METHODS

Narrative valuation in a policy judgment context

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Abstract

Much natural resource policy work stresses the importance of involving lay and expert stakeholders in a dialogue about environmental values pertaining to decisions about land management. To this end, there is growing interest in value elicitation techniques that: (a) provide alternatives to values expressed as willingness to pay formulas; and (b) do a good job of representing the many social, ethical, scientific, or economic value dimensions of a problem and linking those dimensions to the evaluation of a specific policy. Toward these objectives, this paper explores the technique of *narrative valuation*, that is, the act of situating a valuation and decision problem in the context of a narrated story. It reports on an experiment that tested a narrative-based representation of a problem against a utilitarian one (didactic text) to see which representation better served the decision process. The relative proficiency of both formats was tested in the context of a policy decision about the impact of hydroelectric power production on a river's salmon population. The narrative technique appeared better able to help participants consider relevant value information such that they could apply that information to a complex policy judgment. Some reasons for the success of the narrative condition are discussed, including the technique's capacity for engaging participants and rendering technical information salient. The paper closes with some recommendations for further tests of narrative-based valuation tools. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

This paper addresses the problem of developing tools for representing and eliciting environmental values. The first portion characterizes some essential features of values research and considers the challenge of designing elicitation tools that respect and benefit from the behavioral science literature on framing. The second portion explains and presents experimental evidence for the construct 'narrative valuation', which posits that narrative valuation contexts may be an effective means for

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engaging valuation participants and helping them think through the particulars of a decision.

2. Environmental values

Much natural resource policy work stresses the importance of involving lay and expert stakeholders in a dialogue about environmental values so as to inform public policy decisions about land management (Dunlap and Scarce, 1991; Gregory and Keeney, 1994; Stern and Dietz, 1994; Kempton et al., 1995). Value is a complicated term involving myriad definitions, including both the idea of value as a material expression of worth and values as moral, ethical, social or spiritual belief systems that influence behavior. For public policy and natural resource contexts, Brown's (1984) distinction remains useful; he refers to values *held* by individuals and public groups (e.g. the desirability of wilderness areas, the importance of biodiversity) and values *assigned* to specific ecological goods or functions (e.g. the dollar value of 10 000 board feet of harvested timber, or the systemic value of a particular stream to a watershed). The relationship between values and decisions is clarified by employing particular question frames and following a designated sequence of steps — the order and type of which vary with the tools employed by the elicitor — in which stakeholders are asked to deliberate upon a problem and either select a choice, offer support for policy options, or state a price they would be 'willing to pay'. Accordingly, survey researchers, psychologists, and anthropologists have looked for congruence between expressed attitudes, mental or cultural models, and specific policy initiatives (Axelrod, 1994; Stern and Dietz, 1994; Kempton et al., 1995); decision analysts have worked to break problems down into their component parts (values, alternatives, tradeoffs, etc.) such that each part can be examined and recombined into a summary position (Keeney, 1992; Gregory and Keeney, 1994); and contingent-valuation (CV) scholars have posited hypothetical markets to aid in the pricing of environmental goods (Mitchell and Carson, 1989).

2.1. The judgment context

Though their methods vary, all values-elicitation practitioners must set up a task regime in which it is appropriate, and cognitively possible, for respondents to think about and subsequently express their values. This setting-up process can be as simple as the two sentences offered before an opinion survey or as complex as the multiple pages of background reading that can precede dollar valuation tasks or a decision sequence. For brevity's sake, let us call this setting-up process — the discourse that embeds or precedes the judgment task — the judgment context. Properly crafted, the judgment context serves to focus the task, reduce the cognitive effort required of the respondent, and ensure the decision's meaningfulness.

Understandably, the judgment context has been scrutinized for its impact on valuation outcomes. Behavioral decision theorists (Fischhoff, 1991) have examined judgment contexts only to find that very subtle changes in wording or phrasing — the way in which a question is posed — can influence the magnitude of the offered response (Ritov and Kahneman, 1997), or even result in the reversal of a respondent's initial preference (Irwin et al., 1993; Slovic, 1995). Contexts in which the evaluated environmental policy is framed as a recovery from a prior loss are more influential than policies posed as an equivalent improvement of a current status (Tversky and Kahneman, 1981; Gregory et al., 1993a). Judgments that are unnecessarily isolated or decontextualized are subject to manipulation because they fail to offer the respondent a means for evaluating the quality or price of an object as high or low, good or bad, affectively positive, negative, or neutral (Hsee, 1996). Conversely, designing 'evaluable' tasks by providing a comparative basis for evaluating a good can bias or facilitate the ranking of a good's importance (Slovic, 1995; Hsee, 1996; Rutherford et al., 1998).

These results suggest that respondents are very sensitive to the framing of a question which, consciously or subconsciously, work as hints to help construct responses (Gregory et al., 1993b). This sensitivity has been interpreted to mean that

evaluations of environmental goods do not exist fully-formed in the mind of the informant, that most individuals are not exactly clear about the importance of an estuary or the price they would be willing to pay to protect the habitat of a Northern Spotted Owl. When presented with an expressed preference survey or judgment elicitation task, subjects are thus easily influenced by the task. Responses may not be the product of stable predictable opinions. Instead they may be constructed in the process of inquiry, derivatives of the question posed (Slovic, 1995).

