

# Information Bias in Contingent Valuation: Effects of Personal Relevance, Quality of Information, and Motivational Orientation

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A laboratory experiment examined the potential for information bias in contingent valuation (CV). Consistent with the view that information about a public or private good can function as a persuasive communication, willingness to pay (WTP) was found to increase with the quality of arguments used to describe the good, especially under conditions of high personal relevance. Under low personal relevance, WTP for a public (but not for a private) good was higher when an altruistic, as opposed to an individualistic, orientation was activated. It is concluded that the nature of the information provided in CV surveys can profoundly affect WTP estimates, and that subtle contextual cues can seriously bias these estimates under conditions of low personal relevance. © 1996 Academic Press, Inc.

## INTRODUCTION

Contingent valuation (CV) has become a popular tool to assess the dollar value of goods that are not traded in the market place [see 6, 11 for reviews]. Respondents are asked to provide an estimate of how much money they would be willing to pay for a certain good in a hypothetical or contingent market. The monetary value of the good in question is measured by aggregating these willingness-to-pay (WTP) judgments in the relevant population. Although scores of contingent valuation surveys have been conducted in recent years, the validity of the derived measures is often disputed. Some economists [e.g., 13, 14] have expressed serious doubts about the method's ability to provide valid measures of economic value, especially for public goods. Most critics, however, have upheld the fundamental utility of the method, and have urged a more careful approach to the elicitation of WTP estimates [e.g., 9, 15].

One potentially serious problem faced by the contingent valuation method is that respondents often have little, if any, prior experience with the proposed transaction. It has been suggested that, as a result, respondents in CV surveys often express "constructive preferences." Lacking readily available monetary val-

ues for unfamiliar public goods, they must construct a value at the time of the survey [8, 9, 14]. Partly to alleviate this problem, investigators have been exhorted to provide respondents with a detailed and accurate description of the proposed transaction, so that they know what they are being asked to evaluate and can make an informed decision [8, 11].

The study reported in the present article was designed to evaluate some implications of this recommendation. Its intuitive reasonableness notwithstanding, giving respondents detailed information about the public good and about the context relevant for valuation can introduce unintended and unanticipated distortions, a process known as information bias [6]. Just as expressed willingness to pay can be considered a measure of attitude or intention [3, 10], providing information about a public (or private) good can be viewed as a persuasive communication likely to change these attitudes and intentions. Even though we may make every effort to produce an accurate and balanced description of the proposed transaction, the information provided will almost inevitably alter the respondents' beliefs and attitudes.

Persuasive communications provide information that is designed to change the receiver's attitude in the advocated direction. To attain this goal, the message contains a number of major arguments in support of the advocated position and usually some empirical evidence to bolster the arguments [2]. Although the descriptions of goods in contingent valuation surveys are not explicitly designed to be persuasive or to produce attitude change, they often contain a series of arguments that may do just that. The major aim of the present study was to demonstrate the potential for information bias in CV, a bias that will tend to influence WTP judgments. The direction and amount of change produced by the information depends on several interrelated factors. The following ideas are derived from recent theory and research on the effects of persuasive communication, in particular the Elaboration Likelihood Model [for reviews, see 7, 12].

The first and most important factor that determines a message's persuasive impact is the quality of the arguments it contains. As a general rule, strong arguments produce more change than weak arguments. The effect of argument quality, however, depends to a large extent on the receiver's processing mode [12]. For strong arguments to produce more change than weak arguments, receivers of the persuasive message must carefully process the information they are given: they must scrutinize the arguments contained in the message, evaluate them, and then base their judgments on these evaluative processes. This is known as the central processing mode, and it requires that receivers of the message be sufficiently motivated and able to attend to the message and process the arguments it contains. Perhaps the most important determinant of motivation to process information contained in a message is the personal relevance of the issue for the receiver. Only when the message addresses an issue of personal relevance is the receiver likely to process the information carefully. In the absence of sufficient motivation or ability to process the information contained in the message, receivers are said to adopt a peripheral processing mode. In this mode they may base their final judgments on relatively superficial cues in the situation, on implicit moods or motivations, or on simple cognitive heuristics, factors that are unrelated to the content of the message. A factor of potential relevance for CV estimates concerning public goods is the salience of altruistic or individualistic motives. Empirical research [10, 14] has suggested that WTP is related to the moral satisfaction one can derive from

making a contribution to a public good. Altruistic as opposed to individualistic orientations may therefore be particularly relevant motivational cues in contingent valuation surveys.

