Judgment and Decision Making, Vol. 2, No. 5, December 2007, pp. 351–358

Weighing waiting: The influence of information certainty and delay penalty on waiting for noninstrumental information

Samuel M. Duncan[1*], Steven M. Wengrovitz[1], Alexandra Sedlovskaya[2], and Andrea L. Patalano[1]
[1] Department of Psychology, Wesleyan University
[2] Department of Psychology, Yale University

Abstract

People have been shown to delay decision making to wait for missing noninstrumental attribute information — information that would not have altered their decision if known at the outset — with this delay originally attributed to uncertainty obscuring one's true preference (Bastardi & Shafir, 1998). To test this account, relative to an alternative that delay arises from low confidence in one's preference (Tykocinski & Ruffle, 2003), we manipulated information certainty and the magnitude of a penalty for delay, the latter intended to reduce the influence of easily resolved sources of delay and to magnify any influence of uncertainty. Contrary to expectations, the results were largely inconsistent with the uncertainty account in that, under a low penalty, delay did not depend on information certainty; and, under a high penalty, delay rate was actually much lower when information was uncertain. To explain the latter, we propose that people use a strategy for resolving choice under uncertainty that does not require establishing a confident preference for each value of the missing information. These findings are related to others in which choice difficulty has been found to be a major source of delay.

Keywords: decision deferral, waiting, noninstrumental information, disjunction effect.

1 Introduction

For pending decisions, how much attribute information should a decision maker gather before eventually committing to a choice alternative? This is a common dilemma in that much relevant information exists in the world, yet some of it will not ultimately affect one's choice. The term *information instrumentality* refers to whether or not some attribute information could actually alter choice preference (Bastardi & Shafir, 2000); a reasonable strategy is to wait only for instrumental information. In contrast to such a strategy, however, the typical decision maker has been shown to delay choice to obtain noninstrumental information. This has been documented by Bastardi and Shafir (1998) across a wide range of decision situations including consumer choice, applicant selection, ultimatum games, and everyday contexts. For example, it was found that, when a hypothetical course was going to be taught by either a very popular instructor or a less popular one, but it was not yet known which instructor would be teaching it, the majority of individuals postponed choice. That the missing information was noninstrumental was illustrated by the fact that, when the less desirable instructor was known from the outset to be teaching the course, and no opportunity to defer was available, individuals overwhelmingly chose to enroll in the course.

Of interest here is why choice delay occurs in the context of noninstrumental information, and the research we present speaks to this important question. In particular, are individuals actually waiting for the information *per se*? Or are they waiting for other reasons? Bastardi and Shafir (2000; see also Tversky & Shafir, 1992a) proposed that individuals wait specifically to obtain noninstrumental information, and that the phenomenon emerges because information uncertainty obscures decision makers' true preference. Rather than try to resolve their preference, decision makers postpones choice in the hope that any additional information will clarify the situation; we refer to this as an *attribute uncertainty account*. Tykocinski and Ruffle (2003), in contrast, developed an alternative account, which we refer to here as a *confidence account*. By this account waiting occurs to gain not information in the face of uncertainty but rather to gain confidence in a non-ideal alternative through deliberation, which can occur even when all information is known. Consistent with their account, they found that choice delay occurred even when decision makers knew from the outset that the less desirable attribute of the favored option had already become available; in some cases, rates of deferral in the certain condition were found to be as high as those in the uncertain one. Furthermore, they found that, the less confident decision makers were in their ini-

*Address: to Andrea L. Patalano, Department Psychology, Judd Hall, Wesleyan University, 207 High Street, Middletown, CT 06459; email: apatalano@wesleyan.edu

tial preference, as well as the longer the stated delay period (from a day to a week), the more likely they were to postpone choice.