2.2. The judgment challenge

Judgment context effects pose, for obvious reasons, a challenge in which the policy researcher is caught between the need for informed choice and the knowledge that relatively subtle cues can influence judgments. To avoid paralysis one must thus ask: what does or what should constitute the decision context? Background material that precedes a judgment cannot be assumed to be a neutral, 'just the facts' preparatory course. Yet, it is equally futile to avoid using background material so as to avoid any and all framing effects. One approach to this dilemma is greater understanding of decision and deliberation strategies, what Payne et al. (1992) refer to as the individual's capacity to adapt one's decision behavior to a task's effort and accuracy requirements (p. 250). A second related solution is to structure problem solving such that the decision-participant is required to think through a problem using a defensible sequence of steps. To this end, Gregory et al. (1993a); see also Gregory, in press) suggest partnering the logical prescriptive steps of multiattribute utility theory (MAUT) with the behavioral decision theorists' descriptive knowledge of framing. Environmental valuation, they argue, should be an actively constructive process that avoids unrealistic cognitive demands by offering the survey participant supplementary help in the teasing-out of good quality value information. This work is an attempt to move thinking about constructed processes from the passive stance of avoiding judgment errors to the active construction of an improved judgment.

This behavioral decision making perspective changes the parameters of what should constitute the judgment context. One responsibility of that context is to embody constructive techniques that help to organize factual and issue information so as to facilitate sound decisions. A second responsibility is to offer [background] information such that it facilitates cognition or learning; the participant is often asked to take in new information (for instance, about the biological features of a wetland) and use that information to guide his or her judgment about how best to manage that wetland. A third responsibility is to facilitate stakeholder participation by making the task interesting and relevant to the stakeholder. Finally, the task outcome must be useful to the decision maker or expert policy analyst. One measure of usefulness is the analyst's ability to understand the driving forces or thinking behind participants' summary judgments. Thus, the judgment context is of good quality when it engages respondents, facilitates cognition and learning, helps respondents recognize the multiple value components (e.g. cost, ecological health, community concerns) of a policy decision, and then helps them use those components to assess the worthiness of a given policy.

3. Testing narrative valuation frames

It is at this juncture that narrative framing and the affiliated construct 'narrative valuation' become relevant. In previous papers the decompositional approach of MAUT has been advanced as an aid to structuring valuation problems and creating conditions under which good quality preferences, values and/or decisions can be constructed (Gregory and Slovic, 1997; Satterfield and Gregory, 1998). In this paper it is argued that narrative-based decision contexts provide another promising approach to help fulfill the requirements of good quality and policy-relevant decisions. Evidence for this claim stems from extant literature on the cognitive benefits of narrative information frames and from a test presented here of the efficacy of two text-based modes for displaying judgment contexts pertinent to an informed valuation exercise.

The two valuation-focused judgment conditions tested here are defined as *narrative* and *utilitarian*. Specific quantitative and nonquantitative information is common to both conditions; only the discursive modes of delivery vary. [This content is outlined in Sections 3.1 and 4.2 below.] Representation of the decision problem in the narrative mode relies on the everyday language of storytelling including the retelling of a believable sequence of events using first-person narration, image-based description, and character development.

The utilitarian mode is characterized by the affectively passive language of abstract reasoning, justificatory evidence, and scientific thought. Webster's dictionary (Yerkes, 1989) defines utilitarian as pertaining to "usefulness rather than beauty, ornamentation, etc." (p. 1124). As a discursive mode, it is closest in style to the language of policy documents and benefit-cost discussions, and is based on the normative assumption that cost and technical information cleansed of peripheral influences is the proper basis for informed decision making[1]. Such utilitarian frames dominate most current policy debates, a reflection of the influence of economics on the natural resource valuation and policy analysis literature (Stokey and Zeckhauser, 1978; Kopp and Smith, 1993).

3.1. The decision problem and research hypotheses

The empirical test was designed to explore two hypotheses using a decision problem about hydroelectric production and salmon habitat in a Pacific Northwest community. Participants were asked to evaluate a policy involving reductions in power production in exchange for letting more water through the dam's spillways to improve fish habitat and passage. Each participant was provided with a single page of background information using one of two discursive modes: a narrative mode or a utilitarian mode. The information content was the same in both conditions,

only the mode of presentation varied. Embedded within each of the background pages of these two conditions were four criteria, or value inputs, relevant to the decision. The inputs covered information about cost, salmon populations, citizen beliefs about the significance of salmon to the community, and citizen beliefs about the spiritual importance of the natural environment. After reading the one page of background information (either a narrative or utilitarian mode) participants were asked to evaluate a policy based on the four value inputs. The tests examined whether altering the judgment context's discursive frame but *not* the value-inputs would influence the effect of the value inputs on the policy evaluations.

The first hypothesis, inspired by Sanfey and Hastie (1998), is that the language used to present the value inputs will influence which values are most influential in the decision outcome.

By this logic, utilitarian language should accentuate the influence of economic and technical information (i.e. cost or salmon population) while narrative discourse should accentuate experiential and affectively-tinged information such as the citizen value information (i.e. significance of salmon to the community, and the spiritual importance of the natural environment). This proposition is based on the principal of compatibility (Slovic et al., 1990; Fischer and Hawkins, 1993), which stipulates that stimulus information will have its greatest effect on responses when it is represented in a form that is compatible with the mode of response. This suggests that because the utilitarian mode is discursively consistent with technical information such as cost or salmon inventories, these dimensions should have a greater influence on the policy judgment when presented via the utilitarian condition. Conversely, because first-person narration personalizes and deformalizes information, the citizen-value information should have greater influence on the policy evaluations under the narrative condition.

