Preference Reversals in Monetary and Life Expectancy Evaluations

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Two experiments demonstrate a new type of preference reversal. In life expectancy evaluations, health items (e.g., a new treatment that would give you perfect 20/20 vision) were preferred to commodities (e.g., 1 day of vacation in Bermuda), but in monetary evaluations, commodities were preferred to health items. These reversals result from the pattern of similarity of commodities and health items to money and life expectancy and are therefore an example of Tversky, Sattath, and Slovic's (1988) semantic compatibility principle.

Increasing evidence indicates that people often have preferences that are not well defined or stable across different modes of measurement. Because many preference judgments appear to be constructed on-line in the context of a specific preference elicitation procedure (e.g., Payne, Bettman, & Johnson, 1992), the revealed preferences vary both across different response elicitation tasks (for example, judgment versus choice) or even within response tasks across different response scales (for example, pricing versus rating). The lability of preference judgments can result in reversals of preference (e.g., Goldstein & Einhorn, 1987; Lichtenstein & Slovic, 1971; Lindman, 1971; Tversky, Sattath, & Slovic, 1988).

In a typical preference reversal experiment (e.g., Lichtenstein & Slovic, 1971) subjects evaluate a lottery with a small chance of winning a large monetary amount (a $-bet) and a lottery with a large probability of winning a modest cash amount (a P-bet). In choosing between the two lotteries, subjects generally prefer the P-bet; often, however, subjects also state a higher cash equivalent for the $-bet. Thus, the preference for the two lotteries varies with the response elicitation procedure, a violation of normative theory.

Tversky *et al.* (1988) offer an explanation for such preference reversals. According to their compatibility principle, the weight of an input component is enhanced by its compatibility with the output. For example, since monetary payoffs are compatible with a monetary response scale, cash evaluations of lotteries will be more influenced by the payoffs (relative to the probabilities) than will choices between lotteries. This mechanism is termed contingent weighting because the weight of each input attribute is contingent on the compatibility between the attribute and the response scale.

This explanation also applies to reversals that occur when only one response task, such as judgment, is used with different response scales. For example, Slovic, Griffin, and Tversky (1990) asked subjects to predict the performance of 10 students in one course based on their grades in a second course and class rank in a third course. The class grade inputs were given more weight when performance predictions were in terms of grades. Conversely, class rank inputs were given more weight when performance predictions were made in term of class rank. As a result of these differing attribute weights, predictions from the class rank and from the class grade response modes did not agree.

In another example of a compatibility effect, Schkade and Johnson (1989, Experiment 2), replicating a result first demonstrated by Goldstein and Einhorn (1987), asked subjects to evaluate P-bets and $-bets by rating

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each on a 100-point scale and by indicating their minimum selling price for each. Because the 100-point rating scale was compatible with probability, probabilities were most influential for that response mode; thus P-bets tended to be rated higher than $ bets. Likewise, because the monetary pricing scale was compatible with monetary payoffs, payoffs were most influential for that response mode; thus $-bets tended to be priced higher than P-bets. The differences between the two response modes resulted in preference reversals. For 70% of the lottery pairs, the P-bet was preferred in rating, and the $-bet was preferred in pricing.

While the compatibility hypothesis describes the increased weight given to compatible attributes, several specific mechanisms may produce these effects. To explain discrepancies between choice and judgment, Tversky *et al.* (1988) note that these two tasks invoke two different kinds of reasoning. Judgment requires quantitative reasoning, while choice can be accomplished by qualitative comparison. Fischer and Hawkins (1993; Hawkins, 1994) note that qualitative preference tasks are more likely than quantitative tasks to evoke a preference for the alternative that is superior with respect to the most important attribute. This principle is termed strategy compatibility. A second mechanism that can produce compatibility effects has been termed scale compatibility (Tversky *et al.*, 1988): different response scales are more or less compatible with the attributes of the item to be judged. For example Slovic *et al.* (1990) argue that a grading scale is more similar to past grades than to past class rank, causing that element of the student profile to be overweighted. Schkade and Johnson (1989) similarly suggest that pricing judgments emphasize the amount to win, and that probabilities are more similar to their 100-point rating scale, producing their observed results. They also suggest that these reversals are mediated by anchoring and insufficient adjustment. Specifically, they argue that the more compatible element serves to generate an anchor on the response scale, and that insufficient adjustment contributes to the observed increased weight for the compatible attribute.

In this paper we concentrate on a third type of compatibility effect, semantic compatibility, which involves inputs and response modes that are meaningfully related but are not expressed on the same continuum. According to Tversky *et al.* (1988), "The rationale for this principle is that characteristics of the task and the response scale prime the most compatible features of the stimulus. (p. 376)." Tversky *et al.* (1988) give as an example the discrepancy between similarity and dissimilarity judgments (Tversky, 1977). Features that two items hold in common loom larger in similarity judgments, while distinctive features loom larger in dissimilarity judgments because common features are more semantically related to the concept of similarity than are unique features.

Although demonstrations of preference reversals that can be explained in terms of strategy and scale compatibility are plentiful (Fischer & Hawkins, 1993; Goldstein & Einhorn, 1987; Grether & Plott, 1979; Hawkins, 1994; Johnson, Payne, & Bettman, 1988; Lichtenstein & Slovic, 1971, 1973; Schkade & Johnson, 1989; Tversky, Slovic, & Kahneman, 1990), there are fewer demonstrations of the semantic compatibility principle. Note that semantic compatibility relies on neither the differences in the kind of strategy used to express preferences or on the surface similarity of the response scale to one of the features of the stimulus to be judged. Rather, the semantic compatibility principle relies on the priming by the response scale of features of the object being judged. The purpose of the present experiments was to explore a new type of preference reversal that can be explained by semantic compatibility.

In two experiments subjects evaluated two types of items: consumer commodities (e.g., 1 day of vacation in Bermuda) and health-related items (e.g., a new treatment that would give you perfect 20/20 vision). Evaluations were given in terms of money and in terms of life expectancy. We hypothesized that health items would be more compatible with the life expectancy response scale and that commodities would be more compatible with the monetary scale. Although health items are not expressed on the same continuum as life expectancy, we hypothesized that life expectancy would be seen as similar to, or a good substitute for, the health items. Similarly, money would be seen as similar to, or a good substitute for, commodities. Consequently, health items would be given more weight in life expectancy evaluations and commodities would be given more weight in monetary evaluations. These differences would lead to a particular type of preference reversal in which a commodity item is preferred to a health item in monetary evaluations, but the health item is preferred to the commodity item in life expectancy evaluations.

Monetary evaluations are frequently elicited in preference reversal experiments. Life expectancy evaluation is less typically used in preference experiments, but serves as a useful second response mode in that, like money, it is a cardinal scale familiar to our subjects. Utility for life expectancy is very likely monotonic for the range of answers given by our subjects (up to 5 extra years of life expectancy). In addition, everyday decisions often involve life expectancy trade-offs, although perhaps not explicitly. For example, a decision to smoke shortens life expectancy, while a decision to eat a low-fat diet lengthens life expectancy. Unlike a certain monetary amount, however, an amount of additional life expectancy represents the mean of a dis-

tribution of possible lengths of life rather than a certain amount. In addition to using a fairly novel response mode, our experiments also employed unusual items. Because trading commodities is likely a more familiar task than trading health items, we attempted to design unusual commodity items that subjects would be unlikely to have purchased recently.