## HYPOTHESES

To test the potential for information bias in CV surveys, we assessed willingness to pay for a public good as well as attitudes toward the good in question. For comparison purposes, the same measures were also obtained with respect to a private good. Most of the attitudinal judgments were selected for their relevance to Ajzen's [1] theory of planned behavior. According to the theory, the primary antecedent of any behavior, including the behavior of paying money for a good, is the intention to perform the behavior in question. The intention, in turn, is a joint function of three factors: attitude toward the behavior, which is the degree of positive or negative evaluation associated with performing it; subjective norm, or the perceived social pressure to perform the behavior; and perceived behavioral control, which refers to the perceived ease or difficulty of performing the behavior. With respect to paying for the public and private goods, therefore, we assessed—in addition to WTP—attitudes, subjective norms, perceptions of behavioral control, and behavioral intentions.

Based on the Elaboration Likelihood Model of persuasion, we formulated the following hypotheses.

1. The quality of the arguments contained in the description of the proposed transaction affects WTP as well as attitudinal judgments. Specifically, relatively strong arguments produce greater willingness to pay, as well as more positive attitudes, than do relatively weak arguments.

2. The effect of argument quality is greater when respondents are motivated by high personal relevance to process the description of the proposed transaction than when they are not so motivated.

3. Under low personal relevance, WTP and attitudinal judgments can be influenced by implicit motivational orientations that are unrelated to the contents of the description. In the case of a public good, it is expected that in comparison to an individualistic orientation, an altruistic orientation increases willingness to pay and raises the favorability of other attitudinal judgments. No effect of individualistic versus altruistic orientation is expected in the case of a private good for which motivations of this kind are largely irrelevant.

## METHOD

Two pilot studies were performed to develop descriptions of a private and a public good that contained either strong or weak arguments, to test the effectiveness of these descriptions, and to design a manipulation that would make salient either an altruistic or an individualistic motivational orientation.<sup>1</sup> The public good

<sup>1</sup> A description of the pilot studies and their results are available from the senior author upon request.

selected was construction of a campus movie theater while the private good was a personal noise filter.<sup>2</sup>

### *Participants*

A total of 192 students at the University of Massachusetts took part in the main study, 135 females and 57 males.<sup>3</sup> The great majority (87%) were in their freshman or sophomore years, enrolled in low-level psychology courses. They were told that the investigators were developing stimulus materials for two different research projects, that the projects were unrelated, and that data were being collected at the same time to save time and effort, and to make it possible to give the participants full experimental credit. The materials developed in the pilot studies were used to construct a self-contained booklet. Participants were asked to complete the two projects in the order in which they appeared in the booklet, and they were assured that their answers to all questions were confidential and anonymous. The questionnaire was administered to groups of 5 to 15 students, and took approximately 40 minutes to complete. After handing the booklet to the experimenter, the participants received a written explanation of the experiment and were offered an opportunity to have their questions answered.

### *Motivational Priming Manipulation*

The first part of the booklet consisted of a sentence unscrambling task. Developed by Costin [5], it has been used as a priming procedure to make accessible certain cognitive or motivational constructs [e.g., 16]. Adapted for the present study, the questionnaire listed 45 sentences containing six words each in scrambled order, including one word that did not belong. Participants were told that the investigators were trying to develop a measure of cognitive flexibility and that the respondent's task was to cross out the word that did not belong in the sentence and to write the correct sentence in proper order on a blank line provided underneath each sentence. The sentences were selected to express predominantly an altruistic orientation or predominantly an individualistic orientation. Specifically, one form of the instrument contained 30 altruistic statements and 15 neutral sentences. To illustrate, among the altruistic statements were "Giving is better than receiving," "Sara likes to help others," and "Cooperation assures the best results." Interspersed among these items were such neutral sentences as "Paul is doing his homework" and "I bought new shoes today." A second form of the instrument was composed of 30 individualistic statements and the same 15 neutral statements as in

<sup>2</sup> We use "public" good in a loose sense. Strictly speaking, the movie theater is neither nonexclusive nor nonrival; rather it is a congestible good.

<sup>3</sup> Although quite common in CV research, our use of a convenience sample of college students deserves comment and justification. Clearly, a sample of undergraduates enrolled in low-level psychology courses is representative neither of the population in general nor even of all college students. The obtained levels of WTP can thus not be generalized beyond a rather limited population. However, the present study was not designed to establish the absolute level of WTP for a campus movie theater and for a personal noise filter. Instead, its purpose was to compare WTP under different experimental conditions that were designed to reflect theoretical constructs of potential importance to CV estimates. Because the predicted effects dealt with basic psychological processes, there was no reason to think that they would vary across subject populations.

the first form. Among the individualistic sentences were "Charity must begin at home," "I am responsible for myself," and "Paul doesn't like social pressure." One half of the respondents completed the altruistic version of the task and the other half completed the individualistic version. They were asked to work quickly but at the same time to be careful to avoid making mistakes.

