

Transaction Analysis: A Framework and an Application to Insurance Decisions

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Abstract

Creating or interpreting people's choices requires attention to a great many details. A framework initially presented in this journal (Fischhoff and Furby, 1988) specifies those details. It is applied here to several insurance-related choices appearing in Johnson et al. (1993) and elsewhere. These specific applications suggest alternative explanations for the results of these studies. The approach as a whole provides an alternative perspective regarding reliance on experiments and markets to study people's preferences.

Key words: transaction analysis, insurance decisions, preferences

Like many other transactions, insurance decisions offer the chance to give something and get something else in return. Accepting a policy means giving a premium and getting some coverage. Rejecting it means retaining the premium and accepting some exposure—in effect, self-insuring. The wisdom of people's insurance decisions depends on how well they perceive these components of the transactions that they are offered, as well as how thoughtfully they combine them.

After decomposing “coverage” into “risk” and “benefits,” Johnson, Hershey, Meszaros, and Kunreuther (1993) show how misunderstanding of each component can derail people's insurance decisions. Johnson et al.'s approach reflects a mixture of arguments drawn from first principles (derived from the general research literature on decision making), anecdotal evidence from market “anomalies,”¹ and demonstration studies involving brief pencil-and-paper quizzes. They conclude with a challenging discussion of how these human foibles might be blunted or exploited by market mechanisms.

In discussing potential limitations of their studies, Johnson et al. focus on two questions of *external validity*. They worry first about their incomplete probing of the cognitive “mechanisms [that] produce these effects” (p. 19). Because one can generalize most confidently to situations evoking similar cognitive process, it is important to know just what those processes are. Secondly, the authors worry about the lack of “real-world consequences for respondents.” As a result, it is harder for them to allay concerns that “these results will not generalize to decisions made in economic settings” (p. 19).

In both respects, the authors seem unduly harsh on themselves. The cognitive hypotheses motivating their studies are derived from an extensive research literature providing

many clues as to when effects will be observed. The external validity of questionnaire studies has been the subject of much debate and experimentation (e.g., testing the effects of adding stakes). The day should be past when hypothetical choices could either be dismissed outright or accepted uncritically.

Of greater concern, however, is the *internal validity* of these studies—and others like them, including some conducted by the present author. That is, are we sure what we have measured, even within the constrained reality of the experiment or interview? The following section outlines the theoretical perspective underlying this concern. The next section applies this approach, called *transaction analysis*, to two of Johnson et al.'s studies and one by the present author. The concluding section examines the implications of the approach for insurance decisions, markets, and regulation.

1. A framework for transaction analysis

1.1. *Background*

Social scientists' primary occupation is interpreting other people's responses to particular situations.² Experimental psychologists and survey researchers create these situations themselves, in the form of laboratory tasks and questionnaires. Economists and anthropologists more often observe naturally occurring situations. The success of any of these intellectual enterprises hinges on the scientists' understanding of how people interpret each situation and their responses to it.

Social scientists who create the situations that they study ostensibly have an easier time with these interpretations. They do not have to discern the effective features of complex real-life situations. Nor need they feel as much pressure to locate each choice in the context of a long stream of actions. They are not compelled just to accept the natural confounds among the features of real-life choice situations (which complicate determining the relative effects of each). In principle, these investigators can create situations that include only the features that are relevant to their theories, in tasks so novel that participants can be construed as providing a "fresh look" at them, and with task features neatly disentangled.

One noble attempt to exploit the potential of such experimental control is *contingent valuation*, the branch of resource (and sometimes health care) economics that evaluates goods by asking people how much they would pay for them. This family of procedures has become a method of choice when critical goods are not traded in anything resembling a market subject to standard "revealed preferences" analyses. Once the threshold of accepting "expressed preferences" has been crossed, contingent valuation offers investigators enormous freedom to pose the transactions of greatest theoretical or practical interest (Cummings, Brookshire, and Schulze, 1986; Mitchell and Carson, 1989; Smith and Desvouges, 1988).

The underlying metaphor of contingent valuation studies is that of a “contingent market.” Participants are asked to imagine a market in which a good such as atmospheric visibility is traded. Then they are asked whether they would accept a trade between some of that good and some payment, in some social context (e.g., voting on it in a state referendum). Any collection of contingent valuation studies shows the enormous variety of specifications that investigators have devised. Because anything can be asked, investigators can, in principle, design a question meeting their precise research needs.

Unfortunately, this flexibility exacts a price. Because anything can be asked, nothing can be taken for granted. Investigators must first specify exactly what the transaction is, then ensure that respondents understand all its particulars, and, finally, allow respondents to articulate stable preferences. These are substantial challenges, which may overwhelm the cognitive capacity of both respondents and investigators. Just how many details can respondents absorb and integrate within the confines of a typical interview? Just how readily can investigators create a functional market from whole cloth, specifying all features that might affect respondent's evaluations, including those features that are irrelevant to economic theory (e.g., what other respondents are doing; what precedents are being set) (Fischhoff, 1988, 1990, 1991)?

