

On the Pursuit and Misuse of Useless Information

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Decision makers often pursue noninstrumental information—information that appears relevant but, if simply available, would have no impact on choice. Once they pursue such information, people then use it to make their decision. Consequently, the pursuit of information that would have had no impact on choice leads people to make choices they would not otherwise have made. The pursuit of noninstrumental information is documented and its effects on ensuing decisions are explored in a variety of social, consumer, and strategic situations. The causes and implications of this pattern are discussed.

Situations in life often permit no delay; and when we cannot determine the course which is certainly best, we must follow the one which is probably the best . . . This frame of mind freed me also from the repentance and remorse commonly felt by those vacillating individuals who are always seeking as worthwhile things which they later judge to be bad.

—Rene Descartes, *Discourse on Method*

The decisions that we make often involve uncertainty about our subjective values and preferences as well as about the objective state of the world. A college student planning next semester's schedule, for example, may be uncertain about whether she prefers to register for a course in psychology or in economics, or she may not know which instructor will be teaching a particular course. Sometimes information can be obtained that will resolve the uncertainty. For example, the student can call to find out who will teach the course in question. Whereas this information may influence the choice, other information—for example, the room in which the class will be taught—is likely to have no impact on the student's decision. When making decisions under uncertainty, one needs to determine what information may prove instrumental and, therefore, perhaps may be worth paying or waiting for, and what information is unlikely to affect (and thus need not delay) the decision at hand. Consider, for example, the following scenario suggested by Savage (1954):

A businessman contemplates buying a certain piece of property. He considers the outcome of the next presidential election relevant

to the attractiveness of the purchase. So, to clarify the matter for himself, he asks whether he would buy if he knew that the Republican candidate were going to win, and decides that he would do so. Similarly, he considers whether he would buy if he knew that the Democratic candidate were going to win, and again finds that he would do so. Seeing that he would buy in either event, he decides that he should buy, even though he does not know which event obtains. (p. 21)

Once he realizes the election will have no impact on his decision, the businessman decides to act without waiting for the election's outcome. If one would prefer a to b knowing that x obtained, and if one would also prefer a to b knowing that x did not obtain, then one definitely prefers a to b (Savage, 1954, p. 22). Knowing whether or not x obtains has no instrumental value for—that is, it would not alter—the decision, and a person need not delay decision for the sake of noninstrumental information. The above rationale, which Savage called the *sure-thing principle*, has a great deal of both normative and descriptive appeal. Nonetheless, people's decisions do not always abide by this compelling principle.

Contrary to the classical theory of choice, according to which each individual has a clear preference order (or a utility function) over any set of options (Von Neumann & Morgenstern, 1947), recent studies of decision making have shown that people do not have well-defined values and preferences (for reviews, see Camerer, 1995; Slovic, Lichtenstein, & Fischhoff, 1988, and references therein). Making decisions is often hard because we are not sure how to trade off one attribute (e.g., interest) compared with another (e.g., difficulty), or how to predict the pleasure or pain of future consequences (Goldstein, 1990; Kahneman & Snell, 1990; March, 1978). People often arrive at a decision problem not with well-established and clearly ranked preferences, but rather with the need to determine their preference as a result of having to decide, and they often look for additional information in hopes that it may facilitate the choice. Tversky and Shafir (1992; see also Baron, Beattie, & Hershey, 1988), documented instances in which decision makers pursued information even when that information was unlikely to alter the decision. In one scenario, for example, people who wished to purchase a vacation to Hawaii both if they passed an exam and if they failed, chose to postpone the decision while the exam's outcome was uncertain. In another study, Shafir and

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Tversky (1992) had participants play a series of one-shot prisoner's dilemma games for real payoffs. The majority of participants in this setup defected regardless of whether they were told that the opponent had chosen to cooperate or to defect. Nevertheless, on over 80% of trials in which the opponent's choice of strategy was unknown, participants chose to discover the opponent's strategy before making their decision. People like to obtain information and base their decisions on compelling reasons for selecting one option over another (Shafir, Simonson, & Tversky, 1993). They sometimes pursue information that seems relevant and that might crystallize preference, even if ultimately it is unlikely to alter the decision.

We call a piece of information *relevant* if it could impinge on the decision in some, perhaps even subtle, way. Thus, information may be relevant because it makes one option look better, or because it makes the decision maker happier. We call a piece of information *instrumental* only in case this information can alter what decision is made. If your decision to go fishing depends on whether or not it rains, then, for you, the rain report is instrumental—you will go in one case; you will not go in another. If, on the other hand, you intend to go whether or not it rains, then information about rain could be relevant to you—you may enjoy yourself more, or drive longer—but it is noninstrumental, because you will do the same thing, namely, go fishing, regardless of the information. (Of course, information that is noninstrumental for one decision may well be instrumental for another: Rain may not change your plan to go fishing, but may alter your decision to take a coat.)

The present article documents instances in which people pursue information that would be noninstrumental if it were directly available and explores the effects that such pursuit can have on ensuing decisions. The term *noninstrumental* is often used to refer in what follows to information that would have no instrumental value were it directly available; such information, we argue, can come to acquire instrumental value once it has been sought. People, we suggest, are rarely aware of pursuing noninstrumental information; rather, they typically pursue such information because it appears relevant to the decision. Then, having pursued it, people come to treat the information as instrumental, and proceed to make their decision partly on the basis of the information obtained. Whereas the information would have had no impact on the decision had it been directly available, having pursued it can lead people to make choices they would not otherwise have made. Imagine, for example, a student who contemplates registering for a course in the coming semester. As it turns out, it is uncertain whether a very popular instructor, or a substitute, will be teaching the course. The student may choose to wait and find this out before making the decision, particularly if waiting carries little cost. Once it turns out that the popular instructor will not be teaching, the student is likely to decide not to register for the course (otherwise, why did the student wait to find out?). The decision not to register, we suggest, is likely to be made even if the student would have registered had she simply known that a substitute would be teaching the course. Once she has chosen to wait for the information, the student naturally infers that a substitute is not quite good enough. Imagine that the student would have registered for the course had she known it would be taught by either instructor. Then, waiting to know who will teach amounts to the pursuit of noninstrumen-

tal information. Nonetheless, having chosen to pursue what would have been noninstrumental information, the student is now likely to endow this information with instrumental value and reach a decision partly on the basis of the information obtained.

The patterns we explore are motivated by two assumptions: (a) The pursuit of missing information can lend greater weight to that information, relative to the attention it might have received had it simply been known from the start; and (b) the contrast between how an uncertainty is resolved and how it could have been resolved often carries logical implications for what decision ought to ensue. These two factors, we suggest, are mutually enhancing. The presence of uncertainty and the contrast between potential outcomes motivate decision makers to pursue further information. This, in turn, can put more weight on the obtained information and on the contrast it generates with what might have been. Note, incidentally, that the decision maker need not engage in active pursuit of the information; it is enough that his or her curiosity be aroused. Mere interest in how the uncertainty is resolved can focus attention on the missing information and lead the person to act accordingly once it is obtained. In what follows, we document a number of decision scenarios that exhibit this pattern. We then discuss its causes and implications.

Everyday Decisions

The problems in this section were presented to Princeton University and Stanford University undergraduate volunteers who were paid for their participation. The problems, two or three per participant, were arbitrarily inserted among other, unrelated problems in a booklet format. We counterbalanced the order of presentation of problems and found no effects of order. Each problem consisted of two versions of a hypothetical choice scenario, administered to two separate groups of participants. The simple version presented a brief scenario and required participants to choose between two alternatives. In the uncertain version, the same scenario was presented, but this time some piece of information was left uncertain. Participants had the option to wait for the missing information before making their choice. Those who waited were then provided with information that rendered the scenario identical to that of the simple version. This manipulation made it possible to assess the impact of the pursuit of information on the ensuing choice.

