Goal-based Construction of Preferences: Task Goals and the Prominence Effect

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Preferences inferred from choice are more likely to favor the alternative that is superior with respect to the prominent (most important or salient) attribute than are preferences inferred from matching (direct tradeoff) judgments. This prominence effect violates standard models of rational choice and complicates the task of measuring preferences. In this article, we propose a new *task-goal hypothesis* regarding the prominence effect: The prominent attribute receives more weight in tasks whose goal is to differentiate among options than in tasks whose goal is to equate options. We use this hypothesis to generalize the prominence effect beyond choice and matching to several additional tasks, including the choice-based matching and difference comparison methods that are widely employed in decision analysis. The results of three studies provide strong support for the task-goal account of the prominence effect and cast doubt on competing explanations. We discuss the implications of these findings for descriptive decision theory and for preference measurement in decision analysis, public policy, and marketing.
(*Multiattribute Utility*; *Preference Assessment*; *Preference Reversals*; *Prominence Effect*; *Task Goals*)

According to the standard model of rational action, logically consistent beliefs and values guide human behavior. This implies that preferences satisfy the *procedure invariance principle*—they should not differ across logically equivalent preference tasks (Tversky et al. 1988). For example, preferences expressed in choice should not differ from those expressed in other incentive-compatible tasks, such as a minimum selling price or matching task. The procedure invariance assumption plays a central role in economic theory, decision analysis, and other management science disciplines that assume that people have rational preferences.

Behavioral decision research suggests an alternative view, according to which people construct preferences as they are needed (e.g., Fischhoff 1991, Payne et al. 1992, Slovic 1995, Tversky et al. 1988). How they construct those preferences depends on details of the response task and decision context that should not matter, according to the standard rational account. Moreover, these task and context-induced changes in process lead to systematic changes in preference that violate the principle of procedure invariance and cast doubt on the rational account. Consider the following example documented by Tversky et al. (1988, p. 373).

> About 600 people are killed each year in Israel in traffic accidents. The Ministry of Transportation investigates various programs to reduce the number of casualties. Consider the following two programs, described in terms of yearly costs and the number of casualties per year that is expected following the implementation of each program.

	Deaths	Cost (millions)
Program 1	500	$55M
Program 2	570	$12M

0025-1909/99/4508/1057$05.00

One group of participants was asked to choose between the two programs; a second group to make a matching (tradeoff) judgment in which they adjusted the cost of one program up or down until the two programs were equally attractive. For instance, if the cost attribute of Program 1 above (i.e., \$55 million) was initially left blank, the participant would be asked to provide a cost figure for Program 1 that would make the two programs equally attractive. One can infer preferences between Programs 1 and 2 from the decision maker's matching value for the cost of Program 1, which we denote as X. If X = \$55M, then the decision maker should be indifferent between Programs 1 and 2 in the original choice problem. If $X >$ \$55M, the decision maker should prefer Program 1. If $X <$ \$55M, then Program 2 should be preferred. Tversky et al. found that 68% of the participants chose Program 1 over Program 2, but only 4% stated a matching value large enough to imply preference for Program 1. In this and many other examples, people display a *prominence effect*—they are more likely to prefer the alternative that is superior on the prominent attribute (lives lost in this example) in choice than in matching. The prominence effect is one of the strongest preferences biases documented in the decision making literature. It has been demonstrated for a wide variety of decision contexts and attributes (see Fischer and Hawkins 1993, Hawkins 1994, Tversky et al. 1988; but see Carmon and Simonson 1998 for boundary conditions).

The prominence effect is interesting for several reasons. First, it clearly violates the procedure invariance principle, thus casting doubt on descriptive decision models that make strong rationality assumptions. Second, it provides important clues as to how people construct preferences in the presence of conflicting objectives. Finally, it seriously complicates the task of assigning utilities to outcomes in decision analysis, public policy analysis, and marketing research. If utilities inferred from choice differ from those implied by matching judgments, which (if either) should be taken as the expression of the decision maker's "true" preferences?

This article has three objectives. The first is to propose the *task-goal hypothesis*, a new explanation for the prominence effect, the implications of which extend well beyond the prominence effect itself. The second is to test the task-goal hypothesis and compare its explanatory power with that of alternative interpretations that have been proposed previously. The third is to discuss implications for how to measure preferences in decision analysis, public policy analysis, and marketing research.

Task Goals and the Prominence Effect

How can one explain the prominence effect and other violations of procedure invariance? According to the constructive preference perspective, the answer lies in understanding how formally irrelevant task features influence the weighting of different attributes. In this article, we consider three constructive accounts of the prominence effect. Each may be viewed as an interpretation of the distinction by Tversky et al. (1988), between qualitative tasks (which evoke greater weighting of the prominent attribute) and quantitative tasks (which evoke more equal weighting of attributes). The first two are variants of the strategy compatibility account, proposed by Tversky et al. (1988) and Fischer and Hawkins (1993). The third is the new task-goal account, proposed in this article.

Compatibility Hypotheses

Past research has established that, other things being equal, an attribute that is measured in units similar to those of the response process will tend to receive more weight in judgment. Such attributes are said to be more *compatible* with the response scale. For example, the amount of money to be won or lost has a greater impact when one states a minimum selling price for a risky prospect than when one chooses among risky prospects (Bostic et al. 1990, Tversky et al. 1990). Similarly, X versus Y tradeoffs expressed in units of X (e.g., cost) give more weight to X than tradeoffs assessed in units of Y (e.g., lives saved) (Slovic et al. 1990, Delquie 1993, Fischer and Hawkins 1993). Biases of this type are often termed *scale compatibility biases* (Slovic et al. 1990, Fischer and Hawkins 1993). However, scale compatibility cannot account for the prominence effect because the prominent attribute receives

more weight in choice, even when matching is with respect to the prominent attribute (Fischer and Hawkins 1993).

Tversky et al. (1988) proposed a related compatibility explanation for the prominence effect. They suggested that because choice is a qualitative decision task, it is compatible with qualitative decision strategies, such as lexicographic ordering, which lead to a preference for alternatives that are superior with respect to the most important attribute. By contrast, because matching tasks require a quantitative response, they are naturally compatible with quantitative reasoning processes that lead people to substitute one attribute for another, thus giving some weight to all attributes. Fischer and Hawkins (1993) called this the *strategy compatibility hypothesis* because the compatibility in question is between the nature of the response task (qualitative vs. quantitative) and the type of decision strategy evoked. Following Fischer and Hawkins (1993), we consider two interpretations of the strategy-compatibility hypothesis.

The simplest interpretation is that strategy selection depends on the type of response required. Here we interpret the notion of a response scale literally. It is the physical or conceptual continuum in terms of which a person expresses a response. If a response scale requires a qualitative response (e.g., prefer A or B, buy or not buy), then it will evoke a qualitative strategy and give greater weight to the prominent feature. If it requires a quantitative response (e.g., matching, pricing), then it will evoke a quantitative strategy that weighs attributes more equally. This *qualitative scale hypothesis* accounts for the findings of Tversky et al. (1988), as well as most of those reported by Fischer and Hawkins (1993). However, contrary to this interpretation, Fischer and Hawkins found that preferences in choice (a qualitative response task) were identical to those in strength-of-preference judgments expressed on a quantitative scale. We provide additional tests of this hypothesis in this article.

Tversky et al. (1988) suggested a second interpretation of strategy compatibility based on a distinction between what they termed qualitative and quantitative arguments for choice. Qualitative reasoning involves making ordinal comparisons of attribute levels or of the importance ranking of attributes. Quantitative reasoning involves making cross-attribute comparisons of value differences or ratios of differences (e.g., establishing rates of substitution among attributes). Thus, tasks that focus attention on ordinal comparisons are more likely to evoke qualitative strategies, such as lexicographic ordering, that weight the prominent attribute more heavily. In contrast, tasks that focus attention on cross-attribute rates of substitution will evoke compensatory judgment strategies that weight attributes more equally. In cases where either type of reasoning is applicable, we assume that people will conserve effort and adopt a qualitative strategy. This *qualitative reasoning hypothesis* focuses on the type of reasoning evoked by a task, rather than on surface features of the task such as reference points, attribute definitions and measures, and scale types. It provides a good account of all the main findings in the prominence effect literature. We provide a variety of stronger tests in this article.