There is currently limited and mixed evidence regarding the influence of information uncertainty as a source of choice delay above and beyond that of low confidence. Because only Tykocinski and Ruffle (2003) used a control condition that could discriminate between these accounts, the extent to which attribute uncertainty underlies delay behavior across a range of contexts remains largely unclear. To expand the breadth of contexts in which these sources of delay are explored, and to further evaluate evidence for the attribute uncertainty account relative to the low confidence account, the present research considers delay behavior in situations in which there is some external reason not to postpone choice relative to those in which is little reason not to delay. The introduction of a penalty for delay is an ecologically important one in that such penalties abound in everyday experience (e.g., hold fees on consumer purchases, charges for running internet searches for information, the risk of a course filling all available seats), and a full account of delay behavior should be able to accommodate data in the context of such penalties. More central to the present work, the context is methodologically interesting in that the desire to avoid delay penalties can motivate people to make more serious attempts at resolving choice difficulties than they might otherwise do. As a result, not only does the introduction of a penalty manipulation have the potential to extend the noninstrumental information effect to a high penalty context, but it also has the potential to dissociate these two sources of delay. In particular, a large penalty might produce greater decreases in confidence-related delay than in attribute uncertainty because confidence-related delay is arguably easier to resolve under pressure (because the preference is already known) than is delay driven by attribute uncertainty.

We conducted two experiments of delay behavior in the context of noninstrumental information, manipulating both the presence of a significant penalty for delay and information certainty. In Experiment 1, a course registration scenario, the penalty manipulation involved risk: participants were informed either that there was a high risk of loss of a course alternative over time or that the risk was minimal. In Experiment 2, a consumer purchase scenario, the penalty manipulation instead involved cost: participants were informed of either a high or a negligible cost to put an item on hold. In both experiments, in an uncertain information condition, the value of the noninstrumental attribute information would not be known until the next day; in a certain information condition, it was known to have the least desirable value. As in Tykocinski and Ruffle (2003), we reasoned that delay in the certain condition is consistent with a confidence source of delay, although any *additional* delay in an uncertain condition can reasonably be attributed to attribute uncertainty; we expected evidence of both sources for each level of penalty. Assuming such evidence of two sources of delay, we further predicted that a penalty manipulation would reveal a dissociation between strategies, namely, a disproportionate decrease in delay in the certain condition, where low confidence is the only source of delay, on the grounds that it is might be easier to resolve choice difficulty when at least a tentative preference has been identified than when none has been selected.

2 Experiment 1: Deferral-related risk in a course selection task

This experiment provides data towards assessing the relative contributions of low confidence and information uncertainty motivations for delay behavior, in the context of noninstrumental information and a risk associated with delay. To establish information noninstrumentality, a decision scenario was adopted from Tykocinski and Ruffle (2003; Exp. 1) and was given to 46 undergraduate volunteers. They were instructed to imagine that they wished to register for a class in their major, on a highly interesting topic, usually taught by a popular professor; however, the professor would be on leave, and a less popular one would be teaching instead. A full 89% still chose to register, confirming that the information was noninstrumental. Information certainty was manipulated in the scenario by stating either that the instructor information would not be available until the next day, or that the less popular professor would be teaching the course. Risk was manipulated by stating either that there was 1 seat left in the course, implying that waiting could result in course unavailability, or that there were 6 seats left (a number considered very large by the population of Wesleyan University students from which our samples were drawn). Our focus was on the pattern of choice deferral in the uncertain relative to the certain condition for each level of risk, with the expectation that, under a low penalty, choice delay would be greater in the uncertain than the certain condition and that, under a high penalty, delay would disproportionately decrease in the certain condition, illustrating both use of two strategies and greater difficulty resolving preference under attribute uncertainty.

2.1 Method

Participants. One hundred sixty (89 males and 71 females) undergraduates at Wesleyan University participated in this study as a part of an Introductory Psychology course requirement or in exchange for monetary compensation.

https://doi.org/10.1017/S1930297500000498 Published online by Cambridge University Press

Design and materials. A 2 (certainty: uncertain/certain) x 2 (risk: low/high) between-subjects design was used to create 4 different versions of the course registration scenario. The uncertain (information) scenario (with the risk manipulation indicated by brackets) was:

> **Uncertain [Low Risk / High Risk] scenario:**
>
> 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. As of now, there [are six seats / is one seat] left in the class, and not all students have yet registered.