The second hypothesis posits that the narrative judgment context will outperform the utilitarian judgment context, by generating stronger linkages (as evidenced by larger β weights) between the provided value inputs and the subsequent policy evaluations. Conventional wisdom assumes the

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[1] The narrative and utilitarian background pages are included as Appendix A. Segments of each text are also included in the 'materials' portion of Section 4.

efficacy of the utilitarian mode because its exacting and evidentiary style is expected to instill in participants confidence that they are well-informed and thus well prepared for analyzing and evaluating policy options. Further, a utilitarian model of judgment posits that the validity and statistical representativeness of factual information allows participants to generalize and thus apply that information to related judgments (Harnill et al., 1980).

The authors, however, expected participants in the narrative condition to make better use of the [value] information for two reasons. The first is that narratives are conducive to the processing of information, and should therefore lead to better comprehension and use of provided information. In Sanfey and Hastie (1998), respondents given narrative information conditions produced more accurate performance estimates for a set of marathon runners than did those using information presented via either bar graphs or data tables[2]. Further, participants have been shown to impose narratives on data to help explain it when a narrative organization of information does not exist. For example, Pennington and Hastie (1993) discovered that jurors constructed narrative-like summations of trial evidence, summations that equipped them to 'process' their judgments of guilt or innocence. Both studies suggest that if evidence is already provided in narrative form, the judgment should be — cognitively speaking — that much easier. Ease of processing might also enhance knowledge integration which is akin in valuation contexts to the bringing together of multiple value dimensions in order to generate a summary judgment. Paraphrasing Kearney (1994), a coherent and interesting story may increase comprehension of the text's main ideas, allowing participants to answer complex questions about content and apply the information to new situations (p. 431).

A second argument for the efficacy of narratives is their ability to facilitate task engagement and comprehension. This is typically achieved by employing emotion to add meaning to otherwise abstract information (Kida and Smith, 1995; Finucane et al., 2000) and by concretizing information through the use of imagery and anecdote. Epstein (1994); see also Bruner, 1986) has defended the importance of experiential levels of processing which is defined as emotionally-driven and consistent with narrative representations of information[3]. Strange and Leung (1999) and Hendrickx et al. (1989) have, meanwhile, demonstrated the influence of anecdotal narratives on causal judgments. Hidi and Baird (1988) showed as well that students tend to recall concrete, personally involving material better than generalized, abstract material, even when the abstract material was more important in expressing the main ideas of the passage (quoted in Kearney, p. 429)[4].

4. Method

4.1. Participants

Participants in the study were drawn from the University of Oregon community. A total of 48% of the 239 respondents were male, 52% were female. The youngest participant was 17 years of age; the oldest participant was 52 years old. The mean age across all participants was 21.6 years.

4.2. Materials

All participants were given brief, one-paragraph introductions, asking them to read one page of background material covering information about

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[2] Valuation is not concerned with processing accuracy per se because valuation exercises are designed to be vehicles which elicit a value from a respondent without implying that there is such a thing as a right or wrong, good or bad [value] answer, only a well thought-out one. And yet accuracy does matter to the extent that valuation tasks expect the participant to assimilate (i.e. process) information which in turn helps the respondent generalize from the specifics contained within background text to a related question about policy support.

[3] Epstein (1994) refers to the importance of both rational and the experiential thought, a point we will take up further in Section 6.

[4] One can also think of a narrative as a means for embodying data, putting a face, so to speak, on abstract material such that technical information becomes concrete and comprehensible.

citizen values, hydroelectric power, a dam, and salmon. They were asked to read the material carefully and to pay attention to both technical information and information about different citizens' attitudes. Thereafter, participants read one of two single-pages entitled 'background text'. One text employed a discursive style defined above as utilitarian while the second employed a (first-person) narrative discursive style. The four value dimensions are listed below. Each was expressed in a high or low form; sample text follows.

1. *Cost*. Power would increase the per-household cost of hydroelectric power by either $60.00 or $300.00 annually.
2. *Salmon population*. Spawning salmon populations would increase either 2-fold (8000 spawners) or 10-fold (40 000 spawners).
3. *Spirituality*. Some citizens were characterized as those who believed that it was necessary to use human ingenuity to produce power and control river flow; others, as those who believed that the area's spiritual and natural beauty should be respected rather than controlled through dam technology.
4. *Significance of salmon to community*. Some citizens were characterized as those who identified strongly with the salmon's olfactory powers (its sense of smell) to find its way home to spawn; others, as those who identified with the salmon as primarily important for jobs and for supporting a fishing way of life[5].

The utilitarian text opens with an introduction of the problem, which is quickly followed by a reference to the geographical setting and case:

A large number of hydroelectric dams have been built in the Pacific Northwest over the past 70 years to generate electricity ... The Monroe River is representative of many river systems that produce power and salmon.

This text later includes the following:

Key policy decisions involve concerns such as the timing of power production (e.g. letting more water through dams on a regular basis would decrease the amount of power produced but also increase spawning habitat and food availability for young salmon)... The expectation is that increased water flow will raise the number of returning salmon on the river by at least 2-fold (8000 salmon instead of the current 4000) and possibly as high as 10-fold (or approximately 40 000 salmon).

The narrative text opens with the introduction of the narrator and an invocation of place:

There is a lot of talk around here lately about salmon habitat and hydroelectric dams. I am reminded of this as I drive along the road that borders the Pacific Northwest's Monroe River...

