



# Construal Processes in Preference Assessment

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*Abstract*

Interpreting people’s preferences requires understanding how they have *construed* their tasks, interpreting the proposed alternatives in the context where the evaluation is being made. With stylized experimental or survey choices, researchers’ challenge is typically identifying the features that people add in order to make their task real enough to answer (i.e., how they read between the lines). With rich “real world” choices, researchers’ challenge is typically identifying the features that people neglect, as they reduce their task to manageable complexity (i.e., which lines they choose to read). In either case, if people misunderstand or mistrust the stated transaction, they may evaluate a different offer than the one that was proposed. Such misconstruals are a nuisance for investigators, insofar as dealing with them delays the measurements that motivated the research. However, they can also provide an opportunity, by focusing attention on how people give meaning to choice situations. This article describes procedures for studying construal processes, strategies for getting people to answer the questions that interest researchers, and options for interpreting responses when people construe questions differently than was intended.

**Key words:** Preferences, elicitation, construal, values, environment

**Introduction**

Before people can express their preferences, they must figure out what their options are. Inevitably, that requires a *construal* process, in which people interpret the terms of a proposed transaction, considering the context in which it is offered. That process may involve accepting some details as stated, reinterpreting others, and inferring still others. Construal processes can arise both when people have well-articulated values (e.g., “My answer depends on whether there’s a warranty. I’ll assume that there is.”) and when they lack them (e.g., “I suppose they’re telling me everything I need to know.”).

Construal processes can create both problems and possibilities for researchers. On the one hand, misunderstanding people’s construal processes means misinterpreting their preferences. On the other hand, understanding those processes means learning about a fundamental aspect of preference expression. This article offers a strategy for dealing with construal processes, including (a) a task analysis of possible construals, (b) methods for revealing those processes, and (c) analytical approaches for promoting intended construals and addressing unintended ones.

The concluding section describes the collaborative research needed to implement this approach.

### **Problems and possibilities**

Integrating theoretical and methodological concerns over preference elicitation is a special case of a general strategy in the social sciences. Often, they advance by discovering that people interpret tasks in simpler, more complicated, or just different ways than investigators had assumed. Indeed, the history of psychology has been described as a process of converting such “artifacts” into “main effects,” worthy of study in their own right (McGuire, 1969), in addition to their value for improving research design. Two examples might illustrate this process:

(A) Survey researchers often instruct interviewers to maintain a neutral demeanor, hoping to focus respondents entirely on the literal content of the questions being asked. However, people are naturally attuned to social cues, even when none are intended. As a result, respondents may treat the interviewer as part of the stimulus, when they decide how to interpret the interaction. Faced by an impassive stranger, employed by an unfamiliar institution, respondents might interpret the interviewer’s demeanor as hostility, disinterest, or deception—or as a sign that the interviewer really wants to know what they, personally, believe. Because interviewers have to have some demeanor, respondent construals are inherent to survey research. Over time, pursuit of this topic evolved from the narrow study of “interviewer effects” to the broader study of nonverbal communication (Ekman, 1985; National Research Council, 1982; Rosenthal and Rosnow, 1969). That broader view allows survey researchers to draw on theories and results from related areas (e.g., perceptions of honesty, cues to emotion, body language). As a result, survey researchers now have other scientists working on their problem, probing the questions that people ask about those who ask them questions. Sometimes, that research provides solutions, showing how to create an intended impression; sometimes, it just documents continuing problems (e.g., respondents’ unpredictable second guessing of political pollsters).

(B) Experimenters often present stimuli in random order, hoping to elicit independent judgments of each stimulus. However, subjects still spontaneously generate expectations about coming stimuli, which often deviate from randomness (Peterson and Beach, 1967; Tune, 1964). The most familiar example is the gambler’s fallacy: expecting, say, a head after four consecutive tails. These response biases have long been known to experimental psychologists. However, they were poorly understood as long as they were treated as a methodological nuisance, and addressed with ad hoc procedures. In time, though, these response biases acquired intrinsic interest—for what they revealed about judgment under uncertainty (Gilovich, Vallone, and Tversky, 1985; Lopes, 1982; Tversky and Kahneman, 1974). Although the theories arising from these studies lost direct contact with the experimental design issues that prompted them, they still provide an evolving

research base for such design. For example, these theories show that sequences look more random when they have more alterations and shorter runs than are statistically expected. Gold (1997) found that changing the data generator helps as well (e.g., using a new coin eliminates “memory” for the sequence and reduces gamblers fallacy).

Of course, there is much still to learn about both nonverbal communication and interpretations of randomness. Waiting for complete understanding of such methodological issues would be a formula for paralysis. On the other hand, in the absence of such basic research, design choices can be defended only by appeals to intuition and convention. When colleagues have different intuitions, research may be unfairly rejected. When colleagues see things similarly, research may be accepted uncritically, creating a body of work with shared errors. Continued reliance on ad hoc designs increases the risk of disciplines diverging from one another (because they have different conventions) and diverging from the truth (because they consistently view behavior through a distorted lens).

The rest of this article proposes a hybrid approach to dealing with construal processes. It includes ways to stimulate new research, to exploit existing research, and to assess the residual uncertainty in how tasks have been construed. For addressing construal processes in general, it applies approaches developed by psychologists, anthropologists, linguists, and others (Frazier and Charles, 1995; Grice, 1975; Hilton, 1990; Schwarz, 1997). For addressing the construal of specific tasks, it applies standard *frameworks* for task specification. These frameworks are intended to facilitate pooling results across tasks and drawing upon general research, conducted without preference elicitation in mind. We hope that the combination provides a common perspective for efforts that many researchers are already pursuing in one way or another.

Examples are drawn primarily from our own research, because it is accessible and can be criticized without offending anyone else. Some examples deal with contingent valuation (CV) (Mitchell and Carson, 1989). In part, this choice reflects CV’s familiarity, making it a good place to examine general issues, even for those who never want to see another CV study. In part, this choice reflects our belief that fundamental disagreements about the construal of CV tasks prevent the convergence of rival programs for eliciting preferences among nonmarket goods. Identifying the empirical conditions for convergence might help to put researchers on the same page. We focus here on expressed preferences elicited in the staged circumstances of surveys and experiments. Analogous issues arise in the staged circumstances of market choices, and in researchers’ interpretation of the preferences that they reveal.