A natural response is to create simple tasks, focusing attention on a few theoretically relevant details. However, there is no guarantee that omitted details will not be imputed by respondents who need to make some assumption about them, in order to make the task meaningful. Venerable literatures in experimental psychology and survey research detail the ease and ingenuity with which respondents read between the lines of ostensibly simple tasks (e.g., Hogarth, 1982; Mitchell and Carson, 1989; Poulton, 1989; Rosenthal and Rosnow, 1969; Turner and Martin, 1984). What follows is one approach to dealing with the internal validity question of whether tasks have been understood as intended.

1.2. A framework

After reviewing many contingent valuation studies, Lita Furby and I were troubled by the enormous variability in task specification. We found that the details emphasized by one investigator were sometimes ignored by another. Thus, where one investigator feared misinterpretation or erroneous inferences, another felt that the same detail went without saying. Lita and I produced a framework providing the details required for a fully specified transaction (Fischhoff and Furby, 1988). It appears in table 1, with examples drawn from studies evaluating changes in atmospheric visibility.

As can be seen from the table, the framework raises many issues. Applied to a single existing study, it can identify features that have not been specified explicitly. In such cases, readers must guess what subjects have assumed about those features (if anything)—unless, of course, the investigator has performed a *manipulation check*, explicitly asking subjects how they interpreted the task. Even when details have been specified, there still is some question of whether respondents have heard and understood those features that were mentioned explicitly—although the burden of proof here might more reasonably lie with critics.

Table 1. Components for defining transactions (with examples from visibility valuation)

The Good (e.g., visibility)	Context
<i>Substantive Definition</i>	Electric bill, sales tax, income tax, park entry fee, environmental fund (for money)
Attribute(s)	When convenient, when demanded (for time)
Haze intensity	When rested, when exhausted (for effort)
Visual range	
Plume (color)	
Light extinction	
Context	Constituency
Natural or built	
Judged uniqueness	
Associated activities (e.g., hiking, viewing, playing)	<i>Formal Definition</i>
Significance (e.g., religious cultures, historical)	Reference and target levels
Source of change	Magnitude and direction of change
Predominantly natural (e.g., vegetation, forest fires, dust storms, humidity)	Statistical summary
Predominantly human (e.g., power plant, other factories, field burning, slash burning, motor vehicles)	Elicitation (response mode, response format, cues, feedback)
<i>Formal Definition</i>	Extent
Reference and target levels	Frequency
Magnitude and direction of change	Duration
Statistical summary	Timing of payment
Representation (mode, richness, organization)	Certainty of payment
Extent of change	The Social Context
Geographical	<i>Other People Involved</i>
Temporal (existence, direct enjoyment)	Provider of the good
Timing of change	Others present
Certainty of provision	<i>Resolution Mechanism</i>
The Value Measure (e.g., money, time, discomfort, effort)	Determining parties
<i>Substantive Definition</i>	Iterations
Attribute(s)	Constraints
Leisure, work (for time)	<i>Other Stakes</i>
Physical, emotional (for discomfort)	Externalities
	Precedents
	Legitimacy of process

Source: Fischhoff and Furby (1988).

How precisely a task is specified might itself be one of its psychological properties. Respondents who note the omissions, but do not know what to guess, may tend to prefer options that are more clearly laid out. Such *omission aversion* would be different than risk aversion or ambiguity aversion. For these latter aversions, respondents know what the transaction is, just not how it will turn out or what the exact odds are.

Once a task has been characterized, it can be compared with other tasks that have been characterized similarly. This provides a systematic way of assessing the generalizability of results; the better the fit between tasks, the more similar the responses should be. One

particular comparison is between matched conditions in an experimental test, where the analysis may reveal unintended differences (other than the critical manipulation).

Ideally, a conceptual framework would be used for creating new tasks, not just for reanalyzing existing ones.

2. Transaction analysis of insurance decisions

2.1. *Illusory simplicity?*

The development of the transaction framework was prompted by the complexity and diversity of the contingent valuation tasks that we studied. Frankly, we needed it ourselves to keep track of what was being asked.

Simple tasks, like the insurance decisions posed by Johnson et al., should, it would seem, create no such problems. They bring a small number of features directly to subjects' attention. It is easy to see everything that might be important, at least as far as the investigator is concerned. According to the implicit rules of test questions, there will not be too many irrelevant features.

One critical assumption made by investigators adopting this research strategy is that the missing features do not matter to people. That is, subjects may ignore the omissions entirely. Or, if they spontaneously fill in the blanks, then their evaluations are unaffected by the values that they impute. A second critical assumption is that subjects are unaffected by the lack of detail. That is, they neither exhibit omission aversion nor respond casually (thinking that a briefly stated task demands little effort).³

The failure of these assumptions could add either random or systematic error to a study. The former would occur if subjects either treat a simple task casually or find it infuriating. The latter would occur if they answer a different question than the one that the investigator tried to ask.

In the absence of extensive manipulation checks, discrepancies between the intended task and the interpreted task are a matter of judgment. The framework of table 1 provides one way to organize and discipline that judgment. The following sections apply it to three (ostensibly) simple tasks, two taken from Johnson et al. and one from my own work. All three appear in table 2. They are characterized in tables 3 to 5, which use two different formats, as indicative of how this approach to conceptual secondary analysis might be applied. Many, many similar examples can be found in the literature.