EXPERIMENT 1

Subjects evaluated 96 items representing three categories. Thirty-four consumer commodity items were items of the type that are normally traded for cash. Twenty-two health care items were health-related outcomes that are not generally available on the market. In addition there were 40 filler items. All the items are listed in the Appendix (Table A-1).

Subjects evaluated each item by making a trade-off between the item and either money or life expectancy. Experiment 1 was a between-subjects preference reversal design in that each subject evaluated any given item in only one response mode; however, subjects gave two evaluations in a given response mode. One evaluation was a buying amount: the largest amount of money (or life expectancy) the subject was willing to give up to gain the item. The second evaluation was a selling amount: the smallest amount of money (or life expectancy) the subject would demand in compensation for losing the item. These two evaluations provided a measure of the reliability of each response mode (money and life expectancy). Although research on loss aversion (Tversky & Kahneman, 1991) indicates that selling prices are often larger than buying prices, the rank order of items based on buying prices is likely to be similar to the rank order based on selling prices. This reliability check was less transparent to subjects than a standard test-retest reliability check.

After making each trade-off, subjects rated each item on 12 attributes. These attributes were designed to measure characteristics of the item; those relevant to the present analysis concerned the similarity between the item and each response mode. We hypothesized that the pattern of similarity ratings could explain the mechanisms underlying preference reversals.

Methods

Subjects. The subjects were 32 students from Philadelphia area colleges. They were paid $6.00 per hour for participating in two approximately hour-long computer sessions separated by 2 to 7 days.

Procedure. Experiment 1 employed a set of 96 items (see listing in Appendix, Table A-1). Each subject evaluated one quarter of the total item set (24 items). Thus, each subject evaluated 8 or 9 commodity items, 5 or 6 health items, and 10 filler items. During the first of two sessions, 6 of the 24 items appeared in each of the following types of trade-offs: gaining the item in exchange for losing some money, losing the item in exchange for gaining some money, gaining the item in exchange for losing some life expectancy, and losing the item in exchange for gaining some life expectancy. For each trade-off, the subject was asked to set the amount of money or life expectancy so that the trade was just acceptable.

For trials involving a gain, subjects were told that they did not currently possess the item described. If the trial involved a loss, the subjects were instructed that they did possess the described item. After reading the item description, subjects were asked for the greatest amount of money (or life expectancy) they would give up to gain the item, or the least amount they would demand in exchange for losing the item. The subjects then rated the item on twelve attributes using 5-point scales. The three rating questions measuring similarity were as follows: Is money (or life expectancy) a good substitute for this item? How similar is this item to money (or life expectancy)? How experienced are you with trades involving this item and money (or life expectancy)?

During the second session, each subject evaluated the same 24 items seen in the first session. Items that had previously appeared as gains now appeared as losses, and items that had previously appeared as losses now appeared as gains. Items that had previously appeared in trade-offs with money once again appeared in trade-offs with money, and items that had previously appeared in trade-offs with life expectancy once again appeared in trade-offs with life expectancy. Thus for each of the 24 items, the subject gave both a buying and selling amount in the same response mode. For 12 of the items, these amounts were given in terms of money, and for the other 12 items, these amounts were given in terms of life expectancy. Across all subjects, all 96 items were evaluated in both the money and life expectancy response modes.

Each subject was randomly assigned to a counterbalance condition that counterbalanced which 24 of the 96 items the subject saw, which items were evaluated in terms of money or life expectancy, and the order of item presentation, the order of response modes (money and life expectancy), and the order of response frames (buying and selling).

Results and Discussion

Preference reversals. For each of the 34 commodity items and 22 health items, four geometric means were computed across subjects: the buying price in money, the buying amount in life expectancy, the selling price in money, and the selling amount in life expectancy.

Each of the 34 commodity items was paired with each of the 22 health items, for a total of 748 pairs. For each pair, the implied preference order of mean monetary evaluations was compared to the implied preference order of mean life expectancy evaluations. If the commodity (or health item) received the higher evaluation in both response modes, then the response modes were consistent for that pair. If the commodity received the higher monetary evaluation but the health item received the higher life expectancy evaluation, then the pair indicated the predicted type of preference reversal.

Table 1 illustrates the frequency of preferences reversals for the buying amounts, and Table 2 for the selling amounts. While only 26% of the buying price pairs showed reversals, 84% of those reversals were of the predicted type: the commodity was preferred in the money response mode, but the health item was preferred in the life expectancy response mode. Although only 24% of the selling price pairs showed reversals, 65% of those reversals were of the predicted type.

McNemar's χ^2 tests whether the frequencies in the off-diagonal cells differ from one another, (Siegel, 1956, p. 63); however this test requires independent observations. Because each item contributed to multiple pairs, the observations shown in Tables 1 and 2 are not independent from one another. In order to test whether the percent preference for health items in the monetary response mode was the same as in the life expectancy response mode, we ran two logistic regressions based on 1496 observations (22 health items × 34 commodity items × 2 response modes). The dichotomous dependent variable was coded as 0 if the commodity item for a particular pair was preferred and as 1 if the health item was preferred. The independent variables were health item, commodity item, and response mode. Inclusion of the health and commodity item variables factored out the main effect of items. The effect of response mode was significant for the buying ($\chi^2 = 112$, $df = 1$, $n = 1496$, odds ratio = 14.62, $p < .0001$) and selling analyses ($\chi^2 = 24.7$, odds ratio = 2.61, $p < .0001$), indicating that health items were preferred more often in the life expectancy response mode than in the monetary response mode. As shown in Tables 1 and 2, in the life expectancy buying response mode, 88% of pairs showed a preference for the health item (86% for selling), whereas in the monetary buying response mode, only 70% of pairs showed a preference of the health item (79% for selling). This analysis indicated that the predicted preference reversals significantly outnumbered the preference reversals that were contrary to prediction. Thus, for both buying and selling prices, the monetary response mode increased the preference judgments for commodities and the life expectancy response mode increased the preference judgments for health items.

TABLE 1

Buying Price Preference Orders from Experiment 1

	Money amounts		
	Prefer commodity	Prefer health item	Marginal totals
Life amounts			
Prefer commodity	62 (8.3%)	30 (4.0%)	92 (12.3%)
Prefer health item	161 (21.5%)	495 (66.2%)	656 (87.7%)
Marginal totals	223 (29.8%)	525 (70.2%)	748 (100%)

Note. Internal cells and marginal totals show frequency (percentage) of observations in each category.

TABLE 2

Selling Price Preference Orders from Experiment 1

	Money amounts		
	Prefer commodity	Prefer health item	Marginal totals
Life amounts			
Prefer commodity	39 (5.2%)	64 (8.6%)	103 (13.8%)
Prefer health item	119 (15.9%)	526 (70.3%)	645 (86.2%)
Marginal totals	158 (21.1%)	590 (78.9%)	748 (100%)

Note. Internal cells and marginal totals show frequency (percentage) of observations in each category.