The text later includes the following:

My neighbor, an engineer, has taught me a thing or two about how dams and their hydroelectric technology can be managed in ways that kill fewer young salmon. She says that increasing water flow around the dams would help. Right now only about 4000 salmon are making it back per year, but if more water is released through the dam, salmon habitat and food availability will improve and more young salmon can survive the passage to the ocean and return years later to spawn. My neighbor also thinks that an increase in water flow could increase the salmon population by at least 2-fold (about 8000 fish a year compared to the current 4000) and by as much as 10-fold or about 40 000 returning salmon a year[6].

After reading the assigned background text (narrative or utilitarian), respondents were asked to evaluate a single policy (one-of-eight). The eight policies were derived from a 2^4 fractional replication design which made the value dimensions uncorrelated across the eight policies. Table

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[5] The content of both the utilitarian and narrative conditions is based on a stakeholder involvement process directed by one author (Gregory) in British Columbia, Canada (McDaniels et al., 1999). It is also based on writing solicited for this purpose from author John Daniel (1992), and on a nonfiction narrative (St. Germain, 1998) published in the literary periodical ISLE. We gratefully acknowledge Sheryl St. Germain's permission to use excerpts from her essay, "Masks of the Heart: Spawning Salmon," and otherwise assume all responsibilities for condensing or re-writing the original material to accommodate our research task.

[6] The above-quoted text covers the background information on dimension two: salmon population.

Table 1
Mean support for eight policy options using a 7-point strongly oppose/strongly support scale[a]

Option	Cost	Salmon population	Spirituality	Significance of salmon to the community	Condition	
					Utilitarian	Narrative
1	−	−	−	−	5.3	5.9
2	+	+	−	−	5.1	4.9
3	+	−	+	−	5.2	4.9
4	+	−	−	+	4.9	3.9
5	−	+	+	−	5.3	6.5
6	−	+	−	+	5.8	6.1
7	−	−	+	+	5.6	5.9
8	+	+	+	+	5.1	5.1
				Overall	5.3	5.4

[a] Note. −, low on value dimension; +, high on value dimension.

1 (below) indicates the configuration of dimensions in each policy. Each participant was randomly assigned to one of sixteen conditions: eight versions of the narrative condition and eight versions of the utilitarian condition. For example, respondents assigned to option 1 under either the narrative or the utilitarian condition received the corresponding background text followed by policy option 1 which expressed all four value dimensions in their low form:

Government regulators are looking into an option that would increase power costs by 5% or about $60 a year per household. This is expected to increase the number of spawning salmon by about 2-fold. Consultants report that two main categories of citizen opinion or values are linked to the policy option. First, many citizens believe that it is important to use human ingenuity to produce power and control river flow through the use of dams. Second, many citizens believe that increased production of salmon is important for jobs and for supporting a fishing way of life. Respondents were then asked:

We want to know what you think about this policy option. Is it something you favor or something you oppose? Please circle a number on the following scale to state your opinion. (A 7-point 'strongly oppose/strongly support' scale was used.)

The policy judgment was followed by two questions about the helpfulness of the background texts for thinking about the different dimensions (technical and citizen value) of the problem. These items were followed by a question that asked participants to rank the four dimensions that were most to least important in helping them determine their support for the policy decision.

5. Results

5.1. Policy preferences

The mean rating of support for each of the eight policy options is shown in Table 1. Overall, there was moderately strong support across all options in both conditions (mean = 5.3 for utilitarian and 5.4 for narrative). However, there was considerably more differentiation among options in the narrative condition, where the means ranged from 3.9 for option 4 to 6.5 for option 5. The range in the utilitarian condition was 4.9 (option 4) to 5.8 (option 6). The greater differentiation among options in the narrative condition suggests that respondents in that condition were more sensitive to the variation in the attributes levels that defined each option.

Table 2
Predicting policy support from four dimensions

Dimension	Condition	
	Utilitarian	Narrative
Cost	−0.14	−0.46***
Salmon population	0.03	0.17**
Spirituality	0.01	0.13
Significance to community	0.04	−0.08
R^2	0.02	0.26***
P	n.s.	<0.001

*** $P < 0.001$.
** $P < 0.05$.

5.2. Modeling policy preferences

This increased sensitivity to information is confirmed by the results of a regression analysis in which each of the four attributes was entered as a predictor (coded 0 or 1) of each respondent's 7-point policy rating. The resulting β weights for each condition are shown in Table 2. There was little or no relationship between the four attributes and the support ratings in the utilitarian condition. The R^2 value of 0.02 was non-significant and none of the β weights were significantly different from zero. In contrast, there was substantial predictability in the narrative condition. The R^2 value was 0.26 ($F = 9.8$; $P < 0.001$). Both cost and salmon population had significant β weights. The weights for spirituality and significance of salmon to the community, although non-significant statistically, were larger than the respective weights for these variables in the utilitarian condition.

In this design, the weights shown in Table 2 reflect the size of the mean changes in support as the stimulus attribute (cost, salmon population, etc.) changed from low to high. These mean changes are presented in Table 3. The greater the change, the larger the β weight. Consistent with the small β weights, changes in the stimulus attributes had little effect on the mean support ratings in the utilitarian condition, except for a small decline in support for the high-cost options. Differences were greater for the narrative condition, particularly for cost changes.