The Task-Goal Hypothesis

In this article, we propose a new *task-goal hypothesis* according to which perceived task goals play a central role in the construction of preferences. Specifically, we propose that *the prominent feature is weighted more heavily in response tasks whose perceived goal is to differentiate between alternatives than in tasks whose perceived goal is to equate two alternatives*.

The task-goal hypothesis was inspired by the choice-matching prominence effect of Tversky et al. (1988), and therefore is sufficient to account for the effect. However, it makes predictions that extend well beyond choice and matching tasks. It implies that any response task whose primary goal is to differentiate among alternatives should lead to greater weighting of the prominent attribute than any response task whose primary goal is to equate alternatives, other things being equal. This is a strong prediction that makes the task-goal hypothesis both testable and useful. The task-goal hypothesis appears to be similar to the qualitative reasoning hypothesis, but we will show that they make distinct predictions for some tasks (e.g., the difference-comparison task investigated in Study 1).

To say that goals affect judgments of preference

may seem obvious, because one normally thinks of goals as driving judgment and decision making. However, as we use the term, *task goals* relate to the response generation process per se, not to the final outcome of the decision. For example, the ultimate consequences of a job choice will presumably be evaluated in terms of *fundamental objectives* (Keeney 1992) such as maximizing job satisfaction, wealth, and quality of life for one's family. By contrast, we use the term *task goal* to refer to the purpose of the response task per se—for example, either to differentiate among or equate alternatives.

Why would the task goal of differentiating among options lead to greater weighting of the prominent attribute than the task goal of equating options? Consider an individual confronted by a choice between job A, which offers a salary of $60,000 with 10 days of paid vacation, and job B, which offers a salary of $50,000 with 20 days of paid vacation. Choice requires differentiation. The more different the perceived values of the two job options, the easier it is to resolve the choice. Because each job has an advantage over the other, resolving this conflict requires the decision maker to weight one difference more heavily than the other. Shepard (1964) proposed that people frequently deal with difficult choices by adjusting and readjusting their attribute weights until they find a set of weights that makes the choice easy to resolve (see also Ariely and Wallsten 1995, Montgomery 1983). The question is which attribute to weight more heavily. Clearly, this depends in part on the absolute magnitudes of the differences (Carmon and Simonson 1998, Fischer 1995, von Nitzsch and Weber 1993). Other things being equal, a salary differential of $10,000 matters more than one of $500. General attitudes about the relative importance of the attributes provide a second cue (Gabrielli and von Winterfeldt 1978). Assigning greater weight to the prominent attribute,—i.e., the one that is normally more salient or important—provides a natural means for emphasizing one difference while downplaying others. In short, if the goal of a task is to differentiate, and if two alternatives are similar in overall value, then giving greater weight to the prominent attribute makes it easier to arrive at a clear choice.

Different considerations arise when the goal of a task is to equate options. To see why, let us consider the matching version of our job choice example: Job A has a salary of $60,000 and 10 days of paid vacation. Job B offers 20 days of paid vacation. At what salary would job B be equally attractive to job A? Assuming that one is willing to give up some salary in exchange for more vacation time, the break-even salary must be some amount lower than $60,000, but how much less? One way to simplify matching judgments is to resort to proportionally equal matching schemes (Carmon and Simonson 1998). In our example, Job B offers twice as many vacation days, which suggests $30,000 as the matching salary value for Job B (giving each job a 2:1 advantage on one of the attributes). In short, giving equal weight to proportionally equal differences simplifies the task of equating the alternatives. A weaker assumption is that equal weighting serves as the initial anchor from which the matching judgment is adjusted to reflect considerations such as attribute importance and knowledge of exchange rates in markets (Carmon and Simonson 1998, Coupey et al. 1998). However, because adjustments from anchors tend to be insufficient (Schkade and Johnson 1989, Slovic et al. 1990), use of an equal weighting anchor will tend to lead to more equal weighting of attributes in matching. Together, the considerations raised above suggest that the prominent attribute will receive less weight in tasks whose goal is to equate options than in tasks whose goal is to differentiate among options.

The main objective of this article is to test this task-goal hypothesis, pitting it against the two interpretations of strategy compatibility. If we limited our consideration to choice and matching tasks, the task-goal account would provide a new interpretation of the prominence effect, but there would be no way of choosing between this and the strategy compatibility account. However, by considering a wider array of response tasks, a better test is possible.

Study 1

In Study 1, we considered four tasks: choice, matching, difference comparisons, and choice-based matching. Because our predictions depend on characteristics of these tasks, we describe them before explaining the

predictions. The decision scenario used in this study investigated college students' preferences for jobs described by two attributes: annual salary and number of vacation days. Based on pretests and prior research (Fischer 1995), we determined that college students generally consider salary to be more important than vacation days. Thus, we treat salary as the prominent attribute.

Response Modes

Choice. In this response mode, participants viewed a pair of job offers and were asked to select the one they preferred.

Matching. In this response mode, participants were presented with both attributes of option A but only with the vacation days attribute for option B (the annual salary value was not specified). They were then asked to generate the annual salary that would make the two alternatives equally attractive.

Difference Comparison. This response task is often used by decision analysts, as the first step in assessing attribute scaling constants in multiattribute utility analysis (Keeney and Raiffa 1976), but it has not been investigated in previous studies of the prominence effect. In our implementation of this task, participants were presented with a starting option described by attribute levels (salary = x and vacation days = y). Participants were then offered the following choice: Given (x, y), would you prefer to improve salary from x to x^* or to improve vacation days from y to y^*? This task is logically equivalent to the choice task: Which would you prefer, (x^*, y) or (x, y^*)?

The difference comparison task is of theoretical interest because although it explicitly instructs the respondent to engage in a quantitative reasoning process (i.e., to compare two differences), the response is ordinal and the task goal is to differentiate. Thus, as we show below, the task-goal and qualitative reasoning hypotheses yield conflicting predictions regarding this task.

Choice-Based Matching. This task was a computer-based version of the standard decision analysis method for homing in on indifference values in preference assessment (e.g., Keeney and Raiffa 1976). A computer algorithm presented participants with a series of choices designed to home in on the matching salary for option B.[1] The homing-in process was transparent to respondents. They worked all the way through one matching sequence before moving on to the next. Thus, respondents knew that their goal was to find matching values. Although all of the responses in this task were qualitative, the end goal of the process was to equate two alternatives.

This task is of particular interest for two reasons. First, for those who hold the view that choice is the best indicator of true preferences, this task has the appeal of inferring indifference values from choices. Thus, it might allow decision analysts to circumvent the prominence effect problem by basing all value elicitation on choice-based methods. Second, prior research by Bostic et al. (1990) showed that risky preference reversals—between choice and minimum selling prices—were substantially reduced or eliminated using a choice-based method for eliciting selling prices.

Predictions

Task-Goal Hypothesis. According to this hypothesis, the goal of the response process is the key. In two tasks, choice and difference comparison, the goal of the task is to discriminate between alternatives. In contrast, the goal of matching is to equate pairs of alternatives. Thus, the task-goal hypothesis predicts greater weighting of the prominent attribute (salary) in the choice and difference comparison tasks than in matching.

The prediction for the choice-based matching task is more complex because it involves a converging sequence of choices, each of which may be viewed as a

[1] This convergence process was based on the following algorithm. The starting value of annual salary for option B was randomly generated from the range between the maximum and minimum allowable salary levels. After the first choice, the salary level for option B was adjusted up or down by half the remaining range between the salary levels for option B on the current and previous choices. The salary level of option B was adjusted up if option A was chosen, and down if option B was chosen. This sequence of discrete choices continued until the range of possible matching values was less than $100. At that point, the convergence process terminated and the participant was introduced to the next choice scenario.

subtask within the convergence process. To apply the task-goal hypothesis here, we assume that the relative weighting of attributes is influenced by both the overall task goal and the subtask goal, with the relative impact of the two types of goals depending on their relative salience. The overall task goal of choice-based matching is to equate two alternatives by converging on the indifference value. Thus, we predict that this task will evoke lesser weighting of the prominent attribute than choice, even though the response process involves choice. However, during each step in the convergence process, the subtask goal is to discriminate between the two options presented. To the extent that this subtask goal also influences attribute weights, choice-based matching will evoke greater weighting of the prominent attribute than standard matching.