Preference reversal are often illustrated in 2 by 2 tables (such as Tables 1 and 2) that illustrate preference orders for pairs of items. In the present experiment, subjects did not actually rank order item pairs; instead, preference orderings for all possible pairs were inferred from buying and selling prices given to individual items. Consequently, in the logit analyses reported above the number of degrees of freedom is larger than the number of items, potentially inflating the level of significance of the preference reversal effect. We therefore examined this effect in two alternate ways as well.

First, we ran two ANOVAs using buying and selling amounts (with a natural logarithm transformation) as the dependent variables. Each ANOVA was based on 112 observations, resulting from the fact that each of the 56 items was evaluated in two response modes. Although each subject contributed preference judgments to more than one of these 112 observations, the variance due to subjects has been factored out by averaging across subjects. The independent variables used in each ANOVA were item type and response mode. Buying amounts showed a significant interaction between response mode and item type ($F(1,108) = 6.58$, $p < .02$) but selling prices did not ($F < 1$). This interaction is analogous to the preference reversal effect. Whereas health items were preferred to commodities by only a factor of about 6 in monetary evaluations

TABLE 3
Within and between Response Mode Correlations in Experiment 1

	Life expectancy		Money	
	Buy	Sell	Buy	Sell
Life expectancy				
Buy				
Sell	**.78**			
Money				
Buy	.56	.57		
Sell	.57	.53	**.86**	

Note. Within-response mode correlations (shown in bold) are larger than between-response mode correlations.

(geometric mean buying prices $744 versus $122), they were preferred in life expectancy evaluations by a factor of about 82 (geometric means 14.88 years versus 66 days). Thus, this method of characterizing the pattern of preference reversals indicates systematic preference reversals for buying but not selling amounts.

Another alternative method to examine preference reversals is to ask whether the reversals were sufficient to reduce the rank order correlation between the monetary and life expectancy response modes. Because subjects gave both buying and selling amounts for each item, these two evaluations served as a measure of the reliability of each response mode. Table 3 shows the within- and between-response mode correlations across items. The rank order correlation across the 56 items between monetary buying and selling prices was .86 ($p < .001$); between life expectancy buying and selling amounts the correlation was .78 ($p < .001$). The reliability of money was not significantly larger than that of life expectancy ($p > .07$, using a Fisher Z transformation, Kleinbaum & Kupper, 1978, p. 79), suggesting that life expectancy is as natural an evaluation scale as is money. In contrast, the rank order correlation over items between a monetary response and a life expectancy response ranged from .53 to .57 ($ps < .001$). The largest between-response mode correlation (.57) was significantly lower than the .78 reliability of the life expectancy response mode ($p < .005$).[1] Thus, the preference ordering of the 56 items according to the monetary response mode did not match the ordering for the life expectancy response mode, indicating preference reversals.

Filler items. The preceding analyses involved only the commodity and health items. If the revealed preference reversals resulted from semantic compatibility, we would expect the results to be specific to these items. Systematic preference reversals should not occur with the filler items because these items had no predicted similarity relationship with the two response modes. We conducted three analyses to determine if preference reversals were specific to commodity and health items.

We first conducted four ANOVAs like that reported above. Two of these analyses involved only the commodity and filler items; the remaining two included only health and filler items. Both buying and selling prices were used as dependent variables. None of these four ANOVAs showed an item type by response mode interaction ($F(1,144)$s < 2.6, $ps > .11$). Thus, comparing filler items to each of the other item types did not reveal any systematic reversals.

Second, as in Table 3, we compared within- and between-response mode correlations for commodity and filler items, and for health and filler items. In both of these analyses, the within-domain correlation for life expectancy did not significantly exceed the largest between-response mode correlation (Zs < 1.2, $ps > .23$). Thus, these analyses did not show the same pattern as did the analysis of commodity and health items shown in Table 3.

In a third analysis, we constructed 2 by 2 tables like Tables 1 and 2 to examine the implied preference order for commodity and filler item pairs, and for health and filler item pairs. These tables suggested that filler items were intermediate between commodity and health items. Of 1360 commodity-filler item buying price pairs, 465 showed reversals. In 70% of these reversals commodities were preferred in monetary evaluations, and filler items in life expectancy evaluations. (The proportion of 'predicted' reversals was only 42% for selling price pairs.) Of the 880 health-filler item buying price pairs, 253 showed reversals. In 70% of these reversals filler items were preferred in monetary evaluations, and health items in life expectancy evaluations. (This proportion was 74% for selling price pairs.)

Thus, the filler items appeared to show some systematic reversals. The proportion of 'predicted' reversals, however, was much smaller than for the commodity-health item pairs. In those buying price pairs, 84% of reversals were in the predicted direction, significantly larger than the 70% in the filler item pairs ($Z = 3.60$, $p < .01$). In the selling price commodity-health item pairs, only 65% of reversals were in the predicted direction. This proportion is intermediate between the two proportions seen in filler item pairs. This analysis points to two results. First, systematic preference reversals were more apparent for buying prices than for selling prices. Second, in buying prices, preference re-

[1] We also computed these correlations using Kendall's Tau rather than Spearman correlations. The Kendall correlation coefficients shows the same pattern of results, although the reliability of life expectancy ($r = .58$) was not significantly larger than the between-response mode correlations, which ranged from .37 to .41 ($ps < .12$). The reliability of money was .71.

versals were more evident in the commodity-health item pairs than in the filler item pairs. Thus, preference reversals between monetary and life expectancy evaluations are specific to commodity and health items.

Similarity ratings. This pattern of preference reversals may be explained by attributes of the health and commodity items evaluated. The three attribute ratings concerning the similarity between the items and response modes were averaged to form one similarity score. Table 4 shows the similarity scores for health and commodity items in money and life expectancy trades.

Similarity ratings were examined using an ANOVA based on 112 observations (56 item means crossed with two response modes). The independent variables were item type (commodity or health) and response mode (money or life expectancy). There was a main effect of response mode, indicating that, as a group, the items were viewed as more similar to money than to life expectancy ($F(1,108) = 37.26$, $p < .0001$). In addition, there was an interaction between item type and response mode ($F(1,108) = 110$, $p < .0001$). As predicted, commodities were rated as more similar to money, but health items were rated as more similar to life expectancy.

Because the similarity ratings showed an interaction between item type and response mode, it is possible that the pattern of similarity of commodities and health items to money and life expectancy underlies the observed preference reversals. This similarity mediation hypothesis specifies that commodities are preferred to health items in monetary evaluations because the commodities are similar to money. Likewise, health items are preferred to commodities in life expectancy evaluations because the health items are similar to life expectancy. To test this hypothesis, we added similarity ratings as a covariate to the buying price ANOVA reported above. The effect of similarity ratings was significant ($F(1,107) = 4.09$, $p < .05$, partial $r = .16$), and, after covarying out the similarity factor, the item type by response mode interaction was no longer significant ($F < 1$, $p > .6$). The variance in buying amounts explained by the interaction was significantly reduced by the covariate ($F(1,107) = 6.62$, $p < .02$). Thus, by the criteria outlined by Baron and Kenny (1986), similarity mediates the interactive effect of item type and response mode on buying amounts. Because this interaction is analogous to the preference reversal effect, we conclude that the similarity of commodities and health items to money and life expectancy is at least a partial basis for the observed preference reversals in buying amounts. A similar analysis using selling amounts did not show evidence for mediation because selling amounts were not correlated with similarity ratings and did not show an item type by response mode interaction.