5.3. Predicting support

Additional insight into the degree to which the option attributes were influencing judgments comes from applying the β weights in Table 2 to predict each person's policy support judgment for respondents in the narrative condition. The distribution of predicted support values was then divided into four equal-size segments, or quartiles. The R^2 value of 0.26 implies that, as one goes from options with the lowest predicted support values (Quartile 1) to consecutively higher quartiles, the support ratings should systematically increase. This does happen, and the results are shown in Table 4. Note the high percentage (62%) of strong support ratings (rating = 7) for Quartile 4 in contrast to the rarity of such ratings (13 and 10%) in the lower quartiles. Similarly, the percentage of low ratings (1, 2, 3, or 4) decreases from

Table 3
Mean support rating

Dimension	Utilitarian		Narrative	
	Low	High	Low	High
Cost	5.52	5.10	6.10	4.71***
Salmon population	5.27	5.35	5.15	5.66*
Spirituality	5.30	5.32	5.22	5.60
Significance of salmon to the community	5.25	5.37	5.53	5.28

*** $P < 0.001$.
* $P < 0.10$.

Table 4
Policy support ratings for each quartile of predicted policy support (narrative condition only)

Policy rating	Predicted support			
	Quartile 1	Quartile 2	Quartile 3	Quartile 4
1 (strongly oppose)	10	3	0	0
2	0	3	0	3
3	23	10	3	0
4	10	10	3	0
5	30	27	20	17
6	10	37	47	17
7 (strongly support)	13	10	27	62

43–27 to 7–3% across the quartiles. Thus it can be seen that this R^2 value of 0.26 translates into a moderately strong predicted difference in support, depending on what combination of attributes (options 1 through 8, Table 1) defined the policy option being rated. As expected from the very low value of R^2 in the utilitarian condition, there was little systematic predictability in support ratings in that condition, hence these data are not shown in Table 4.

5.3.1. Subjective weights

It has been seen in Table 2 that respondents in the narrative condition relied heavily upon the cost information in forming their policy support judgment, with salmon population being second in importance, followed by spiritual values and significance of salmon to the community to a much lesser extent. In contrast, those in the utilitarian condition seemed influenced only by cost, and even that to a slight degree.

These weighting patterns inferred from the policy ratings can be compared with the importance that respondents *thought* they were giving to each attribute, as indicated by their importance rankings and their assignment of points to each attribute according to its presumed importance in their judgments. These subjective weights are shown in Table 5 for each condition. We finding stands out in this table for both rankings and assigned points. Despite the apparent differences between conditions in the degree to which attributes actually related to judgments, persons in both conditions produced very similar patterns of

Table 5
Subjective weights

Dimension	Mean rank[a]		Mean points[b]	
	Utilitarian	Narrative	Utilitarian	Narrative
Cost	2.45	2.38	47.7	47.2
Salmon population	1.63[c]	1.58[d]	64.4[e]	67.5[f]
Spirituality	2.88	2.92	32.7	32.6
Significance of salmon to the community	2.88	3.00	35.0	32.7

[a] Mean rankings are based on a 4-point scale where 1 = most important dimension, and 4 = least important dimension.
[b] Participants were asked to assign 100 points to their 'top' or 'most important' dimension. The next most important dimension was rated relative to the first, and so on.
[c] 69.2% of respondents ranked salmon more important than cost; 28.3% ranked cost as more important.
[d] 73.1% of respondents ranked salmon more important than cost; 25.2% ranked cost as more important.
[e] 65.0% of respondents allocated more points to salmon than to cost; 24.2% allocated more points to cost.
[f] 67.2% of respondents allocated more points to salmon than to cost; 20.2% allocated more points to cost.

Table 6
Mean responses to additional questions

	Utilitarian	Narrative
Question 1. Do you think the background text did a good job or a poor job of helping you think through the different technical considerations behind this policy decision?	5.11	4.55[a]
Question 2. Do you think the background text did a good job or a poor job of helping you think through the different opinion or value considerations behind this policy decision?	4.76	4.65
Question 3. Would you be comfortable using the results of this survey (including your own response to the policy question) as input to salmon policies throughout the Pacific Northwest?	4.97	4.80

[a] $t = 3.07$; $P < 0.005$.

presumed information usage. In both conditions, salmon population was presumed most important, followed by cost, followed by a near tie between spiritual values and significance of salmon to the community. This ordering did not match the inferred weights in the narrative condition, where cost, not salmon population, was found to be the most influential attribute. Similarly, cost is the dominant though not significant attribute in the utilitarian condition despite the finding that respondents ranked salmon population as the most important criteria.

5.3.2. Additional questions

In addition to indicating their degree of support for the policy options, respondents answered additional questions pertaining to whether the background text, narrative or utilitarian,

- did a *poor job (1)* or *good job (7)* of helping them think through the different technical considerations behind this policy decision,
- did a *poor job (1)* or a *good job (7)* of helping them think through the different opinion or value considerations behind this policy decision.

Respondents also indicated the degree to which they would be *extremely uncomfortable (1)* or *extremely comfortable (7)* in using the results of this survey as input to salmon policies.

The mean responses to these questions are shown in Table 6. For both conditions, these means tended to be above the midpoint of each scale, in the direction of the category labels *good job* and *extremely comfortable*. The utilitarian condition received slightly higher ratings than the narrative condition across all three question-

items. Only one of these differences is significant, the item pertaining to assistance with technical considerations. This perception is inconsistent with the data described above which shows that policy judgments were actually more sensitive to technical features such as cost and salmon population in the narrative condition.