The certain version of this scenario was created by replacing the second and third sentences with: "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."

Procedure. Each participant read one version of the hypothetical course registration scenario in a booklet. The participant chose either to enroll in the course, to decline, or to wait until the next day to decide (at which point, in the uncertain versions, he or shee would know the actual course instructor), by circling the corresponding response in the booklet. Because the interest here was in deferral behavior, participants who deferred did not later make a final decision (as they did in Tykocinski & Ruffle, 2003). The experiment ended after this choice was made. The entire task took approximately 5 minutes to complete and was followed by unrelated cognitive tasks.

2.2 Results

The percentages of participants deciding to choose (either to enroll or to decline) versus to delay choice in each certainty and risk condition are shown in Table 1. Under low risk, a greater number of participants deferred choice in the uncertain relative to the certain condition, but the difference was not statistically reliable (χ^2 (n = 80) = 1.88, p = .171).[1] Under high risk, in contrast, the opposite pattern emerged; namely, many more people deferred in the certain relative to the uncertain condition (χ^2 (n = 80) = 8.89, p = .003). This is due to the fact that the rate of choice delay with certain information decreased only slightly in response to an increase in risk (χ^2 (n = 80) = 1.61, p = .204), while the rate of choice delay with uncertain information decreased to 0% delay under a high risk (χ^2 (n = 80) = 24.92, p < .001). This pattern is supported by a single logistic regression. The best fitting model for predicting binary choice (χ^2 (2, N = 160) = 25.59, p < .001) includes risk (β = 3.28, SE = 1.04, Wald = 10.01; p = .002) and a risk by uncertainty interaction (β = -2.30, SE = 1.09, Wald = 4.49; p = .034). Also, in each condition, 80 — 100% of participants who did not delay choice enrolled in the course, indicating that differences in preference are unlikely to account for delay differences.

2.3 Discussion

The pattern of results provides no evidence for uncertainty-motivated delay and is partially consistent with the existing confidence-motivated account. Recall that the influence of low confidence is suggested by rate of delay in a certain condition, while the influence of attribute uncertainty is suggested by rate of delay in an uncertain condition above and beyond that in a certain condition. In the present study, under a low penalty, a substantial number of individuals delayed in the certain condition, consistent with a confidence account. The number was not reliably higher in the uncertain condition, suggesting, at most, a minimal contribution of information uncertainty to delay behavior. Under a high penalty, a substantial number of individuals delayed in the certain condition, again consistent with a confidence account. And, the number of individuals delaying was actually considerably higher in the certain than in the uncertain condition, again inconsistent with an uncertainty motivation for delay. If the decrease in the uncertain condition had instead occurred in both certainty conditions, it could be argued that penalty simply eliminates delay (regardless of what produced it in the first place) but, because the decrease emerged only under uncertainty, this argument cannot explain the results.

What is counterintuitive and not obviously predicted by either account in its current form is that, under a high penalty, the rate of delay in the certain condition was far greater than that in the uncertain condition. If the choice that must be made in the certain condition is a subset of the choice paths that must be resolved under attribute uncertainty, how can one make a choice under uncertainty without being able to make it under certainty? It seems unlikely that uncertainty in some way *increases* the ease with one can identify a preference. We propose that, when motivated by a high penalty, individuals implement a choice strategy that does not require having to resolve their confidence issues. Instead, they consider the likelihood of their preferring a particular alternative for a given choice path weighted by the likelihood of that choice path actually emerging. When the attribute is uncertain, this

[1] Fisher-tests confirmed the results of the χ^2 tests when cells contained fewer than 5 observations, in both Experiments 1 and 2.

https://doi.org/10.1017/S1930297500000498 Published online by Cambridge University Press

Table 1: Percent deferring versus deciding (to enroll or decline) as a function of information certainty and risk associated with delay in Experiment 1.