### *Personal Relevance and Argument Quality*

The second part of the booklet assessed attitudes and willingness to pay with respect to the proposed campus movie theater and the personal noise filter. The two topics appeared in counterbalanced order; the movie theater came first for one half the respondents and second for the other half. There were strong and weak versions of the descriptions, and the product was either high or low in personal relevance. The questionnaires were constructed such that if the first product (movie theater or noise filter) was of high relevance then the second was of low relevance, and vice versa. Similarly, if the first description contained strong arguments, then the second contained weak arguments, and vice versa. Equal numbers of respondents were assigned at random into the different experimental conditions.

In the case of the public good, the participants were told that the University Administration was considering a plan to construct a movie theater on campus, and they were given an anticipated completion date for the project. One half of the respondents were told that the building would be ready in "September 1994, about 18 months from today" whereas the remaining participants learned that completion was anticipated in "September 1997, about  $4\frac{1}{2}$  years from today." The earlier completion date was designed to make the project personally relevant to the college students. With the later completion date, the participants in the study would not personally benefit from the proposed theater.

At this point, the participants were asked to read carefully an article describing the proposed project, an article that had ostensibly been published recently in *The Campus Chronicle*, an actual campus newsletter. They saw what appeared to be a photocopy from the *Chronicle*. The article reported on information ostensibly provided by "William Reinert, Spokesperson for the Chancellor's Office." The first paragraph reiterated that a new campus movie theater was being planned and restated the anticipated completion date to reinforce the relevance manipulation. In the strong version of the article, the spokesperson explained that the proposed movie theater was to serve the needs of the local student population, that existing facilities were inadequate, that no facilities were currently available to screen video movies, and that even the existing facilities (mainly class rooms) were not always available. He emphasized that the proposed theater would not duplicate the services provided by commercial movie houses in the area in that the movies shown would be mainly of an artistic nature produced by small companies and movies produced by the students themselves. He concluded that the proposed theater would greatly enhance the educational opportunities of students at the university.

In the weak version of the article, the spokesperson explained that the proposed movie theater was to serve the needs of all people in the area, that even though there were plenty of movie theaters in the local communities, it would be nice to have a facility right on campus. He pointed out that many students and faculty did not like to watch movies in the same locations in which lectures or meetings take

place, and that having a separate building to house the theater would make it easier for people from off campus to find it. He emphasized that the proposed movie theater would have comfortable seats, would be well equipped, and would be able to compete with commercial movie theaters. He concluded that the proposed theater would offer new entertainment opportunities to students at the university.

In both versions, the article ended by pointing out that to encourage student participation, admission would be free for all students.

The second topic addressed in the survey concerned a private good, a "personal noise filter," described as being under development by the *DigiSys Corporation*. Personal relevance was manipulated primarily by varying the target population, although different product availability dates were also mentioned. In the version with high personal relevance, this hypothetical product was said to be intended for college students to help them concentrate on their studies in a noisy environment, and it was to be introduced in the fall of 1993. In the low personal relevance version, the filter was said to be intended for factory and construction workers to improve safety in the workplace, and it was to be ready in early 1997.

The participants were asked to read an article about the personal noise filter ostensibly published in the *Silicon Valley Advisor*, a fictitious computer newsletter. They saw what appeared to be a photocopy of the article. In the strong version of the article, sources at the DigiSys Corporation had informed the *Advisor* that the personal noise filter was expected to be a popular study aid with college students (factory workers) because it filtered out ambient noise. It was explained that the filter consisted of a set of ear phones with an embedded digital sound chip that counteracted and canceled incoming sound waves. The filter was said to be vastly superior to mechanical ear plugs. It could be adjusted to enable the user to dampen sounds in the environment or to virtually eliminate any sounds. The product would enable students to filter out loud music and other sources of noise in their environment, and thus help them to concentrate on their studies (filter out environmental noise for factory workers and help them focus on their tasks). Finally, the filter earphones would also be usable as conventional earphones to be connected to a stereo system, and they would be attractively styled, comfortable to wear, and easy to use.

