envision a binary relation $\succeq$ on $P$—where we interpret $p \succeq \tilde{p}$ as denoting that the gamble $p$ is weakly preferred to the gamble $\tilde{p}$. Now, an expected utility representation here would consist of a (utility) function:

$$U : X \to \mathbb{R} \quad \text{such that} \quad p \succeq \tilde{p} \iff \sum_{i=1}^m u(x_i) p_i \geq \sum_{i=1}^m u(x_i) \tilde{p}_i.$$ 

Finally, such a representation exists if and only if $\succeq$ on $P$ satisfies weak order, substitution, and Archimedean axioms. In other words, to say the representation exists is to say the three axioms are satisfied. (The axioms are also independent.)
Thus, if (and only if) choice behavior from $P$ satisfies the axioms, we say that the individual behaves as if he or she is maximizing expected utility. We often casually think of the model as an evaluation process and even coach our students in its use. In a generic sense, however, the model is a particular numerical representation of a well-defined relational system.

As EH observe, the descriptive validity of the expected utility model has been repeatedly challenged. However, it is important to recall the delicacy of the expected utility representation. One issue here is the identification of the prize space $X$ and the probability measures thereon. Experimental results leave open the question of what prize space and probabilities were actually employed by the subjects (versus the investigator). This observation arose in the first experimental work on expected utility theory (Mosteller and Nogee [1951]) and continues throughout its history. In turn, this is a major reason that the emphasis placed on the process of “framing” decisions by EH is so important.

A second and equally important issue in interpreting these results is one of “small worlds.” Choices, actual or hypothetical, arise in a sequence of past and prospective circumstances. We necessarily exist in a “big world” but experience this with a sequence of “small worlds.” Here, it is important to recognize that if our choice behavior could be represented by the expected utility model in the “big world,” it would not be so (except under highly restrictive circumstances) in any of the “small worlds.”

Moreover, changing tastes and sophisticated choice issues also arise in this sequence of past and prospective circumstances. We may consciously constrain or seek flexibility in future choices, as discussed by EH. For example, a desire for flexibility can be represented by a type of expected utility construction in which tastes are uncertain and characterized by a probability measure. Unfortunately, but to the point, with the future states affecting the utility function, the probabilities themselves are meaningless. Human responses and the expected utility model are both vastly more subtle than we tend to admit. And the split between violations and inappropriate interpretations remains quite unclear at this juncture.

It is at this point that EH identify Kahneman and Tversky’s [1979] prospect theory as the “first comprehensive” competitor to the expected utility model. Here a von Neumann-Morgenstern relational setting is envisioned in which (1) prizes are terminal asset positions and (2) prob-

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3 Two approaches have been used to test the descriptive validity of expected utility theory. One has been to test the behavioral validity of the axioms; the other has been to test the predictive ability of the theory—that is, whether the theory, as an “as if” model, predicts behavior. Direct violations of the axioms and failures of the theory to predict have been reported and evaluated (Rapoport and Wallsten [1972]). A. Ashton [1980] and R. Ashton [1979] provide descriptive evidence about the independence axiom in auditing and accounting contexts.


5 See Kreps [1979].
abilities are objective. Confronted with such hypothetical choices, subjects exhibit systematic violations of the expected utility hypothesis, such as anchoring at the status quo asset position or the Allais paradox.

Within this setting, prospect theory consists of an editing phase followed by an evaluation phase. Editing entails a re-representation of the relational system—in part to support the evaluation phase and in part to reflect the prospects as changes from a status quo point. In particular, Kahneman and Tversky envision a focus on gains and losses along with the flexibility to accommodate a status quo anchoring phenomenon. For example, gain \( x \) from initial wealth \( w \) is not necessarily interpreted as a terminal wealth of \( x + w \). It is as though in the posited system, the subject experiences a cash outcome and a gain or loss relative to some anchor or status quo. Other aspects of the editing phase are envisioned as simplifying the evaluation phase: "dominated" alternatives may be discarded, common elements of alternatives may be discarded, probabilities may be rounded, and so on. Kahneman and Tversky propose tendencies in this regard that are consistent with experimental evidence, but the editing phase remains amorphous and largely uninvestigated at this point. It remains important to recognize that the posited system (terminal wealth and objective probabilities) is not the relational system employed by the evaluation phase of the theory.