To summarize, the task-goal hypothesis predicts the following ordering of tasks in terms of the proportion of responses favoring the alternative that is superior with respect to the prominent attribute: *choice = difference comparison > choice-based matching ≥ matching*.

Qualitative Response Scale Hypothesis. According to this hypothesis, qualitative scales evoke greater weighting of the prominent attribute. This leads us to predict that the choice and difference comparison tasks will evoke greater weighting of the prominent attribute than the matching task, in which responses are made on a quantitative scale. To apply this hypothesis to the more complex choice-based matching task, we assume that the scale used for each subtask will determine the attribute weights for that subtask. Because every stage of our choice-based matching process requires a response on a qualitative scale, this hypothesis predicts that choice-based matching should resemble choice. In summary: *choice = difference comparison = choice-based matching > matching*.

Qualitative Reasoning Hypothesis. According to this hypothesis, qualitative reasoning strategies (e.g., lexicographic) favor the option that is superior on the prominent attribute more than do quantitative reasoning strategies. Further, people employ qualitative reasoning strategies when the response task is compatible with such strategies. This leads us to predict that people will use qualitative strategies for choice and quantitative strategies for the matching task. Although the difference comparison task requires qualitative responses, it demands quantitative reasoning (compare one difference with another). Fischer (1995) showed that cross-attribute difference comparisons are sensitive to the relative ranges on the respective attributes. This sensitivity to magnitudes of differences implies that this task evokes quantitative reasoning processes. Thus, this hypothesis predicts that difference comparisons should resemble matching more than choice.

To apply the qualitative reasoning hypothesis to the choice-based matching task, we assume that the type of reasoning used to resolve each subtask will determine the attribute weights for that subtask. If a subtask can be resolved either quantitatively or qualitatively, it will be resolved qualitatively because that requires less mental effort. Because every stage of a choice-based matching process can be resolved using a qualitative strategy, this hypothesis predicts that choice-based matching should resemble choice. In summary: *choice = choice-based matching > difference comparison ≥ matching*.

Method

Participants. Twenty-seven student participants were recruited through advertising for a decision making experiment. They were paid $10 for their participation. The study took about 45 minutes to complete.

Design and Procedure. We used a 4(response modes) × 2(replications) within-participant design, in which each participant responded to 8 pairs of alternatives in each of the 4 response modes. After a short pause, each participant completed all 4 tasks for a second time, giving two replications of each preference response.

The study was computer controlled. Participants worked in separate rooms at their own pace. They were introduced to the experimental environment, and then read the general instructions. The order of the different response modes was randomized for each participant, as was the order of choice scenarios (stimuli) within each response mode. Before the first

Table 1 Stimuli for Study 1

	Option A		Option B	
	Vacation-Days A	Annual-Salary A	Vacation-Days B	Annual-Salary B
Scenario 1	15	$31,500	5	$36,500
Scenario 2	20	$35,000	15	$37,000
Scenario 3	15	$33,000	10	$35,500
Scenario 4	15	$34,500	10	$36,500
Scenario 5	20	$33,000	10	$37,000
Scenario 6	15	$33,000	5	$37,500
Scenario 7	20	$32,000	10	$37,000
Scenario 8	20	$32,500	15	$35,000

Note. In the matching task, the value of Annual-Salary B was missing. In the choice-based matching task, the value for Annual-Salary B was randomly generated within the specified range.

trial of each response mode, participants were presented with an instruction screen. Before every trial, participants were shown a screen asking them if they were ready for the next trial, and whether they had questions.

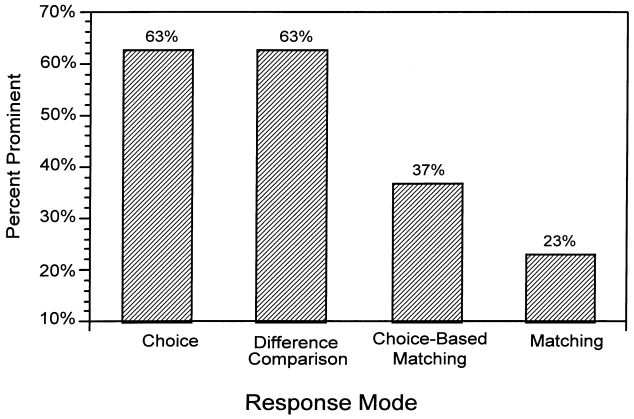
Choice Alternatives. Participants were asked to imagine that they faced a decision between two job options, identical in all respects but salary and number of vacation days. They were asked to make these judgments according to their own preferences, and were assured that there were no right or wrong answers. Every stimulus was a scenario describing two job offers, each characterized by two attributes: the number of annual vacation days, ranging from 5 to 20, and the annual salary, ranging from $31,500 to $37,500 (see Table 1). Based on pretesting of students' salary-versus vacation-days tradeoffs, we designed the stimuli so that the two members of each pair of choice alternatives were roughly equally attractive.

Results and Discussion

Dependent Measures. Responses in the choice task provide a direct expression of preference. In this task, we collapsed across the 2 replications of the 8 choice scenarios to compute an overall proportion of times that a participant favored the option that was superior with respect to the prominent (salary) attribute. Responses in each of the other tasks were first converted into their implied preference regarding the two alternatives in the choice scenario (recall our earlier example of how choice preferences can be inferred from matching judgments). Matching judgments that implied indifference between two alternatives were randomly split. Then, for each participant and each response mode, we collapsed across items and replications to obtain the percent of "prominent preferences," i.e., preferences for the option that was superior with respect to the prominent attribute. In this manner, each participant received four scores, one for each response mode. When performing statistical tests, we used Tukey's starting-split-count logit transformation to create more normally distributed random variables (see Tukey 1977, pp. 495–498). All statistical conclusions were the same whether we used transformed or nontransformed proportions, as well as when we performed all tests using distribution-free, nonparametric methods.

Response Mode Effects. The results displayed in Figure 1 reveal strong response mode differences in the proportions of "prominent preferences" (multivariate $F(3, 24) = 16.84$, $p < 0.001$). Furthermore, tests of within-participant effects provided strong support for each of the predictions of the task-goal model. First, preferences in the choice task did not differ from those in the difference comparison tasks (63% prominent preferences in both cases, $F(1, 26) = 0.11$, $p = 0.74$). Second, the choice and difference comparison tasks both evoked a higher proportion of promi-

Figure 1 **Percent of Preferences for the Alternative that Was Superior on the Prominent (Salary) Attribute in Study 1**



nent preferences than did the choice-based matching task (63% vs. 37%, $F(1, 26) = 20.41$, $p < 0.001$). Finally, the choice-based matching task evoked a higher proportion of prominent preferences than the standard matching task (37% vs. 23%, $F(1, 26) = 6.66$, $p = 0.016$).

Each of these findings is based on within-participant comparisons of the different response tasks. The within-participants design adds to the statistical power of the tests, but also raises possible concerns about carry-over effects. For example, performing the matching task before choice-based matching might change how one viewed the second task. One simple check is to look only at data for the first task each participant performed. The results for the first task showed the same pattern as the pooled data for all tasks. The proportions of prominent preferences were 56%, 52%, 37%, and 25% for the choice, difference comparison, choice-based matching, and matching tasks, respectively. Thus, there is no evidence that the response mode effects displayed in Figure 1 are a result of task-order or carry-over effects.

Critical Comparisons. The predictions outlined earlier lead to four critical comparisons of our three hypotheses. First, the task-goal and qualitative scale hypotheses predict choice = difference comparison, whereas qualitative reasoning predicts choice > difference comparison. Our data show no difference between these tasks, thus failing to support the qualitative reasoning hypothesis.