Registering for a Course

Consider the following problem presented to students around the time they were planning their next semester's courses. The percentage of participants who chose each option is presented in brackets. One hundred forty participants received the simple version:

Problem 1, simple version:

You are considering registering for a course in your major that has very interesting subject matter and will not be offered again before you graduate. While the course is reputed to be taught by an excellent professor, you have just discovered that he will be on leave, and that a less popular professor will be teaching the course.

- Do you
- a) Decide to register for the course? [82%]
 - b) Decide not to register for the course? [18%]

One hundred forty-nine participants received the uncertain version. Its first part read as follows:

Problem 1, uncertain version (first part):

You are considering registering for a course in your major that has very interesting subject matter and will not be offered again before you graduate. While the course is reputed to be taught by an excellent professor, you have just discovered that he may be on leave. It will not be known until tomorrow if the regular professor will teach the course or if a less popular professor will. Do you

- a) Decide to register for the course? [42%]
- b) Decide not to register for the course? [2%]
- c) Wait until tomorrow (after finding out if the regular professor will be teaching) to decide about registering for the course? [56%]

In the uncertain version it was not known which professor would be teaching the course, and participants had the option to determine this before making their decision. In the simple version, in contrast, this information was immediately available. In the simple version, 82% of participants decided to register for the course when they knew it would be taught by the less popular professor. (As expected, an even greater proportion, 100% of a separate group of participants, chose to register when the course was to be taught by the excellent professor.) Now, what percentage of participants are expected to delay the decision in the uncertain condition? Because 82% decided to register when the course was taught by the less popular professor (and certainly would have done so when taught by the excellent professor), these students would be expected to register for the course no matter how the uncertainty was resolved. In the context of this decision, the missing information regarding the professor had no instrumental value for more than 80% of participants and, thus, less than 20% of participants were expected to wait. This notwithstanding, less than half made their decision under uncertainty, and the majority chose to wait for the information before making their decision.

Immediately following the first part, participants were presented (on the same page) with the second part of the uncertain version:

Problem 1, uncertain version (second part):

If you chose (c) in the question above, please answer the following:

It is the next day, and you find out that the less popular professor will be teaching the course. Do you

- a) Decide to register for the course? [29%]
- b) Decide not to register for the course? [27%]

Note that the percentages (29% and 27%) in the second part add up to the 56% who chose to wait (Option c) in the first part of this version. The data are summarized in Table 1. Whereas fewer than 20% of participants decided to forego the course in the simple version, nearly half of those who waited (27% out of 56%) decided to forego the course in the uncertain version. Among those who waited, some may have hoped the excellent professor would be teaching, not intending to register

Table 1

Percentage of Participants Who Chose to Register in the Simple and Uncertain Versions of the Course Scenario

Version	Choice	Time of choice		Total
		Immediately	After waiting	
Simple	Register	82	—	82
	Not register	18	—	18
Uncertain	Register	42	29	71
	Not register	2	27	29

otherwise. Nonetheless, it appears that many of those who waited and then withdrew would have chosen to register for the course had they simply known, rather than pursued, the disappointing information. In the uncertain version, where the information was not immediately available, a total of 29% of participants (2% before and 27% after pursuing the information) chose not to register for the course; in contrast, only 18% chose not to register in the simple version, where the information was known up front, $\chi^2(1, N = 289) = 4.86, p < .03$.

Although most participants would have registered for the course in either case, the majority waited to find out which instructor would be teaching before making their decision. These participants, we suggest, were not aware they were pursuing noninstrumental information. Rather, they chose to pursue information that appeared relevant to the decision, and then proceeded to use it in making their choice. Having chosen to pursue noninstrumental information, people then proceed to endow it with instrumental value. Consider a student who would register for the course in either case but who chooses to find out who will teach the course before making a decision. Having pursued this information, she discovers that the course will be taught by the less popular professor and naturally decides not to register for the course in light of the disappointing news.

Evaluating Applicants

Several other scenarios showed the effect in a variety of everyday situations. In the scenarios that follow, respondents had to make decisions involving others. Such decisions not only can be burdensome but often carry the additional weight that they may have to be explained or justified (cf. Tetlock, 1992). In such contexts, having more information can make a person appear and feel more responsible and better informed than having less. We expected, therefore, that in making decisions that can influence the fate of others, people would be particularly compelled to defer decision until the uncertainty is resolved. In the following two scenarios, participants assumed the role of decision makers evaluating applicants for college admissions and for bank mortgages. One group of participants ($n = 261$) received the following simple version of the college admissions scenario:

Problem 2, simple version:

Imagine that you are on the admissions committee of Princeton University. You are reviewing the file of an applicant who plays varsity soccer, has supportive letters of recommendation, and is

Table 2
Percentage of Participants Who Accepted or Rejected the Applicant in the Simple and Uncertain Versions of the College Admissions Scenario

Version	Choice	Time of choice		Total
		Immediately	After waiting	
Simple	Accept	57	—	57
	Reject	43	—	43
Uncertain	Accept	21	25	46
	Reject	5	49	54

editor of the school newspaper. The applicant has a combined SAT score of 1250 and a high school average of B. Do you

- a) Accept the applicant? [57%]
b) Reject the applicant? [43%]

A second group ($n = 278$) received the uncertain version:

Problem 2, uncertain version:

Imagine that you are on the admissions committee of Princeton University. You are reviewing the file of an applicant who plays varsity soccer, has supportive letters of recommendation, and is editor of the school newspaper. The applicant has a combined SAT score of 1250 but you have two conflicting reports of the applicant's high school average grade. The guidance counselor's report indicates a B average, while the school office reported an A average. The school has notified you that the records are being checked, and that you will be informed within a few days which of the averages is the correct one. Do you

- a) Accept the applicant? [21%]
b) Reject the applicant? [5%]
c) Wait for clarification from the applicant's school before deciding? [74%]

If you chose (c) in the question above, please answer the following:

The school informs you that the applicant's average grade is a B. Do you

- a) Accept the applicant? [25%]
b) Reject the applicant? [49%]

As before, the percentages appearing in the second part of the uncertain version (25% and 49%) sum up to the proportion of people (74%) who chose Option c in the first part. Note that participants exhibited a strong tendency to wait for the missing information; nearly three-quarters of the participants in the uncertain version chose to find out the exact grade average before making a decision. In fact, for many participants this information was noninstrumental: Because more than half the participants in the simple version accepted the applicant when the grade average was a B, at least half the participants would be expected to accept the applicant regardless of whether the grade average was a B or an A. Instead, only 21% chose to accept without waiting, and the majority opted to wait for information that should have had no impact on their decision.

The data of the college admissions problem are summarized in Table 2. Before we consider the consequences of the proclivity to pursue information in the context of this problem, let us examine another, similar problem. Below are the simple and

uncertain versions of the mortgage scenario ($ns = 122$ and 111 , respectively):

Problem 3, simple version:

Imagine that you are a loan officer at a bank reviewing the mortgage application of a recent college graduate with a stable, well-paying job and a solid credit history. The applicant seems qualified, but during the routine credit check you discover that for the last three months the applicant has not paid a \$5,000 debt to his charge card account. Do you

- a) Approve the mortgage application? [29%]
b) Reject the mortgage application? [71%]

Problem 3, uncertain version:

Imagine that you are a loan officer at a bank reviewing the mortgage application of a recent college graduate with a stable, well-paying job and a solid credit history. The applicant seems qualified, but during the routine credit check you discover that for the last three months the applicant has not paid a debt to his charge card account. The existence of two conflicting reports makes it unclear whether the outstanding debt is for \$5,000 or \$25,000, and you can not contact the credit agency until tomorrow to find out which is the correct amount. Do you