	Percent selecting option		
	Defer	Choose (Enroll/Decline)	
High Risk Condition			
Certain Information	21	79 (84/16)	$p < .010$
Uncertain Information	0	100 (97/3)	
Low Risk Condition			
Certain Information	32	68 (78/22)	$p > .100$
Uncertain Information	48	52 (97/3)	

Note: 40 participants in each of 4 groups. p-values indicate χ^2results.

results in one of the alternatives emerging as a far better choice; in contrast, when the attribute is certain to have the less desirable value, the alternatives are still quite similar and choice remains difficult.

To be more concrete, with an uncertainty condition and a high penalty, a decision maker might reason that he or she would definitely prefer to take the course if the popular professor were teaching it, and *might* prefer to take it if the less popular professor were teaching it. Without having to overcome the lack of confidence in regard to the second choice path, the decision maker can conclude that the likelihood of being most satisfied with his or her choice is greatest if the option to enroll in the course if chosen. When the information is instead known from the outset to be the less desirable attribute, all the decision maker can say is that he or she might prefer to take the course with the less popular professor teaching it. The likelihood of being satisfied with choosing to enroll versus to decline is still nearly even and so the individual is unable to establish any reason for choosing one alternative over the other and cannot make a choice, even under a high penalty.

In sum, this experiment provides evidence that is consistent with a confidence-based source of delay, as indicated by delay under certainty under both low and high penalties. There is no evidence that delay results from attribute uncertainty, as evidenced by no delay in the uncertain conditions above and beyond the delay in the certain conditions, under either a low or a high penalty. Counter to our initial prediction, there is also no evidence that individuals set aside confidence and simply choose the tentatively preferred alternative when making a choice under a high penalty. Rather, they appear to develop a strategy that facilitates choice under uncertainty by taking into account both their confidence in a preference given a choice path and the likelihood of that choice path occurring. While the high-penalty results and proposed strategy were not directly predicted by the existing confidence approach, we suggest that they are broadly consistent with it in that the strategy simply integrates confidence in one's preference in any specific situation with the likelihood of that situation actually arising. Before we discuss these findings more generally, we present a second study conducted to replicate and extend the findings of Experiment 1 to a consumer purchase domain and to a cost-related penalty and to provide further support for these conclusions.

3 Experiment 2: Deferral-related costs in a consumer purchase task

This experiment provides data towards assessing the relative contributions of low confidence and attribute uncertainty motivations for delay behavior, in the context of noninstrumental information and a cost associated with delay. To establish noninstrumental information, a decision scenario was adapted from Bastardi and Shafir (1998, Problem 4) and was given to 50 undergraduate volunteers. They were instructed to imagine that they wished to purchase a compact-disc (CD) player, on sale, discounted by 50% to \$120. However, they still owed \$90 for an amplifier they recently had repaired, because it was not covered by a warranty, and thus they had outstanding expenses. A full 87% of participants chose to purchase the player anyway, confirming that the information was noninstrumental in this context. Information certainty was manipulated in the scenario by stating either that the warranty's coverage of the \$90 would not be available until the next day, or that it was known that the warranty would not cover the \$90. Cost was manipulated by stating either that there was a \$5 nonrefundable fee for

https://doi.org/10.1017/S1930297500000498 Published online by Cambridge University Press

putting the CD player on hold for a day or that there was a $25 nonrefundable fee. As in Experiment 1, our focus was on the pattern of choice deferral in the uncertain relative to the certain condition for each level of cost. We expected to replicate the results of Experiment 1 in this new context.

3.1 Method

Participants. One hundred sixty (94 males and 66 females) undergraduates at Wesleyan University participated in this study in exchange for either monetary compensation or entry into a gift certificate raffle.