Second, the task-goal hypothesis predicts that choice > choice-based matching whereas the qualitative scale and reasoning hypotheses predict that choice = choice-based matching. In fact, choice evoked a substantially stronger preference for prominent alternatives, thus casting doubt on both the qualitative scale and reasoning hypotheses.

Third, the task goal and qualitative scale hypotheses predict that difference comparison > matching, whereas qualitative reasoning predicts that difference comparison = matching. In fact, the difference comparison task evoked substantially greater weighting of the prominent attribute than did matching, thus casting doubt on the qualitative reasoning hypothesis.

Fourth, the task-goal hypothesis predicts that difference comparison > choice-based matching, whereas the qualitative scale hypothesis predicts that difference comparison = choice-based matching and qualitative reasoning predicts that difference comparison < choice-based matching. In fact, difference comparisons evoked greater weighting of the prominent attribute than choice-based matching, thus casting doubt on both the qualitative scale and reasoning hypotheses.

In short, all four critical comparisons cast doubt on the qualitative reasoning hypothesis. Two of the four comparisons cast doubt on the qualitative scale hypothesis. In contrast, all four support the predictions of our task-goal hypothesis. Thus, this head-to-head comparison clearly favors the task-goal account over both the qualitative scale and qualitative reasoning interpretations of strategy compatibility. In addition, the task-goal hypothesis can account for our finding that choice-based matching led to heavier weighting of the prominent attribute than simple matching. The standard matching task has only one goal: to equate the two options. The choice-based matching task has two goals. The overall goal of a complete matching sequence is to equate two options. But on each choice in the converging sequence, the subtask goal is to differentiate between the two options. Thus, one might expect that the mix of the subtask and overall task goals would produce an intermediate weighting of the prominent attribute. Consistent with this, we

found that choice-based matching fell between choice and matching.

Finally, the results of Study 1 highlight the difference between the seemingly similar task-goal and qualitative-reasoning accounts. Some tasks that clearly require quantitative reasoning (e.g., matching) evoke weaker weighting of the prominent attribute than choice. However, other tasks that clearly evoke quantitative reasoning (e.g., difference comparison) also evoke strong weighting of the prominent attribute (equal to choice). In short, the prominence effect does not appear to be determined by whether a task requires quantitative or qualitative reasoning. Instead, the results of Study 1 suggest that the task-goal—to differentiate or equate—is the key factor determining how much weight is given to the prominent attribute.

Study 2

In Study 1, we found greater weighting of the prominent attribute in choice than in choice-based matching, even though both tasks involved the same response process. The task-goal hypothesis predicts this because the perceived goal of choice is to differentiate whereas the goal of choice-based matching is to equate. Suppose, however, that interweaving a large set of converging sequences hid the goal of the choice-based matching process from the decision maker. In this case, the apparent task goal would be to make a large number of unrelated choices, so a hidden choice-based matching task should resemble choice, not matching, in terms of the weighting of the prominent attribute. Consistent with this line of argument, Bostic et al. (1990) found that a hidden choice-based mechanism for eliciting minimum selling prices for two-outcome gambles evoked preferences consistent with those in choice. However, they did not compare this with a transparent choice-based pricing task, so one cannot be sure that the hidden-versus-transparent distinction was crucial.

The primary goal of Study 2 is to directly compare preferences in hidden and transparent versions of the choice-based matching task. We employ a within-participant design in which each participant performs both versions of the choice-based matching task. This comparison provides a strong test of our task-goal hypothesis because the two tasks have identical surface features (i.e., attribute measures, displays, and response scale) as well as identical convergence algorithms. They differ only in their perceived overall task goals. This comparison also allows us to rule out one other explanation of why our (transparent) choice-based matching task evoked preferences that differed from those in choice. Choice-based matching infers preferences from sequences of judgments whereas other tasks infer preferences from single judgments. This raises the possibility that errors might accumulate in a sequence of choice-based-matching judgments. In Study 2, both the transparent and hidden versions of choice-based matching infer preferences from sequences of judgments, so error accumulation cannot account for any differences between the two tasks.

Response Tasks

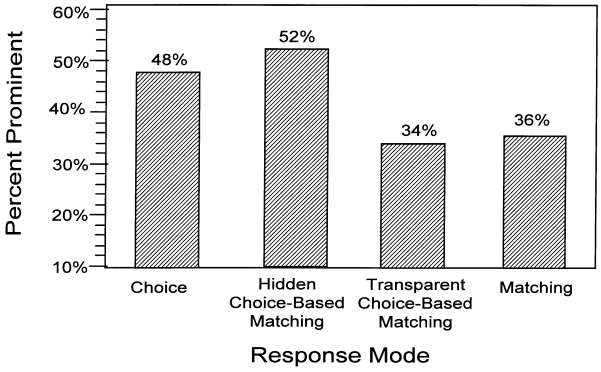
Participants evaluated eight job descriptions using the standard *choice* and *matching* response modes. In addition, they responded to two versions of choice-based matching. In *transparent-choice-based matching*, the task goal (to match two options) and converging sequence of choices were both made clear to participants. A complete series of choices leading to a matching value was completed before the next pair of choice options was considered. The instructions and response interface made the matching goal of this task even clearer than in Study 1. In the new *hidden-choice-based matching* task, participants were instructed to consider each pair of options separately and to choose the member of each pair that they preferred. The convergence process was concealed from participants by having them make one choice from converging sequence #1, then one choice from sequences #2, #3, #4, #5, #6, #7, and #8 before returning to sequence #1. This process continued until all eight tasks converged to a range smaller than \$100 (as in Study 1).[2] Thus, although the real goal

[2] Because the eight sequences were independent, some converged faster than others did. We wished to avoid the possibility that at the final stages there would be only one or two sequences that had not converged, because this might reveal the convergence process. So after four sequences had converged, we introduced enough filler items to assure that there would always be five choices between one round of a particular sequence and the next round of that sequence.

of the hidden-choice-based matching task was to converge on the matching value, the goal from the participant's perspective was simply to differentiate between pairs of choice options.

Finally, we improved both versions of the choice-based matching task by using a modified convergence algorithm. Participants occasionally appear to make "mistakes" during converging sequences of choices. These mistakes trap them in too high or too low a range to achieve a true match. In this study, we used a convergence algorithm that allowed participants to go back past a previously rejected value to correct such errors.

Figure 2 **Percent of Preferences for the Alternative that Was Superior on the Prominent (Salary) Attribute in Study 2**



Predictions

Task-Goal Hypothesis. The goal of choice and the apparent goal of hidden choice-based matching are the same, to differentiate between pairs of alternatives. Similarly, the goal of matching is the same as the overall task-goal of the transparent choice-based matching process, to equate two options. However, as noted in the predictions for Study 1, at each step in the choice-based matching convergence process, the subtask goal is to differentiate between the two options presented. Thus, this task may evoke a mixture of the two goals. This leads to the following predictions regarding the proportion of preferences favoring the alternative that is superior on the prominent attribute: *choice = hidden choice-based matching > transparent choice-based matching ≥ matching*.

Qualitative Response Scale Hypothesis. Only the matching task involves a quantitative response (in any subtask). So the prediction here is: *choice = transparent choice-based matching = hidden choice-based matching > matching*.

Qualitative Reasoning Hypothesis. Here, only the matching task requires direct comparisons of value differences across attributes. In choice as well as at any stage of both versions of choice-based matching, one can employ qualitative reasoning to resolve any choice posed. For instance, if lexicographic reasoning is used to resolve close choices, as Tversky et al. (1988) suggested, then all three tasks would lead to a prominence effect relative to matching. So, like the qualitative response scale hypothesis, qualitative reasoning also predicts *choice = transparent choice-based matching = hidden choice-based matching > matching*.

Method

Participants. Thirty-two student participants were recruited through advertisements for a decision making experiment. The study took about 45 minutes and participants were paid $10.

Stimuli and Procedure. The stimuli were the same as those used in Study 1. The only changes were in the response tasks and convergence algorithm, and that participants performed only one replication of each task.