6. Discussion

The results did not confirm the first hypothesis — that the mode (narrative versus utilitarian) in which information is presented determines the relative importance of the different values that will influence a subsequent policy judgment. We expected to find that the utilitarian format would enhance people's reliance on cost and salmon population whereas the narrative format would enhance the salience of spiritual and community values. Instead a pattern of results consistent with the second hypothesis was observed, the expectation that participants in the narrative condition would be more aware of, and make better use of, the provided value dimensions. Specifically, it was found that persons exposed to the utilitarian background text did not rely upon any of the policy attributes in a systematic way, save for some nonsignificant reliance on cost. In contrast, those exposed to the narrative frame were more sensitized to changes in the attribute levels (particularly cost and salmon population and, to a lesser nonsignificant degree, spiritual values) and better able to incorporate them in their judgments. Changing the individual attributes in the policy option significantly influenced narrative respon-

dents' support of the policy option and did not influence utilitarian respondents. Participants in the narrative condition thus appeared to better comprehend and assimilate the content in the background material. They were able to more carefully consider the merits of high versus low expressions of the value dimensions, and therefore make judgments based on the configuration of these dimensions within the policy option.

The regression analysis on which the conclusions were based was done 'across' rather than 'within' individuals. It is possible that the higher correlations and higher R^2 value in the narrative condition could indicate more between-individual agreement rather than greater within-individual coherence or reliability[7]. It is not believed this interpretation holds for the present data. First, the attributes are unlikely to be interpreted differently by different individuals. Lower cost likely is seen by almost everyone as better than higher cost, greater salmon production is better than lesser numbers of salmon protected, etc. Second, more between-individual agreement would be expected to yield smaller variance in policy ratings. This did not occur. The response variance was almost identical in both groups. Finally, it is seen that the subjective weights, representing the ways that the respondents believed they were using information, were also quite similar across conditions.

Finding no signs in support of greater between-individual variability in the non-narrative groups, several other possible explanations were tentatively proposed for the success here of the narrative condition. Embedding social and technical detail within a narrative may be sensible because it triggers or relies upon dual modes of information processing (a utilitarian mode and a narrative-experiential mode). Dual processing theories can be traced to Aristotle's *Nicomachaean Ethics*, but are best expressed contemporarily by the work of Bruner (1986), Hammond et al. (1987), and as the central feature of the 'Cognitive-Experiential Self Theory' (CEST) of Epstein (1991, 1994). Bruner has proposed that human cognition

relies upon two modes of thought: 'a paradigmatic or logico-scientific [mode]... and a narrative mode (p. 12–13). Epstein argues that two similar systems operate in parallel and interact with one another at all levels of processing (from preconscious to highly complex). Epstein's systems are: "an experiential system that is intimately associated with affect..., that encodes experience in the form of concrete exemplars and narratives", and a "relatively affect-free, abstract analytical, rational system" (1994, p. 713). Hammond et al. (1987) similarly show that judgment is most accurate when there is high correspondence between task properties and the mode of processing applied to the task. Tasks such as the one presented in the salmon/dam study contain perhaps ideally both intuition-inducing properties (i.e. subjectively measured cues) and analysis-inducing properties (i.e. objectively and reliably-measured cues). In light of these theories, the narrative condition might be better described as a composite condition that improves information processing by combining a good story with judgment-relevant quantitative information.

Narratives may also mimic the move in valuation work toward constructive processes. Adherents of constructive processes note that many valuation problems are exceedingly complex. One goal of the facilitator or analyst is to structure the problem for participants by breaking a problem down into its component parts and rendering these features salient to the participant (Gregory et al., 1993b). Narratives, by definition, are largely built around plots or event structures (Rimmon-Kenan, 1983) that can be analogously used in valuation contexts to outline the attributes of a problem. In the salmon/dam problem the attributes were put forth as an episodic event in the life of the narrator. He or she (the gender was not specified) spoke first of the salmon's migratory habits and abilities, then of the impact of the dam on salmon populations, then of the possible influence of changes at the dam on power costs, and finally of conflicts in the community about the spiritual significance of the river and salmon. The attributes are clearly stated as features of the plot but are also memorable due to their linkages to one another (Kearney, 1994). No one piece stands

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[7] We are indebted to an anonymous referee for bringing this point to our attention.

on its own because plot structure provides an overall cognitive map of the problem.

Consider also the need in most valuation contexts to assimilate new technical and social information as part of the judgment process. The discovery (Sanfey and Hastie, 1998) that narrative information produced more accurate judgments (in the form of performance estimates for a set of marathon runners) than did either bar graph or data table conditions has been noted above. It is also noted above that narratives have been shown to promote knowledge integration, data organization, comprehension, and the ability to contend with complex problems (Kearney, 1994). A growing number of scholars are similarly developing evidence for the efficacy of narrative with regard to memory retention (Price and Czilli, 1996).

A further possible explanation for the success of this experiment's narrative condition is its ability to facilitate task engagement by using a language that is consistent with *lay* talk of values. Kempton et al. (1995), Earle and Cvetkovich (1995), and Satterfield (1996) have all demonstrated that values are expressed discursively in context-dependent narratives about who we are and what matters to us as members of society. Engagement may also be achieved by employing information about human experience to otherwise abstract information such that investment in judgment and decision making is enhanced. Oatley (1994) has developed a taxonomy of emotional response to literature with the aim of demonstrating that it is through affectively engaging devices that one enters into the world of the narrative. By seeing the problem through the narrator's point of view, the authors take the problem on as their own and endeavor to solve it from a less distanced perspective than might be typical of utilitarian frames such as those used in some cost-benefit analyses.