Design and materials. A 2 (certainty: uncertain/certain) x 2 (cost: low/high) between-subjects design was used to create 4 different versions of the CD purchase scenario. The uncertain scenario (with the risk manipulation indicated by brackets) was:

> **Uncertain [Low Cost / High Cost] scenario:**
>
> For some time, you have considered adding a compact disc (CD) player to your stereo system. You now see an ad for a 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. The store is running low on CD players, and will run out today, but offers to hold one until tomorrow for you if you pay a [$5 fee / $25 fee].

The certain version was created by replacing the third and fourth sentences with: "Recently, however, your amplifier broke and the repair shop has told you that you must pay $90 for repairs."

Procedure. Each participant read one version of the hypothetical purchase scenario in a booklet. Participants were asked to choose either to purchase the CD player now, not purchase it at all, or to wait until the next day to decide, by circling the corresponding response in the booklet (at which point, in the uncertain versions, they would know the actual situation with the amplifier). As in Experiment 1, because our interest was in the choice to defer, and not the final decision, the experiment ended after that choice, and participants who deferred were not later asked to make a final decision. The entire task took approximately 5 minutes to complete and was followed by unrelated cognitive tasks.

3.2 Results

The percentages of participants who decided to choose (either to purchase or to decline) versus to delay choice in each certainty and cost condition are shown in Table 2. Under low cost, more participants delayed in the uncertain relative to the certain condition, but the difference was not statistically reliable (χ^2 (n = 80) = 0.47, p = .491). Under high cost, in contrast, the opposite pattern emerged; namely, many more people deferred in the certain relative to the uncertain condition (χ^2 (n = 80) = 9.80, p = .002). This is due to the fact that the rate of choice delay with certain information decreased only slightly in response to an increase in cost (χ^2 (n = 80) = 1.98, p = .160), while the rate of choice delay with uncertain information dramatically decreased to just 3% delay under a high cost (χ^2 (n = 80) = 13.87, p < .001). This pattern is supported by a single logistic regression. The best fitting model for predicting binary choice (χ^2 (2, N = 160) = 23.02, p < .001) includes risk (β = 3.21, SE = 1.04, Wald = 9.53; p = .002) and a risk by uncertainty interaction (β = -2.69, SE = 1.07, Wald = 6.31; p = .012). Also, in each condition, 80 — 100% of participants who did not delay choice purchased the CD player, indicating that differences in preference are unlikely to account for delay differences. These results replicate the pattern of findings of Experiment 1.

3.3 Discussion

As in Experiment 1, the pattern of results provides no evidence for uncertainty-motivated delay but is consistent with the confidence-motivated account when the latter is combined with our earlier proposed explanation for reasoning under a high penalty. In the present study, under a low penalty, a substantial number of individuals delayed in the certain condition, consistent with a low confidence account. The number was minimally lower in the uncertain condition, providing no evidence of a contribution of information uncertainty to delay. Under a high penalty, a substantial number of individuals delayed in the certain condition, again consistent with a low confidence account. And, the number of individuals delaying was actually considerably higher in the certain than in the uncertain condition, inconsistent with an uncertainty motivation for delay. Under a high penalty, the rate of delay in the certain condition was far more than that in the uncertain condition, which can again be explained by the possibility that individuals consider the likelihood of their preferring a particular alternative for a given choice path weighted by the likelihood of that choice path actually occurring. When the attribute is uncertain, this results in one of the alternatives emerging as a far better choice; in contrast, when the attribute is certain to have the less desirable value, the alternatives are still quite similar and choice remains difficult.

https://doi.org/10.1017/S1930297500000498 Published online by Cambridge University Press

Table 2: Percent deferring versus deciding (to purchase or decline) as a function of information certainty and cost associated with delay in Experiment 2.

	Percent selecting option		
	Defer	Choose (Purchase/Decline)	
High Cost Condition			
Certain Information	27	73 (100/0)	$p < .010$
Uncertain Information	3	97 (97/3)	
Low Cost Condition			
Certain Information	43	57 (100/0)	$p > .100$
Uncertain Information	35	65 (73/27)	

Note: 40 participants in each of 4 groups. p-values indicate χ^2results.