### **A task analysis of construal processes**

People must construe a proposed transaction before they can evaluate it. That evaluation could involve the straightforward “read out” of a previously derived

value. Or it could require a “constructive” process, inferring the implications of basic values for a novel task (Fischhoff, 1991; Fischhoff, Slovic, and Lichtenstein, 1980; Gregory, Lichtenstein, and Slovic, 1993; Payne, Bettman, and Schkade, 1999). In either case, construing a preference task involves two interrelated steps. The first is deciding which features might matter, thereby providing *structure*. The second is deciding how to interpret each potentially relevant feature, thereby providing *substance* to that structure.<sup>1</sup>

Construal and evaluation can be iterative processes. For example, initially selected features may prove unimportant, once examined in context (e.g., “I always check the price tag, but prices here are similar enough that I’ll ignore them.”). Conversely, the evaluation process may show the importance of seemingly irrelevant features (e.g., “If it’s that cheap, I had better check the fine print—which I had ignored up to now.”).

Figure 1 depicts the tasks faced in construing a proposed transaction. The first branch reflects respondents’ construal of the process used to assess their preferences, namely, has the transaction has been offered in good faith, even if it is not entirely clear? The subsequent branches involve construal of its structure and

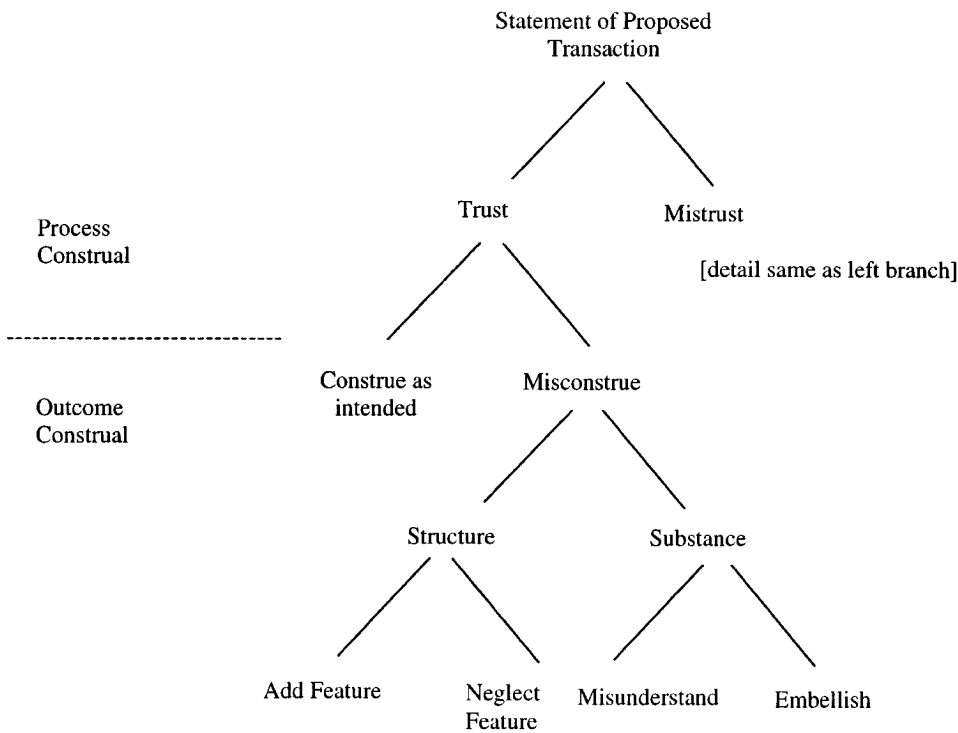


Figure 1. Task analysis of construal processes.

substance, thereby determining its *outcome value* (i.e., what one expects to give and get if the transaction is accepted). The work of construal determines the *process value* of engaging in such a social relationship. Accepting a transaction as presented can create positive process value, by affirming one's relationship with the proposer. Distrust may create negative process value, by incurring uncomfortable social relations. For example, consumers sometimes discount a product rebate, realizing that they may not send in the coupon. That makes its perceived outcome value different than the stated one. The associated process value is, however, quite different for consumers who reflect ruefully on their own disorganization and for consumers who think angrily about the merchant's exploiting their personal foible; such individuals would fall on the left- and right-hand branches of Figure 1, respectively.

Outcome and process value can also affect one another. For example, trust should increase respondents' faith that a stated commitment will be honored, with any ambiguities being resolved to mutual satisfaction. Such predictability should increase proposals' outcome value. Even trusting individuals may, however, still misconstrue a transaction, adding or neglecting some details, misunderstanding or embellishing others. For example, respondents may be so busy managing the social side of the interaction that they overlook critical features, however carefully their instructions have been crafted. Trust may even encourage misinterpreting those features that are noticed, insofar as respondents uncritically accept their initial impressions without clarifying the terms. Conversely, suspicion may add meaning where none was intended. For example, surveys typically begin by naming their sponsors, experiments by presenting informed consent forms. For investigators, these details are routine aspects of ethical research practice, unrelated to the task. Respondents, though, may seize on them for help in construing the terms of the transaction and, hence, its outcome value.

Distrust (the right-hand branch) can lead to analogous processes. It creates pressure for a transaction so precise that no construal is possible, thereby fixing the outcome value. Distrust can lead people to add new features or to suspiciously discount presented ones. It should reduce outcome value, if it increases uncertainty about whether a proposal will be honored.

Construal processes can be more and less deliberate. People may labor to decode an unfamiliar bidding game, but effortlessly reinterpret an advertiser's appeal—or vice versa. How hard they work may itself influence evaluations. People may resent having to ferret out details; or they may pride themselves on not needing everything spelled out. Actively adding personally relevant details may help people to savor the pleasure of potential positive outcomes and internalize the fear of potential negative ones. One challenge in value elicitation is matching subjects' effort level to what they would invest in the real world. A subject's exegesis on a jar of peanut butter may not predict market behavior any better than a focus group predicts intimate sexual behavior.

As mentioned, construal processes are a necessary part of everyday life. People often do not (and, sometimes, cannot or even should not) specify every detail of a

proposed transaction. Problems arise when respondents invent more of a transaction than is realized by its proposer—so that they are, in effect, evaluating a different proposal than the one being offered.<sup>2</sup> As a result, they may wander down any of the tracks in Figure 1, changing structure or substance, with an overlay of trust or distrust. Unfortunately, as investigators, we often study transactions that require elaborate construal processes. We care about real-world choices whose rarity ensures their unfamiliarity (e.g., housing purchases, retirement planning, medical emergencies).<sup>3</sup> We invent laboratory tasks whose originality reflects our own creativity. When we guess wrong about construal processes, we both misinterpret the expressed preferences and miss an opportunity to learn how people shape them.