- a) Approve the mortgage application? [2%]
b) Reject the mortgage application? [23%]
c) Wait until tomorrow (after finding out about the charge card debt) to decide whether to approve or reject the application? [75%]

If you chose (c) in the question above, answer the following:

It is the next day, and you find out that the applicant's unpaid debt is \$5,000. Do you

- a) Approve the mortgage application? [54%]
b) Reject the mortgage application? [21%]

The data are summarized in Table 3. As in the college admissions problem, the majority of participants chose to wait for the information. The strong tendency to defer decision may be exacerbated by social norms; when another person's fate is at stake, it seems inappropriate or indefensible to make a decision without knowing his or her exact grades or outstanding debt, especially when these are easily available. Nonetheless, for many respondents the information was noninstrumental: because 71% rejected the mortgage application when the debt was only \$5,000 (and predictably more, 92%, rejected the application when the debt was \$25,000), a majority of respondents would be expected to reject the application in either case. In-

Table 3
Percentage of Participants Who Approved or Rejected the Application in the Simple and Uncertain Versions of the Mortgage Scenario

Version	Choice	Time of choice		Total
		Immediately	After waiting	
Simple	Approve	29	—	29
	Reject	71	—	71
Uncertain	Approve	2	54	56
	Reject	23	21	44

stead, a mere 23% rejected the application when unsure whether the debt was \$5,000 or \$25,000, and a full 75% chose to wait and find out.

What are the repercussions of waiting for noninstrumental information? In situations where information costs little to obtain, is there a reason to avoid noninstrumental pursuits? As in Problem 1, the present data indicate that the pursuit of noninstrumental information can influence subsequent decisions. In the college admissions scenario, about two-thirds of those who waited (and discovered that the grade average was a B, not an A) chose to reject the applicant, yielding a total 54% rejection rate in the uncertain version, compared with 43% rejection in the simple version, $\chi^2(1, N = 539) = 6.15, p < .02$. The mortgage scenario showed an even more dramatic effect. More than two-thirds (54%/75%) of those who waited (and discovered the debt was \$5,000 rather than \$25,000) chose to approve the application, yielding a total of 56% approval in the uncertain version, compared with a 29% approval rate in the simple version, $\chi^2(1, N = 233) = 17.65, p < .0001$. Note, incidentally, that a simple contrast-based account, according to which the contrast between the A and the B grades, or between the \$5,000 and \$25,000 debts, makes the B and the \$5,000 look less impressive than when they appear in isolation, does not apply to the earlier course scenario, nor can it explain a number of scenarios presented next. We return to consider the role of contrast in the discussion.

The direction of the effect observed above depends on the information obtained: "Bad news" in Problem 2 led to a lower admission rate, whereas "good news" in Problem 3 led to a greater rate of approval. (In one case, we observed a greater tendency to maintain the status quo, in the other, a greater tendency to depart from it.) Having chosen to wait for information, participants assumed it is instrumental for the decision: One option ought to be chosen if the uncertainty is resolved one way, and the other ought to be chosen if it is resolved another. Consider, for example, the mortgage problem, wherein participants waited to find out whether the debt was \$5,000 or \$25,000. Because the former is clearly preferable to the latter, participants who waited and then received the good news, namely that the debt was only \$5,000, naturally proceeded to approve the mortgage. Indeed, whereas only 29% approved the mortgage with a \$5,000 debt in the simple version, a full 72% of those who waited for this information then approved the application in the uncertain version (54% of participants approving out of 75% who waited; $54/75 = 72\%$).

Data from two additional versions of the mortgage problem ($n = 137$ in each) lend further support to this interpretation. As in the original, in both of these versions participants had the option to wait for information about a debt, which turned out to be \$5,000 outstanding for 3 months. In one version, however, the alternative to the \$5,000 debt was a \$1,000 debt. In the other version, the alternative to the \$5,000 debt outstanding for 3 months was a \$25,000 debt outstanding for just 1 week. Note that in the latter version it is not obvious which debt is worse. Table 4 summarizes the tendency to approve or reject the same \$5,000 debt among those respondents who chose to wait for the information in each of three conditions. When the debt constituted "good news," namely, it was \$5,000 and not \$25,000 (as in Table 3), 72% of those who waited chose to approve the

Table 4

Approval and Rejection Rates Among Those Who Waited and Learned the Debt Was \$5,000 and Three Months Overdue in Three Versions of the Mortgage Scenario

Version	% Approve	% Reject
Good news	72	28
Bad news	29	71
Ambiguous news	51	49

Note. Good news = \$5,000 and 3 months overdue rather than \$25,000 and 3 months overdue; bad news = \$5,000 and 3 months overdue rather than \$1,000 and 3 months overdue; ambiguous news = \$5,000 and 3 months overdue rather than \$25,000 and 1 week overdue.

application; when it constituted "bad news," namely it was \$5,000 and not \$1,000, only 29% of those who waited approved the application; and when the news was ambiguous, namely, a \$5,000 debt outstanding for 3 months rather than a \$25,000 debt outstanding for 1 week, no clear preference emerged, with roughly half of those who waited approving and the other half rejecting the application.

Information sought and obtained can influence decision. When numerous outcomes are plausible or when the findings are ambiguous, the information may not point in an obvious direction. At other times, however, the obtained information has clear implications that can have a decisive influence on choice. Further evidence that people are sensitive to the implications of information pursuit comes from a variation on the problems above in which we asked participants to predict the choice of hypothetical others, rather than indicate their own preference. In a version of the mortgage scenario (Problem 3), for example, 70% of respondents predicted that a loan officer who had waited to find out whether an outstanding debt was \$5,000 or \$25,000 would approve the application once he or she discovered that it was \$5,000. In contrast, only 20% of another group of respondents predicted that the loan officer would approve the application when he or she knew from the start that the debt was \$5,000. It is noteworthy that these predictions are close to the percentages, 72% and 29%, respectively, observed among respondents who actually made these hypothetical decisions (see Table 3).¹ A similar pattern was observed in the college admissions scenario (Problem 2). Eighty-two percent of respondents predicted that an admissions officer who waited to find out whether the grade average was an A or a B would reject the applicant once it became known that it was a B. In contrast, only 40% predicted rejection by an admissions officer who knew of the B from the start. (Corresponding rates among respondents who actually made these decisions were 66% and 43%, respectively; see Table 2.) The similar pattern observed in respondents' predictions of others and in their own responses suggests the possible role of self-perception, namely, that respondents infer their preferences in view of the obtained information, much as

¹ Note that the percentage of those who approved after having waited is not stated explicitly in Table 3. This percentage consists of the 54% of all participants who chose to approve after waiting, divided by the 75% who first waited ($54/75 = 72\%$).

they would infer the preference of another person. We return to the issue of self-perception in the concluding section.

Consumer Choice and Further Issues

People are inclined to postpone decision for the sake of additional information, which they then incorporate in making their choice. The information, sought and then obtained, tends to receive greater attention and often has obvious implications for decision. This pattern manifests itself in everyday decisions faced by consumers. Consider the following consumer choice problem regarding the purchase of a new compact-disc (CD) player. Ninety-three and 109 participants, respectively, responded to the simple and to the uncertain versions:

Problem 4, simple version:

For some time, you have considered adding a compact disc (CD) player to your stereo system. You now see an ad for a week-long sale offering a very good CD player for only \$120, 50% off the retail price. Recently, however, your amplifier broke. You learn that your warranty has expired and you have to pay \$90 for repairs.