In the weak version of the article, the information provided by the DigiSys Corporation indicated that the digital sound chip in the personal noise filter masks noise in the environment by producing a loud sound of its own. The filter was said to work nearly as well as mechanical ear plugs, but to do its work electronically and to be able to be switched on or off. By generating a penetrating sound of its own, the filter would mask noise, making it less identifiable, and would thus enable students to concentrate on their studies (factory workers to focus on their tasks). Users would be able to choose among various random and unpredictable noise patterns, and the intensity of the noise could be set at different levels for each ear. The earphones were to be designed for the mass market, styled to suit contemporary tastes, and offered in different colors.

### *Questionnaire*

The description of a product was followed immediately by a 20-item evaluative semantic differential scale. The sentence stem "Constructing a campus movie theater is" or "The personal noise filter is" was rated on each of the 7-place

bipolar scales. Responses to the scales were coded from 1 (negative end of the scale) to 7 (positive end), and factor analyzed and the first evaluative factor was extracted. This factor accounted for 55% of the variance in evaluations of the campus movie theater and 53% of the variance in evaluations of the personal noise filter. The 12 items with the highest loadings on the evaluative factor were selected to construct a measure of attitude toward each product. This procedure resulted in the selection of the same 12 items for the two products: *desirable-undesirable*, *happy-sad*, *unpleasant-pleasant*, *strong-weak*, *good-bad*, *important-unimportant*, *harmful-beneficial*, *useful-useless*, *foolish-wise*, *meaningful-meaningless*, *right-wrong*, and *productive-destructive*. Responses to these 12 items were averaged to yield a measure of general attitude toward the product in question. The internal consistency of these attitude measures, as indexed by Cronbach's alpha coefficient, was 0.96 for the movie theater and 0.95 for the personal noise filter.

Two willingness-to-pay measures were obtained, one voluntary and the other compulsory. Both assessed the maximum amount of money respondents would be willing to pay. We did not use the referendum format that has recently been recommended [17, 18]. The preference for a referendum format lacks a firm empirical basis, at this point, and the elicitation mode was in any event largely irrelevant for the central purpose of our investigation, i.e., to examine the role of information bias in contingent valuation.

The evaluative semantic differential scale was followed by the voluntary WTP measure. With respect to the campus movie theater, the respondents received the following instructions.

Construction of the campus movie theater would be quite expensive. Because of the State's financial difficulties, only a small part of the expense could be covered by State funds. Most of the money would have to be raised by selling bonds, and these bonds would have to be repaid from student fees over a 30-year period. One option under consideration is to institute a new *voluntary* student fee, to begin in the **Fall semester of 1993**. As with the Mass PIRG fee, students could check a box if they did not want to pay the indicated fee for the movie theater.

A major purpose of this survey is to assess how much money, in the form of a voluntary fee, students on the Amherst campus would be willing to pay for construction of the proposed movie theater. In the space below, please enter the *greatest* amount of money you would be willing to pay each semester before you would check the box to indicate that you do not want to pay the movie theater fee.

I personally would be willing to pay a maximum of \$ \_\_\_\_\_ per semester in additional student fees to help finance construction of the Campus Movie Theater.

An equivalent WTP measure was developed for the personal noise filter:

Development of the Personal Noise Filter involves a variety of new technologies, and it is difficult to anticipate how much it will cost to produce each unit. In this survey, we therefore are trying to assess how much money people like you would be willing to pay for a product of this kind.

In the space below, please enter the *greatest* amount of money you would be willing to pay for the Personal Noise Filter.

I personally would be willing to pay a maximum of \$ \_\_\_\_\_ to buy the Personal Noise Filter.

The third part of the questionnaire consisted of a series of eight attitudinal questions designed to assess the constructs in the theory of planned behavior. There were two items for each of the four constructs in the theory. Bipolar graphic scales with seven spaces (numbered 1 to 7) were used, and the two items for the

same construct were interspersed among the scales for the other constructs. Unlike the semantic differential scale described earlier, which assessed general attitudes toward each of the two products, the attitudinal measures in this section focused on the act of paying money for the products.

Attitude toward the behavior was assessed by means of the following two items. (i) "For me to pay an additional student fee to help finance construction of the Campus Movie Theater would be" was rated on a *good-bad* scale and later (ii) on a *harmful-beneficial* scale. Parallel items were constructed for the concept, "For me to buy a Personal Noise Filter would be." Responses to the two scales were highly correlated ( $r = 0.77$  for the movie theater and  $r = 0.80$  for the noise filter), and were averaged to yield measures of attitudes toward the behaviors.