TABLE 4
Mean Similarity Ratings from Experiment 1

	Response modes	
	Money	Life expectancy
Item types		
Commodities	3.35	1.53
Health items	2.20	2.68

Experiment 1 demonstrated a new type of preference reversal. In life expectancy evaluations, health items tend to be preferred to commodities, but in monetary evaluations, commodities are preferred to health items. Experiment 1 also provided support for the hypothesis that the similarity of money and life expectancy to commodities and health items mediates the preference reversal effect. This mediational evidence was limited to buying amounts, perhaps because the preference reversal effect was larger in buying amounts than in selling amounts.

EXPERIMENT 2

The purpose of Experiment 2 was to replicate the preference reversal result found in Experiment 1 using a within-subject design. Subjects evaluated a subset of items used in Experiment 1 by indicating minimum selling amounts. All subjects gave both monetary and life expectancy evaluations for each item. It was hoped that this more sensitive design would reveal more substantial evidence in support of the hypothesis that similarity underlies the preference reversal effect.

Because mediational evidence was lacking for selling amount reversals in Experiment 1, this evaluation frame was the focus of Experiment 2. An additional reason for using selling amounts was that this evaluation frame did not require subjects to give up life expectancy. Earlier pilot testing had revealed that subjects were sometimes reluctant to give up any life expectancy at all in exchange for gaining some items. To prevent zero evaluations in the computerized Experiment 1, subjects were required to give minimum life expectancy buying amounts of .01 seconds. Experiment 2 used paper and pencil questionnaires and therefore could not enforce such a requirement.

Methods

Subjects. The subjects were 40 undergraduate students in an Introductory Psychology class at the University of Illinois at Chicago. They received class credit for participation in one experimental session.

Procedure. Ten commodity items and 10 health items were selected from those used in Experiment 1 (see Appendix, Table A-1). A few commodity items were revised to be appropriate for Chicago subjects (e.g., "cabin in the Poconos" was changed to "cabin in Wisconsin".) Each subject was presented with a questionnaire and asked to evaluate all 20 items twice. In one evaluation, subjects stated "the least amount of money for which you would sell this item." In the other evaluation, subjects stated "the least amount of additional life expectancy you would demand in exchange for losing this item." The two evaluations were separated by a filler task. After the second evaluation, subjects used a 5-point scale to rate how similar each of the 20 items was to money, and how similar each was to life expectancy. Subjects were randomly assigned to one of 4 conditions to counterbalance the order of items and response modes. (Experimental instructions are included in the Appendix.)

Results and Discussion

Preference reversals. Each of the 10 commodity items was paired with each of the 10 health items, resulting in 100 pairs. Each of the 40 subjects evaluated both items in each pair, resulting in 100 × 40 = 4000 observations. For each observation, a predicted preference reversal occurred if the monetary selling price for the commodity was larger than the selling price for the health item and the life expectancy amount for the health item was larger than the life expectancy amount for the commodity.

Observations were excluded from the analysis if the subject failed to provide either the monetary or life expectancy evaluation of either item (350 observations, 8.75% of the data.[2]) Observations were also excluded from the analysis if the two items received the same evaluation in either response mode (an additional 419 observations, 10.48% of the data). Table 5 presents a break down of the remaining observations. Sixty-one percent of the preference orderings were consistent across response modes, and 39% of the preference orderings showed reversals. Of those preference reversals, 61% were in the predicted direction.

As in Experiment 1, we conducted a logistic analysis based on 8000 observations (40 subjects × 10 health items × 10 commodity items × 2 response modes), less missing observations. The dichotomous dependent variable was coded as 0 if the commodity item for a particular pair was preferred and as 1 if the health item was preferred. The independent variables were health item, commodity item, subject, and response mode. Including the health and commodity item and subject variables served to factor out the main effects of items and subjects. The effect of response mode was significant ($\chi^2 = 61.7$, $df = 1$, $n = 6462$, odds ratio = 1.58, $p < .0001$), indicating that health items were preferred more often in the life expectancy response mode (61%) than in the monetary response mode (52%).

[2] Two subjects had to be eliminated from the analysis because they did not provide any life expectancy evaluations.

TABLE 5
Selling Price Preference Orders from Experiment 2

	Money amounts		
	Prefer commodity	Prefer health item	Marginal totals
Life amounts			
Prefer commodity	778 (24.1%)	493 (15.3%)	1271 (39.3%)
Prefer health item	768 (23.8%)	1192 (36.9%)	1960 (60.7%)
Marginal totals	1546 (47.8%)	1685 (52.2%)	3231 (100%)

Note. Internal cells and marginal totals show frequency (percentage) of observations in each category.

As in Experiment 1, we also conducted an ANOVA based on 1600 observations (20 items crossed with 2 response modes and 40 subjects), less missing observations. The ANOVA used selling amount (with a natural logarithm transformation) as the dependent variable, and a subject factor and the within-subject factors of item type and response mode as independent variables. The significant interaction between response mode and item type ($F(1,1494) = 6.54$, $p < .01$) is analogous to the preference reversal effect. Whereas health items were preferred to commodities by only a factor of about 1.4 in monetary evaluations (geometric means \$857 versus \$611), they were preferred in life expectancy evaluations by a factor of about 3.4 (geometric means 3.44 years versus 1.01 years).

In addition, we examined the rank order correlation between the two response modes across the 20 items and 40 subjects (800 observations, less missing data). Monetary evaluations of the items were only moderately correlated with life expectancy evaluations (Spearman $r = .36$, $n = 745$, $p < .001$). It appears that because of the preference reversals, the rank ordering of items did not agree across the two response modes. Because the reliability of the response modes was not assessed in Experiment 2, however, this conclusion cannot be confirmed.

Similarity ratings. Table 6 summarizes the similarity ratings. The commodities were judged to be more similar to money than to life expectancy; conversely, health items were rated more similar to life expectancy than to money. An ANOVA based on 1600 observations (20 items by 2 response modes by 40 subjects), less missing observations, used similarity ratings as the dependent measure and a subject factor and the within-subject factors of response mode and item type

TABLE 6
Mean Similarity Ratings from Experiment 2

	Response modes	
	Money	Life expectancy
Item types		
Commodities	3.18	2.42
Health items	3.04	3.51

as independent variables. There was a significant interaction between item type (commodity or health item), and the response mode to which similarity was being judged (money or life expectancy) ($F(1,1532) = 90.14$, $p < .0001$).

This result suggests that commodities are preferred to health items in money evaluations because the commodities are similar to money, and likewise, health items are preferred to commodities in life expectancy evaluations because the health items are similar to life expectancy. To test this hypothesis, we conducted a mediational analysis as in Experiment 1. Similarity ratings were added as a covariate to the selling price ANOVA reported above. The effect of similarity ratings was significant ($F(1,1493) = 13.25$, $p < .001$, partial $r = .50$), and the item type by response mode interaction was no longer significant ($F(1,1493) = 1.04$, $p > .3$). The variance explained by the interaction was significantly reduced by the covariate ($F(1,1493) = 5.68$, $p < .05$). Thus, by the criteria outlined by Baron and Kenny (1986), similarity mediates the interactive effect of item type and response mode on selling amounts. Because this interaction is analogous to the preference reversal effect, we conclude that the similarity of commodities and health items to money and life expectancy is at least a partial basis for the observed preference reversals.[3]

GENERAL DISCUSSION

Two experiments demonstrated a new type of preference reversal in which health items were preferred to commodities in life expectancy evaluations, but commodities were preferred in monetary evaluations. In both experiments, the predicted reversals significantly outnumbered the counter-predicted reversals. Experiment 1 demonstrated that these reversals significantly reduced the rank order agreement between the money and life expectancy response modes relative to the reliability of each response mode. Both experiments provided evidence that at least one reason for the preference reversals is the similarity of commodities and health items to money and life expectancy.