### Methods of assessing construals

The previous sections raised many possible differences between questions asked and questions answered. The present section considers ways to determine which of them become realities. Although imperfect, these fairly simple procedures offer some protection against naive assumptions. They also provide the raw materials for more systematic accounts, the topic of the following section. In effect, this section looks for artifacts, while the next looks for ways to turn them into main effects.

#### *Concurrent verbal protocols*

Investigators naturally worry about how respondents will construe their tasks. However, mere reflection may not be enough. Professional training is designed to make scientists see the world differently than do laypeople.<sup>4</sup> A standard approach for confronting investigators with lay perspectives is asking respondents to “think aloud” as they derive their answers (e.g., Schriver, 1989). Table 1 shows sample instructions for eliciting such *concurrent* verbal protocols. Table 2 shows the kinds of issues that they can raise. It is the first section of an attempt to envision the transaction posed by Tolley et al. (1986), in a CV study eliciting monetary valuations for changes in atmospheric visibility. What might one conclude regarding the adequacy of this introduction and the meaning of the preferences that it begins to shape, for an individual who provided these comments?

This individual takes the task seriously, showing the sort of intense involvement that investigators often hope to evoke. However, that involvement has revealed or evoked confusion over the precise meaning of “household.” That confusion is problematic if the outcome depends on the choice of definition or if the frustration reduces process value (or simply makes it harder to take the task seriously). As a result, such a respondent could be pushed down various branches in Figure 1.

The protocol also shows that the respondent cares enough about the study’s sponsorship that mentioning it creates a temptation to respond strategically. This

Table 1. Typical instructions for a think-aloud protocol

As I read each question aloud, please think out loud as you answer it. So that I can understand your reasoning, please tell me everything that you can about your answer. I am interested in why you chose that answer, any difficulty that you had in answering, any questions that crossed your mind, and so on. Thank you . . . .
[Use the following prompts if they say too little, or their rate of comments slacks off:
<ul style="list-style-type: none"><li>•Talk out loud as you think your answer, OK?</li><li>•What’s going on in your head? Tell me about it.</li><li>•Is that all you were thinking about?</li><li>•Anything else?</li></ul>
Use the prompts extensively at the beginning and then for any subsequent set of questions where they are silent—since some kinds of questions may be more difficult than others. That’s more important than pressing them for each subset of questions, where it would be a hassle.]
Source: Pretest of expectations questions for National Longitudinal Study of Youth Expectations Module (Investigators: Manski, Dominitz, Fischhoff).

sensitivity shows that researchers have fulfilled their ethical responsibility to communicate their funding source. Being seen to level with respondents should increase the transaction’s process value. The assumptions made about that sponsor will affect outcome value, but in more predictable ways than had respondents had to guess.

Table 2. Fragments from a (hypothetical) think-aloud protocol

<b>An Actual Survey</b> Hello, I’m _____ from the University of Chicago. We are visiting with people in Atlanta, as part of a research study about environmental quality. Since we’re talking with a scientifically selected sample of Atlanta residents, the viewpoint of your household is very important to us (Tolley, Randall, et al., 1986).
<b>A Possible Construal</b> They say that they’re from a university. Assuming that’s true, does that mean that this is just to satisfy their scientific curiosity? Or, are my answers going to affect governmental policy? If it’s just a matter of curiosity, I might as well tell the truth, but I probably don’t need to work all that hard. If it’s going to make a difference, then I really ought to think about what I want and whether there are any opportunities to slant the results in the direction of policies that I want.  What does it mean that they’re interested in the “viewpoint of my household?” Am I supposed to tell them what I think, as a representative of the household, even if others in the family think differently? Or, am I supposed to average, in some way, what I think everybody in the house thinks? If so, then what weight am I supposed to give to each of those bodies? For example, are the kids’ opinions worth less because they can’t vote, haven’t thought as much about environmental issues, and won’t be directly paying the bill? Or, are their opinions worth more because they’ll be living with the environment for longer than us old folks and because they’re the ones we’re trying to protect? What if they haven’t really thought about these questions? What if I haven’t? This is confusing.

Source: Fischhoff and Furby (1986).

If this protocol were collected during pretests, one could reformulate the instructions, trying again to create the desired construal. Additional pretests could determine whether these problems were resolved, without creating new ones. A latter section considers a systematic approach to such proactive design. If this protocol were taken from an actual interview, one would have to live with these imperfections. The section on Reactive Analysis considers what to do then. In either case, one must decide how seriously to take the thought processes revealed in protocols.

Fortunately, verbal protocols have been studied extensively (e.g., Ericsson and Simon, 1994; Hasher and Zachs, 1984; Nisbett and Wilson, 1977; Wilson et al., 1993). Some relevant results include: (1) People can report fairly well on their thought processes, as those occur. As a result, there is reason to believe what people say in concurrent verbal protocols. (2) Some task features affect behavior so automatically that they elude people's powers of introspection (e.g., an option's place in a physical or temporal array, the reference point, the effects of previous exposure). (3) Forcing people to reflect deeply on their options sometimes reduces satisfaction with their choices—as though any decision can become conflicted, if one thinks about it enough. As a result, pretest subjects should work as hard as actual subjects, if their experience is to be predictive.

### *Manipulation checks*

Well-executed pretests should reduce the variability in respondents' construals. However, they are unlikely to eliminate it. Words may just mean different things to different people, such that no single version will uniformly evoke the desired construal. For example, explicitly guaranteeing that a promised good will be delivered may reassure some respondents, but make others suspicious.<sup>5</sup> Providing many explicit details may satisfy some respondents, while overloading others.

Manipulation checks are another standard procedure for determining how closely respondents' construals match the intended ones. The simplest versions just ask respondents how they interpreted a task, immediately after completing it. Neutral wording is used to avoid inducing artificial skepticism or acceptance. For example, in a brief phone survey, we elicited willingness-to-pay judgments for cleaning up either 30 or 1000 miles of Pennsylvania rivers (Fischhoff et al., 1993). The brevity of the task was intended to reduce respondents' memory load, at the price of increasing their construal load (i.e., the less we said, the more respondents had to infer). At the end, we asked respondents to recall several task details. Their reports suggest what such checks can reveal:

*How many miles of river would be cleaned up?* Respondents were offered three ranges (0–100, 101–1000, and 1001–10000). Despite this hint, 52% of respondents gave wrong answers or none at all. If these reports reflect respondents' beliefs when they produced their valuations, then over half of the expressed preferences misrepresent respondents' values for the described good.<sup>6</sup>



*How effective would the clean-up be?* Although the program had been described as one that would “eliminate the problem,” only 27% of respondents endorsed the “eliminate completely” option. Almost half (48%) said that it would just “make good headway,” 7% said that it would not do much and 15% said that they had not thought about its effectiveness. Thus, most respondents’ values for the described good should be higher than their expressed WTPs (which referred to but a fraction of the promised clean-up).