The first subjective norm item asked respondents to rate the statement, "Most people who are important to me would approve/disapprove of my paying an additional student fee to help finance construction of the Campus Movie Theater" on an *approve-disapprove* scale. The second measure of subjective norm was phrased, "Most people who are important to me think that I should pay an additional student fee to help finance construction of the Campus Movie Theater." This statement was rated on a *likely-unlikely* scale. Responses to the two items correlated 0.70. Parallel items were constructed for the act of buying a personal noise filter, and they correlated 0.75 with each other. With respect to each product, the average of the two items was used as a measure of subjective norm.

Two ratings were used to assess perceived behavioral control. Respondents were asked to rate (i) "For me to pay an additional student fee to help finance construction of the Campus Movie Theater would be" on an *easy-difficult* scale, and (ii) "I believe that I could afford to pay an additional student fee to help finance construction of the Campus Movie Theater" on a *true-false* scale. Similar items were used to assess perceived behavioral control with respect to buying a personal noise filter. The correlations between the two control items were 0.74 and 0.58 for the two products, and responses were again averaged.

Finally, behavioral intentions were measured by means of the following two statements. (i) "How likely is it that you would pay an additional student fee to help finance construction of the Campus Movie Theater?" (*likely-unlikely*). (ii) "All things considered, would you be willing to pay an additional student fee to help finance construction of the Campus Movie Theater?" (*I would-I would not*). These two items correlated 0.91 with each other, and parallel items constructed for the intention to buy a personal noise filter correlated 0.92. The average of the two responses served as a measure of behavioral intention.

The next part of the questionnaire contained the compulsory measure of willingness to pay. A certain amount of money was stipulated, and the respondents were asked to indicate their willingness to pay this amount. The stipulated amount was based on the results of the pilot research. In response to open-ended questions, the mean WTP estimates of participants in the pilot studies were about \$15 each semester for construction of the movie theater and about \$20 for the personal noise filter. With respect to the movie theater, the compulsory WTP measure was worded as follows.

As an alternative to the voluntary fee, a second option under consideration is to impose a *compulsory* fee on all students to help pay for the proposed Campus Movie Theater. Although the exact cost of construction is not known at the present time, the best estimate

we have is that the total cost would be about 2.5 million dollars. To pay for the loans in this amount, student fees would have to be raised by about *\$15.00 per semester*, beginning in the **Fall semester of 1993**.

The respondents first checked "yes" or "no" to indicate whether they would be willing to pay the stated amount. In either case they were then asked to state the maximum amount they would be willing to pay.

The compulsory WTP measure for the personal noise filter took a similar form.

At this stage of the development of the Personal Noise Filter, it is difficult to determine the retail price at which the product will be offered for sale. Based on anticipated costs of production and marketing, *DigiSys* estimates that the Personal Noise Filter will be offered at a list price of about *\$20.00*.

This introduction was followed by the two-part question described above for the campus movie theater.

The last section of the questionnaire asked respondents to state their age, sex, and year in college. In addition, four questions were asked to establish each person's financial situation which might affect their ability to pay for the products considered in the present study. They were asked to indicate who paid for their tuition, who paid for their living expenses, whether they owned a car, and approximately how much money they spent on entertainment each semester.

## RESULTS

Preliminary analyses showed that there were no significant effects due to the order in which the public and private goods had been presented in the questionnaire. Because of the relatively small number of male participants, sex differences could not be systematically evaluated, but inspection of the results did not reveal any clear patterns. The data were therefore pooled across order of presentation and gender. Finally, the respondents' financial situation also had no systematic impact on their responses. Neither willingness to pay nor any of the attitudinal measures revealed significant relations with the different measures of the respondent's financial situation, nor were the effects of the experimental manipulations moderated in any way by controlling for the respondent's financial situation.

### *Willingness to Pay*

The two WTP measures obtained in the present study (voluntary and compulsory WTP) correlated highly with each other ( $r = 0.86$  for the movie theater and  $r = 0.94$  for the noise filter). Multivariate analyses of variance (MANOVA), followed by univariate tests, were conducted on the two measures. The factors in the analysis were argument quality (strong versus weak), product relevance (high versus low), and motivational orientation (altruistic versus individualistic). The experimental manipulations were found to have the same effects on the two WTP measures in the univariate tests, and these effects also emerged in the multivariate tests across the measures. Because of these findings, it was decided to construct a single willingness to pay index by computing the mean of the voluntary and compulsory WTP measures. The results discussed below refer to this index.