These preference reversals constitute an example of Tversky *et al.*'s (1988) semantic compatibility principle. When the response mode was semantically compatible with the item type, preference judgments were higher than otherwise. In line with Tversky *et al.* (1988), we explain this result in terms of contingent weighting: the input attributes that are compatible with the response mode are more heavily weighted. Specifically, because the life expectancy response mode enhances the subjective weight of health attributes of the items (and because those health attributes were primarily positive for our items), those items with more health attributes (e.g., the health items) received more favorable life expectancy evaluations. Likewise, because the monetary response mode enhanced the subjective weight of commodity attributes of the items, those items with more commodity attributes (e.g., the commodity items) received more favorable monetary evaluations.

The preference reversals demonstrated here shed light on some other theories of preference reversals. Some of these theories analyze choice under uncertainty and thus cannot be used to explain the results reported here. These include Expression Theory (Goldstein & Einhorn, 1987), Regret Theory (Loomes & Sugden, 1983), and failures of the usual selling price instructions (Becker, DeGroot, & Marchak, 1964) to reveal true preferences due to a violation of the independence axiom (Karni & Saftra, 1987). Thus the mechanisms postulated by these theories are not necessary for preference reversals to occur.

We considered whether a more informal notion of regret could explain our preference reversal results. For example, if decision makers anticipated feeling regret if they traded a health item for life expectancy, or a commodity for money, they might increase their selling amounts to compensate for the regret. If trades between items and incompatible response modes elicited less regret, those selling amounts would be correspondingly lower, thus yielding the systematic preference reversals we observed. However, some of the attributes rated by subjects in Experiment 1 concerned the regret resulting from each trade-off (e.g., "How much regret would you feel if you actually made this trade?"). Unlike similarity ratings, regret ratings did not mediate the preference reversals. Thus, even an informal regret theory is not able to account for the results.

Regret Theory is an example of a more general class of explanations of preference reversals that posit that reversals occur because preference orderings are intransitive (Fishburn, 1985). A theory of intransitive preferences could explain our results. For example, suppose that the monetary equivalent assigned to a

[3] Because similarity ratings were obtained after monetary and life expectancy evaluations, one might argue that the evaluations influenced the similarity ratings, rather than similarity affecting evaluations. We view this argument as implausible because similarity mediates an interaction rather than a main effect.

particular commodity item was $500 and the monetary equivalent of a health item was $250. Further suppose that the life expectancy equivalent was 6 months for the commodity and two years for the health item. Assuming that utility is increasing in both dollars and years of life, this preference reversal would be consistent with the following intransitive preference ordering:

$$commodity > \$400 > health > 1\ year > commodity$$

where > indicates "is preferred to".

Tversky, Slovic, and Kahneman (1990) showed that intransitive preference orders did not account for most preference reversals between lotteries. It is nonetheless possible that the preferences reversals demonstrated for our riskless items are intransitive. Such an explanation of our results would not predict the result that similarity ratings mediate the preference reversals; nevertheless, we cannot rule out intransitivity as an additional contributor to preference reversals between monetary and life expectancy response modes. Further research is needed to evaluate this possibility.

The preference reversals reported here are somewhat unique in that they cannot be explained by strategy or scale compatibility. Strategy compatibility emphasizes the distinction between quantitative and qualitative decision tasks (Fischer & Hawkins, 1993). This principle explains why choice (a qualitative task) is more likely than pricing (a quantitative task) to evoke a preference for the alternative that is superior with respect to the most important attribute. Because our experiments employed only quantitative judgment tasks, our results cannot be explained by strategy compatibility. According to the scale compatibility principle (Tversky *et al.*, 1988), inputs are weighted more heavily if they are expressed on the same scale as the response. Because our health and commodity items were not expressed on the monetary or life expectancy response scales, scale compatibility cannot account for our reported preference reversals. In contrast, our results can be explained by semantic compatibility; inputs are weighted more heavily if they are similar to the response scale.

The preference reversal effect reported here is modest in size compared to other demonstrations of preference reversals. In our experiments, 16 to 24% of all item pairs showed reversals in the predicted direction. In contrast, for example, in Schkade and Johnson's (1989) experiments, 45 to 70 percent of lottery pairs showed reversals in the predicted direction. It is possible that the overall preference for health items in our experiments reduced the size of the observed preference reversal effect. Our selection of items may have also influenced the size of the effect. We elected to demonstrate a semantic compatibility effect across a wide range of items rather than selecting items specifically to show the largest possible preference reversal effect. Finally, it is possible that semantic compatibility is a weak effect compared to scale or strategy compatibility.

Although our results cannot be explained by either scale or strategy compatibility, they do not provide a comparison of semantic compatibility with scale or strategy compatibility. Thus, we cannot determine whether semantic compatibility effects are smaller than scale or strategy compatibility effects. Furthermore, although Fischer and Hawkins (1993) have compared the relative effects of strategy and scale compatibility, it may be difficult or unnatural to separate scale and semantic compatibility in order to pit one against the other. Most response modes have natural units; thus altering the scale properties in order to affect scale compatibility may also affect the semantic compatibility between the response scale and the items to be evaluated.

Like our results, recent preference reversal results from Irwin (1994) cannot be explained by scale or strategy compatibility. Irwin showed that in buying price evaluations, market commodities were preferred to environmental goods; however in selling price evaluations, environmental goods were preferred to market commodities.[4] Irwin concluded that moral aspects of the goods are given more weight in selling price evaluations because the selling frame implies that the decision maker is responsible for the item under evaluation. The moral responsibility aspects of the goods might be viewed as more semantically compatible with selling evaluations than with buying evaluations. Preference reversals result because environmental goods are superior to market commodities on moral responsibility dimensions.

The semantic compatibility principle has potentially broad implications for understanding the construction of preference judgments. Our results suggest that a salient feature of the preference judgment task, such as the response mode, can influence the features of the target item that are weighed heavily in the evaluation. Other task features may similarly increase the subjective weight of compatible target features. For example, Shafir (1993) showed that when asked to accept one of two options, decision makers appear to focus on the positive features of the options. In contrast, when asked to reject one of two options, decision makers fo-

[4] The results of our Experiment 1 showed a similar result. In 504 of the commodity–health item pairs, both the buying and selling prices were higher for the health item; for 137 pairs both buying and selling prices were higher for the commodity. Of the 107 pairs that showed reversals, for 86 the health item was preferred in selling prices and the commodity preferred in buying prices. After factoring out item effects, a logit analysis revealed that the 79% preference for health items in selling prices was reliably larger than the 70% preference in buying prices ($\chi^2 = 49.9$, $df = 1$, $n = 1496$, odds ratio = 7.35, $p < .0001$). If our health items are analogous to Irwin's (1994) environmental goods, then our results are consistent with hers.

cus on the negative features of the options. Consequently, an option with many positive and many negative features can be both accepted and rejected over a second options with only average features. The features compatible with the "accept" or "reject" instruction appear to be weighted more heavily.