Results

Dependent Variable. For each response mode, we calculated the percentage of a participant's responses that favored the prominent (high-salary) alternative. These percentages were calculated using the same procedure as in Study 1, except that each percentage was based on only eight responses per task. All tests were performed using Tukey's (1977) starting-split count logit transformation of these proportions, as described in Study 1. Again, all statistical conclusions hold for the transformed and untransformed proportions and for both parametric and nonparametric tests of our hypotheses.

Response Mode Effects. The main results of this study are displayed in Figure 2. Again, we observed a

highly significant overall effect of response modes on the proportion of prominent preferences (multivariate $F(3, 29) = 7.77$, $p = 0.001$). In addition, contrasts testing the within-participant response mode effects provided strong support for the task-goal model's predictions. First, preferences in choice did not differ significantly from those in hidden choice-based matching (48% vs. 52%, $F(1, 31) = 0.97$, $p = 0.33$). Second, hidden choice-based matching evoked significantly more prominent preferences than transparent choice-based matching (52% vs. 34%, $F(1, 31) = 17.38$, $p < 0.001$). Third, transparent choice-based matching did not differ significantly from matching (34% vs. 36%, $F(1, 31) = 0.22$, $p = 0.64$).

Each of these statistical tests is based on within-participant comparisons. Thus, it is possible that the observed effects might somehow be due to task-order or task carry-over effects. As in Study 1, however, the data for the first task performed by each participant closely resembled the data for all tasks. The percentages of prominent preferences for the first task were 57%, 55%, 34%, and 40% for the choice, hidden choice-based matching, transparent choice-based matching, and standard matching tasks, respectively. So as in Study 1, we found no evidence of task-order or carry-over effects that might affect our results.

Critical Comparisons. Three comparisons are of particular interest. First, the critical task-goal prediction that motivated this experiment was that hidden choice-based matching will evoke more prominent preferences than transparent choice-based matching. The data provide strong support for this prediction ($p < 0.001$). The surface features of the hidden and transparent tasks were identical, as was the convergence algorithm for the two tasks. The only clear difference between the tasks was that their perceived goals differed. Thus, this comparison provides a strong test of the task-goal hypothesis and the results clearly support it.

Second, as the task-goal hypothesis predicts, preferences in choice did not differ from those in hidden choice-based-matching ($p = 0.33$). This finding is also consistent with the other two hypotheses, so it does not discriminate among them. However, it does provide additional support for the task-goal prediction that differences in perceived task goals are an important source of differences in attribute weighting. It also eliminates any apparent discrepancy between our findings on choice-based matching of riskless alternatives and the findings of Bostic et al. (1990), regarding choice-based pricing of risky prospects. Further, it is noteworthy that although hidden choice-based matching appears to be a choice task from the participant's perspective, the equivalence of preferences in the two tasks is not trivial. Preferences in hidden choice-based matching are inferred (using transitivity and dominance) from the matching value generated in a sequence of choices, not from a direct comparison of the two original alternatives compared in the choice task. Thus, the similarity of preferences in these two tasks not only supports our hypothesis but also provides evidence of the convergent validity of the hidden choice-based matching method.

Finally, in this study, preferences in matching and transparent-choice-based matching did not differ significantly ($p = 0.64$). Interpreted through the lens of the task-goal hypothesis, this suggests that the overall task goal of choice-based matching (to equate the two options) completely overshadowed the subtask goal of differentiating between options at each stage of the convergence process.[3] The qualitative response scale and qualitative reasoning hypotheses both predict stronger weighting of the prominent attribute in the choice-based task. Thus, neither can account for the absence of a difference between matching and transparent choice-based matching.

Study 3

The results of Studies 1 and 2 consistently supported the predictions of the task-goal hypothesis but not those of the qualitative response scale and qualitative reasoning hypotheses. The primary goal of Study 3 is to provide additional tests of the task-goal hypothesis by considering both a new decision context, prefer-

[3] In Study 1, transparent choice-based matching apparently evoked a mix of the two goals. However, changes in procedure made the matching goal even more transparent in Study 2 and improved the convergence algorithm for choice-based matching, either of which might account for the difference.

ences among consumer products and services, and a new response task, the high-low response task employed by Tversky et al. (1988) and Carmon and Simonson (1998). Our key comparisons are between one version of the high-low task, whose stated goal is to discriminate among options, and two other versions, whose stated goal is to equate options.

Response Tasks and Predictions

We begin by describing the five response modes used in the study (see Figure 3), our motivation for including them, and our predictions regarding the resulting preferences.

Choice. In this response mode (see Task 1 in Figure 3), participants were asked to choose between pairs of options (in a product or service category) that differed in their price and quality. Choice served as the standard of comparison for other tasks with the goal of differentiation.

Matching. In this response mode (see Task 2 in Figure 3), participants were presented with the same two options as in the choice response mode. However, the price of the higher quality (HQ) option was not displayed. They were asked to generate a matching price for the HQ option that made the two alternatives equally attractive. This response mode served as a standard of comparison for preferences in other response tasks whose goal was to equate two options.

High-Low. The initial information displayed was the same as in the matching task (see Task 3 in Figure 3). The price of the HQ option was not displayed. However, instead of generating a matching value, participants were asked whether a price of $\$X$ would be too high or too low to make the two options equally attractive. In posing this question, we provided a value of $\$X$ that corresponded exactly to the price of the HQ option in the choice task. Thus, a response of "Too High" implies a preference for the lower quality (LQ) option in the choice task, and a response of "Too Low" implies a preference for the HQ option in the choice task.

This task can be thought of as the first step in a matching process. However, the procedure does not reveal that matching is the goal of the process. From the participant's perspective, the goal of the task is to make a differentiating judgment—whether the price is too high or too low to make the two options equally attractive. Thus, the task goal hypothesis predicts that this response task will yield preferences that closely resemble those in choice.

High-Low-Match-Now. This task consisted of a two question sequence, a high-low question followed by a standard matching question (see Task 4 in Figure 3). Our analysis focuses on how participants responded to the first question, which is the same question as that in the "pure" high-low task. Considered in isolation, the goal of this question is to discriminate. However, when followed immediately by the matching question, it is clear that this question is relevant to the goal of the second response, which is to equate the two options. In short, this is a hybrid task with goals of both discriminating and equating. Thus, we predict that it will fall between choice and matching in terms of the weighting of the prominent attribute. Note that this prediction applies to the first stage high-low response, which is identical in format to the first stage response in the simple high-low task.

High-Low-Match-Later. This response mode was very similar to *high-low-match-now* except that the manipulation was subtler. Respondents were told that they would answer a high-low question for all the products or services and then be asked to return to the beginning of the questionnaire and indicate a precise matching price for the HQ option in each item pair. To reinforce this instruction, participants made high-low judgments for two practice items, then supplied matching values for these practice items. Then they answered a series of high-low questions for the test stimuli. The matching questions were not displayed at the time when they made the high-low responses because these judgments were not to be made until later (see Task 5, Figure 3). Although the perceived goal of this task should be similar to that in the *high-low-match-now* task, the goal of equating the two options should less salient, because the matching responses were not made immediately after the high-low responses, nor were the matching questions displayed at the time when the high-low responses were

Figure 3 An Example of the Response Tasks Used in Study 3

Task 1: Choice

Minolta	Jason
9 x (9 times) magnification power ; 555 ft. field of view; 25 mm objective lens; Price: $54.99	7 x (7 times) magnification power; 325 ft. field of view; 20mm objective lens; Price: $24.89

Assuming you must choose between the two, which would you select? (circle one)

Minolta **Jason**

Task 2: Matching

Minolta	Jason
9 x (9 times) magnification power ; 555 ft. field of view; 25 mm objective lens; Price: $_____	7 x (7 times) magnification power ; 325 ft. field of view; 20mm objective lens; Price: $24.89

Enter the price of the Minolta binoculars that would make the 2 brands equally attractive to you.

Task 3: High-Low

Minolta	Jason
9 x (9 times) magnification power ; 555 ft. field of view; 25 mm objective lens; Price: $_____	7 x (7 times) magnification power; 325 ft. field of view; 20mm objective lens; Price: $24.89

Would a price of $54.99 for the Minolta brand be too high or too low to make the two brands equally attractive (circle one)?