About 15% of the respondents indicated willingness to pay \$0 for construction of the campus movie theater, and about 20% did so with respect to the personal noise filter. These respondents were retained in all analyses. Ninety percent of the WTP responses were \$35 or less, but a very small number of respondents (about 3%) gave responses in excess of \$100. These outliers were arbitrarily set to \$100.

Table I presents the mean dollar amounts (averaged over the two WTP measures) participants were willing to pay for construction of the campus movie theater (top part of the table) and for the personal noise filter (bottom part). These data were submitted to three-way analyses of variance.<sup>4</sup> The factors in the analysis were again argument quality (strong versus weak), product relevance (high versus low), and motivational orientation (altruistic versus individualistic).

The results of the analysis with respect to willingness to pay for construction of the campus movie theater provided strong support for the study's hypotheses. First, argument quality had a highly significant effect on WTP judgments,  $F(1, 181) = 90.76$ ,  $p < 0.01$ . Under all experimental conditions, respondents who read the description of the movie theater that contained strong arguments were willing to pay more money than were respondents who read the weak description. With a grand mean of \$13.28, mean WTP in the strong arguments condition was \$18.79 as opposed to only \$7.78 in the weak arguments condition. Thus, by providing a strong description, we were able to more than double the amount of money respondents stated they were willing to pay for construction of the campus movie theater.

Second, as predicted, the magnitude of this effect was moderated by the personal relevance of the proposed transaction, as indicated by a significant interaction between argument quality and product relevance,  $F(1, 181) = 18.65$ ,  $p < 0.01$ . Inspection of Fig. 1 reveals the nature of the interaction: the effect of argument quality was considerably greater when the movie theater was personally relevant than when it was irrelevant. Apparently, when the movie theater was of personal relevance, the students paid closer attention to the arguments contained in the description and were thus more sensitive to the quality of those arguments, as compared to students for whom construction of the movie theater was largely irrelevant.

Third, there was a significant main effect of the priming manipulation,  $F(1, 181) = 9.44$ ,  $p < 0.01$ . As expected, respondents for whom an altruistic orientation was

TABLE I  
Mean Willingness to Pay (in Dollars)

	Strong arguments		Weak arguments	
	Relevant	Irrelevant	Relevant	Irrelevant
Campus movie theater				
Altruistic orientation	22.08	19.33	6.92	11.90
Individualistic orientation	22.50	11.24	5.65	6.63
Personal noise filter				
Altruistic orientation	25.10	17.37	11.31	22.04
Individualistic orientation	26.08	19.44	14.85	14.56

<sup>4</sup> Because of three missing WTP responses for the campus movie theater, the degrees of freedom in the analysis of these data were reduced to 181.

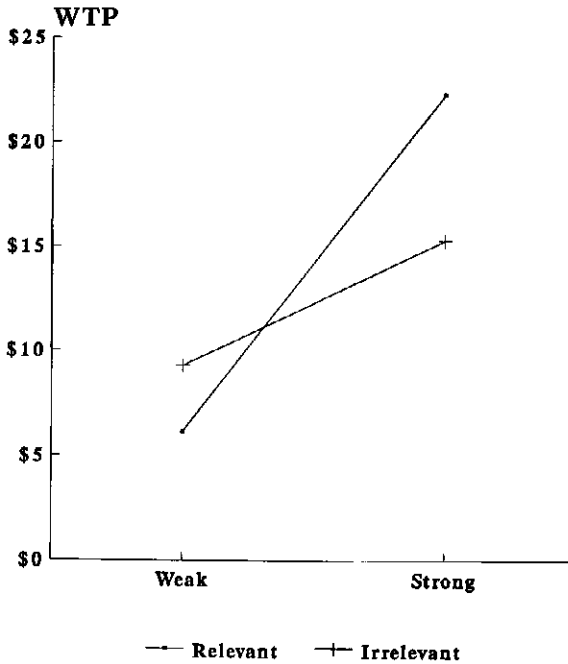


FIG. 1. Effects of argument quality and product relevance on willingness to pay for a campus movie theater.

activated were willing to pay more money for the movie theater ( $M = \$15.06$ ) than were respondents in the individualistic condition ( $M = \$11.51$ ). Thus, at least in the case of a public good, activation of an altruistic orientation seems to raise WTP estimates appreciably.

Finally, the analysis of variance revealed a significant priming by relevance interaction,  $F(1, 181) = 7.31, p < 0.01$ . This interaction was also predicted. As can be seen in Fig. 2, the motivational orientation had an effect on WTP judgments only when the product was of little personal relevance. It appears that with high personal relevance, WTP was determined largely by the description of the product, and whether an altruistic or individualistic motivation had been activated was of little importance.