Do you

- a) Decide to buy the CD player during the week sale? [91%]
- b) Decide not to buy the CD player during the week sale? [9%]

Problem 4, uncertain version:

For some time, you have considered adding a compact disc (CD) player to your stereo system. You now see an ad for a week-long sale offering a very good CD player for only \$120, 50% off the retail price. Recently, however, your amplifier broke, and the repair shop must verify the date of your warranty. You will not know until tomorrow whether you must pay \$90 for repairs. Do you

- a) Decide to buy the CD player during the week sale? [26%]
- b) Decide not to buy the CD player during the week sale? [5%]
- c) Wait until tomorrow (after finding out about the \$90 repairs) to decide whether or not to buy the CD player during the week sale? [69%]

If you chose (c) in the question above, answer the following:

It is the next day. You learn that your warranty has expired and you have to pay the \$90 for repairs. Do you

- a) Decide to buy the CD player during the week sale? [29%]
- b) Decide not to buy the CD player during the week sale? [40%]

The data are summarized in Table 5. Whereas 91% of partici-

Table 5
Percentage of Participants Who Chose to Buy in the Simple and Uncertain Versions of the CD Scenario

Version	Choice	Time of choice		Total
		Immediately	After waiting	
Simple	Buy	91	—	91
	Not buy	9	—	9
Uncertain	Buy	26	29	55
	Not buy	5	40	45

pants chose to buy the CD player in the simple version, when they knew they had to pay \$90 for repairs, only 26% chose to buy in the first part of the uncertain version, knowing they would have to pay either \$90 or nothing. Most of those who chose to wait would have bought the CD player had they known they had to pay the \$90 repair cost. Having waited to find this out, however, the majority chose not to buy the CD player. Waiting for the information had a dramatic effect on participants' choices: 91% chose to buy the player in the simple version, whereas only 55% bought it in the uncertain version, $\chi^2(1, N = 202) = 32.74, p < .0001$.²

As discussed earlier, people need not actively pursue the missing information for the above pattern to arise. Other aspects of the situation can lead the decision maker to focus on the missing information, even when it is obtained incidentally, without an explicit choice to defer decision. The decision problem may be presented in a way that arouses curiosity about the missing information or that strongly implies the information matters for the decision. We ran two additional versions of the problem above to explore the role of two alternative interpretations of the observed pattern. The first concerns the experimental or conversational demands that may arise with the introduction of uncertainty; the other concerns the role of the pursuit of information in the final formation of preference.

Conversational Demand

People generally assume that information communicated in a conversational situation is relevant to the situation and to the task at hand (Grice, 1975). In both the simple and uncertain versions of the CD player scenario, as in other scenarios above, the mere mention of the information may imply that it is relevant. Furthermore, the mention of uncertainty about the information, as in the uncertain version, could imply greater relevance than the direct availability of the information, as in the simple version. Note that the introduction of uncertainty along with the option to wait does not necessarily imply that the information is instrumental or that, indeed, one should wait. Respondents were asked whether they care to have the information, presumably because they may or they may not. A reasonable inference given this presentation is that the usefulness of the information is indeed an open question—a question to be resolved by the respondent. The option to wait leaves open the possibility that the information could be instrumental; the option to decide with-

² Tversky and Shafir (1992; see also Shafir & Tversky, 1992) described situations in which people's decisions under uncertainty were inconsistent with what they would choose once the uncertainty is resolved. People who would prefer *a* to *b* if they knew that *x* obtained, and who would also prefer *a* to *b* if they knew that *x* did not obtain, choose *b* over *a* when the outcome of *x* is uncertain. We have observed such a *disjunction effect* in the context of the CD problem. In a version ($n = 243$) in which the option to wait for information was not available, participants had to decide whether to buy the CD player, without knowing if they would have to pay the \$90 repairs. Whereas 91% in the simple version of Problem 4 chose to buy the CD player when they had to pay the repair (and presumably would buy if they did not), only 74% chose to buy the CD player when uncertain (and unable to find out) whether they would have to pay the \$90 repair, $\chi^2(1, N = 336) = 12.57, p < .001$.

out waiting highlights the possibility that the information may not be instrumental after all.

Clearly, the deliberation is likely to focus attention on the missing information. Nonetheless, it is possible that the mention of uncertainty about the information suggests that the information ought to prove instrumental. To explore this possibility, we constructed a new version of the problem above, in which the uncertainty is introduced and then resolved, without the respondent having to pursue the information. A new group of participants ($n = 161$) received this resolved uncertainty version:

Problem 4, resolved uncertainty version:

For some time, you have considered adding a compact disc (CD) player to your stereo system. You now see an ad for a week-long sale offering a very good CD player for only \$120, 50% off the retail price. Recently, however, your amplifier broke, and the repair shop must verify the date of your warranty. It will not be known until the next day whether you must pay \$90 for repairs.

The next day you learn that you must pay the \$90 repair cost. Do you

- a) Decide to buy the CD player during the week sale? [75%]
- b) Decide not to buy the CD player during the week sale? [25%]

The uncertainty regarding the warranty was presented and then resolved before the respondent was asked to make a choice. With regard to conversational norms, note that there is a particularly strong implication the missing information may prove instrumental: The opportunity to make a decision is not even provided until after the uncertainty is resolved, thus suggesting that the information ought to prove useful in making the decision. Indeed, the tendency to forego the CD player increases in the present version, following the introduction and resolution of uncertainty, compared with the simple version, in which the information is directly available, $\chi^2(1, N = 254) = 10.77, p < .002$. Nevertheless, the proportion of participants who opted to forego the CD player in the original uncertain version, in which they choose to pursue the information, was significantly greater, despite the weaker conversational demand, than in the resolved uncertainty version, $\chi^2(1, N = 270) = 11.10, p < .001$. It appears that the pursuit of information, independent of potential conversational demands, leads people to make use of the obtained information in formulating their choice.

As it turns out, it is not the pursuit itself that leads people to make use of the acquired information. The introduction of uncertainty and the subsequent pursuit may draw attention to the missing information, but its influence on decision depends on its perceived relevance. In a variant of the original uncertain version of the CD player problem, the decision to wait was presented as incidental, attributed to the fact that the stores had already closed for the day. The opening paragraph was identical to that of the original uncertain version ($n = 60$):

Problem 4, incidental version:

For some time, you have considered adding a compact disc (CD) player to your stereo system. You now see an ad for a week-long sale offering a very good CD player for only \$120, 50% off the retail price. Recently, however, your amplifier broke, and the repair shop must verify the date of your warranty. You will not know until tomorrow whether you must pay \$90 for repairs. Do you

- a) Decide to buy the CD player during the week sale? [25%]

- b) Decide not to buy the CD player during the week sale? [5%]
- c) Wait until tomorrow, since the stores are already closed today anyway, to decide whether or not to buy the CD player during the week sale? [70%]

If you chose (c) in the question above, answer the following:

It is the next day. You learn that your warranty has expired and you have to pay the \$90 for repairs. Do you

- a) Decide to buy the CD player during the week sale? [52%]
- b) Decide not to buy the CD player during the week sale? [18%]

The only difference between this and the original uncertain version is Option c: Originally, the decision to postpone was linked to the desire to find out about the repair; in the present version, the decision to postpone is incidental, presumably due to the fact that the stores are closed for the day. It is noteworthy that the proportion of respondents who chose to postpone decision was very similar in the two versions (69% and 70%). On the other hand, the proportion of participants who decided to forego the CD player once they found out about the cost of repair was significantly different: The majority who waited to find out about the repair decided not to buy the player, whereas the majority who presumably waited because the stores were closed decided to buy it, $\chi^2(1, N = 118) = 10.93, p < .001$. Thus, neither the presence of uncertainty nor the pursuit of information suffices to generate the original pattern. Rather, participants' pursuit of information in situations in which they perceive it as relevant leads them to rely on the obtained information when making the decision.