*How would the program be paid for?* Although the task specified “higher prices on goods and services,” only 28% of respondents chose that option. More than twice as many chose “taxes,” while 25% chose “donations” and the remainder other ways (more than one choice was allowed). If people care about the payment vehicle, then these WTPs do not apply to the described task. The same price may mean something different if achieved through taxes or through companies internalizing environmental costs.

*Who will pay?* Even though the project description said nothing explicitly about this topic, almost all subjects chose one of the options that we offered. The most common choice (60%), “all PA taxpayers,” was consistent with the modal belief in taxes as the payment vehicle. For these respondents, this feature effectively went without saying.

When respondents report something other than what was stated, several interpretations are possible. They may not have understood the original statement. They may have understood, but rejected it. Or, they may have understood and accepted it, but forgot those details between performing the task and answering the manipulation check. If so, then their information processing was fairly shallow, even if it settled on the desired specification.

One measure of the depth of processing is the internal consistency of judgments and manipulation checks, or their degree of *construct validity*. For example, subjects reporting a small clean-up program were twice as likely to expect it to be completed as subjects reporting a large clean-up (35% vs. 18%), a sensitivity to practicality that suggests coherent beliefs. Two other consistent reports were that respondents expected taxes to be the payment vehicle and taxpayers to bear the burden. Responses were very similar with two versions of the task, varying in ways that should not affect construals (whether the river clean-up was compared to using cleaner coal technology or to limiting forest development). Such coherent response patterns provide grounds for trusting these manipulation checks—even if they showed a consistent failure to construe the task as we had intended.

In principle, one could also ask respondents to describe their own thought processes and examine the construals that those reflect. Unfortunately, such *retrospective* verbal protocols have proven to be questionable indicators of actual thought processes (Fischhoff, 1975; Nisbett and Wilson, 1977). They can be distorted by people’s intuitive cognitive theories (i.e., how they think they think), by self-presentation effects (i.e., how they would like to think), and by subsequently acquired knowledge (i.e., what they now think). In addition, many

different thought processes can lead to the same choices, making it hard to validate any particular description (Dawes and Corrigan, 1974; Slovic and Lichtenstein, 1971). Although researchers sometimes ask respondents how important different task features were to them, these responses are better treated as describing the task than the thought processes.

### **Construal frameworks**

Our interpretation of the river clean-up study was made easier by having some basic science about eliciting and evaluating verbal reports. Our interpretation was handicapped, by our treating the substance of the preference task in an ad hoc way. We made no reference to other studies of how people deal with river clean-ups, nor how they think about public goods or payment schemes, nor what confidence they place in institutions that manage the environment (or that conduct social research). Other scientists make a living studying these topics (Gardner and Stern, 1996). Invoking their work could have constrained our speculations, even when it did not provide complete answers. For example, it would have been nice to know when taxes come to mind, how legitimate they seem, what determines expectations of clean-up success, and so on.

If people have relatively constant tastes, across situations (Becker, 1976), then it should be possible to create general accounts of construal processes. That is, other things being equal, the features that matter to people in one context should matter to them in another. Ideally, we would have empirically grounded theories of construal for each domain of preference elicitation. Those theories would tell us what features concern people and what they presume about missing (or incomprehensible or suspicious) details.

There should be a natural coincidence of interests between researchers for whom understanding construal processes is a means and those for whom it is an end. The latter should welcome having others work on how best to present tasks. The former should welcome seeing their topics incorporated in choice tasks. The remainder of this section describes two approaches to creating this bridge. Each involves creating a general framework, incorporating features occurring in a large class of tasks. That framework allows pooling whatever has been learned about the construal of each feature. If recurrent patterns emerge across tasks, then one can extrapolate them to new situations. If general patterns do not emerge, then one must measure construals in each specific context. The first of the two frameworks deals with evaluating transactions. The second deals with evaluating the consequences of risk behaviors (e.g., smoking, drinking); a complementary framework would consider construing the benefits of such behaviors. Although we have some fondness for these particular frameworks, the logic of their construction and use applies to any functionally equivalent ones.

*Investigator-driven frameworks: construing transactions*

Our framework (Fischhoff and Furby, 1988) for transactions arose from a secondary analysis of studies eliciting evaluations of atmospheric visibility.<sup>7</sup> Some were contingent valuation studies; others were studies of preferences, conducted by environmental psychologists and landscape architects; still others were attitude surveys. Characterizing these tasks revealed great variability in the details that different investigators chose to specify. Although such variability might reflect careless design, this seemed unlikely, considering the effort invested in many studies and the emphasis on task specification in the CV literature (Mitchell and Carson, 1989). Rather, we concluded that the details varied because investigators had different intuitive theories of their respondents' construal processes. Features that some investigators thought went without saying (e.g., that the good will definitely be provided, should the payment be promised), others thought required explicit description, lest respondents produce their own alternative construals.

Table 3 presents the framework. Although illustrated with visibility examples, it is intended to apply more generally, to any opportunity for receiving a *good* in exchange for a *payment*, in a *social context* capable of influencing the transaction's outcome or the process value. People may not care about each *substantive* feature in the transaction specification (e.g., visual range). However, if they do, then they should care about the *formal* aspects of its definition (its quantity, the certainty of its provision, the payment period's duration, etc.). Thus, for example, someone who values visual range should be willing to pay more (or campaign harder) for a transaction that promises greater visual range, over a longer time period, or a larger geographical region.

The first feature in the framework, "attribute of visibility," reports four aspects of atmospheric pollution that have been found to affect aesthetic judgments. These are plausible candidates for features that might interest subjects in tasks eliciting visibility preferences. When investigators specify these features, differences in them may account for differences in valuations *across* studies. When the features are ambiguous, differences in subjects' construals may account for differences in valuations *within* studies. Our secondary analysis asked whether differences in task specification could account for differences in preferences. However, so many task features varied across studies that no clear signal was possible. However, in future studies, it should be possible to circumscribe those aspects of visibility that matter to people—as an end in itself and as a tool to managing task construal.