4 General discussion

The starting point for our research was that there was limited and largely mixed evidence regarding the influence of attribute uncertainty as a source of choice delay above and beyond that of low confidence in one's preference. The present work failed to find any further evidence of an influence of attribute uncertainty, despite use of a manipulation that might have illuminated this effect by reducing easy-to-resolve sources of delay under a high penalty. Not only was there no greater delay when information was uncertain relative to when it was known but, in response to a high penalty, the results were the *opposite* of what was predicted: the level of delay decreased only when information was uncertain. Building on the work of Tykocinski and Ruffle (2003), our results are consistent with a confidence account of delay whereby individuals delay choice not because they are necessarily hampered by information uncertainty in forming a preference but, rather, because they lack confidence in their preference for at least one of the choice paths simply because the choice is a difficult one. Ultimately, by both accounts, delay is due to an unwillingness to identify or to commit to a preference and the two accounts differ in whether uncertainty need be posited as the source of this difficulty; the results here add to existing evidence that uncertainty might be unnecessary to explain the data.

Lack of confidence in a preference can serve as a mediating variable in predicting delay behavior, but this account alone does not address *why* such a lack of confidence arises. The manipulation of attribute certainty here suggests only that uncertainty is not the main contributor to low confidence. Many other variables, however, have been found to influence delay that might be relevant here (see Anderson, 2003, for a review), such as the similarity in attractiveness of alternatives (Dhar, 1997), the need to make tradeoffs (Tversky & Shafir, 1992b), or difficulty establishing a reason for preferring one alternative over another (Shafir, Simonson, & Tversky, 1993). Dhar (1997), in particular, proposed a compelling explanation for choice delay based on preference uncertainty, whereby people are sometimes unsure which alternative they prefer (because the alternatives are similar in attractiveness) but, because people believe that they do actually have a preference, they are unwilling to choose arbitrarily and so defer choice. The present situation is different from many past ones in that, here, there is some external reason to believe that people *do* have initial preferences but are just unwilling to act on them. An account such as preference uncertainty could easily be extended to accommodate this by making explicit how preference uncertainty might arise even when an initial preference exists. For example, as long as one feels that there is a substantial margin of error surrounding his or her estimates of the attractiveness of each choice alternative and that the estimates are similar to one another, then even an initial preference might be seen by the decision maker as a poor indicator of a stable preference over the long term and thus little reason for committing to a choice alternative.

What is most novel and surprising in the present work is that waiting occurs in these decision situations, in which people appear to have initial preferences, even in the face of large penalties for waiting. Rather than confidence serving as a measure of reasonable caution against acting on a preference impulsively, low confidence appears to produce almost rigid resistance to choice commitment. The present findings support existing accounts of motivation that claim that it is difficult for individuals to act in the face of competing wishes or preferences (Kuhl, 1986; Feather, 1990), and they suggest that confidence, rather than being epiphenomenal, might be an

https://doi.org/10.1017/S1930297500000498 Published online by Cambridge University Press

important component of people's mental representations of their decision problems. This argument is consistent with our account that, when people do make choices under a high penalty, it is because they use confidence information to reason probabilistically about the likelihood of being satisfied with a choice alternative that possesses a particular attribute value, weighted by the likelihood of that attribute value emerging. In other words, information about confidence might be assessed quantitatively and integrated into strategies for reasoning about choice. We imagine that the confidence variable will become increasingly useful as comprehensive models of human choice, one's that can accommodate delay behavior, are developed.