2.2. *Insurance/preference*

The first pair of examples in table 2 grew out of a discrepancy noticed, in the late 1970s, between the results produced by two concurrent research programs, namely, Kunreuther et al.'s (1978) studies of insurance-buying behavior and Kahneman and Tversky's (1979) development of prospect theory. The former found a much higher rate of willingness to insure against high-probability/low-consequence events than did the latter.

Table 2. Three sample tasks*Insurance*

Imagine that you must play a gamble in which you can lose but cannot win. Specifically, this gamble exposes you to:

- 1 chance in 4 of losing \$200
 (and 3 chances in 4 to lose nothing)

You can either take a chance with the gamble or insure against the \$200 loss by buying a policy for a premium of \$50. If you buy this insurance, you cannot lose \$200, but you must pay the \$50 premium.

Please indicate what you would do in this situation.

Preference

In the task you will be asked to choose between a certain loss and a gamble that exposes you to some chance of loss.

Specifically, you must choose either:

- Situation A. One chance in 4 to lose \$200 (and 3 chances in 4 to lose nothing)
 Situation B. A certain loss of \$50

Of course, you'd probably prefer not to be in either of these situations, but, if forced to either play this gamble (A) or accept the certain loss (B), which would you prefer to do?

Flight Insurance Question

As you know from news reports, both terrorism and mechanical failures are sources of danger to travellers. Suppose that you are planning to fly to London next week. You are offered a flight insurance policy that will provide \$100,000 worth of life insurance in case of your death due to

- | | |
|---|--------------------------|
| (1) any act of terrorism | [\$14.12, <i>n</i> = 34] |
| (2) any nonterrorism-related mechanical failure | [\$10.31, <i>n</i> = 36] |
| (3) any reason | [\$12.03, <i>n</i> = 34] |

This insurance covers from the moment you step on the plane until the moment you exit the plane at your desired location.

How much would you pay for this coverage?

Auto Insurance, Deductibles, and Rebates

Imagine that you have just bought a new \$12,000 car and are buying insurance for your car. The insurance package described below includes all coverage mandated by the state including comprehensive and collision insurance. Suppose you are offered the policy described below.

[Deductible frame]

This policy has a deductible of \$600 which will be subtracted from the total claims against the policy. In other words, if you make any claims against the policy, the company will give you the total amount of the claims minus the deductible. If your claims in one year total less than \$600, the company will pay nothing. If your claims exceed \$600, the company will pay all of the amount above \$600.

- Would you pay a premium of \$1000 for *one year* of this coverage? [44.3% yes]

[Rebate frame]

With this policy, a rebate of \$600 minus any claims paid will be given to you at the end of the year. In other words, if you have no claims against the policy, the company will give you \$600 back at the end of the year. If you do file one or more claims, you will get back \$600 minus the amount the company paid out for your claims. Should your total claims exceed \$600, the company will give you no rebate but will pay the claims.

- Would you pay a premium of \$1600 for *one year* of this coverage? [67.8% yes]
 [*n* = 187]

Table 2 shows an attempt by Fischhoff, Slovic, and Lichtenstein (1980) to create formally equivalent tasks capturing the salient features of the two programs. They reported consistent differences in responses to these stimuli, even within subject. They attributed these to cultural norms that make people (or at least middle-class Americans) ready to pay insurance premiums, but not to accept sure losses.⁴

Table 3 characterizes these two tasks in terms of some elements of the framework. The sole difference cited by Fischhoff et al. appears in the second line under "Payment." It is the "context" within which the risk-reducing payment might be made. Although the descriptions are brief, they do make several other features explicitly clear. For example, both the good and the payment are in dollars. There are no "iterations" of the decision-making process (a term used by the framework to indicate whether subjects can reflect on their decision, or must make it immediately and irrevocably).

Subjects are told the probability of the risk occurring and promised the protection if they commit themselves to pay. As a result, certainty of provision is listed equivalently for the two tasks. A question mark is added to reflect the influence that hypotheticality might have here. Single question marks are also placed by some features that are not mentioned explicitly but might be guessed reasonably, and similarly, in the two cases.

Table 3. Transaction Analysis: Insurance/Preference

	Insurance	Preference
<i>Good</i>		
attribute	\$	\$
source of change	?	??
extent	one play?	one play?
certainty of provision (probability)		
receiving needed compensation	1.00?	1.00?
needing compensation	.25?	.25?
<i>Payment</i>		
attribute	\$	\$
context	sure loss	premium
constituency	?	??
certainty of provision (probability)	1.00	1.00
<i>Social Context</i>		
providers	?	??
others involved	Exp. group, family, friends?	Exp. group, family, friends?
determined by	self?	self?
iterations	none	none
constraints	?	??
precedents	?	??
legitimacy	?	??

Note: ? = uncertain value; ?? = uncertain, possibly different value than in insurance condition.

These include the assumptions that the protection is provided for a single play of the risky prospect, that the subject alone makes the choice, and that the decision might be known (and perhaps reviewed) by some mixture of the experimenter, the other subjects, and friends or family to whom one might describe the experiment.