The final formal feature for specifying the good is the certainty of its provision (if the transaction is accepted). The manipulation checks for the river clean-up study revealed that respondents were skeptical about our promise to deliver the clean-up, if they provided the payment. If other preference elicitation studies used comparable manipulation checks, we could determine the generality of this finding. Those results could be integrated with basic research into intuitive theories about the trustworthiness of promises (which might be informed by results from manipulation checks in preference elicitation studies).

*Respondent-driven frameworks: construing risk behavior choices*

The framework in Table 3 was initially derived from the features mentioned explicitly in existing studies. These features reflect those investigators’ intuitions about what matters to their subjects (or their sponsors’ stipulation of features that they wanted to have mentioned). We supplemented them with features drawn from the social science literatures on decision making and responses to environmental changes.

The alternative strategy is initially to derive a framework from lay beliefs. We have done this with a pair of convergent procedures. The first asks respondents to think aloud as they read deliberately underspecified questions. That protocol uses a “funnel” design, with increasingly specific prompts. Respondents are asked, initially, just to express their thoughts. Then, as the interview progresses, they are asked what they mean by those thoughts, which missing details would have helped them to answer, and what assumptions they made (e.g., “Oh, when I hear drinking and driving, I always think about what happened to my friend Jeff, who . . .”).

Table 4 shows the result of applying this approach to adolescents’ evaluations of possible negative consequences of risk behaviors, like drinking and smoking. It

Table 3. Components for defining transactions (with examples from visibility valuation)

The Good (e.g., visibility)	
Substantive Definition	
Attribute(s)	
	Haze intensity
	Visual range
	Plume (color)
	Light extinction
Context	
	Natural or built
	Judged uniqueness
	Associated activities (e.g., hiking, viewing, playing)
	Significance (e.g., religious, culture, historical)
Source of Change	
	Predominantly natural (e.g., vegetation, forest fires, dust storms, humidity)
	Predominantly human (e.g., power plant, other factories, field burning, slash burning, motor vehicles)
Formal Definition	
Reference and Target Levels	
	Magnitude and direction of change
	Statistical summary
	Representation (mode, richness, organization)
Extent of Change	
	Geographical
	Temporal (existence, direct enjoyment)
Timing of Change	
Certainty of Provision	

Table 3. Continued

The Value Measure (e.g., money, time, discomfort, effort)
Substantive Definition
Attribute(s)
Leisure, work (for time)
Physical, emotional (for discomfort)
Context
Electric bill, sales tax, income tax, park entry fee, environmental fund (for money)
When convenient, when demanded (for time)
When rested, when exhausted (for effort)
Constituency
Formal Definition
Reference and Target Levels
Magnitude and direction of change
Statistical summary
Elicitation (response mode, response format, cues, feedback)
Extent
Frequency
Duration
Timing of Payment
Certainty of Payment
The Social Context
Other People Involved
Provider of the good
Others present
Resolution Mechanism
Determining parties
Iterations
Constraints
Other Stakes
Externalities
Precedents
Legitimacy of process

Source: Fischhoff and Furby (1988).

groups features into Behavior (expressed in terms of dose determinants), Other Behaviors (affecting the expression and effects of the behavior), the Actor, Context, and the Outcome. The subfactors are general statements of ones that might seem relevant to a given risk domain. They are illustrated with examples for drinking and driving.

We conducted such interviews with 61 adolescents, drawn from diverse backgrounds. They thought aloud, while answering questions like “What is the probability that someone who drinks and drives will get into an accident?” Most (49) of these young people wanted to know how much driving was involved (categorized as “amount” under Behavior). One-quarter (15) wanted to know something about the kind of driving (categorized under “potency”).<sup>8</sup> And so on. Research design is simplest when some features appeared in most individuals’ construals of most

Table 4. Coding framework

Framework element	Risk factor categories	Example variables drinking-and-driving question
BEHAVIOR	Amount	Amount of alcohol consumed
	Potency	
	Method	
OTHER BEHAVIORS	Risk Buffers	Amount of food eaten
	Risk Amplifiers	Other drugs consumed
	Time-Related	Night or day; day of the week
	Place-Related	Where alcohol was consumed
ACTOR	Physical	Tolerance to alcohol
	Cognitive	Awareness of effects of alcohol
	Social-Psychological	Mood
	Material	Wealth
	Spiritual	Faith
	Skill	Driving skill
	Character	Responsible; mature
	Age	
	Gender	
	Genetic History	
	Status	
	Luck	
	Motivation	
	Self Other	
CONTEXT	Social	
	General, cultural	Drinking norms
	Family	Family approval
	Peers, others	Peer approval
	Environmental	Road conditions
RISK OUTCOME	Social Reactions	Get in trouble
	Personal Effects	
	Physical	Injury
	Psychological	Worry, guilt
	Cognitive-Physiological	Kill brain cells
	Cognitive-Psychological	Can't think
	Material	Lose car, lose license
	Accidents	Get in a wreck while high
	Lifestyle	Become a bum
	Complex	Get high
	Effects on Others	Hurt your friends, family
	Behaviors	Use more, do heavier drugs
	Severity, type when measured	

Source: Fischhoff (1996).

tasks, while other features seldom arise. Then researchers could specify just the focal features, revealed by studies like this one. For example, most teens' construals of most events included the amount of the risk behavior; thus, investigators should always assume that they need to specify that feature, lest respondents invent a value.<sup>9</sup> The salience of other features was more variable across our 9 risk behaviors (e.g., when the effects were measured, how potent each exposure was, how it was administered). As a result, the salience of these features must be studied for each risk.

The second, converging procedure in this approach uses structured questionnaires to see whether people actually use the factors evoked during the open-ended interviews. The questionnaires present almost fully specified tasks, including all but one of the features mentioned by any significant portion of interview respondents. Questionnaire subjects evaluate this complex stimulus once, then repeat the task after receiving a value for the missing feature. They also receive values for two other missing features—but ones rarely mentioned in the open-ended interviews. If people have stable construal processes, then questionnaire subjects should be more sensitive to learning about a factor cited often in the open-ended interviews than to learning about a factor that was seldom cited. This was the case in our study. Furthermore, youths drawn from high-risk and low-risk settings (e.g., juvenile detention centers, swim teams) responded similarly. As a result, similarly specified questions could be used with these diverse populations.<sup>10,11</sup>

### **Construal-sensitive preference elicitation**

Investigators can respond to construal processes either proactively or reactively. That is, they can try to control construal processes, by focusing respondents on the specific questions that they want answered. Or, they can deal with the residue of uncontrolled construal processes, somehow translating elicited preferences into the ones of interest. Implementing either strategy requires knowing what question is intended and what question has been answered. This section considers these options.