The phenomenon of waiting for missing attribute information has been previously framed as an example of the broader *disjunction effect*, by which people wait to make a decision until the outcome of some event — a state of the world, the action of an opponent, the result of a gamble — is known, even though the outcome of the event will not alter choice (Croson, 1999; Tversky & Shafir, 1992a; but see Bagassi & Macchi, 2006; Kuhberger, Komunska, & Perner, 2001). We do *not* mean to claim that other types of disjunction effects — ones that do not involve missing attributes — might also be better explained with a confidence account. Rather, we suggest that one distinction between the other contexts and the present one is how well- versus ill-defined the decision problem is in light of the missing information. Problems with missing attribute values are largely well defined — that is, relevant alternatives, attributes, and personal values are relatively clear — and the presence of a missing value simply introduces a small gap in knowledge. Other previously studied contexts, such as when one must decide whether to go on a vacation before knowing whether major exam has been passed or failed (Tversky & Shafir, 1992a), are arguably more ill defined in that relevant attributes and personal values are unclear. Uncertainty might complicate formation of the decision problem representation in the first place rather than choice once such a representation has been established.

Finally, we note a number of limitations of the present research. First, the experiments are limited by the content of the decisions scenarios, the use of hypothetical situations, and the accept-versus-reject nature of the choice alternatives. It is important to consider whether similar findings emerge when multiple substantive alternatives are available (e.g., two possible courses). Second, the delay rates here were lower than those seen in past work so it is possible that something about the participants themselves or the presence of even a minimal penalty for delay was an important difference. Third, our interpretation of the results using a confidence account is limited by the fact that we did not set out to measure or manipulate confidence; further direct evidence in support of this explanation is needed. Nonetheless, our results support the conclusions that delay in the context of missing information does not appear to be the result of attribute uncertainty; that delay is better explained by low confidence in one's preference in regard to the less desirable choice path; that delay can be quite resistant to penalties for delay; and that a probabilistic reasoning strategy, rather than categorical assessment of information instrumentality, might be used to overcome delay under uncertainty.

References

Anderson, C. J. (2003). The psychology of doing nothing: Forms of decision avoidance result from reason and emotion. *Psychological Bulletin, 129,* 139–167.

Bagassi, M. & Macchi, L. (2006). Pragmatic approach to decision making under uncertainty: The case of the disjunction effect. *Thinking & Reasoning, 12,* 329–350.

Bastardi, A., & Shafir, E. (1998). On the pursuit and misuse of useless information. *Journal of Personality and Social Psychology, 75,* 19–32.

Bastardi, A., & Shafir, E. (2000). Nonconsequential reasoning and its consequences. *Current Directions in Psychological Science, 9*, 216–219.

Croson, R. T. A. (1999). The disjunction effect and reason-based choice in games. *Organizational Behavior and Human Decision Processes, 80,* 118–133.

Dhar, R. (1997). Consumer preference for a no-choice option. *Journal of Consumer Research, 24,* 215–231.

Feather, N. T. (1990). Bridging the gap between values and action; recent applications of expectancy value model. In E. T. Higgins & R. M. Sorrentino (Eds.), *Handbook of Motivation and Cognition: Foundation of Social Behavior* (Vol. 2, pp. 151–192). New York: Guilford Press.

Kuhl, J. (1986). Motivation and information processing: A new look at decision making, dynamic change, and action control. In R. M. Sorrentino & E. T. Higgins (Eds.), *Handbook of Motivation and Cognition: Foundations of Social Behaviour* (Vol. 1, pp. 404–434). New York: Guilford Press.

Kuhberger, A., Komunska, D., & Perner, J. (2001). The disjunction effect: Does it exist for two-step gambles. *Organizational Behavior and Human Decision Processes, 85,* 250–264.

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

Tversky. A., & Shafir, E. (1992a). The disjunction effect in choice under uncertainty. *Psychological Science, 3,* 305–309.

Tversky. A., & Shafir, E. (1992b). Choice under conflict:

https://doi.org/10.1017/S1930297500000498 Published online by Cambridge University Press

The dynamics of deferred decision. *Psychological Science, 3,* 358–361.

Tykocinski, O. E., & Ruffle, B. J. (2003). Reasonable reasons for waiting. *Journal of Behavioral Decision Making, 16,* 147–157.