Another potentially related result is the bias of anchoring and in sufficient adjustment, often viewed as similar in mechanism to the preference reversal effect (Lichtenstein & Slovic, 1971; Schkade & Johnson, 1989). Lichtenstein & Slovic (1971) suggested anchoring and adjustment as a cause of preference reversals. According to this theory, a decision maker uses the attribute compatible with the response scale as an initial estimate of the preference judgment. For example, in setting a selling price for a gamble, the decision maker would "anchor" on the monetary payoff. This starting point is then adjusted in light of other information, for example, the probability information. Because adjustment is insufficient, the final judgment is overly influenced by the anchor.

In the gamble example, the anchoring and adjustment can take place along the monetary scale because both the gamble payoff (the anchor) and the response are expressed on that scale. In cases of semantic compatibility, such as the present experiments, the inputs and response are not expressed on the same scale. In these cases it is less clear how anchoring and adjustment could operate. An alternative view of the relationship between preference reversals and anchoring (Chapman & Johnson, 1995) is that a semantic compatibility mechanism may underlie both phenomena. Specifically, just as the response mode increases the weight given to compatible target features, so the presence of an anchor may facilitate the retrieval and use of features of the target item that are similar to the anchor.

Such an extensive scope of a semantic compatibility mechanism has important implications for the use of preference judgments for the evaluation of economic outputs and public policy. The contingent valuation method uses questions very similar to those used here as a means of measuring the worth of alternatives not unlike the items we employed in our studies. Contingent valuation has been used, for example, to value household production (Quah, 1987) and societal risks (McDaniels, 1988). This method has recently been the subject of some criticism. For example, Kahneman and Knetsch (1992) conclude that contingent valuation responses reflect the moral satisfaction of contributing to public goods rather than the value of the goods themselves. Our results suggest a further critique. Even when valuation responses do reflect preferences for the items themselves, these preference judgments depend, in a fairly fundamental way, on the similarity of the response scale to the objects being evaluated. This implication raises interesting questions for further research, including the appropriate method for assessing public value for medical treatments and public health programs.

To summarize, the present preference reversal results indicate a contingent weighting mechanism. As evidenced by the pattern of similarity ratings, these results provide a clear demonstration of semantic compatibility. Combined with previous research, our results point to the importance of three types of compatibility effects in the explanation of preference reversals: scale compatibility, strategy compatibility, and semantic compatibility.

APPENDIX

Instructions used in Experiment 2. (Instructions used in Experiment 1 were the same but contained descriptions and examples of buying amount questions.)

Trade-Off Experiment

Many everyday decisions involve trade-offs. For example, you might have a choice between one job that is very enjoyable but does not pay well and a second job which pays very well, but which is not very enjoyable. To make this decision, you must *trade off* money and enjoyment. In other words, you must decide how much money would make up for the difference in enjoyment, or how much enjoyment would make up for the difference in salary.

Or, for example, you might make a decision between two apartments. One is conveniently close to campus, but because of the crime rate in the neighborhood, there is a small chance that you could lose your life while residing there. A second apartment is very far away from campus but is located in an area where you have a smaller chance of losing your life. You must trade off commuting distance and a very small chance of loss of life. You must decide how much commuting time would make up for the difference in life expectancy, or what difference in life expectancy would make up for the difference in commuting time.

Both of these decisions might seem difficult to you. However, for most people there is some amount of money (perhaps very large) that would cause one to switch to the less enjoyable job. Similarly, there is some difference in life expectancy (perhaps very very small) that would cause one to live in the apartment closer to campus. Each of these decisions is called a trade-off.

In this experiment, we are interested in how you make trade-offs. We will ask you to consider trade-offs between various items and either money or life expectancy.

In some questions, you will consider losing an item in exchange for gaining some life expectancy.

In other questions, you will consider losing an item in exchange for gaining some money.

When you make these trade-offs, please consider what each item is worth to you. Don't consider what the item's market value would be. Imagine that each item is for your own use (and that of your family and friends) and not for resale.

Remember, there are no right or wrong answers to these questions. We want to know what these items are worth to YOU and how YOU would make trade-offs involving these items and money or life expectancy.

You might be tempted to give answers that are especially high or low in an attempt to get a 'good deal' when making these trade-offs. However, there is no chance to bargain or negotiate about these trade-offs. Please honestly state your value for these items when you select your answer.

Please assume that you start out with an average life expectancy and an average college student's savings account.

Let's try an example question. This question will involve losing an item in exchange for gaining some money. For example, you might accept a smaller apartment (lose living space) in exchange for gaining money (by paying less rent). We want to know what is the smallest amount of money you would demand in exchange for losing the item. Of course, this amount might be very large, very small, or somewhere in between.

Example Question:

You possess the following item:

A One-Week Hiking Trip in Alaska

What is the least amount of money for which you would sell this item?

In the next example, you will lose an item in exchange for gaining some additional life expectancy. Making trade-offs that involve life expectancy can be a very hard task. Remember, however, that people make life expectancy trade-offs all the time. For example, smoking 1 cigarette reduces your life expectancy by 6 minutes. People who quit smoking are implicitly agreeing to a trade-off in which they gain 6 minutes of life expectancy for each cigarette they give up.

Here is another example. By altering one's diet so that fat comprises only 30% of calories ingested, one's life expectancy is lengthened by 3 months. People who adopt low fat diets are implicitly agreeing to a trade-off in which they lose the opportunity to eat fatty food in exchange for gaining 3 months of life expectancy.

Notice that in these examples, one does not automatically gain 6 minutes of life by forgoing one cigarette or automatically gain 3 months of life by giving up fatty foods. Instead, *on average,* people who don't eat fatty foods live 3 months longer than those who do. When you consider these life expectancy trade-offs, keep in mind that life expectancy is an average or expected length of life. No one knows your actual length of life or how much life you would actually gain or lose as a result of these trade-offs. These trade-offs would result in changes in how long you expect to live and not necessarily how long you will actually live.

In this example, we want to know the smallest amount of additional life expectancy you would accept in exchange for losing the item. Of course, this amount might be very large, very small, or somewhere in between.

Example Question

You possess the following item:

An Antique Rocking Chair

What is the least amount of additional life expectancy you would demand in exchange for losing this item?

Starting with the next page, we will ask you to consider 20 questions. For each question, we will ask you for the least amount of additional life expectancy you would demand in exchange for losing the item [the least amount of money for which you would sell the item].