#### *Proactive design*

Ideally, one would control respondents' construal processes by fully specifying tasks, in terms that respondents will readily understand and accept. The empirical study of construal processes can guide that specification, by identifying the features that typically matter and features that can be ignored (because people are indifferent to them). The next section describes a study that relied heavily on existing research to apply a full specification strategy. The section after it describes a study clarifying the construal of a feature that might concern many respondents in many studies: how the results will be used.

**BTU tax: implementing a full scenario.** Several years ago, we followed a proactive strategy in eliciting preferences among the tradeoffs embodied in the BTU tax proposed early in the first Clinton Administration. Although complex, the BTU tax lent itself to proactive design for several reasons. One is that the Administration's proposal provided the details for specifying most elements in the transaction framework (Table 3).<sup>12</sup> Moreover, these details were derived from a more or less common conception; having a transaction with a relatively high degree of coherence increases the amount of detail that can be conveyed without cognitive overload. A second reason is that members of our climate research group had modeled the tax's impacts, allowing us to answer respondents' questions on issues like distributional effects (Dowlatabadi and Morgan, 2000). Third, we had just developed a brochure explaining climate change, allowing us to present the relevant science relatively clearly (Bostrom et al., 1994; Morgan, 1995; Read et al., 1994).

In a situation that clearly called for constructed preferences, we used a group format to discuss issues, with the moderator working to bring the full specification to participants' attention. However, the preferences used in data analyses were collected privately, at several points in the proceedings—so that they would represent individuals' personal values, not just the ones that they felt comfortable expressing publicly, in this arbitrary group of people (see also Morgan et al., 1996).

Our experience provided some reason for optimism about this approach: (a) Participants seemed to take their task seriously and be glad to be involved, consistent with other experiences in value-focused thinking (Keeney, 1992; National Research Council, 1996). (b) Their questions required drawing on our prepared information. (c) There were few overt expressions of confusion or protest responses. (d) On various measures, participants reported satisfaction with the procedure. (e) The preferences that they expressed seemed reasonable and sensitive to task details. (f) Respondents evaluated variants on the Administration's proposal similarly, except for strongly preferring it as part of an international agreement (consistent with other research on perceived equity; Earle and Cvetkovich, 1995). Overall, respondents were split about evenly regarding the tax, with supporters holding their views more strongly than opponents at the beginning, and strongly less at the end.

Unfortunately, events caught up with us before we could collect a full sample: The Administration withdrew the proposal, in so public a fashion that we discontinued the study. Nonetheless, this example shows what proactive design demands: fully specified tasks, technical analysis of policy issues, tested methods for explaining the science, and opportunities for participants to moot them (Fischhoff, 1997). How heavily the design must rely on intuition depends on how much of the needed research is already in place.

**Monongahela clean-up: determining the bounds of a scenario.** With the BTU tax, the Administration specified the proposed transaction. Our task was to translate it into framework terms, then present it comprehensibly. Often, though, knowing what to



include is less clear. One common issue is what to say about a study's purpose. A common philosophy is to say nothing beyond "we want your true preferences," hoping to discourage strategic responses. However, if respondents care about this aspect of the transaction's social context, they are likely to assume something. The investigators' silence may then evoke distrust, as well as leaving a vacuum—affecting both outcome and process value.

Deciding what to say is partly a matter of principle. Scientists disagree about the legitimacy of withholding such information and about how it affects a task's incentive compatibility. The importance of these disagreements depends on how much of a difference the disputed information makes. In a recent study (Welch and Fischhoff, 1999), we examined the impact of telling about the contingent valuation method, on responses to a CV-like study. Specifically, we asked Pittsburgh-area residents (e.g., Rotarians) for their willingness to pay to reduce acid mine drainage (AMD), into the Monongahela River.<sup>13</sup> At one point in the process, respondents were told about CV, either in brief or with a set of reasons supporting and opposing its use as a public policy tool. In different conditions, respondents evaluated the good with and without knowledge of CV; they also evaluated CV with and without having evaluated the good.

Our respondents showed a mixture of sensitivity and insensitivity to this aspect of social context. Their median WTP was always \$50, whenever they were asked and whatever they had been told about CV. However, in both between- and within-subject comparisons, the more respondents knew, the less happy they were. Only 55% of those who had both performed the evaluation task and been told about the CV context said that they would agree to participate in such a study, compared with 79% of those who had had neither experience. Having evaluated the good slightly decreased how convincing respondents found the reasons favoring CV (from 3.7 to 3.5 on a 1-5 scale), while somewhat increasing how convincing they found the reasons opposing it (from 2.8 to 3.3). Ratings of CV's legitimacy predicted respondents' sensitivity to task-specification problems if they had evaluated the good, but not if they had not.

If these results are robust, then we can fulfill our ethical obligation to describe the purpose of CV studies (and perhaps other tasks), without affecting expressed preferences. Some other aspects of these results were also encouraging for CV proponents: respondents were somewhat more persuaded by the reasons legitimating CV than by the reasons opposing it. Most were willing to have their responses used in setting public policy. However, respondents' support declined, as they learned more about their task (both from being told about it and from trying to perform it). Perhaps better proactive design could increase support.

### *Reactive Analysis*

However clear a task's specification, and however diligent its presentation, there will often be gaps between the question being asked and the question being

answered. What should be done with the residual imperfections? For example, how do we treat the preferences of respondents who reported evaluating 10 miles of river clean-up, when we stated 1000, or those who reported expecting less than the promised full clean-up (i.e., “good headway” or “not much”). Presumably, their value for the stated amount is larger than their response indicates. Should we act as though these people answered our question, when they did not?

There are three possible strategies for addressing these residual imperfections: *disqualification* (eliminating respondents whose construals have strayed too far from the intended one), *adjustment* (modifying observed preferences to those that would have followed from the intended construal), and *accommodation* (living with the problems, and reflecting them in the study’s conclusions). The choice among these strategies depends on the data and on one’s data-treatment philosophy.

**Disqualification.** Historically, social scientists have been very reluctant to discard respondents. In this sense, the CV literature is unusual in using practices such as “alpha-trimming” (disqualifying some percentage, alpha, of the highest and lowest responses) and omitting “protest responses.” As a result, respondents may unwittingly disqualify themselves by expressing extreme valuations.<sup>14</sup> Nonetheless, some methodologists argue that sciences needlessly handicap themselves by including all data no matter how deviant (Wilcox, 1998).