If these guesses are incorrect, then we do not know what tasks subjects answered. If subjects made different assumptions in the two conditions, then we would also misconstrue why they responded differently. Single question marks indicate cases where it seems reasonable that subjects in both conditions would make similar alternative assumptions. For example, if hypotheticality is a problem, then it is probably the same problem in both cases. Different numbers of question marks in the two columns indicate cases where that assumption seems less assured. For example, people may make different assumptions about the sources of the changes (i.e., the potential losses) that are being controlled with a “premium” and with a “sure loss.” For example, a sure loss might sound like the sort of donation solicited by a protection ring or like the cost of an antitheft device whose manufacturer promises to pay the deductible for a stolen auto. If the source of the imagined loss matters to subjects, then their inferences about this missing detail may contribute to the differences in their responses to the two conditions.

The explicitly stated context (premium vs. sure loss) may have been the cue to these inferences, but it would be an incomplete explanation for subjects’ differing desires for these two kinds of protection. The same could be said for the possibly different interpretations of the missing social context features: who provides the coverage (and is the other party to the contract), what constraints there are on the kinds of deals that can be offered (and on the opportunities to take advantage of the subject), what precedents are being set (relative to subjects’ self-concept, if not relative to their relationship with the insurance provider or the experimenter), and what social norms might legitimate (or proscribe) such a deal.

These interpretations might be thought of as elaborating the basic concepts of “sure loss” and “premium.” However, they provide a different kind of account than saying that people’s preferences can be reversed merely by changing labels.

2.3. Terrorism/mechanical failure

The three versions of the second question in table 2 differed in which of the three italicized causes of death was cited as being covered by the proposed policy. The bracketed mean responses show that subjects reported being willing to pay about the same amount for coverage for “any reason” as for “terrorism” or “any non-terrorism related mechanical failure.” Johnson et al. argue that the latter two terms evoke “more vivid and available” events than the “the inclusive phrase ‘any cause.’” By expanding the set of covered events, this “availability bias” (Tversky and Kahneman, 1973) increases the value of the corresponding policies.

Table 4 provides a brief characterization of these tasks. Although the task description received by subjects is no longer than that for the insurance/preference questions, flight

Table 4. Transaction analysis: Terrorism/mechanical/any cause

	Terrorism	Mechanical	Any cause
<i>Good</i>			
attribute	\$ peace of mind	\$ peace of mind	\$ peace of mind
context	terror	mechanical	?
extent	one flight/roundtrip?	one flight/roundtrip?	one flight/roundtrip?
timing	soon postflight?	soon postflight??	soon postflight???
certainty of provision	??	??	???
<i>Payment</i>			
attribute	\$	\$	\$
context	premium	premium	premium
constituency	beneficiaries	beneficiaries	beneficiaries
timing	preflight	preflight	preflight
<i>Social Context</i>			
provider	?	??	???
others involved	exp. group, family, friends	exp. group, family, friends	exp. group, family, friends
iterations	none	none	none
constraints	?	??	???
precedents	?	??	???
legitimacy	?	??	???

Note: ? = uncertain value; different numbers of question marks indicate possibility of different values

insurance is a much more familiar mechanism. This means, on the one hand, that subjects can fill in more blanks from their everyday experience (than they could with the obviously artificial insurance/preference transactions). It means, on the other hand, that subjects may import beliefs from a wider set of expectations. Thus, subjects should infer that the timing of the payment will be preflight, that the timing of the payout would be fairly soon postflight, that the payees would be designated beneficiaries, that some peace of mind would be a side benefit, and so on.

The investigators count on these details going without saying, in order to focus subjects' attention on the unique details of these transactions. They must hope that the same inferences are made in each condition. In the absence of supporting evidence, any concern about this assumption is necessarily unfounded.

One possible line of skeptical speculation is that subjects believe that standard flight insurance does not cover terrorism (which is seen as falling into the "act of war" category excluded by many life and casualty policies). Such a belief might enhance the value of this insurance for those in the terrorism group who believe that they are being offered a unique opportunity, whose provision might signify the existence of an unusually high risk. That line of thinking could prompt other differences in inferences, for example, regarding the provider of the coverage, the regulatory bodies that constrain the terms of policies, and the speed with which claims are paid (Good-timing). Even if the existence of

coverage does not seem unusual, its acceptance might be. If so, then those who do accept it might be setting a personal precedent regarding the worries they assume responsibility for and, thereby, legitimate (perhaps making a concession to terror).

Johnson et al. do not discuss the possibility of inconsistent inferences regarding the terrorism and mechanical-failure tasks. Indeed, they would not be particularly troubled by speculations like those just raised, because they do not compare responses to these two tasks. They would, however, be concerned if the “any reason” task were defined differently in ways that affected evaluations.⁵

If terrorism insurance were perceived as a novel form of coverage, then it might create such a threat. By saying that “both terrorism and mechanical failures are sources of danger to travellers,” the investigators clearly intended terrorism to be included under “any reason.” However, one cannot exclude the possibility of some subjects missing the reference, or rejecting it (as indicating a kind of coverage that is needed but unavailable), or doubting their beneficiaries’ ability to collect in a timely fashion. Any such tendency would make “any reason” relatively similar to “mechanical failure.” That would undermine the authors’ claim of inconsistency in subjects’ expressed willingness to pay.