Information and the Time Course of Decision

Some of the foregoing versions of Problem 4 have noteworthy implications for a question regarding the time course of decision: At what point are preferences constructed in situations in which people have opted to pursue missing information? The ultimate decision is typically made only after information is obtained, but preferences may be formed either before or after one opts to wait for the information. It is possible, for example, that the uncertainty compels people to consider their preferences contingent on the various outcomes. They then pursue the missing information, but their preferences at that point have already been ascertained. According to this view, people's preferences are constructed not when the pursued information is actually obtained, but earlier, when the potential outcomes of the uncertainty are contemplated. Another possibility is that people choose to wait not because they perceive the missing information to be instrumental, but for some other reason: perhaps as a result of standard procedure, or to appear responsible, or (because the information is not costly) to avoid having to contemplate what their preference would be under each scenario. Only then, after having waited for the information, do they form their preference, typically consistent with the information obtained.

A comparison of the uncertain and the incidental versions of Problem 4 supports the latter interpretation. Recall that in both these versions about 70% of respondents chose to pursue the missing information. In the uncertain version, the majority of those who received the information (that they would have to

pay for the repair) opted not to buy the CD player. In the incidental version, however, the majority of those who waited and then received this information proceeded to buy the CD player despite the information. Presumably, respondents to the latter version would not have chosen to wait had they concluded before waiting that they would make the same decision (namely, buy the CD player) no matter what. There is, furthermore, no reason to assume that those who pursued the information in the uncertain version did so because they had already decided the information was instrumental, but that the same percentage of people who pursued it in the incidental version did it for some other, unrelated reason. Respondents in both versions are likely to have pursued the missing information not because it was deemed instrumental, but because it was not very costly and it appeared relevant to the decision.

When confronted with a nontrivial decision, people are prone to pursue additional information, particularly when the information is relevant and is not very costly. This is, of course, quite reasonable and likely to lead to better decisions overall. The proclivity to pursue information, however, often extends to information that is noninstrumental; it might shed some light on the alternatives, but, despite its relevance, ought not affect decision. Additional versions of the problems above illustrate the extent of people's proclivity to look for information. Consider, for example, the uncertain version of Problem 4, which offered the opportunity to find out whether repairing an amplifier would cost \$90 or nothing before deciding whether or not to buy the CD player. A person for whom this information is instrumental is expected to purchase the CD player in one case (presumably when the repair is free) and not in the other (when the repair costs \$90). Waiting to discover whether the repair is free or costs \$90 implies that a price of \$90 (and anything above it) is too high and would lead the person to forego the purchase. Thus, if the decision of 70% of participants is contingent on whether the cost is \$0 or \$90, then the decision of at most 30% of participants should be contingent on any two prices above \$90. Now, consider a situation in which it is uncertain whether the repair will cost \$90 or \$180. Those who choose to wait when the cost is either \$0 or \$90 ought not wait when the uncertainty is between \$90 and \$180, both of which presumably exceed their threshold. Instead, whereas 70% of participants chose to wait when the uncertainty was between \$0 and \$90, a full 92% of participants chose to wait when the uncertainty was between \$90 and \$180. Similar proclivity to pursue relevant but noninstrumental information was observed in other variations on the problems above.³

Tape-Player Experiment

The preceding problems all involved hypothetical choices. There may be some concern about how these patterns replicate in the context of real decisions (cf. Freedman, 1969). Of course, what is most relevant are the general patterns observed, rather than the specific numbers. Even if the above were not accurate estimates of the likelihoods that a college or mortgage application will be accepted, of interest is the compelling evidence that these likelihoods can be affected by waiting for noninstrumental information. To that end, the following two studies involved real decisions. In the tape player experiment participants were

confronted with a consumer decision with real potential costs and benefits.

Method

Participants. Forty-five Princeton University undergraduates who were enrolled in an introductory psychology course participated in the experiment.

Procedure. The experiment was conducted in small groups of 8 to 10 students, arbitrarily assigned to either the simple or the uncertain condition. On entering the room, participants were presented with a Panasonic dual-cassette player, still in its original wrapping, and received an entry form, reproduced below:

As part of our study of people's tastes and preferences, we are currently raffling some prizes. You will now be given the opportunity to participate in a raffle for the dual-cassette player on display (list price: \$99.99). Each cassette player will be raffled among 50 participants, and there will be no fee for entering the raffle. However, if you win, you will be required to pay a small amount for the prize. Unfortunately, the dean's office has not yet indicated if they will help fund this research. If the dean's funding is awarded, winners will have to pay \$10.00 to receive the cassette player. If the funding is not awarded, we will have to charge \$30.00. We apologize for not knowing yet whether the price will be \$10 or \$30.

If you would like to participate in the raffle, please fill in your name and phone number below. If you would rather not participate, please hand in this form blank: signing your name indicates a commitment to pay for the prize if you win the raffle.

Thus, on first reading the entry forms, participants in both conditions did not know whether the tape player would cost \$10 or \$30. Participants in the simple condition were told immediately that the fee had been determined. The experimenter explained that, after the forms had been printed, it was found that the grant had not been awarded, and that the winner of the raffle would have to pay \$30 for the tape player. Participants were asked to indicate whether they would like to enter the raffle, and the forms were collected. In the uncertain condition, participants were given a somewhat different account. The experimenter explained that he was on his way to a meeting and that he would announce before the end of class whether the price was \$10 or \$30. Participants had the option to make their decision and turn in their forms immediately, or they could keep their forms until the end of class, when the exact price would be announced. Approximately 45 min later the experimenter returned with the news that the grant had not been awarded and that the fee would be \$30. Thus, participants in the uncertain condition now faced the same decision as participants in the simple condition. Those who had deferred then indicated their choice and the forms were collected.

³ In other versions of Problem 4, for example, a majority (66% and 60%, respectively) chose to wait when it was uncertain whether the price of repair was \$50 versus \$90, or \$50 versus \$25. In other versions of the mortgage scenario (Problem 3), a majority of participants (58%, 64%, and 88%, respectively) chose to wait to find out whether the outstanding debt was for \$1,000 or \$5,000; \$5,000 or \$10,000; or \$10,000 versus \$25,000. In versions of the college admissions scenario (Problem 2), 62%, 56%, 39%, and 38% chose to find out whether the candidate's grade average was an A+ or an A-, an A- or a B+, a B+ or a B, and a B versus a B-.

Table 6
Percentage of Participants Who Chose to Enter the Raffle in the Simple and Uncertain Conditions of the Tape Player Experiment

Version	Choice	Time of choice		Total
		Immediately	After waiting	
Simple	Participate	57	—	57
	Decline	43	—	43
Uncertain	Participate	14	9	23
	Decline	54	23	77

Results and Discussion

The data are summarized in Table 6. Fifty-seven percent chose to enter the raffle in the simple condition, when they knew the price was \$30. Thus, a greater proportion would be expected to enter the raffle in the uncertain condition, when the price was either \$30 or \$10. However, only 14% chose to enter the raffle in the uncertain condition; the rest either refused to enter or chose to wait until the uncertainty was resolved. As before, the data indicate that waiting had a significant effect on choice: More than 70% of those who waited chose to forego the raffle once they discovered that the price was \$30 rather than \$10. Ultimately, a total of only 23% participated in the raffle in the uncertain condition, compared with a 57% rate of participation in the simple condition, $\chi^2(1, N = 45) = 5.35, p < .03$.⁴

Ultimatum Game

The pursuit of noninstrumental information can also affect people's chosen strategies in multiparty decision situations such as bargaining, where the outcome depends partly on the actions of another person. Much attention in experimental work has recently been devoted to what is known as the ultimatum game. The game involves two players who are randomly assigned the roles of allocator and recipient. The allocator is given a fixed sum of money, say \$10, which she is to divide between herself and the recipient. The rules stipulate that the allocator must make an offer; the recipient can then accept the offer, in which case the recipient gets what was offered and the allocator keeps the remainder, or the recipient can reject the offer, in which case both players get nothing. According to a purely money-maximizing interpretation of game theory, allocators should make offers just above zero, and recipients should accept all positive offers. The experimental data are inconsistent with that prescription. Allocators typically make significantly positive offers, and recipients decline offers that they deem to be too low. These behaviors have been attributed to people's perception of fairness and to related social norms. (For review of the experimental literature, see Roth, 1995; Thaler, 1988.) In what follows, we explore the effect that noninstrumental pursuits might have on people's behavior in this bargaining situation.