It is customary to assume that the utilitarian language of the nonnarrative condition is solely appropriate for valuation tasks; such careful statements of fact are part of a long tradition of attempts to inform the public and disabuse lay stakeholders of undue emotion that might cloud their thinking. The respondents reflected this conventional wisdom by upholding a certain faith in the utilitarian condition. Respondents in the utilitarian condition were more likely to offer a higher ('good job') rating when asked if the assigned background text helped them 'think through the different technical considerations behind this policy'. This was true despite the finding that participants in the utilitarian condition were insensitive to alterations in the policies' technical attributes (salmon population and cost). This inconsistency between perception and action could require reconciliation if narratives prove in many other valuation contexts to be more viable than utilitarian media.

The inconsistency between weights inferred through ANOVA analyses of policy judgments and participants subjective weights (evaluations based on rankings) is also cause for concern. Participants in both conditions reported being more concerned about salmon population, even though cost emerged as the dominant attribute (though not significantly so in the utilitarian condition). Though other studies have found that, when making judgments, participants do not necessarily use the attributes the way they think they have, the gap between intention and actual information usage remains (Slovic and Lichtenstein, 1971; Nisbett and Wilson, 1977; Hsee, 1998). Inconsistency may be an artifact of participants' unwillingness to admit that cost mattered heavily in an ethically-charged decision such as this one about salmon, dams, citizens' values and power production. But it also may speak to a poverty of technique. Ideally, valuation tools should provide the conditions for good quality judgments and ensure that stakeholders' decision processes reflect actual intention.

Additional experiments will need to be conducted to test the robustness of the findings, in particular the findings pointing to the benefits of narrative valuation contexts. One has yet to test the effect of the narrator on the participant's judgment process. Further, differences in participants' responsiveness to the changes in attribute levels may be a function of the particular variations selected; relatively larger or smaller ranges for these variables may produce different results. It also cannot be said with any certainty that other unmentioned value dimensions were irrele-

vant to participants' policy judgments; one can only speak to the subset of dimensions contained within this one experiment.

Another unexplored possibility is that the articulation in the respective background texts of the nonquantitative value dimensions (spirituality and significance of salmon to the community) failed to serve its purpose. Better links could be developed between these dimensions and their expression at the level of policy. In this experiment, a participant could consider him/herself actively concerned with spiritual or natural beauty, but not find that value directly addressed in the policy option; instead, the value was included in the policy option as a statement of community opinion. Value and policy would be more directly linked if the policy included a specific, related action such as stream or dam restoration that enhanced, for example, aesthetic value of the area. Moreover, the fractional replication design manipulated dimensions by expressing them in the policy judgment at two distinct levels, such as either high or low. It is easy to express numeric data (cost or salmon populations) as high or low: one just changes the numbers accordingly. But how does one differentiate the spiritual importance of a local salmon run? A reverence for a river is something like 'awe' but what in the end is high or low awe? Differences of opinion in resource disputes tend to revolve around competing and often mutually exclusive belief systems and not greater or lesser quantities of one dimension on the part of the evaluator. It also raises the question of whether or not it is fair — in a judgment task meant to give four value dimensions equal weight — to compare dimensions that are easily quantifiable to dimensions that are not. In retrospect, it might have been prudent to write the nonquantitative value dimensions as easily recognizable opposites and as far as possible mutually exclusive beliefs[8].

Future tests should examine the possibility of different optimal combinations of quantitative, narrative- or utilitarian-descriptive content. The utilitarian condition could be altered to include concrete images, or the enlivening of information through reference to anecdotal examples. Conversely, both conditions could be made more disparate still — the instrumental more analytic and quantitative, the narrative less quantitative, more developed with regard to plot and characters. This might better determine the beneficial features of both conditions. One can hope, ultimately, for an amalgam that respects narratives' ability to render certain kinds of information salient and employs analytic and quantitative content to ensure that a complex medium like narrative be utilized constructively, not persuasively.

In the end, it is believed these results do provide evidence suggesting that narratives should be explored more fully for their contributions to judgment and valuation contexts. Narratives may well provide a viable means for developing tasks that are cognitively manageable, engaging for participants, and yet flexible enough to encompass multiple (quantitative and nonquantitative) expressions of value. It may be that doing something as simple as increasing the salience of information by putting that information into the mouths of narrators, or animating tasks such that decision contexts are concrete and thus more easily imagined by participants, improves a person's ability to evaluate and assess a technically and ethically complex policy problem.

Acknowledgements

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[8] In the case of dimension four (significance of salmon to the community), our goal had been to pit those who believe in the intrinsic value of salmon (expressed by the fish's native intelligence, its genius for returning to its stream of origin) against those who primarily think about salmon in instrumental terms (salmon as it benefits employment). However, one can quite reasonably support both positions simultaneously or support the low and not the high expression. This may explain the mean support ratings for dimension 4 in Table 3; support is highest under the attribute's 'low' expressions, that is, salmon as it benefits employment.

Appendix A

A.1. Background Page (Narrative)

There is a lot of talk around here lately about salmon habitat and hydroelectric dams. I am reminded of this as I drive along the road that borders the Pacific Northwest's Monroe River. I stop the car at the mouth of a creek known as Sheep Creek and walk to the river bank's edge where I used to watch the salmon journey upstream during spawning season nearly 50 years ago. In those days, thousands of spawning Coho and Sockeye would swim frantically up the creek from the Monroe River. I used to try and focus on just one fish, watch it cut forward, thrashing and twisting, while it moved to the next pool, and the next, until whatever instinct had propelled it, told it to stop, and mate.