Mere uncertainty over the nature of the “any reason” coverage might reduce the attractiveness of that policy by evoking omission aversion. This would compound any tendency to treat the coverage as a form of “probabilistic insurance” (first you file a claim, then we decide whether we will honor it). People may be particularly averse to such policies, even when the premiums are adjusted to reflect the reduction in their expected value due to the uncertainty over payout (Slovic, Fischhoff, and Lichtenstein, 1982; Tversky and Kahneman, 1981). Both aversions would reduce willingness to pay for such coverage, and the amount of inconsistency that could be claimed.

Such talk is cheap, and the burden of proof may lie with the critic, rather than with the investigators, who are the ones who have, in fact, collected data. The intent of this discussion is not to cast doubt on Johnson et al.’s fascinating result, but to frame future research regarding its internal validity.⁶

2.4. Rebate/Deductible

The third set of tasks appearing in table 2 presents the most complicated of these simple questions. Johnson et al. ask readers to “Note that the policy with the rebate is worse than the policy with a deductible, since the rebate is in essence a \$600 interest-free loan to the insurance company. Given any positive discount rate for money, the consumer is worse off choosing the rebate policy” (p. 44). Nonetheless, as noted in the figure, subjects preferred the rebate frame, a result that Johnson et al. interpret in terms of prospect theory’s differential treatment of gains and losses.

Unlike tables 3 and 4, which present just highlights of a transaction analysis, table 5 addresses each element in the Good and Social Context portions of the framework. As before, some features are extracted explicitly from the task descriptions, whereas others are inferred. Differences between the tasks take two forms: a) cases where different

Table 5. Transaction Analysis: Rebate/Deductible Question (d = deductible; r = rebate; b = both; b? = both, but possibly different)

The Good	Extent of Change one year coverage-b subsequent year commitment-b?
<i>Substantive Definition</i>	
Attributes	Timing of Change possible at some point during year-b?
<i>financial</i> money for reimbursement-b capped cash flow-b forced saving-d	Certainty of Provision (of claim service) probability of claimable accident-b? probability of filing claim for accident-b? probability of claim being honored-b?
<i>psychological</i> peace of mind during year: partial-d; complete-r regret at end of year-b?	
Context	The Social Context
car expenses-b insurance expenses-b	Other People Involved good provided by insurance company-b good mandated by state-b experimenter also present for hypothetical-b family members involved-b
Source of Change	Resolution Mechanism subject resolves hypothetical transaction-b subject determines filing real claims-b company/courts resolve honoring real claims-b
self-b? uninsured other-b?	
<i>Formal Definition</i>	Other Stakes protection from suits to others-b long-term control of insurance costs-b greater personal control of policies-b loss of other rights to sue-b unfamiliar (legitimate?) process-b?
Reference and Target Levels (of year-end financial status)	
reference level = accident-free status minus expected amount of damage-b; minus \$1000-d; minus \$1600-r target level = reference level minus up to \$600-d; plus up to \$600-r	
Reference and Target Levels (of psychological status)	
peace of mind during year, cap on exposure-b, possible additional expense-d, possible rebate-r, uncertainty about rights-b regret at end of year, no accident-b; no claimable accident-b?	

features appear in each (so that there are different entries for d = deductible and r = rebate; b) cases where the same features appear, but with question marks indicating that they may have different values (reflected by d? or r?).

An example of the former discrepancy that would increase the attractiveness of the rebate policy is that it may be seen as a form of forced saving. People will sometimes pay a price for help with self-control, perhaps enough to compensate for the opportunity costs of not having the \$600 (or what remains of it) in hand during the year. An example of the latter discrepancy, also favoring the rebate policy, is that it might be seen as inducing less year-end regret over the claims that one has filed. The number and speculative character of all the other differences in the table preclude any detailed discussion here. As with the proposals in tables 3 and 4, they are best seen as points of departure for systematic analysis of internal validity.

3. Implications

3.1. Experiments as revealing mechanisms

The difference between the rebate and deductible conditions that was intended by Johnson et al. appears in table 5 under the heading “Formal definition—Reference and target levels (of year-end financial status).” It is also the leading candidate for explaining the 25% greater popularity of the rebate policy. It is mentioned explicitly. It has a theoretical grounding, in prospect theory. It just is not the only candidate.

Systematic use of our transaction framework (or one like it) could, over time, provide more stable guidance for identifying and evaluating such alternative explanations. That is, studies might show, for example, how sensitive people are to the probability of actually receiving a promised good, to what other people observe their choice, or to the schedule for making payments. Such studies could be seen as having primarily methodological interest, creating, in effect, a science of potential artifacts. Or, they could be seen as having substantive interest, creating a science of how people interpret life’s situations. In our focus on the rules that people use to combine information, we decision theorists may have neglected the study of how they choose and construe information in complex, ambiguous real-life situations. Such a shift would not be the first time that behavioral science has turned “artifact into main effect” (McGuire, 1969), discovering that paying serious attention to annoying issues can be theoretically productive.