Rejecting respondents on the basis of deviant manipulation checks, however, raises different philosophical questions. For example, few respondents in the river clean-up study passed all four manipulation checks. Many got all four wrong. One might argue that it is dishonest to pool the responses of individuals who are answering fundamentally different questions. Moreover, extensive misconstrual need not mean carelessness. A thoughtful individual could have a coherent reinterpretation of an entire task. On the other hand, one might want to preserve just such misconstruals, if they parallel those to be expected in the real world (e.g., when voters misread the meaning of an election).

**Adjustment.** When people misconstrue the *formal* features of a transaction, and investigators know (or can conjecture) basic structural properties of respondents’ preferences, systematic adjustment may be possible. Assume, for example, that “good headway” on the river clean-up means 50% completion. Then WTP for the “complete clean-up” might be roughly double the WTP expressed by a respondent who construed it as meaning just good headway. Similar logic could be used to adjust WTP values for respondents who misconstrued the river lengths (although that value might not be linear with length, as it should be linear with probability of completion).

Such adjustments may be less feasible when *substantive* features are misconstrued. For example, some ways of paying may be more legitimate than others, hence command a larger WTP (reflecting their greater process value). Dedicated studies might estimate the conversion factor for going, say, from “WTP with taxes”

to “WTP with higher prices for goods and services.”<sup>15</sup> If that conversion factor is similar for different goods, then this result could to be reused, providing an empirical estimate for that element in the transaction framework.

**Accommodation.** Adjustment and disqualification can be controversial practices. An alternative strategy is to accommodate these problems in a fuller reporting of all data—aggregating responses corresponding to qualitatively similar construals. Thus, readers would be told such things as (a) what percentage of respondents passed each (and all) manipulation check(s), (b) which misconstruals occurred frequently and what they suggest about how people view the topic, (c) how evaluations varied with construals, (d) how well respondents felt that their judgments represent their preferences, and (e) how different adjustment and disqualification procedures affect the overall picture.

Such full reports would allow a reader to see *how* respondents thought about their task, in addition to *what* they said about their preferences. Readers would get a feeling for what respondents meant by their answers, and how seriously they want to (or should) be taken. Complex accounts may still allow practical and theoretical conclusions (e.g., if most respondents who take the task seriously express similar preferences, if preferences differ in ways consistent with construals). Full accounts may, however, frustrate those hoping to reduce preferences to simple numbers suited to mechanical aggregation.

## Conclusion

Taking construal processes seriously can be troublesome in the short run. It introduces an unwanted dimension of complexity into task design. It opens the door to alternative interpretations of responses. It slows the pace at which studies can be run. It is only natural to want to handle construal processes as expeditiously as possible, by reusing familiar tasks, trusting one’s intuitions, or conducting minimal pretests. Sometimes, these practices will suffice. Where they don’t, short-term expediency can mean long-term inefficiency, if fundamental problems are persistently neglected.

As a reflection on where we stand, Table 5 offers excerpts from think-aloud protocols conducted with two California residents. Each was asked to express willingness to pay for the Long Beach Harbor clean-up, using instructions from the NOAA benchmark study (Carson et al., 1994). Participant 1 seems initially to accept the scenario at face value, but then to have second thoughts, once a higher cost is suggested. Indeed, this within-subject manipulation of the “referendum” price apparently calls the entire clean-up program into question. As a result, it is unclear whether this individual’s expressed preference refers to the specified clean-up, or just to some portion of it. Participant 2 has serious questions about the quality of the science underlying the clean-up program. Initially, she explains her

\$1 WTP response as a gesture, rather than as a value for the good. Further reflection leads, not only to abandoning that response, but to a demand to be compensated for the “clean-up,” which she now sees as environmentally destructive. Given the great effort invested in the Long Beach study, these construals suggests a need to move beyond the current state of the art in creating tasks with the intended meanings.

We propose here such an approach, based around standard frameworks for specifying tasks, like those in Tables 3 and 4. These frameworks are complex, so much so that it is small wonder if researchers worry, “Could any CV study meet all the criteria . . . set out by Fischhoff and Furby (1988)?” (Schkade and Payne, 1993, p. 289). The complexity of the framework, however, reflects the richness of the construal processes that people naturally undertake when confronted by tasks with too many or too few details. A framework can make that complexity more tractable by providing a way to coordinate empirical research on particular construal processes. For example, there is an extensive literature on environmental psychology that might inform the elicitation of preferences regarding environmental goods

Table 5. Two think-aloud protocols, evaluating a Long Beach Harbor clean-up

**Participant 1**

At present, the program to speed up covering of the contaminated sediment is estimated to cost your household a total of \$80. Your household would pay this as a special one-time tax added to next year’s California income tax. If an election were being held today and the total cost to your household would be a one-time additional tax of \$80, would you vote for the program or would you vote against it?

**I would have to think about it. I’m into the environment, but I don’t know right now. I couldn’t say. I probably would vote for it, but I don’t know. If it came up on the ballot, I probably would vote for it. I’m sure, though, that the money could be spent on schools—towards education. I’m not happy with my kids’ education. So, if it came to this program here or schooling, I would vote for the schooling.**

It is possible that the final engineering cost estimates would be higher than this. If it turns out to be the case and your household would have to pay a one-time tax of \$140 instead of \$80, would you vote for or against the program?

**I’d say that I’d have to vote against it then. You see, that’s something, too. It always seems that—they always say it’s going to be \$80, but it ends up being \$140 anyway. That’s why I say I don’t know right now—I would have to hear more about the program.**

...

When you voted, did you think your household would have to pay the special tax for 1 year or more than one year?

**That’s what I was saying before. The government tells you one thing, but then it always tends to be more than what they told you. So, it wouldn’t surprise me if it did get voted for and we did have to pay the tax, that it could end up as more than \$80 per household. That wouldn’t surprise me at all.**

...

Do you believe that DDT and PCB could cause the problems I described.

**If they’ve checked into it and they say that’s what the problem is, then yeah, I’d say ‘sure.’**

Table 5. Continued

<b>Participant 2</b>
Do you have any questions about how [the clean-up process] would work?
<b>Where has it been done elsewhere? How did they determine whether it was successful? Is the sediment they are going to dump, exactly like the sediment on the bottom of the ocean? And also dumping all this stuff in the ocean could affect something they don't foresee. And what about other species? Does the absence of these birds affect other species, like bobcats, or animals that live in the mountains?</b>
...
At present, the program.... Would you vote for the program or would you vote against it?
<b>Against.</b>
...
What is the most that you would pay?
<b>\$1</b>
How did you arrive at that figure?
<b>I just figure the program would give some people some jobs, and I could part with a dollar. But I kind of think it's a foolish idea. I'm still worried about the effects of the program.</b>
[Such as?]
<b>Well, the organisms on the ocean floor and the plant life could possibly be harmed by all the dumping. I don't think this is a good idea at all.</b>
[But earlier you said you would pay to support the program.]
<b>That's a very good point. I guess I should pay to not have program occur, according to what I just said.</b>

Source: Light type taken from (Carson et al., 1994); boldface from interviews conducted in Oakland, CA, July 24–25, 1997.