Too high **Too low**

Task 4: High-Low-Match-Now

Minolta	Jason
9 x (9 times) magnification power ; 555 ft. field of view; 25 mm objective lens; Price: $_____	7 x (7 times) magnification power; 325 ft. field of view; 20mm objective lens; Price: $24.89

1) Would a price of $54.99 for the Minolta brand be too high or too low to make the two brands equally attractive (circle one)?

Too high **Too low**

2) Enter the price of the Minolta binoculars that would make the 2 brands equally attractive to you.

Task 5: High-Low-Match-Later

Minolta	Jason
9 x (9 times) magnification power ; 555 ft. field of view; 25 mm objective lens; Price: $_____	7 x (7 times) magnification power; 325 ft. field of view; 20mm objective lens; Price: $24.89

Would a price of $54.99 for the Minolta brand be too high or too low to make the two brands equally attractive (circle one)?

Too high **Too low**

made. Thus, we predict that the high-low-match-later task will evoke a stronger preference for the prominent attribute than will the high-low-match-now task. Again, this prediction focuses on how participants respond to the high-low question for each item.

To summarize, our task-goal account predicts that the five response modes will be ordered as follows in terms of their tendency to evoke a preference for alternatives that are superior with respect to the prominent attribute: *choice = high-low > high-low-match-later > high-low-match-now > matching*. By contrast, the qualitative scales and qualitative reasoning accounts both predict that *choice = high-low = high-low-match-later = high-low-match now > match*. In each of the first four tasks, both the response and reasoning involved are qualitative. Only the matching task involves a quantitative response or requires quantitative reasoning.

Method

Participants. We recruited 167 students by advertising for a decision making experiment. Each was paid $4 for participating. The study took about 15 minutes to complete.

Design and Procedure. We used a 5(response modes; compared between participants) × 6(replications in different product and service categories; compared within participants) design. Thus each participant evaluated 6 pairs of alternatives in one of the 5 response modes.

Stimuli—The Choice Alternatives. Four categories in this study were drawn from Carmon and Simonson (1998): airport shuttles, AM/FM cassette players, binoculars, and lawyers. The other two choice categories, traffic accidents and pollution, were adopted from Tversky et al. (1988). Previous research demonstrated a substantial difference between choice and matching for all six categories. For each category, price has been found to be less prominent than the competing attributes of value (product quality, health, or safety).

Results and Discussion

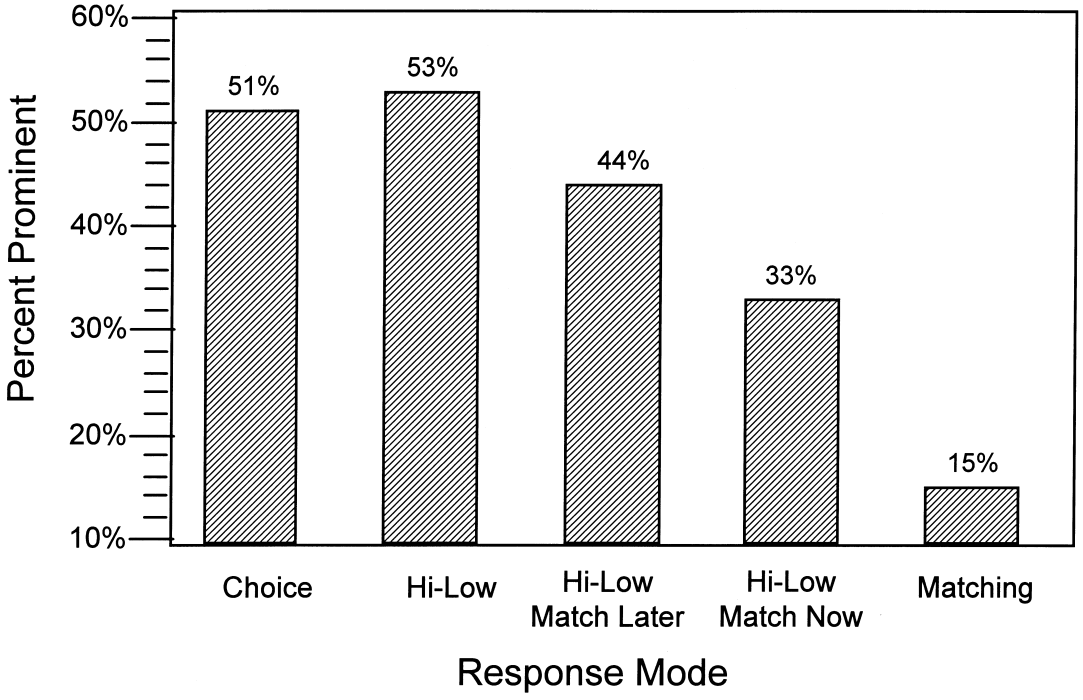
Dependent Measures. We compared the five response modes in terms of the preference for the prominent option (the option that was superior on the prominent attribute). In the choice questions, we simply tallied the share of the prominent options. In matching, we calculated the percentage of implied preferences for the prominent option. For each of the three variants of the high-low task, we tallied the percentage of implied preferences for the prominent option in the initial response to the high-low question. All tests were performed using Tukey's (1977) starting-split count logit transformation of these percentages, as described in Study 1. Again, all statistical conclusions hold for the transformed and untransformed percentages and for both parametric and nonparametric tests of our hypotheses. All tests involve between-participant comparisons.

Response Mode Effects. The main results are summarized in Figure 4. A one-way analysis of variance (of the logit-transformed percentages) revealed that the five response tasks evoked significantly different preferences ($F(4, 163) = 26.8$, $p < 0.001$). Preplanned comparisons revealed that preferences in the high-low condition did not differ from those in choice ($t(65.1) = -0.10$, $p = 0.89$).[4] The high-low-match-later task resulted in a significantly lower proportion of preferences for prominent options than the choice and high-low methods ($t(50.7) = 2.63$, $p = 0.01$). The high-low-match-now task resulted in still weaker preferences for prominent options ($t(53.8) = 2.18$, $p = 0.04$). Finally, the standard matching task resulted in an even lower proportion of preferences for the prominent option than the high-low-match-now task ($t(67.4) = 3.43$, $p = 0.001$).

This ranking of response modes (according to the percent of choices favoring the prominent option) corresponds exactly to that predicted by the task-goal account. By contrast, neither the qualitative scales nor the qualitative reasoning hypothesis correctly predicts the ranking of the three versions of high-low task. These results are impressive because the first stages of the three versions of the high-low task differ only in subtle ways.

[4] Because variances differed substantially across conditions, we computed the contrast tests using an SPSS procedure that does not assume equal variances across conditions. This method produces fractional degrees of freedom that differ from contrast to contrast.

Figure 4 **Percent of Preferences for the Alternative That Was Superior on the Prominent Attribute (Quality or Health) in Study 3**



The simple high-low task differs from the first stage of the high-low-match-now and high-low-match-later tasks only in that the latter tasks have the added goal of matching at the second stage. This contrast is especially clear in the comparison of high-low with high-low-match-later. The two tasks are identical except that in the latter, participants expect to make a matching judgment soon. The differences among these three conditions provide strong support for our claim that altering the task goal changes the expressed preference even when the surface features of the stimulus and response task are held fixed. Merely introducing a task goal for a future judgment is sufficient to alter rates of substitution in an initial response.

Finally, it is noteworthy that the high-low task is different from standard matching not only in its overall goal. Another important difference is the information content. The high-low question indicates a price for both options. Thus, respondents are likely to partly anchor on both prices (Tversky et al. 1988). In the matching task, however, there is only one price that can serve as an anchor. This difference in price anchors may well contribute to the discrepancy between these two conditions (Carmon and Simonson 1998). However, different price anchors cannot account for differences among the three versions of the high-low task, because all three provided the same two price values.