It is instructive to compare the results for the campus movie theater to the findings with respect to a private good, the personal noise filter. Across all conditions of the experiment, respondents were willing to pay an average of \$18.84 for the filter. The analysis of variance revealed only two significant effects: a main effect of argument quality,  $F(1, 184) = 6.06, p < 0.05$ , and an interaction between argument quality and product relevance,  $F(1, 184) = 5.86, p < 0.05$ . Respondents in the strong arguments condition were generally willing to pay more money for the noise filter ( $M = \$21.99$ ) than were respondents in the weak arguments condition ( $M = \$15.69$ ). However, as can be seen by inspecting Fig. 3, the effect of argument quality again appeared only when the product was of high personal relevance. It is only here that respondents were expected to pay careful attention to the nature of the arguments.

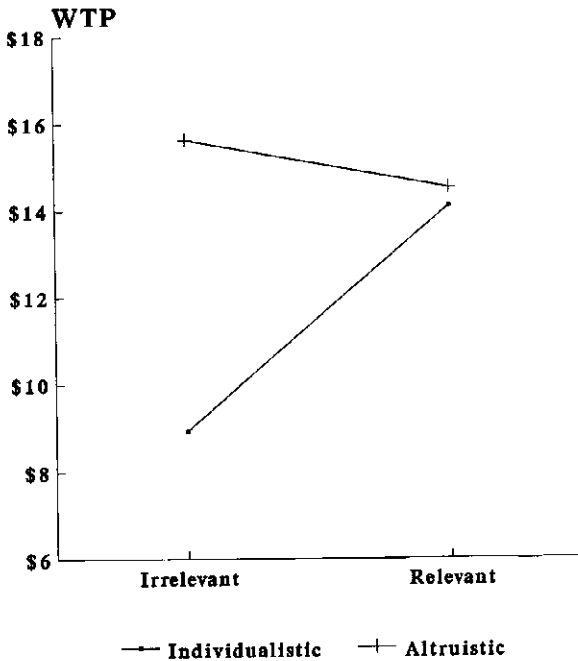


FIG. 2. Effects of product relevance and motivational orientation on willingness to pay for a campus movie theater.

The analysis of WTP for the personal noise filter revealed no significant main effect or interaction involving the priming manipulation. As expected, altruistic or individualistic orientations were irrelevant for WTP judgments in the case of a private good.

### Attitudes

The results reviewed thus far indicate that WTP judgments are sensitive to the kinds of manipulations that have, in the past, been found to influence attitudinal judgments. Further evidence for the similarity between contingent valuation estimates and attitudes is provided by the correlations between the two types of measures, shown in Table II. All correlations between WTP and the various attitudinal indices were highly significant ( $p < 0.01$ ). As might be expected, the amount of money respondents were willing to pay for a public or private product correlated most strongly with intentions to pay ( $r = 0.56$  for the movie theater and  $r = 0.57$  for the noise filter).<sup>5</sup>

The effects of the experimental manipulations on the attitudinal judgments were very similar to the effects described earlier with respect to WTP, except for the priming manipulation. Due to space limitations, we discuss results only for the semantic differential measure of attitude, but the results for the other attitudinal measures were virtually identical.

<sup>5</sup> Separate analyses for the two WTP measures yielded virtually identical correlations.

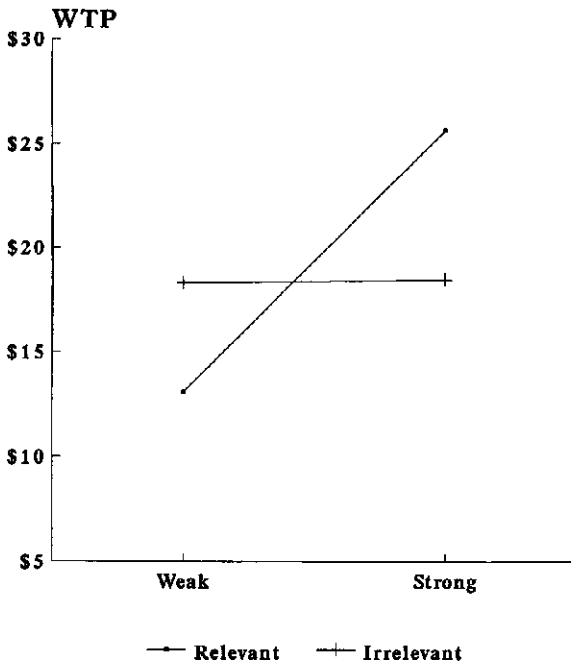


FIG. 3. Effects of argument quality and product relevance on willingness to pay for a personal noise filter.