As an example of this strategy, Quadrel (1990) had adolescents think aloud as they assessed the probability of several incompletely specified events (e.g., getting in an accident as a result of drinking and driving). She found that they spontaneously noted many of the omissions and asked about them (e.g., “how much drinking”) or provided their own values (e.g., “they probably mean that a guy is driving”). For 7 of her 9 test events, subjects addressed the question of “dose” in one way or the other. The two exceptions were sex-related risks (getting pregnant, getting AIDS as the result of intercourse), suggesting that their intuitive physiology was insensitive to exposure, and confirming a result observed elsewhere with closed-ended tasks (Morrison, 1985). Quadrel found similar patterns of (in)sensitivity in a subsequent structured task.

In principle, one might circumvent these problems by telling subjects everything that they need to know, taking the usual care to express it in terms that they understand. In practice, the question still arises of whether they can take it all in. Recently, we quizzed subjects about the details of a brief contingent valuation task that we had just read to them over the phone. Many either had forgotten or not believed such essential details as the amount of the good, the likelihood of it being provided, and who would pay. Their responses showed less evidence of a common bias. The embedding effect (Kahneman and Knetsch, 1992) is smaller when answers are interpreted in terms of the task subjects reported answering rather than the one that they had actually been asked (Fischhoff et al., 1993).

Even if these hurdles can be overcome, investigators still face what might be called the “curse of context”: we would like interpret subjects’ responses as reflecting deep-seated

values, of the sort that come from intense involvement with real-world decisions. Yet we typically set minimalist problems before subjects and expect them to resist the temptations to recontextualize. “In a sense, we want subjects to be both mammals and reptiles: the products of a long nurturing process yet freshly hatched at t_1 ” (Fischhoff, 1990; p. 339). We may also be victims of the “curse of cleverness.”: we pride ourselves on our ability to devise just the right set of tasks for evaluating competing theories of human behavior, tasks that none of our colleagues have been clever enough to concoct. Then, we expect subjects immediately to discern our rules, analyze their mutual implications, and decide how they feel. These two curses change their texture when we try to enrich the experience (e.g., by giving practice rounds or more time to think); however, they do not vanish.

These issues only matter if one accepts the potential reality of experimental settings—that is, if one believes that a well-crafted experiment can elicit thoughtful expressions of genuine values in response to the situation that it seems to pose. A (the?) critical question of research strategy is how to allocate resources between understanding the reality created by an experimental environment and trying to conquer new worlds with it. A conceptual framework (like that of table 1) might help to clarify the work left undone, as well as to pool experiences with a particular feature across settings.⁷

3.2. Markets as revealing mechanisms

These methodological challenges might be music to the ears of those who doubt the ability of experimental methods to reveal underlying preferences. The competing strategy of relying on markets to reveal preferences has long been justified by the attraction of having consequential, nonhypothetical stakes. To that attraction might be added the benefits of reducing the two curses: real-world decisions often come with full, familiar contexts. Their complexity is often buffered by the ease with which their details can be organized cognitively into coherent wholes (or “chunks”).⁸ Where true, these claims would strengthen the internal validity of real-life tasks, adding to their natural advantage in terms of external validity (Fischhoff and Cox, 1985).

The truth of these claims is an empirical question. Every revealed preference analysis begins with something akin to a transaction analysis. The variables in the analytical specification represent the features that decision makers are held to consider. It is conceptually straightforward, if methodologically nontrivial, to establish whether the individuals being studied have actually noted these variables and interpreted them in the way specified by the investigator.

One well-known attempt to do this produced discouraging results. In their study of residents of flood- and earthquake-prone areas, Kunreuther et al. (1978) found limited understanding of risks and insurance possibilities even among policy holders. Substantial errors in estimating people’s perceptions do not, of course, preclude some degree of success at predicting their choices. Just getting the right variables (and signs) can go a long way (Dawes, 1979, 1988; von Winterfeldt and Edwards, 1982, 1986).

Independent assessment of decision makers’ perceptions can reduce the risk of reading too much into modest successes in predicting real-world choices. One should not

make strong claims of lay optimality simply because behavior moves in the right direction, vis-a-vis changes in some variables that the investigator holds to be relevant. This is particularly true when the investigator has had ample opportunity to hunt for arguably relevant variables (and alternative measures of those variables) until something has correlated with behavior. With enough ingenuity, some expression of some value can often be found that people can be held to optimize. The full set of variables and formulations that have been tried will not be apparent from the subset that the investigator eventually selects.

One possible protection against the risks of capitalizing on chance is to use a standard format in specifying and reporting revealed preference studies. Table 1 provides one such framework. It includes not just the names of variables (the attributes) and the changes in their states associated with transactions (the reference and target levels), but also the auxiliary details (e.g., payment vehicle, precedence) that give transactions meaning. Completing such a “style sheet” for every attempted specification would give a better feeling for the degrees of freedom “used up” en route to the final model. Any feature left unspecified is a potential confound, obscuring the relationships that the investigator seeks (e.g., when social pressure leads someone to decline an otherwise attractive transaction).⁹ An unspecified feature could also be “missing with prejudice” when an investigator holds it to be irrelevant to a class of transactions.