General Discussion

The prominence effect is one of the most powerful illustrations that logically equivalent questions can elicit systematically different preferences. Options that are superior on the most prominent attribute are preferred more often in choice than in matching, suggesting that the prominent attribute is weighted more heavily in choice than in matching. Tversky et al. (1988) suggested an explanation and generalization of this effect—namely, that qualitative tasks evoke strategies that give greater weight to the prominent attribute than the strategies evoked by quantitative tasks.

In this paper we proposed a new task-goal hypothesis; the prominent option is more likely to be preferred in tasks whose goal is to differentiate (e.g., choice or difference comparisons) than in tasks whose

goal is to equate (e.g., matching or transparent choice-based matching). Our rationale for this hypothesis is that the goal of differentiating can be accomplished more easily and reliably by giving greater weight to the prominent attribute, whereas the goal of equating options can be accomplished more easily by using proportionally equal weighting as a starting point for generating judgments.

Main Findings and Implications for Behavioral Models of Judgment and Choice

We conducted three studies to evaluate this task-goal hypothesis. These studies compared responses both within (Studies 1 and 2) and between participants (Study 3), with a variety of different types of choices alternatives—jobs, consumer goods and services, and health and safety options. The results consistently supported our task-goal hypothesis and were inconsistent with two other interpretations of the qualitative versus quantitative tasks distinction in Tversky et al. (1988). Two findings provide particularly strong tests and support for the task-goal hypothesis. First, the transparent- and hidden-choice-based matching tasks were identical in all respects (including the convergence algorithm) except for their implied task goals. The task-goal hypothesis correctly predicts that the prominent attribute will be more heavily weighted in the hidden version of the task (whose apparent goal is to make a series of independent choices) than in the transparent version (where the overall goal of a sequence of choices is to arrive at a matching value). The second strong finding concerns comparisons among the three versions of the high-low task. The first stages of the high-low, high-low-match-now, and high-low-match-later tasks are identical. The three tasks differ only in that the latter two have a second stage whose goal is to equate. The mere presence of this second stage led participants to weight the prominent attribute less heavily in the first stage.

In contrast, the two alternative accounts for the prominence effect failed to explain several aspects of our data. According to the qualitative scale hypothesis, responding on a qualitative scale leads to greater likelihood of preferring the prominent alternative than responding on a continuous or quantitative scale (Fischer and Hawkins 1993). Several findings contradicted this hypothesis. First, it cannot account for our finding that choice evoked a substantially stronger preference for prominent options than did transparent choice-based matching, even though both tasks involved qualitative choice responses. Similarly, the qualitative scale hypothesis also fails to explain why the high-low-match-now and high-low-match-later tasks differed from choice, the simple high-low task, and each other in Study 3. All four tasks involve qualitative responses.

According to the second alternative interpretation, the qualitative reasoning hypothesis, tasks that can be resolved using qualitative reasoning alone are more likely to lead to a preference for the prominent option than tasks that evoke quantitative reasoning about cross-attribute differences in value (Fischer and Hawkins 1993, Tversky et al. 1988). This account of the prominence effect also failed to account for our data. First, it predicts greater weighting of the prominent attribute in choice, which can be resolved using qualitative reasoning, than in the difference comparison task, which has been shown to evoke quantitative reasoning (Fischer 1995). Contrary to this prediction, preferences in the two tasks were virtually identical. Second, the qualitative reasoning hypothesis predicts that preferences in the high-low-match-now, and high-low-match-later tasks will not differ from each other or those in choice, because all three tasks can be resolved using qualitative reasoning. Thus, it cannot account for the significant differences among these tasks that we observed in Study 3.

In short, the task-goal hypothesis accounts for all of the major findings of our three studies, whereas both the qualitative scales and qualitative reasoning interpretations of strategy compatibility are contradicted by several of our results. In addition, it is noteworthy that we obtained a choice-matching prominence effect in all three studies despite the fact that matching was on the prominent attribute, which creates a scale compatibility bias in the opposite direction. This provides further evidence that the prominence effect is stronger than scale compatibility or anchoring effects.

Finally, the task-goal hypothesis provides a superior account of Fischer and Hawkins' (1993) findings regarding a quantitative strength of preference task.

This response mode differs from choice tasks in that it requires a quantitative response (from −5 = Strongly Prefer A to +5 = Strongly Prefer B). Thus, according to the qualitative response scale hypothesis, the prominent attribute should be weighted more heavily in choice tasks than in a strength of preference task. Contrary to this prediction, Fischer and Hawkins (1993) found that preferences in choice were indistinguishable from those in strength of preference, and that both showed a strong prominence effect compared to matching. This directly violates the qualitative scale hypothesis and it is not easily explained by the qualitative reasoning hypothesis.[5] By contrast, the task-goal hypothesis easily accounts for these findings because choice and strength of preference have the same task goal—to differentiate alternatives—whereas the goal of matching is to equate options.

Task Goals and the Prominence Effect. There are two ways to interpret our new hypothesis and results. Both are consistent with the qualitative versus quantitative task distinction proposed by Tversky et al. (1988) and elaborated by Fischer and Hawkins (1993). The first is to redefine strategy compatibility in terms of task goals. For example, tasks whose goal is to differentiate among options are naturally more compatible with qualitative strategies (such as lexicographic ordering) than tasks whose goal is to equate options. The latter are naturally more compatible with quantitative strategies, such as equal weighting of proportionally equal differences.

A second interpretation of our findings is to distinguish between task-goal effects and compatibility effects. With this interpretation, task-goal effects arise because people implicitly select attribute weights that allow them to achieve their task goals more easily or reliably. By contrast, scale compatibility effects arise because of natural perceptual or semantic connections between the features describing stimulus attributes and the features describing response scales (e.g., Chapman and Johnson 1995, Slovic et al. 1990, Delquie 1993). Whether one prefers the first interpretation or the second is largely a matter of theoretical taste. Our own taste leads us to prefer the second interpretation because the underlying mechanisms seem different. In our analysis, task-goal effects result from an implicit cost-benefit analysis of weighting strategies whereas scale compatibility effects arise from perceptual or semantic similarity or from use of anchoring-and-adjustment judgment rules.

Task Goals and Fundamental Objectives. Although our discussion in this paper has focused exclusively on task goals as a source of weighting biases and the prominence effect, our findings underscore the broader importance of task goals as a major influence on how people construct preferences. The theoretical account proposed here makes a fundamental distinction between different types of goals that arise in judgment and choice. The first kind of goal relates to the *intrinsic value* of the decision outcomes—how they are expected to affect our well-being. Thus, in choosing a car, maximization of safety and comfort might be viewed as intrinsically valued objectives. Keeney (1992) referred to such goals as *fundamental objectives*. Such objectives provide the basis for evaluating decision outcomes themselves. For example, Dhar and Wertenbroch (1998) showed that preferences differ among goods perceived to be utilitarian and comparable goods perceived to be hedonic.

In contrast, *task goals* concern the process of making judgments or decisions per se. In our research, we have distinguished between the task goals of *differentiating and equating* options. The power of this distinction lies in the fact that it subsumes many seemingly different tasks. Thus, choice, strength of preference, difference comparison, hidden choice-based matching, and high-low judgments are all alike (in our analysis) because they share the task goal of differentiating among options. Similarly, matching, pricing, and transparent choice-based matching are alike in that they share the goal of equating two options. Task goals such as these have at least two sources. First, task goals are directly conveyed in instructions to decision makers (e.g., adjust attribute *X* until the

[5] To account for this within the qualitative reasoning framework, Fischer and Hawkins suggested that people make strength of preference judgments by first engaging in a simple choice process, then making a metajudgment about how difficult it was to make the choice. Heavy weighting of the prominent attribute arises because the first-stage choice evokes qualitative reasoning. This interpretation is plausible, but it stretches the qualitative reasoning hypothesis.

alternatives are equal in value). Second, task goals may be discovered, or made more salient, through task performance itself. For example, the equating goal of the High-Low-Match-Now task probably becomes clearer after the assessor has completed several examples of the task.