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TABLE A-1

Geometric Mean Life Expectancy and Monetary Evaluations of Items Used in Experiments 1 and 2

Item	Expt 1: Life buying amount	Expt 1: Life selling amount	Expt 1: Money buying price	Expt 1: Money selling price	Expt 2: Life selling amount	Expt 2: Money selling price	Item description
			Commodity items				
1.	32.51 min	2.10 days	$28.82	$156.64			1 original painting of your favorite Philadelphia landscape, painted by a talented but unknown local artist
2.	2.72 min	1.57 days	$28.12	$503.15			10 artificial fur coats
3.	38.49 min	2.14 days	$29.49	$67.40			5 huge wall-sized posters of your favorite movie star or other public figure
4.	27.89 days	99.64 days	$58,856.63	$117,017.38	59.80 days	$1908.74	A 4-room vacation cottage in the Poconos
5.	43.20 min	6.00 h	$19.67	$132.03			A copy of 3 of the story books which you most enjoyed as a child
6.	4.37 min	3.34 days	$7.94	$27.85			50 hamburgers at a fast food restaurant near your house
7.	11.43 h	176.60 days	$366.30	$547.77			5 round-trip bus fares anywhere in the USA
8.	64.14 min	1.27 days	$332.26	$7692.16	19.61 h	$57.01	A 10-year supply of Blatz beer
9.	25.63 min	10.10 h	$24.87	$44.46			1 ticket to see Les Miserables at the Forrest Theater
10.	6.60 s	11.14 min	$17.94	$18.65			3 coffee table books of photographs of famous Philadelphia sights
11.	18.00 s	11.31 h	$7.74	$31.42			1 real mink coat
12.	22.95 h	30.80 days	$19.17	$30.81			A record or CD of one of your favorite musicals or operas (which has been impossible to buy from local record stores)
13.	11.84 h	8.89 h	$25.19	$52.52			1 professional quality and flattering portrait of yourself
14.	18.11 h	4.22 days	$14,564.78	$205,976.91	31.62 days	$3324.37	A shared ownership of a vacation home in the Canary Islands with four other families whom you don't know
15.	40.60 min	1.05 days	$36.65	$42.18			2 Italian dinners at a local restaurant
16.	2.81 days	22.41 days	$276.05	$248.96			1 round-trip air fare anywhere in the USA
17.	56.95 min	8.01 days	$2.59	$62.65			A 3-year supply of Dock Street beer
18.	13.93 min	3.26 days	$59.49	$79.27			1 ticket to a concert of your favorite musical artist at the Spectrum or other large stadium
19.	5.34 min	16.36 days	$2451.45	$963.95			6 1-year-old Yugo cars, *in* good condition
20.	1.13 days	4.42 days	$26.59	$27.85			A talented string quartet provides musical entertainment at your next dinner party

TABLE A-1—*Continued*

Item	Expt 1: Life buying amount	Expt 1: Life selling amount	Expt 1: Money buying price	Expt 1: Money selling price	Expt 2: Life selling amount	Expt 2: Money selling price	Item description
21.	9.56 h	2.12 days	$148.16	$2943.24	21.75 days	$268.08	A professionally photographed collection of 10 portraits of your college friends
22.	6.90 min	6.22 min	$473.03	$1590.65	23.52 days	$1980.35	1 day of vacation in Bermuda (including air fare and expenses)
23.	15.57 h	17.51 days	$88.03	$85.77			2 dinners for two at a fancy center city restaurant
24.	17.29 days	94.89 days	$819.14	$1771.68			A 4-day safari to see animals in East Africa (transportation and expenses included)
25.	1.23 min	11.85 min	$10.32	$35.53			10 vinyl arm chairs, your choice of design
26.	3.66 min	1.80 h	$194.81	$510.09	40.20 h	$59.17	2 tickets to the Broadway musical of your choice (transportation to New York City is included)
27.	58.70 min	12.37 h	$149.58	$405.41	4.18 days	$86.29	A 1-year membership in the National Zoological Gardens in D.C. (transportation included)
28.	31.36 min	50.63 days	$3835.16	$20,597.68	69.00 days	$3576.94	2 1-year-old Toyota hatchbacks, in good condition
29.	30.74 min	6.25 days	$416.79	$10,583.42	46.00 days	$1230.18	A collection of professional-quality photos of all of your family members
30.	2.84 h	4.59 days	$294.39	$366.38			3 days of vacation at a beach house in Cape May, NJ (including transportation and expenses)
31.	3.91 min	39.44 min	$61.41	$115.98			4 dinners at a Chinatown restaurant
32.	4.51 h	10.34 days	$912.52	$3440.02	38.25 days	$1636.75	A 3 day trip to visit art museums in Paris (transportation and expenses included)
33.	3.38 min	2.11 days	$1000.53	$1189.44			1 leather arm chair, your choice of design
34.	3.80 h	2.44 days	$251.13	$678.24			30 video rentals at your local video store (assume you have access to a VCR and monitor for 1 month)
				Health items			
35.	5.59 h	1.99 y	$1613.39	$3522.41	132.60 days	$3491.37	For the next year will definitely not be mugged, physically attacked, or assaulted
36.	42.36 days	230.71 days	$11,934.80	$2.7 mill			A vaccine which would prevent you from contracting AIDS, even if you were exposed to the HIV virus
37.	2.26 days	3.40 y	$10,467.08	$92,117.57			You will never be injured in an automobile accident

TABLE A-1—*Continued*

Item	Expt 1: Life buying amount	Expt 1: Life selling amount	Expt 1: Money buying price	Expt 1: Money selling price	Expt 2: Life selling amount	Expt 2: Money selling price	Item description
38.	1.19 h	1.26 days	$4.07	$1840.29			3 pills which would definitely stop a headache (i.e., you could use it to stop any 3 headaches)
39.	6.58 days	127.00 days	$1565.12	$1968.03	128.40 days	$5012.46	A new treatment that would give you perfect 20/20 vision: You would never need glasses or contact lenses
40.	1.65 days	211.43 days	$2.16	$11.31	53.12 days	$359.50	A healthy eating plan that would cause you to lose 10 pounds and keep them off for at least 10 years
41.	71.85 days	100.36 days	$9306.27	$149,541.70			A medical treatment which would completely eliminate all health risks caused by eating foods high in fat or cholesterol
42.	8.22 days	81.28 days	$599.48	$1901.85	177.60 days	$3411.19	You will never be injured in an airplane accident
43.	4.36 h	6.23 days	$25.38	$37.11	16.55 days	$211.30	3 doses of a pain reliever that will completely eliminate all pain during dental procedures
44.	49.54 min	8.41 days	$74.14	$195.95	3.48 days	$138.81	20 extra hours of sleep this month (without losing any time that you would spend on other activities)
45.	22.07 days	1.05 y	$224.74	$1336.46	16.62 days	$322.55	For 1 week you are in such tremendous physical condition that you could compete in a triathalon
46.	1.29 y	347.44 days	$3980.07	$110,693.10			You will never be the victim of a drunk driving traffic accident
47.	80.30 days	77.22 days	$84,091.34	$25.8 mill			A preventive medical treatment which would eliminate any chance that you would develop any form of cancer for the rest of your life
48.	11.41 days	2.24 y	$49.31	$4474.91	85.20 days	$1261.01	You will never be injured in a public transportation accident (i.e., subway, local bus, trolley)
49.	5.70 h	1.16 days	$196.88	$3845.87			For 3 winters you are completely free of cold, flu, or asthma symptoms
50.	23.58 h	9.28 days	$178.60	$14,566.79			You acquire a perfect smile—your teeth are straight and white
51.	20.60 h	1.46 y	$26,593.80	$840,932.02			You suddenly acquire near professional-level athletic ability for your favorite sport
52.	12.99 days	5.00 y	$22,366.22	$211,479.49			You will never be murdered