These seem like testable propositions. They might be steps toward more contextually based theories of decision making, with a clearer relationship between market and experimental settings. Keeping context in mind might also help bridge the worlds of the subject and the investigator. In the experimental world, for example, our difficulty in devising a task might indicate subjects’ difficulty in solving it. In the market world, we might find that our own difficulty in identifying relevant features might suggest subjects’ chore of fending off irrelevant details. Thinking about these two worlds simultaneously raises potentially productive questions. For example, do people treat a simple task that they extract from the complex real world differently than the same task when it is handed to them by an experimenter? We risk intellectual common-mode failure by confining our attention to either world.

3.3. Markets as pricing mechanisms

Surveying the litany of problems that they have demonstrated, Johnson et al. ponder the ability of markets to overcome or exploit these weaknesses. Their discussion opens fascinating lines of inquiry regarding the often-privileged status of markets as pricing mechanisms. The degree of concern that is warranted depends on how lifelike their evaluation tasks seem to be.

Answering this question of external validity means applying the same interpretative framework to the experimental task and to the real-world situation destined for generalization and then assessing their degree of similarity. Using an explicit interpretative framework, like that of table 1, provides one way of organizing this work. It might reduce the risk of unduly focusing on particular similarities or dissimilarities as the result of, say, special pleading, availability effects, or radical methodological skepticism.

A final use of transaction analysis is to evaluate the adequacy of reality. Those who offer transactions often have an ethical duty to inform those receiving an offer about all its relevant features. Sometimes, they have a legal duty as well, particularly in states holding to a materiality standard for product liability and malpractice cases. A transaction analysis is one way to determine whether people have been told what they need to know. It might be supplemented by a value-of-information analysis establishing the precision needed in quantitative parameters (Merz, 1991).

In another of their tasks, Johnson et al. show the dramatic differences in responses to an insurance option depending on whether it is presented as purchasing a right or being paid to surrender it. Normatively (and perhaps legally), a transaction analysis might be instructive in determining whether insurers had fulfilled their requirement for full disclosure. Descriptively (and perhaps legally), it might be interesting to see how large Johnson et al.'s framing effect would be with such full disclosure, reducing any contribution of omission aversion to the status quo bias that the authors document.

Notes

1. It is an irony of our usage that deviations from optimality are considered anomalies, however frequently they are observed.
2. To a much lesser extent, they are interested in how people shape situations—in effect, creating questions that they would prefer to answer.
3. As discussed below, these problems can also affect real-world (revealed preference) tasks, where details either cannot be obtained at reasonable costs or are deliberately obscured.
4. More extensive, and better documented, studies of contrasts like these can be found in Hershey, Kunreuther, and Schoemaker (1982).
5. Any differences between the terrorism and mechanical-failure tasks would be troublesome here, insofar as the any-reasons task could not be simultaneously similar to them both—although one might still argue that matching one of them is enough for demonstrating the bias.
6. One possible technical problem with this study is indicated by the question mark in the row for Good-extent. The text specifies that the “insurance covers you from the moment you step on the plane until the moment you exit the plane at your desired location.” Some subjects might interpret this termination point as London, others as back at home. Those who assumed roundtrip coverage (which may be the norm for flight insurance) might infer that they are getting coverage for terrorism while on the ground, enhancing the value of that policy. “Mechanical failure” would more naturally be restricted to the two legs of the flight.
7. About 10 years ago, I proposed a similar strategy for summarizing the experience with different debiasing procedures, which could also be viewed as a way to summarize the robustness of judgmental biases across experimental setting (Fischhoff, 1982). In applications to two biases, I found little evidence that biases diminished with “methodological manipulations” like exhorting subjects to work harder or raising stakes. Expertise *per se* seemed to make little difference in judgment unless it increased the chances of knowing the right answer to a particular task (thereby reducing the need for judgment). To the best of my knowledge, no one else has picked up on this gambit. Perhaps it was a bad idea; perhaps it was the wrong framework; perhaps we don’t provide the professional incentives for such secondary analyses; perhaps the point was made. Similar questions might be raised about the similar-spirited framework introduced by Grether and Plott (1979) to aggregate experience with preference-reversals studies.
8. Consider, for example, the difference between explaining a novel variant on a common financial instrument to an experienced investor and explaining any financial instrument to a novice investor (well enough to secure informed consent for an investment).

9. One of the most striking results in Kunreuther et al. (1978) was the predictive power of whether respondents knew someone with a particular policy. That correlation could reflect the role of social cues in situations where people do not know what to think or the ability of social pressure to dominate independent thinking.