With the edited alternatives in place, the evaluation phase can be viewed as a mutation of the expected utility hypothesis. Two scales are used. A decision-weighting function is a scale on probabilities and a value function is a (status quo-dependent) scale on gains and losses. Evaluation (though dependent on whether "regular" or "nonregular" prospects are involved) follows by summation of decision-weighted value prospects. Kahneman and Tversky offer, based again on observed experimental tendencies, particular properties of these two functions: the value function is envisioned as typically being S-shaped, concave above and convex below the status quo point, while the weighting function is envisioned as typically understating all but low probabilities. Further, nonlinearity of the weighting function precludes its interpretation as a probability measure and, unless they are removed in the editing phase, allows for the possible selection of dominated alternatives.

It remains critical, however, that we not comingle the experimental tendencies offered as particular interpretations with the representation that is involved. The evaluation phase is an additive conjoint structure in which a complete and transitive preference relation on the edited prospects is assumed to obey the independence, cancellation, and solvability axioms of conjoint measurement. Combining these with a "distributivity" axiom ensures the desired representation, though we are here dealing with a sufficient set of axioms.

Whether prospect theory will supplant expected utility analysis is an open question at this point. In descriptive terms, it could not be inferior, simply because the expected utility model is a special case of prospect
theory. The importance of the prospect theory model stems from its recognition of additional phenomena in the choice process. But the evaluation phase retains the weak order representation orientation of the expected utility model, and the relationship between “big” and “small” worlds remains open.

**The Importance of Framing**

Does the way we ask a question affect the answer? Discussions of choice theory usually reflect a distinction between the process of framing actions for consideration and the process of choice from among the framed alternatives. Yet, where the process of choice has been the focus of choice theory, the process of framing actions for choice has not received systematic attention. For example, the expected utility model takes the framed relational system as a given and provides a numerical representation. Implementation of the model typically takes the form of belief and taste assessment, followed by computation over the given, previously framed alternatives. As suggested by EH, both framing and choice processes are important and are likely to interact. They conclude, “...the most important empirical results in the period under review have shown the sensitivity of judgment and choice to seemingly minor changes in tasks ... [and] ... the elements of a psychological theory of decision making must include a concern for task structure, the representation of the task, and the information processing capabilities of the organism.”

This point is well made by EH; our only observation (beyond reinforcement) is speculation about framing and choice processes in multiperson settings. The behavioral choice theory research reviewed by EH is single-person choice theory. An important question is whether insights obtained from this research extend to multiperson settings as well (and vice versa). For example, probability assessment may be quite different when an opponent rather than Nature is the source of uncertainty. Are framing and choice processes different when choices of other individuals also affect the perceived outcomes? Is bidding at an oriental rug auction different from seismic oil exploration on a given, fixed parcel? Are framing and choice processes different when an agency relationship is present?

**Implications for Accounting Research**

Choice theory is central to the practice of accounting, as well as to the production of accounting research. Competing models of choice exist and

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6 See Kreps [1980].

7 Similarly, individuals in our society are taught to and indeed do operate in markets. Here, the notion of equilibrium among actors is important. For example, while individuals may be “...blinded ... to the possibility of missing causes of malfunction” in a fault tree study, would they be correct in presuming any such device that survived a market test would not exclude an important malfunction possibility? We are indebted to Jim Patell for this observation.
are not logically equivalent. Moreover, we are unable to establish any particular model as "superior" or more "reasonable." If history is to guide us, we should not expect any dramatic growth in our understanding of choice in the near term. However, the EH review suggests a change in the emphasis of behavioral choice theory which may have implications for accounting research.

Slovic, Fischhoff, and Lichtenstein [1977] documented a major emphasis on human information processing (hip) by behavioral choice theory researchers during the period of their review. We have witnessed an extension of this interest in accounting research, and new insights have been obtained. EH now suggest framing processes and issues as a major new emphasis in the period of their review. We suspect that these processes and issues may become the focus of hip research in accounting in the 1980s and that such an emphasis may be quite productive.

Choice problems tend to be recognized, analyzed, and disposed of in a piecemeal, almost sequential fashion. To what extent do accounting frameworks, models, concepts, or procedures influence or facilitate this process? Do they impose a particular type or style of framing in the minds of individuals who use them or are subject to their use? Do they foster or legitimize particular views of organizational choice problems? To what extent are they offset or reinforced by incentive structures?