Method

Participants. One hundred thirty-three Stanford University undergraduates enrolled in an introductory psychology course participated in the experiment.

Procedure. Participants gathered in a meeting room, in groups ranging from 8 to 22. One half of the participants were then arbitrarily assigned to the simple condition and sent to one room; the others were assigned to the uncertain condition and sent to another room. Participants first filled out a number of unrelated questionnaires. Next, they were told they would be playing a game for real payoffs. Participants in the simple condition each received a form purportedly filled out by another player, in the other room, including an identification number filled in by the other player. Participants were then assigned their own number, which they wrote next to that of the other player. The form read as follows:

The set-up:

You have been anonymously paired with someone in the other room. The other person is *A*, and you are *B*. The two of you will play a simple game.

The rules:

The two of you have access to a \$10 pot. *A* makes a proposal, indicating what portion of the pot he or she wishes to keep and what portion he or she wishes to leave for *B*.

B judges *A*'s proposal and can veto it.

If *B* does not veto *A*'s proposal, the pot is split as *A* proposed. If *B* vetoes *A*'s proposal, the game ends with neither *A* nor *B* receiving any money from the pot.

Your decisions:

As *A*: (check one)

- ___ I propose a split of the pot giving \$5 to me and leaving \$5 for *B*.
 I propose a split of the pot giving \$8 to me and leaving \$2 for *B*.

As *B*: (choose one)

- a) I accept *A*'s proposal. [80%]
 b) I veto *A*'s proposal. [20%]

All participants were Player *B*; the forms of all participants in the simple condition indicated (as shown above) that Player *A* had offered \$2.

In the uncertain condition, Player *A*'s decision was not yet known. It was explained that participants would shortly receive a form indicating *A*'s allocation, and that they could wait to make their final decision at that time. As in the simple condition, all participants were Player *B*, and the choice of allocations available to Player *A* was \$8 to himself or herself and \$2 to Player *B*, or \$5 each. The set-up and the rules were the same as above. The decisions were presented as follows:

Your decisions:

On his or her form, *A* will mark one of the following:

- ___ As *A*, I propose a split of the pot giving \$5 to me and leaving \$5 for *B*.
 ___ As *A*, I propose a split of the pot giving \$8 to me and leaving \$2 for *B*.

⁴ Note that only 32% of participants waited for the information in the uncertain condition, a lower rate than in the previous problems, in which a majority chose to wait. However, the tendency to decline the raffle without waiting did not diminish in the uncertain relative to the simple condition. This implies that among those who nevertheless chose to wait, most were people who were interested in the tape player and would have participated had the \$30 price been known from the start. Of these, however, 72% proceeded to decline the raffle once they found out the \$30 price after having waited.

As *B*, please choose one of the following:

- a) As *B*, I give up my right to veto. [57%]
- b) As *B*, I will veto either proposal by *A*. [0%]
- c) As *B*, I would like to wait and see *A*'s proposal [43%]
before making my own judgment of whether or not to veto.

After making this choice, participants received a form (as in the simple condition, with Player *A*'s supposed identification number) indicating that Player *A* had kept \$8 and left them \$2. Those who had chosen to wait (Option c) were then asked to make their final decision:

- As *B*: (choose one)
- a) I accept *A*'s proposal. [8%]
 - b) I veto *A*'s proposal. [35%]

In both conditions, respondents who chose to accept *A*'s proposal received the allotted payment. All participants were then debriefed.

Results and Discussion

The percentage of participants who chose each option appears in brackets and is summarized in Table 7. In the simple condition, in which Player *A* has kept \$8 and allocated \$2 to the other player, 20% of participants chose to veto, giving both players nothing. (This is consistent with other data obtained in the context of similar allocations; see Roth, 1995.) Consequently, in the uncertain condition, in which Player *A* could allocate either \$2 or \$5 to Player *B*, at most 20% of participants would be expected to wait for the other's decision (because, presumably, the 80% who are satisfied with \$2 would certainly be satisfied with \$5). Instead, perhaps reluctant to give up the "right to veto," more than 40% decided to wait and see what the other chose to allocate before making their own decision. Having discovered the "bad news," namely, that Player *A* had offered only \$2 and kept \$8, over 80% of those who waited then rejected the offer. This yields an overall rejection rate of 35% in the uncertain condition, significantly higher than the 20% rate of rejection observed in the simple condition, $\chi^2(1, N = 133) = 3.87, p < .05$. Apparently, participants who waited and then received the relatively low offer were led to formulate a threshold for what is minimally fair that differed from those who received the low offer up front.

General Discussion

Research in decision making has shown that people often face decision problems not with clearly established preferences,

but rather with the need to construct their preference in the context of decision (Shafir & Tversky, 1995; Slovic, 1995; Tversky & Kahneman, 1986). The present research explored the construction of preference in two stages: first, by offering participants the option to pursue relevant but noninstrumental information; and then by observing the effects that this has on ensuing choices. It is suggested that the pursuit of information can lead people to pay greater attention to that information than they would have had it simply been available from the start, and that this greater focus can significantly influence people's perception of the decisions that ensue. We address these issues in turn.

Waiting Increases Weighting

Waiting for information that appears relevant to a decision can raise the extent to which it is brought before one's attention and thus increase its influence on choice. Consider, for example, a person who would normally give minimal weight to a candidate's grades relative to his or her other attributes. This person may nonetheless choose to know the candidate's grade average when it is readily available, particularly when obtaining this information bears little cost. Having typically given little attention to a candidate's grades, the decision maker is now in pursuit of this attribute, and this pursuit focuses attention on the attribute and can elevate its bearing on the ensuing choice. As we discuss in what follows, neither the assumption of increased attention nor the contrast between the actual outcome and its alternatives is enough, on its own, to account for our findings. Instead, it is the combination of the two—an increased attention to the contrast between what has obtained as opposed to what might have been—that accounts for the documented patterns.

Even if the pursuit of information served to focus our respondents' attention on the uncertain attribute, note that this, by itself, is not enough to account for the data. Thus, for example, merely focusing participants' attention on an outstanding \$5,000 debt is expected, if anything, to lower their willingness to approve a loan, not to raise it. Critical to the patterns that we observed is the fact that the obtained information has clear implications for the decision at hand. Consider, for purposes of comparison, uncertain situations in which a range of outcomes is possible. Thus, a candidate's average might be any grade, not just an A or a B, and a mortgage applicant's prior debt may be for any amount, not necessarily \$5,000 or \$25,000. We investigated two such problems: an uncertain version of Problem 2, the college admissions problem, in which no specific grades were mentioned in advance (i.e., prior to the resolution of uncertainty); and an uncertain version of Problem 3, the mortgage problem, in which no specific amounts of debt were mentioned in advance ($n = 47$ and 61, respectively). In both problems, those who chose to pursue the information then received the same information, a grade of B and a \$5,000 debt, respectively, as in the original versions. Note that in these versions, although attention is focused on the missing information, a grade of B (rather than any other grade) or a debt of \$5,000 (rather than any other amount) do not have obvious implications. Should the candidate be accepted? Should the mortgage be approved? This is in contrast to the original (uncertain) versions, in which the explicit alternatives to the B and the \$5,000 were an A and \$25,000, respectively, and the implications were clear. In fact,

Table 7
Percentage of Participants Who Chose to Accept the \$2 in the Simple and Uncertain Conditions of the Ultimatum Game

Version	Choice	Time of choice		Total
		Immediately	After waiting	
Simple	Accept	80	—	80
	Decline	20	—	20
Uncertain	Accept	57	8	65
	Decline	0	35	35

once the information was obtained, participants' choices in the open versions (in which any outcome was possible) did not differ significantly from the corresponding simple versions, in which the information was available up front. Thus, learning that the average was a B (and not any other grade) led to decisions that did not differ from when the B was known all along. Similarly, discovering the debt was \$5,000 (and not any other amount) led to decisions that were not different from when the \$5,000 debt was known from the start.