People wondered for centuries how salmon could find their way home up a forking labyrinth of tributaries to an often tiny stream bed. We now know salmon can detect odors; each stream is said to contain a particular 'bouquet' of fragrances that imprint themselves on the salmon before they leave for the ocean, which helps them find their way back. I'm no biologist, but this theory makes sense to me. The smell of pine can lead me back down all sorts of paths of memory to my family home and the brief, intense happiness of Christmas time.

Some of my friends think I identify too strongly with the salmon when I equate smell and home like this. They see it differently. They appreciate the mighty fish but they think more in terms of bounty for humans — that the sea, rivers, and especially salmon provide jobs and support fishing as a way of life.

However, we all agree that things just have not been the same since three hydroelectric dams were built on the Monroe River in the early 1950s. Certainly there are far fewer salmon than the 100 000 or so that used to return annually to spawn. Decades ago, when dams like this were first built, people like my mother and father used to see the dams as a purely positive thing. Inexpensive electrical energy was needed for a growing population. The dams on the Monroe produced enough electricity to power the city of 100 000 people I now call home and they also support public services through revenue taxes. So far the cost of electricity has been pretty cheap (about $1200 this year per household) but it's true that if changes to protect salmon on the Monroe River go ahead, every household in town can expect to pay a little more for the appliances and heaters we've all come to depend on. Word is we can expect the cost of electricity to increase by anywhere from about 5% or $60 a year per household to 25% or about $300 a year per household.

My neighbor, an engineer, has taught me a thing or two about how dams and their hydroelectric technology can be managed in ways that kill fewer young salmon. She says that increasing the water flow around the dams would help. Right now only about 4000 salmon are making it back per year, but if more water is released through the dam, salmon habitat and food availability will improve and more young salmon can survive the passage to the ocean and return years later to spawn. My neighbor also thinks that an increase in water flow could increase the salmon population by at least 2-fold (about 8000 fish a year compared to the current 4000) and by as much as 10-fold or about 40 000 returning salmon a year.

Sometimes I read the newspaper to get a sense of local public opinion on these matters. Reading it yesterday reminded me that some folks do not like the idea of messing with the dams, they believe fiercely in the dams as a symbol of human ingenuity and the ability to control the river system for power production. I look at it differently: the dams' concrete walls strike me as an illusion, remind me that we humans are humble in the face of nature's powers, and that we shouldn't try to control or 'manage' water or fish through elaborate technologies like dams.

In the end, there is the point where our values about nature, economy and ecology clash, and we have to deal with the fact that we can not have all the salmon and the cheap hydroelectric power we want. The decisions are difficult, but they have to be made.

A.2. Background Page (Utilitarian)

A large number of hydroelectric dams have been built in the Pacific Northwest over the past 70 years to generate electricity. These power resources are operated by Pacific Power, whose profits produce revenue taxes that flow to the government to pay for public services in the Pacific Northwest. If power production declines, or if the costs of generating power increases, then the government would receive less money from electricity sales and therefore have less money to pay for public services.

The Monroe River is representative of many river systems that produce power and salmon in the Pacific Northwest. The river and its adjoining creeks provide spawning and rearing areas for coho and chinook salmon. Three medium-sized hydroelectric dams, built on the Monroe River in the early 1950s, have reduced water flows on the river and led to changes in salmon populations. Pre-1950 runs of approximately 100 000 fish have been reduced to about 4000 fish per year, despite the salmon's ability to rely on powerful olfactory capabilities ('smell') to guide it back to its river of origin to spawn. For the Monroe River, key policy decisions involve concerns such as the timing of power production (e.g., more water could be released at critical periods based on the needs of the salmon) and the amount of power produced (e.g. letting more water through dams on a regular basis would decrease the amount of power produced but also increase spawning habitat and food availability for young salmon).

Currently the Monroe River generates 800 MW of electricity, which is enough to provide electric power to the nearby city, population about 100 000. If the current level of power output is reduced in order to protect salmon, there will be changes in the cost of power to individual households because higher-cost sources of electricity (such as coal-fired or gas-powered plants) will be needed. Analysts predict that additional water flows on the Monroe River will increase the current cost of hydroelectric power. The average annual cost of electricity for one household is about $1200, but this could increase by anywhere from 5% ($60 annually per household) to 25% ($300 annually per household) for households within the service area. The expectation is that increased water flow will raise the number of returning salmon on the Monroe River by at least 2-fold (8000 salmon instead of the current 4000) and possibly as high as 10-fold (or approximately 40 000 salmon).

Decisions made about the balance between power production and salmon needs can also affect the well-being of Pacific Northwest citizens in other ways. Newspapers report that salmon/power decisions may throw into conflict two important sets of citizen values: a belief in the rugged ingenuity and knowledge that made hydroelectric dams and the control of river systems possible versus a belief in the Pacific Northwest as a place of great natural and spiritual beauty that should be left alone rather than managed by humans. Also, many locals say they identify with the salmon. Salmon, some report, are akin to humans; both enjoy and depend on the 'smell' of home. Others dismiss this attitude as sentimental but insist that a healthy salmon population translates into jobs and the ability to support fishing as a way of life.

No new plan can provide more of everything without also incurring some costs: what is good for fish generally results in reduced electricity production from dams, and more hydroelectric power generally means fewer salmon because less water is available for spawning and rearing habitat. In the end policy choices will have to reflect the many perspectives on public opinion, electricity production, and salmon habitat. These decisions are difficult, but they have to be made.

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