(e.g., Stokols and Altman, 1987), another literature on people’s sensitivity to social context (e.g., Earle and Cvetkovich, 1995), and yet another on measurement artifacts in interview and experimental settings (Rosenthal and Rosnow, 1969). Studies of lay beliefs and intuitive theories show the factors likely to evoke construal processes in specific domains (Fischhoff, 1992; Fischhoff et al., 1997; Furnham, 1989).

Thus, a construal framework shows where to look for relevant research and offers a way to use what is found. It facilitates comparisons across tasks, by characterizing them in common terms. It encourages coordinating research from across the social sciences. In time, the designers of a task could just look up the results pertaining to a particular feature and be able to anticipate its construal. For their part, preference elicitation studies often involve imaginative, involving tasks. Studying how people construe them might produce valuable insights for domain researchers. For example, the responses to our Mon clean-up study could inform studies of social trust, just as studies of that topic informed our design.

How intensely to seek this ideal should depend, in part, on who pays the price for untreated misconstruals. With studies motivated by purely scientific concerns, investigators bear the costs of error. Poor measurement reduces the power of their designs and increases the chance of artifactual results. With applied science, respondents may bear the risk. The implicit warranty accompanying a study is that the investigators know what questions respondents have answered. When that is not case, respondents have been misrepresented and their informed consent violated.

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### Notes

1. Table 3, discussed below, presents examples of structural and substantive features, when evaluating changes in atmospheric visibility.
2. The doctoral proposal raises a familiar variant on these processes. Not all details can be specified. Indeed, innovative work means having freedom to follow promising new directions, as they arise. When candidate and committee belong to the same intellectual community, they will agree on whether the resulting work represents a plausible construal of the dissertation "contract." Painful mismatches can occur when candidates are less completely socialized than they, or their advisors, realized.
3. With real-world transactions, elements of people's preferences may be embedded in the relationship between the parties. One of us (BF) once received an anxious call from the real-estate editor of a major newspaper, concerned because he had made a Sunday morning bid on a house, while still hung over from the night before. The editor did not notice, and could not remember, many features of his own real-estate transaction, including ones that he routinely stressed to his readers. In our conversation, we pieced together just how many of his values were already incorporated in the procedures that determined the set of houses that his agent would show him and those that would follow making the offer (e.g., inspections, credit checks).
4. Some professions (e.g., history, clinical psychology, anthropology) require apprenticeships, designed to reintroduce a sort of disciplined naiveté. Their graduates hope to decipher lay construals, freed of preconceptions. Belonging to relatively atheoretical disciplines may help them to see a wide range of construals.
5. If the variability in respondents' interpretations is predictable, it might justify "audience segmentation," providing stimuli that are functionally equivalent, although literally different (e.g., by using the terms most familiar to each audience). Alternatively, one could allow respondents to ask clarifying questions, the answers to which would tailor the presentation to their personal needs. Such departures from standardization make some researchers nervous. Their fears over communicating unintended messages outweigh their concerns over leaving respondents confused and appearing uncooperative.

6. In this case and others, some respondents may have tried to evaluate the good as described, even if they did not believe the description.
7. Including the one in Table 2.
8. The other questions dealt with the chances of smoking cigarettes leading to cancer, smoking cigarettes leading to addiction, using cocaine leading to health problems, using cocaine leading to addiction, using marijuana leading to health problems, drinking alcohol leading to addiction, sex leading to AIDS, and sex leading to pregnancy.
9. The one exception is that the teens in this study did not consider the amount of sex, when estimating the risks of AIDS and pregnancy as possible consequences. Such dose (or scope) insensitivity has been found in other contexts as well (e.g., Linville et al., 1993; Shaklee and Fischhoff, 1990). It suggests that teens (and adults) may evaluate similarly the risks associated with different amounts of sex. As a result, with the sex-related questions, a researcher would be in the strange circumstances of having descriptive grounds for omitting a normatively relevant feature.
10. The connection between the two frameworks is as follows: voluntarily engaging in a risk behavior means accepting a transaction. The payment includes accepting the risks of negative outcomes, like those in Table 4. For an individual who cares about them, these outcomes are substantive features in the "value measure" of the transaction (as are the monetary costs of drugs, sex, alcohol, etc.). The Behavior information in Table 4 partially determines the formal features of the transaction (i.e., the probability and extent of the substantive features).
11. A list structure, like Tables 3 and 4, is, of course, not the only possible representation for a set of factors. In studies of lay understanding of health and environmental risks, we have represented features with influence diagrams (Clemen, 1991; Howard, 1989). We create them with a combination of investigator- and respondent-driven approaches. An "expert" model is created, summarizing the scientific literature. It structures subsequent think-aloud protocols using a funnel design, gradually focusing lay respondents on topics in the expert model (e.g., Bostrom et al., 1994; Fischhoff, in press; Fischhoff et al., 1998; Morgan et al., 1992).
12. In this way, it was quite different from a CV study, in which investigators typically have little guidance on how to specify many elements of the transaction.
13. We had wanted to replicate the Mon River CV study conducted by Desvousges et al. (1987), in the early 1980s. However, we discovered that the river was much cleaner than it had been back then (e.g., the Point, in downtown Pittsburgh, has been rated one of the top 10 fishing spots in Western Pennsylvania). This happy discovery led us to change the environmental good to one that is more pertinent (and the subject of occasional local news coverage, usually associated with the sort of major breaches that the proposed program would alleviate).
14. It might, of course, be possible to bias the distribution of legitimate responses without looking directly at their values. If some misconstruals tend to be associated with particularly high (or low) evaluations, they could be disqualified on misconstrual grounds, indirectly changing the distribution of evaluations.
15. In addition to evoking real preferences, the payment vehicle can also have an artifactual impact, by suggesting the magnitude of the expected payment (e.g., changes in income tax may be larger than changes in user fees). Such anchoring effects have been studied extensively by psychophysicists, whose literature is a place to start an analysis of adjustment factors (Poulton, 1989; Schwarz, 1999).

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