The presence of uncertainty can occasionally give rise to additional contrasts that lend the obtained information further impact. Consider, for example, the simple version of the mortgage scenario, in which a \$5,000 debt is mentioned, compared with the uncertain version, which mentioned both a \$5,000 and a \$25,000 debt. In contrast with the possibility of a \$25,000 debt, the \$5,000 debt may then have appeared less severe, leading more participants to approve the mortgage in the uncertain version. Whereas the emergence of contrast may occasionally contribute to the effects of uncertainty, the contrast-effect explanation cannot, by itself, account for much of the data presented above. It cannot, among others, account for the course scenario (Problem 1), the CD player scenario (Problem 4), the tape player experiment, or the ultimatum game. In all these studies, the two contrasting outcomes were explicitly mentioned in both the simple and the uncertain versions: Both versions of the course scenario mentioned the excellent as well as the less popular professor, and both versions of the CD player scenario mentioned the \$90 repair as well as the possible warranty. Furthermore, in the college admissions scenario, it is unlikely that the B grade average did not bring to mind the obvious alternative of an A. In the tape player experiment, both \$10 and \$30 payment alternatives were explicitly mentioned, in an identical presentation, in both the simple and the uncertain conditions. Similarly, in the ultimatum game, the two possible distributive outcomes were explicitly presented in both conditions.

The patterns documented in this article rely on two factors: (a) The pursuit of missing information can lend it greater weight relative to the attention it might have received had it been known from the start, and (b) the contrast between how the uncertainty is resolved and how it could have been resolved carries logical implications for the choice that ensues. These factors can be mutually enhancing: The contrast between potential outcomes contributes to the pursuit of missing information, which, in turn, increases its weight, with obvious implications for decision. This pattern, moreover, does not require an active pursuit of information. In many of the present studies, for example, participants indicated only a hypothetical desire to wait or call for the missing information. All that is required for the pattern to arise is for the person to develop an interest in the missing information in the course of making the decision. The mere arousal of curiosity seems enough to lead people to focus on the missing information and act in accord with it once it is obtained.

Self-Perception and Related Studies

When internal attitudes are unclear, people construct or infer their attitudes partly on the basis of external cues, including their own behavior (for more on self-perception, see Bem, 1972). In the problems above, the pursuit of information was salient to

the participants, it was perceived as relevant to the decision, and thus it acted as a cue in the construction of preference. This is consistent with previous research showing that for an earlier behavior to affect a later decision, the behavior needs to be perceived as relevant and must be salient (Kiesler, Nisbett, & Zanna, 1969; Salancik & Conway, 1975; Sherman, Ahlm, Beriman, & Lynn, 1978). Having engaged in its pursuit, participants focused on the information that had been obtained, and let it influence their decision.

The notion that a later decision can be changed when preceded by a related act or judgment has been supported in a number of studies involving compliance, overjustification, contrast effects, and the prediction of future behaviors. For example, two well-known methods for gaining compliance, the "foot-in-the-door" and the "low ball" techniques, are based, respectively, on the premise that once a person has complied with a small request, he or she is more likely to comply with a larger request, and that once a person has decided to take some action at a small cost, he or she is more likely to take that same action at a larger cost. In this vein, Freedman and Fraser (1966) showed that participants are more likely to put up a large "Drive Carefully" sign if they have already complied with a request to put up a smaller one or to sign a petition regarding careful driving, even when the requests were made by different people. Similarly, Cialdini, Cacioppo, Bassett, and Miller's (1978) participants were more likely to go pick up United Way posters if they had initially agreed to display them. It is interesting to note here that classic demonstrations of self-perception often require nontrivial manipulation to get people to perform some initial act (to serve as cue), which they would not normally opt to engage in outside the experimental context. The patterns observed in the present studies, on the other hand, emerge from a common temptation to wait for missing information, which can be pervasive and compelling without the prompting of an experimenter.

In their classic study on overjustification, Lepper, Greene, and Nisbett (1973) assigned children playing with markers to one of three conditions. One group expected to receive a reward for engaging in the play activity, another group did not expect a reward but received one anyway, and a control group neither expected nor received a reward. Several weeks later, when offered the opportunity to play with markers, those children who had originally expected a reward used the markers less than the rest. Having initially expected and received a reward apparently led the children to construe the activity as one conducted for the sake of the reward, rather than because of the intrinsic interest it offered.

Sherman et al. (1978) showed that initial ratings based on contrast effects can also influence subsequent behavior. People rated the importance of recycling programs either in a context of important issues such as abortion laws, or in a context of relatively trivial issues such as pet leash laws. As expected, recycling was rated more important in the context of the trivial issues. When then asked to distribute pamphlets for a recycling program, participants who had initially rated recycling in the trivial context (thus rating it more important) agreed to distribute more pamphlets than those who rated recycling in the context of important issues.

In related work, Sherman (1980) showed that people's prediction of their future behavior, although inaccurate, can affect

their actual behavior. In one experiment, college students were asked to write counterattitudinal essays. In a prior, seemingly unrelated survey, half the students were asked to predict whether they would comply with such a request, and many predicted they would not. The eventual rate of compliance among these participants was much lower than among those who had not made an earlier prediction. Participants had thus mispredicted their own behavior, because among those who said they would not write the essay, many actually would have written it had they not been asked to predict. Nonetheless, the actual rate of compliance was very close to that predicted. In effect, people went on to behave in a manner consistent with their own mispredictions. Related research has shown that such self-erasing errors may be used to increase voter turnout simply by asking people to predict whether they will vote (Greenwald, Carnot, Beach, & Young, 1987).

The decision patterns documented in this article may be quite pervasive; yet they may not be easy to learn to avoid. Like the postprediction behavior of Sherman's (1980) participants, the decision patterns observed in the present research have the makings of self-erasing errors. People initially "err" by pursuing noninstrumental information, but then proceed to make choices that endow the obtained information with instrumental value, thereby erasing the initial error. The pursuit of additional information, particularly when it is not costly, seems like a reasonable thing to do. It is all the more compelling in situations of social import, in which a decision may need to be explained, to oneself or to others (cf., Tetlock, 1992). This notwithstanding, people do not typically envision themselves in pursuit of noninstrumental information. Instead, they see the pursuit as indicative of the fact that the information has potential impact, and proceed to treat it accordingly.

To see the difficulty, consider, for example, people in Freedman and Fraser's (1966) "foot-in-the-door" study who consented to display a small sign largely due to social pressure. This initial commitment was misconstrued by these people to imply that they are the kind who get involved and take action. As a result, they then exhibited a willingness to display a larger sign. Similarly, the ratings of importance attributed to recycling by Sherman et al.'s (1978) participants were largely due to a contrast effect, of which they were not aware. Believing that the ratings were indicative of their true attitudes, these people later chose to engage in prorecycling behavior. Having misconstrued an initial behavior, people proceed to make choices that are consistent with that misconstrual, and exhibit preferences they would not have had otherwise. This has nontrivial implications for one's ability to learn. To the extent that one's behavior is responsive enough and one's preferences malleable enough to be easily altered by an early mistake, it is not clear how an individual would come to realize these errors. Having pursued what would have been noninstrumental information, people obtain information that appears to have clear instrumental value and proceed to treat it accordingly. At no point need doubt arise about what appears to be a perfectly reasonable procedure.