References

- Cummings, R. G., D. S. Brookshire, and W. D. Schulze (eds.). (1986). *Valuing Environmental Goods: An Assessment of the Contingent Valuation Method*. Totowa, NJ: Rowman & Allanheld.
- Dawes, R. M. (1979). "The robust beauty of linear models," *American Psychologist* 34, 571-582.
- Dawes, R. M. (1988). *Rational Choice in an Uncertain World*. San Diego, CA: Harcourt Brace Jovanovich.
- Fischhoff, B. (1982). "Debiasing." In D. Kahneman, P. Slovic, and A. Tversky (eds.), *Judgment Under Uncertainty: Heuristics and Biases*. New York: Cambridge University Press, pp. 422-444.
- Fischhoff, B. (1988). "Specifying Value Measurements." In B. Driver, G. Peterson, and R. Gregory (eds.), *Evaluating Amenity Resources*. New York: Venture, pp. 107-116.
- Fischhoff, B. (1990). "Experience in Experiments." In R. Hogarth (ed.), *Essays in Memory of Hillel Einhorn: Insights in Decision Making*. Chicago: University of Chicago Press, pp. 337-342.
- Fischhoff, B. (1991). "Value Elicitation: Is There Anything in There?" *American Psychologist* 46(8), 835-847.
- Fischhoff, B. and L. A. Cox, Jr. (1985). "Conceptual Framework for Benefit Assessment." In J. D. Bentkover, V. T. Covello, and J. Mumpower (eds.), *Benefits Assessment: The State of the Art*. Dordrecht, The Netherlands: D. Reidel, pp. 51-84.
- Fischhoff, B. and L. Furby. (1988). "Measuring values: A Conceptual Framework for Interpreting Transactions." *Journal of Risk and Uncertainty*, 1 147-184.
- Fischhoff, B., M. J. Quadrel, M. Kamlet, G. Loewenstein, R. Dawes, P. Fischbeck, S. Klepper, J. Leland, and P. Stroh. (1993). "Embedding Effects: Stimulus Representation and Response Modes," *Journal of Risk and Uncertainty*.
- Fischhoff, B., P. Slovic, and S. Lichtenstein. (1980). "Knowing What You Want: Measuring Labile Values." In T. Wallsten (ed.), *Cognitive Processes in Choice and Decision Behavior*. Hillsdale, NJ: Erlbaum, pp. 117-141.
- Grether, D. M. and C. R. Plott. (1979). "Economic Theory of Choice and the Preference Reversal Phenomenon," *American Economic Review* 69, 623-638.
- Hershey, J. C., H. C. Kunreuther, and P. J. H. Schoemaker. (1982). "Sources of Bias in Assessment Procedures for Utility Functions," *Management Science* 29, 936-954.
- Hogarth, R. (1982). *New Directions for Methodology of Social and Behavioral Science: Question Framing and Response Consistency*. San Francisco: Jossey-Bass.
- Johnson, E., J. Hershey, J. Meszaros, and H. Kunreuther. (1993). "Framing, probability distortions and insurance decisions," *Journal of Risk and Uncertainty* 7, 35-51.
- Kahneman, D. and J. Knetsch. (1992). "Valuing Public Goods: The Purchase of Moral Satisfaction," *Journal of Environmental Economics & Management*, 22, 57-70.
- Kahneman, D. and A. Tversky. (1979). "Prospect Theory: An Analysis of Decision Under Risk," *Econometrica* 47, 263-281.
- Kunreuther, H., R. Ginsberg, L. Miller, P. Sagi, P. Slovic, B. Borkin, and N. Katz. (1978). *Disaster Insurance Protection: Public Policy Lessons*. New York: Wiley.
- McGuire, W. (1969). "Suspiciousness of Experimenter's Intent." In R. Rosenthal and R. L. Rosnow (eds.), *Artifact in Behavioral Research*. New York: Academic Press.
- Merz, J. F. (1991). *Toward a Standard of Disclosure for Medical Informed Consent: Development and Demonstration of a Decision-Analytic Methodology*. Ph.D. dissertation, Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA.
- Mitchell, R. C. and R. T. Carson. (1989). *Using Surveys to Value Public Goods: The Contingent Valuation Method*. Washington, DC: Resources for the Future.
- Morrison, D.M. (1985). "Adolescent Contraceptive Behavior: A Review," *Psychological Bulletin* 98(3), 538-568.

- Poulton, E. C. (1989). *Bias in Quantitative Estimates*. London: Lawrence Erlbaum.
- Quadrel, M. J. (1990). *Elicitation of Adolescents' Risk Perceptions: Qualitative and Quantitative Dimensions*, Ph.D. dissertation, Department of Social and Decision Sciences, Carnegie Mellon University, Pittsburgh, PA.
- Rosenthal, R. and R. Rosnow. (eds.) (1969). *Artifact in Behavioral Research*. New York: Academic Press.
- Slovic, P., B. Fischhoff, and S. Lichtenstein. (1982). "Response Mode, Framing, and Information-Processing Effects in Risk Assessment." In R. Hogarth (ed.), *New Directions for Methodology of Social and Behavioral Science: Question Framing and Response Consistency* San Francisco: Jossey-Bass, pp. 21-36.
- Smith, V. K. and W. H. Desvouges. (1988). *Measuring Water Quality Benefits*. Boston: Kluwer-Nijhoff.
- Turner, C. F. and E. Martin eds. (1984). *Surveying Subjective Phenomena*. New York: Sage.
- Tversky, A. and D. Kahneman. (1973). "Availability: A Heuristic for Judging Frequency and Probability," *Cognitive Psychology* 4, 207-232.
- Tversky, A. and D. Kahneman. (1981). "The Framing of Decisions and the Psychology of Choice," *Science* 21, 453-458.
- von Winterfeldt, D. and W. Edwards. (1982). "Cost and Payoffs in Perceptual Research," *Psychological Bulletin* 91, 609-622.
- von Winterfeldt, D. and W. Edwards. (1986). *Decision Analysis and Behavioral Research*. New York: Cambridge University Press.