One example is provided by the distinction between accounting and opportunity costs. The notion of opportunity cost would be superfluous in an expected utility model were the choice problem framed in terms of searching among all available alternatives (Demski and Feltham [1976]). However, if the choice problem is framed in terms of the acceptance or rejection of a particular alternative, consideration of opportunity cost is essential for the decomposition procedure to be guaranteed to locate a maximizing alternative. Normally, accounting and opportunity costs are viewed in an additive manner. Yet, if accounting costs are viewed as losses and opportunity costs are viewed as foregone gains, prospect theory predicts that accounting costs and opportunity costs will not necessarily be viewed in an additive manner.

9 Newman [1980], for example, offers a recent review of the application of the expected utility model and prospect theory to information evaluation questions. Here, however, we must be careful in drawing information system conclusions. Suppose one costless information system is finer than another. Under the expected utility model, the first is always weakly preferred. Such would also be the case in prospect theory, because any decision rule available in the latter is available in the former (unless it is discarded in editing).

0 Risk neutrality is essential to support the distinction between accounting and opportunity costs with an additive representation in the context of the expected utility model.

Evidence of the treatment of opportunity costs in accounting contexts is somewhat mixed. Where Becker, Ronen, and Sorter [1974] found that their subjects treated opportunity costs as less important than out-of-pocket costs, Neumann and Friedman [1978] found that their subjects "properly" took opportunity costs into account. Friedman and Neumann [1980] subsequently found that subjects requested and used opportunity cost information as often as they used out-of-pocket cost information when both could be acquired at equal cost, that when opportunity cost information was explicitly provided it
Another example is provided by the suggestion so often found in management accounting texts that only incremental costs should affect choices and that sunk costs should be viewed as irrelevant. If expected utility-based choices are framed in terms of terminal wealth, a focus on only incremental costs will be spurious except under quite specialized circumstances (Demski and Feltham [1976]; Dillon and Nash [1978]). But this is not necessarily the case if the framing considerations of prospect theory are correct. That is, an analysis of incremental costs might be quite useful if that is the way alternatives are framed and evaluated.\footnote{The issue of "big" versus "small" worlds is at work here. Thaler [1980] provides a scenario under which sunk costs are not only viewed as relevant, but tend to be heavily weighted. He suggests that if adding a good to one's endowment is viewed as a gain and removing it is viewed as a loss, prospect theory predicts that goods held might be more heavily weighted than those not held.}

A third example is provided by the use of cost allocation procedures to decompose complex problems, such as when service center cost allocations are used as a surrogate for the effect of production schedule decisions on service center activities. In limited settings, we can decompose an overall expected utility analysis so that precisely such a procedure will be consistent with the expected utility model. We also have examined the ability of simplified variations of this technique to produce "close" to optimal choice, again in an expected utility sense. But, these are analytic results that beg numerous questions, including the one of what framing considerations emerge in such activities.

A fourth example is provided by the phenomenon of accounting changes. If accounting methods and procedures influence or facilitate framing processes which exist and interact with choice processes, then to what extent do changes in these methods and procedures alter these processes? Suppose an organization has selected and trained individuals to make "acceptable" choices within the context of some explicit accounting procedures which are related to and reflected in some implicit framing processes. Within such a setting, why does an organization change its accounting procedures? Does such a change alter any implicit framing processes? Was the change made to alter these processes?\footnote{The "functional fixation" or "decision inertia" hypothesis suggests that framing processes are, presumably, unaltered by a change in accounting method. See Ashton [1976] and Swieringa, Dyckman, and Hoskin [1979].}

Summary

EH end their synthesis with the observation that the comparative advantage of psychologists in the study of decision making is "... eluci-
dating the basic psychological processes underlying judgment and choice.” The comparative advantage of accounting researchers in this venture is, in our opinion, the study of institutional dimensions. Recent work by psychologists suggests that institutional dimensions of choice framing activities may be a viable and important subject for accounting research. Perhaps with this research well underway we will be able to revisit the information economics and human information-processing domains and generate yet a new round of understanding. Such is the dialectic mode.

REFERENCES