In addition to self-perception, other emotional and motivational factors may contribute to this effect. For instance, a person may experience and seek to reduce cognitive dissonance (Aronson, 1969; Festinger, 1957) in those cases where she senses a discrepancy between her present preference and the preference

implied by having pursued and obtained a certain piece of information. Also, when a potential option becomes unavailable, people may experience reactance (Brehm & Brehm, 1981) and develop a stronger preference for what they now know they cannot have. Such reactance may be exacerbated by having waited only to find out that the option is no longer available.

The Observed Pattern and Rationality

A recurring pattern observed in the present article consists of people waiting for noninstrumental information but then proceeding to make use of it, thus making it instrumental, once it is obtained. Is it reasonable for information to be instrumental when it is sought after but not when it is directly available? That is, do the different preferences expressed in the simple and uncertain versions of the foregoing problems represent an irrational pattern, or might it be considered rational to treat the information as instrumental in one case and not in the other, leading to different preferences in the two contexts?

One of the most fundamental assumptions in the rational theory of choice is that of *procedure invariance*, according to which logically equivalent preference elicitation methods should yield the same preferences. It has been repeatedly observed, however, that procedure invariance fails in predictable and systematic ways. Perhaps the best known example is the preference reversal phenomenon (Slovic & Lichtenstein, 1983), wherein people presented with a choice between two attractive gambles choose the gamble that offers a greater chance to win over another that offers a higher payoff, but people who are asked to price the two gambles assign a higher price to the latter than the former. This pattern has been observed in numerous experiments, including one involving professional gamblers in a Las Vegas casino (Lichtenstein & Slovic, 1973) and another offering the equivalent of a month's salary to respondents in the People's Republic of China (Kachelmeier & Shehata, 1992). The pattern is explained by the notion of compatibility, according to which a gamble's payoffs are weighted more heavily in pricing (where prices and payoffs are expressed in the same monetary units, and thus are compatible) than in choice. This entails that a high-payoff gamble will be favored in pricing relative to choice, which predicts the observed pattern (for more on compatibility and reversals, see Shafir, 1995; Slovic, Griffin, & Tversky, 1990; Tversky, Sattath, & Slovic, 1988; and references therein).

Preference reversals are attributable to a differential weighting of dimensions in different tasks. Such reversals are seen as clear violations of the normative theory of rationality because, on reflection, people agree that the tasks are logically equivalent, and ought not yield inconsistent preferences. We suggest that a similar analysis applies to the patterns observed in the present research. Pursuing a piece of missing information can lead people to give it greater weight than when it is simply available from the start. This notwithstanding, it seems clear on reflection that the two situations—wherein the information is directly available or else pursued and then obtained—are often otherwise identical and do not warrant conflicting decisions.

To gauge the extent to which people endorse this principle when it is made transparent, we replicated a couple of the problems above in a within-subject design. Thirty-four participants

were presented sequentially with both versions of the CD player problem. In contrast with the original problem, preferences observed in the simple and the uncertain versions remained consistent in this transparent, within-subject replication. Only 1 participant switched from buying the CD player in the simple version to not buying it in the uncertain version. All other participants made the same choice in both versions, (82% choosing to buy; the rest choosing not to buy the CD player). Those respondents who considered the warranty information noninstrumental in the simple version continued to consider it noninstrumental in the uncertain version. Although 56% chose to wait for information in the uncertain version, the majority nonetheless treated this information as noninstrumental once it was obtained, and chose to buy the CD player—the same choice all of them had made in the simple version. A similar pattern emerged when participants were presented with both the simple and uncertain versions of the course registration problem. In this case, not a single participant switched from registering for the course in the simple version to not registering in the uncertain version (although 2 participants exhibited the opposite pattern). Thus, when its applicability is made transparent, people appear to embrace the normative intuition. They do not endorse patterns wherein information is considered instrumental when initially missing but noninstrumental when immediately available.

The expression of conflicting preferences in the simple and uncertain versions may be viewed as inconsistent or even unreasonable. A question remains, however, as to which preference is the “correct” or “true” one, that expressed in the simple or in the uncertain version? From a normative and prescriptive standpoint, we suggest that the simple version should be the one that captures true preference. First, for each well-defined problem, there is one simple scenario, but many uncertain ones. Thus, for example, in our mortgage scenario (Problem 3) above, the simple version consisted of a \$5,000 debt, outstanding for 3 months. The uncertain versions, on the other hand, contrasted that debt with either a \$1,000 debt outstanding for 3 months, a \$25,000 debt outstanding for 3 months, a \$25,000 debt outstanding for 1 week—and there could be many others. It is straightforward to ascertain which is a person’s preference in the simple version; but if one were to consider the uncertain version a true glimpse into a person’s preference, which one of many possible uncertain versions would it be? Consider, furthermore, the paradoxical prescriptions that result if we assume that it is the uncertain versions that yield people’s true preferences. Then, we would have to prescribe momentarily hiding known information from decision makers, because pursuing the missing information is presumably what makes for the right decisions, as opposed to simply having the information directly available. (Most people, incidentally, share the intuition that the simple version characterizes “true” preference. For example, 28 participants were presented with a version of Problem 2 in which an admissions officer decides to accept an applicant whose B average is known, but then, when handling the same folder on a separate occasion, chooses to reject the applicant after having waited to find out about the B, and not A, average. All participants thought this was not a reasonable pattern, and all but 1 participant thought that the choice made in the simple, as opposed to the uncertain, version reflected the admissions officer’s “true” preference.)

Descriptively, of course, which of a person’s conflicting deci-

sions is more appropriate is a subtle matter that can change from one situation to another. The pursuit of missing information leads the decision maker to focus on it more than if it had been directly available. Whether this increased focus leads to a better or worse decision depends on the appropriateness of the attention given to this information when it is directly available. One can err either by overestimating or by underestimating the instrumental value of information. Relative to situations in which the available information would have been appropriately weighted, pursuing it can lead to its overweighing. Conversely, in cases in which the available information is unduly ignored, pursuing it, and consequently assigning it greater weight, may improve one’s decision. What makes for the appropriate weight of information is a complicated matter, often to be resolved by nontrivial normative considerations. What is clear, however, is that the weights assigned in the process of preference construction are typically context dependent and not chosen by the decision maker in a reliable and consistent fashion.

The pursuit of noninstrumental information and its subsequent misuse are both commonplace and compelling, and have important implications for influence and for compliance, as well as for our everyday decisions. Salespeople, for example, can set up apparent uncertainties, only to resolve them with what appears to be excellent news. Thus, a salesman may propose to go check whether the price of a car includes the attractive CD player. His efforts may lead you to infer that this information matters to the decision, and having found yourself mildly interested in the answer, the good news that the player is included ought to bring you closer to being the proud owner of a new car. Similar effects may arise in less insidious ways. Imagine that you are leaning toward Hotel A for your vacation, but you decide to call “just to see” whether or not it has an indoor pool. The disappointing news that it does not could lead you to choose Hotel B even if, prior to the call, you would have preferred Hotel A despite the lack of indoor pool. In academic circles, many have been persuaded by studies that show personal interviews to be a poor predictor of academic success. Nonetheless, there persists a tendency to invite candidates for interviews (Ross & Nisbett, 1991). However, once a candidate, with an impressive curriculum vitae and good letters of reference, has come and interviewed poorly, what is more natural than to forego the potential appointment? In this vein, many of us have had the experience of “just asking” the waiter whether, say, the salmon is good that day. Having learned that it is “absolutely wonderful,” it seems incumbent on one to order it, despite the fact that one really would have preferred the steak. To return to the opening Descartes quote, we ought whenever possible to follow the path that is probably best, rather than vascillate between options, only to find ourselves with things that we then judge to be bad. Of course, what Descartes may not have realized is that, having vascillated and chosen what we otherwise would have judged to be bad, we may then infer that it must be pretty good after all.

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