TABLE A-1—*Continued*

Item	Expt 1: Life buying amount	Expt 1: Life selling amount	Expt 1: Money buying price	Expt 1: Money selling price	Expt 2: Life selling amount	Expt 2: Money selling price	Item description
53.	5.56 days	25.82 days	$259.61	$1369.34	120.60 days	$1725.96	A 1-year supply of a new birth control pill which prevents 100% of unwanted pregnancies, has no adverse side effects, and can be used by both men and women
54.	20.72 h	354.29 days	$5888.08	$131,608.54			You will never be injured in a train or bus accident
55.	20.13 days	35.31 days	$318.09	$294.43	105.00 days	$533.56	For 3 years you are completely free of insect bites, poison ivy, and hay fever
56.	3.99 days	5.14 days	$2239.88	$15,651.38			You will acquire no more tooth decay or cavities for the rest of your life
				Filler items			
57.	4.55 h	119.57 days	$475.14	$2344.17			The Rolling Stones play a 30-min concert at a party at your house
58.	32.93 min	16.58 days	$93.14	$512.11			For 2 weeks this semester, you need not spend any time studying. This will not increase the amount you need to study later or change your grade or the amount you learn
59.	2.73 min	22.00 h	$4.68	$100.39			The ability to be your perfect weight and body shape for 2 weeks, after which you would go back to your current weight and body shape
60.	2.67 days	1.07 days	$740.56	$669.16			A 30-min interview with someone who is very influential in the organization where you desire a job
61.	38.94 days	1.23 y	$3060.60	$149,545.14			The ability to predict any political event one year in advance if you want to
62.	64.98 min	31.29 days	$13.50	$171.11			For 1 month in Philadelphia, there is no air pollution or smog
63.	7.21 h	32.04 days	$271.76	$1224.91			Your household appliances and furniture will never break or be damaged
64.	14.01 h	28.17 days	$331.09	$14,956.53			A 30-s appearance in a top-rated movie with one of your favorite actors/actresses
65.	1.50 days	10.02 days	$122.24	$2476.24			The ability and permission to change any one grade on your college transcript to one letter grade higher (i.e., from a C to a B)

TABLE A-1—*Continued*

Item	Expt 1: Life buying amount	Expt 1: Life selling amount	Expt 1: Money buying price	Expt 1: Money selling price	Expt 2: Life selling amount	Expt 2: Money selling price	Item description
66.	7.86 days	272.52 days	$53,596.84	$294,284.46			You send a suggestion to the President of the USSR about how to solve the current Soviet economic and political crisis, and he actually does what you suggest
67.	52.85 min	13.41 h	$8.66	$12.28			At the beginning of one semester, you get all of your books, bulk packs, course changes, etc. Without having to wait in line at all
68.	4.09 days	13.38 days	$102.09	$334.56			For 1 year, you experience no theft, burglary, or robbery
69.	7.79 h	5.92 h	$91.99	$1051.54			A Valentine card that you received from your very first boyfriend or girlfriend
70.	3.35 h	1.04 days	$294.43	$3976.47			3 strong letters of recommendation from your professors who are well known but have no connection to the organization of your desired employment
71.	24.58 days	20.54 days	$4326.80	$149,538.14			The ability to see and hear things up to 1 mile away if you want to
72.	19.88 h	3.96 days	$12.68	$88.28			For 1 month there is no trash or litter (except in trash cans) anywhere on the block where you live
73.	64.16 days	112.45 days	$1057.72	$1289.09			Your house or apartment will always be neat and clean, with no effort on your part
74.	1.42 days	34.76 days	$15.18	$78.09			1 opportunity to appear on a day-time talk show
75.	1.74 h	11.13 h	$127.00	$562.55			A note service for your most challenging class which would provide word-for-word transcriptions of the lectures and reproductions of any slides, handouts, etc.
76.	4.31 h	23.78 days	$7071.27	$102,988.58			For 1 year, you are the most prominent and well-known person in your area of work
77.	12.96 min	5.95 days	$2.72	$16.03			The opportunity to display an original Georgia O'Keeffe water color in your house for 1 year

TABLE A-1—*Continued*

Item	Expt 1: Life buying amount	Expt 1: Life selling amount	Expt 1: Money buying price	Expt 1: Money selling price	Expt 2: Life selling amount	Expt 2: Money selling price	Item description
78.	19.45 h	11.50 days	$105.50	$3703.91			For one course this semester, you can spend only half your usual amount of time studying (your grade and the amount you learn will not change)
79.	12.95 days	40.09 days	$2340.38	$21,148.29			Your great-grandmother's diary
80.	66.82 min	9.62 h	$1495.90	$59,461.70			An unpaid summer internship at the organization of your desired employment (which will increase your chances of being offered a job there)
81.	5.54 days	1.40 days	$1.8 mill	$17.8 mill			The ability to read other peoples' thoughts when you want to
82.	55.75 min	18.62 h	$0.31	$5.38			For 1 month the block where you live is very quiet at night—no traffic noises, music, screams, etc.
83.	4.53 h	13.86 h	$44.82	$30.25			Your garden and house plants will always be in good health and free of weeds, with no effort on your part
84.	3.49 days	17.55 days	$3288.98	$14,595.65			A 60-min dinner for two with your most admired hero (political, sports, or musical personality)
85.	61.65 min	1.80 h	$29.59	$224.29			Admission to a special review session for your toughest class where the professor will go over the class material that is most relevant to the exam
86.	9.27 h	3.12 days	$12.87	$13,577.52			You send a suggestion to the President of the United States about how to solve the current U.S. economic recession, and he actually does what you suggested
87.	4.43 days	347.54 days	$52.76	$14,146.93			Your favorite local musician writes a song about you, and the song becomes very popular and is played on the radio
88.	1.56 h	2.08 days	$75.95	$350.08			For a whole semester, someone does all your weekend chores for you so that you have more free time
89.	48.67 min	3.99 days	$150.30	$1779.02			Your favorite toy from your childhood

TABLE A-1—*Continued*

Item	Expt 1: Life buying amount	Expt 1: Life selling amount	Expt 1: Money buying price	Expt 1: Money selling price	Expt 2: Life selling amount	Expt 2: Money selling price	Item description
90.	5.18 h	25.73 days	$698.64	$2238.08			A personal friend gets a high ranking job in the organization where you desire a job (thus increasing your chances of being offered a job there)
91.	3.40 days	81.57 days	$1555.12	$428,798.16			The ability to convince someone else to do what you want on any 1 occasion
92.	34.95 min	4.72 h	$223.12	$3084.18			For 1 month, the weather in Philadelphia is whatever you want it to be
93.	7.94 min	5.16 days	$388.34	$1189.85			You will never have a loud or obnoxious neighbor
94.	19.44 h	72.33 days	$4406.81	$5238.21			A famous movie actor/actress, whom you idolized as a teenager, meets you at a party, is completely entranced by you and asks you out on a date
95.	1.63 h	6.76 days	$585.13	$1780.00			An interview with a famous author which will help you improve your term paper
96.	18.53 h	9.54 days	$2945.37	$36,372.93			You write an article on some political topic, and it appears on the front page of the New York Times

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