Analyses of variance conducted on the semantic differential scores revealed the following significant effects. With respect to attitudes toward the movie theater there was a main effect of argument quality,  $F(1, 184) = 11.54$ ,  $p < 0.01$ , and an interaction between argument quality and product relevance,  $F(1, 184) = 9.68$ ,  $p < 0.01$ . As was the case for WTP, respondents expressed more favorable attitudes in the strong arguments condition ( $M = 5.51$ ) than in the weak arguments condition ( $M = 4.87$ ). Moreover, the significant interaction showed again that this effect of argument quality was stronger when the movie theater was of high personal relevance than when it was not.

Contrary to our initial expectations, the priming of an altruistic or an individualistic motivational orientation had no significant effects on attitudes toward construction of the campus movie theater. Whereas WTP judgments were sensitive to

TABLE II  
Correlations between WTP and Attitudes

Attitudinal measure	Movie theater	Noise filter
Attitude toward product	0.36	0.38
Intention to pay	0.56	0.57
Attitude toward paying	0.40	0.53
Subjective norm	0.37	0.52
Perceived behavioral control	0.21	0.38

Note. All correlations are significant at  $p < 0.01$ .

priming of a motivational orientation, especially under low personal relevance conditions, attitudes were not. In retrospect, this finding is perhaps understandable. Under low motivation to process information about a public good, an altruistic orientation can increase willingness to pay without affecting attitudes. Thus, two individuals may hold equally favorable attitudes toward the movie theater, yet the person who has an altruistic orientation may nevertheless be willing to pay more money to help in its construction.

With respect to attitudes toward the personal noise filter, the analysis of variance resulted again in a significant main effect for argument quality,  $F(1, 184) = 16.38$ ,  $p < 0.01$ , as well as a significant interaction between argument quality and product relevance,  $F(1, 184) = 6.03$ ,  $p < 0.05$ . Attitudes toward the noise filter were more favorable when the description contained strong arguments ( $M = 5.57$ ) than when it contained weak arguments ( $M = 4.90$ ), and this effect was significantly stronger in the high than in the low personal relevance condition. The analysis also produced an unanticipated main effect due to product relevance,  $F(1, 184) = 6.93$ ,  $p < 0.01$ , such that attitudes toward the noise filter were somewhat less favorable in the relevant ( $M = 5.00$ ) than in the irrelevant condition ( $M = 5.47$ ).

## DISCUSSION AND CONCLUSIONS

The results reported in this article provide empirical evidence in support of the hypothesis that CV measures are sensitive to the information about a proposed transaction provided to respondents. As an overall generalization, this conclusion is noncontroversial and consistent with prior research [e.g., 4]. The contribution of the present study, however, goes beyond this conclusion. Argument quality was found to have a particularly strong impact under conditions of high personal relevance, conditions that, according to the Elaboration Likelihood Model of persuasion, encourage careful scrutiny of the arguments. When the good was relevant, respondents apparently focused on argument quality and were largely unaffected by relatively superficial motivational cues, in this case, priming of an altruistic or individualistic motivational orientation. However, when respondents were not sufficiently motivated to process the information they were given about the good, they were less affected by argument quality and (in the movie theater case) significantly influenced by the priming of a motivational orientation.

In light of these findings, it appears that the recommendation to provide participants in CV surveys with detailed information about the posited transaction may not offer a satisfactory solution to the problem of information bias. Under conditions of low relevance, respondents may fail to process the information carefully, and even if they are motivated to process the information, the description can bias their estimates depending on the nature and quality of the arguments it contains. Information bias is, in our opinion, particularly likely when respondents lack prior knowledge about the good, as was the case with the campus movie theater and the personal noise filter used in the present study, and as is the case with most goods considered in CV surveys.<sup>6</sup> At the very least, our results indicate that extreme care should be exercised in designing the information presented to

<sup>6</sup> Although many movie theaters could be found in the communities near the university, respondents had no experience with an on-campus movie theater dedicated to student use.

respondents so that it contains as little bias as possible. We suspect, however, that a completely bias-free CV may be unattainable. Because of this possibility, it may be advisable to obtain valuations for more than one information scenario. This would provide investigators with an idea of the extent to which their WTP estimates may be sensitive to information bias.

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