Several other types of task goals have been addressed in previous research. First, Tversky (1977) distinguished between the task goals of *seeking similarities and seeking differences*. The former leads to greater weighting of shared features, the latter to greater weighting of distinctive features. Second, Payne et al. (1993) conducted an extensive program of research concerning how the task goals of *minimizing effort and maximizing accuracy* affect the choice of decision and judgment strategies. For example, when incentives to minimize effort are high, people tend to engage in less thorough information search and rely more on heuristics such as the elimination by aspects rule. Third, the *need to justify one's decisions* is another task goal that has received considerable attention (e.g., Simonson 1989, Shafir et al. 1993).

In short, task-goal effects appear to be one of several key factors influencing the construction of preferences. Task goals influence both the selection of decision strategies and the relative weighting of decision attributes (see also Carmon and Ariely 1998). Other factors also affect the weighting of attributes, e.g., scale compatibility, scale range, and anchoring effects. The evaluation of individual attributes appears to be strongly affected by framing and reference point effects. Finally, of course, preferences are influenced by beliefs about the intrinsic value of the decision outcomes. However, as the present research shows, these beliefs are filtered through constructive processes of judgment. Thus, although it is appealing to assume that a decision maker has true preferences, it is difficult to see how one can discover them, unless one views true preferences as conditional upon the task goal of the response process.

Implications for Decision Analysis, Public Policy Analysis, and Consumer Research

Decision analysts often assume that choice is the "gold standard" for measuring preferences. Thus, they often recommend assessment procedures based on transparent choice-based matching (e.g., Keeney and Raiffa 1976). This approach implicitly assumes that choice-based matching does not differ from choice. However, as we have shown here, choice-based matching is just as prone to the prominence bias as is direct numerical matching. If the goal is to use a choice-based convergence process that leads to the same preferences as those expressed in ordinary choice, our results indicate that the choice-based matching process must be nontransparent to the decision maker. The need to conceal the matching process from the decision maker complicates the measurement process in practical settings because it is difficult to implement a non-transparent method except in a computerized assessment procedure.

A similar problem arises in contingent valuation studies in which respondents are asked to directly state their willingness-to-pay (WTP) for public goods and services (e.g., Diamond and Hausman 1993). Sometimes analysts rely on transparent choice-based methods to elicit WTP (Diamond and Hausman 1993). However, if the goal of a contingent valuation process is to generate prices that are consistent with those that consumers would reveal in a choice-based response task, then our findings suggest that it will be necessary to use hidden choice-based pricing methods similar to our hidden choice-based matching method or the method for pricing gambles shown in Bostic et al. (1990).

Finally, our findings also have implications for consumer research. If the goal is to predict consumers' preferences or actions in natural settings, then it is important that the measurement procedure convey the same task goals that will be present when consumers make the decisions of interest. For example, Simonson et al. (1994) showed that adding certain product features or promotions increased the appeal of products in matching but decreased their appeal in choice. A second implication of our findings is that assessing consumer preferences can actually influence those preferences. For example, consumers asked to price-match two purchase alternatives before choosing between them tend to select the lower-quality, lower-priced option more often than those who simply choose first without considering the matching question (Carmon and Simonson 1998). In short, task

goals affect not only the expression of preferences in measurement tasks but also in actual behavior.[6]

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References

Ariely, D., S. T. Wallsten. 1995. Seeking subjective dominance in multidimensional space: An explanation of the asymmetric dominance effect. *Organ. Behavior and Human Decision Processes* **63**(3) 223–232.

Bostic, R., R. Herrnstein, R. D. Luce. 1990. The effect on the preference-reversal phenomenon of using choice indifferences. *J. Econom. Behavior and Organ.* **13** 192–212.

Carmon, Z., D. Ariely. 1998. Attending to what one gives up: A task-goal view of why value can appear so different to buyers and sellers. Working paper, Fuqua School, Duke University, Durham, NC.

——, I. Simonson. 1998. Price-quality tradeoffs in choice versus matching: New insights into the prominence effect. *J. Consumer Psych.* **7** 323–343.

Chapman, G. B., E. J. Johnson. 1995. Preference reversals in monetary and life expectancy evaluations. *Organ. Behavior and Human Decision Processes* **62** 300–317.

Coupey, E., J. Irwin, J. Payne. 1998. Product category familiarity and preference construction. *J. Consumer Res.* **24** 459–468.

Delquie, P. 1993. Inconsistent tradeoffs between attributes: New evidence in preference assessment biases. *Management Sci.* **39** 1382–1395.

Dhar, R., K. Wertenbroch. 1998. Consumer choice between hedonic and utilitarian goods. Working paper, Yale University, New Haven, CT.

Diamond, P. A., J. A. Hausman. 1993. On contingent valuation measurement of nonuse values. J. A. Hausman (Ed.), *Contingent Valuation: A Critical Assessment*. North Holland Press, Amsterdam, Holland, 3–38.

Fischer, G. W. 1995. Range sensitivity of attribute weights in multi-attribute value models. *Organ. Behavior and Human Decision Processes* **62** 252–266.

——, S. A. Hawkins. 1993. Strategy compatibility, scale compatibility, and the prominence effect. *J. Experiment. Psych.: Human Perception & Performance* **19** 580–597.

Fischhoff, B. 1991. Value elicitation: Is there anything in there? *Amer. Psych.* **46** 835–847.

Gabrielli, W. F., D. von Winterfeldt. 1978. Are attribute weights sensitive to the range of attribute values in multiattribute utility measurement? Working paper, Social Science Research Institute, University of Southern California, Los Angeles, CA.

Hawkins, S. A. 1994. Information processing strategies in riskless preference reversals, *Organ. Behavior and Human Decision Processes* **59** 1–26.

Keeney, R. L. 1992. *Value-focused Thinking*. Harvard University Press, Cambridge, MA.

——, H. Raiffa. 1976. *Decisions with Multiple Objectives: Preferences and Value Tradeoffs*. John Wiley, New York.

Montgomery, H. 1983. Decision rules and the search for dominance structure. P. C. Humphreys, O. Svenson, A. Vari, eds. *Analyzing and Aiding Decision Processes*. North Holland Press, Amsterdam, Holland, 343–369.

Payne, J. W., J. R. Bettman, E. J. Johnson. 1992. Behavioral decision research: A constructive processing approach. *Ann. Rev. Psych.* **43** 87–131.

——, ——, ——. 1993. *The Adaptive Decision Maker*. Cambridge University Press, Cambridge, England.

Schkade, D. A., E. J. Johnson. 1989. Cognitive processes in preference reversals. *Organ. Behavior and Human Decision Processes* **44** 203–231.

Shafir, E., I. Simonson, A. Tversky. 1993. Reason-based choice. *Cognition* **49** 11–36.

Shepard, R. N. 1964. On subjectively optimum selection among multi-attribute alternatives. M. W. Shelley, G. L. Bryan, eds. *Human Judgments and Optimality*. Wiley, New York, 257–281.

Simonson, I. 1989. Choice based on reasons: The case of attraction and compromise effects. *J. Consumer Res.* **16** 158–174.

——, Z. Carmon, S. O'Curry. 1994. Experimental evidence on the negative effect of product features and sales promotions on brand choice. *Marketing Sci.* **13** 23–40.

Slovic, P. 1995. The construction of preference. *Amer. Psych.* **50** 364–371.

——, D. Griffin, A. Tversky. 1990. Compatibility effects in judgment and choice. R. Hogarth, Ed. *Insights in Decision Making: A Tribute to Hillel J. Einhorn*. University of Chicago Press, Chicago, IL. 5–27.

Tukey, J. W. 1977. *Exploratory Data Analysis*. Addison-Wesley, Reading, MA.

Tversky, A. 1977. Features of similarity. *Psych. Rev.* **84** 327–352.

——, S. Sattath, P. Slovic. 1988. Contingent weighting in judgment and choice. *Psych. Rev.* **95** 371–384.

——, P. Slovic, D. Kahneman. 1990. The causes of preference reversal. *Amer. Econom. Rev.* **80** 204–217.

von Nitzsch, R., M. Weber. 1993. The effect of attribute ranges on weights in multiattribute utility measurement. *Management Sci.* **39** 937–943.

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