Experimental Testing of Intrinsic Preferences for NonInstrumental Information

By Kfir Eliaz and Andrew Schotter*

The classical model of decision making under uncertainty assumes that decision makers care only about final outcomes. The decision makers' beliefs enter the model only as a means of weighting the possible material outcomes, yet they do not generate an intrinsic value by themselves. Put differently, they are not part of the domain over which preferences are defined. Consequently, psychological effects of beliefs such as anxiety, suspense, and curiosity are left out of the classical model. A growing trend in the literature argues that the inclusion of beliefs in the domain of preferences accommodates an even richer set of behaviors and allows us to address questions that are left unanswered by the classical model.[1]

One particular question that has received much attention is: why do people sometimes avoid information, which is instrumental in making their decisions? For example, why do people who may be at risk of exposure to HIV, the virus that causes AIDS, avoid being tested when such tests are available at no cost (Andrew Caplin and Eliaz 2003)? Such information avoidance is explained by positing that people derive an intrinsic disutility from anticipating a bad outcome. Hence, when deciding whether to obtain information, individuals not only consider the "material benefit" they could gain from updating their beliefs, but they also consider the implied "lottery" on their posterior beliefs.

This explanation implies the converse, that decision makers may also seek noninstrumental information, i.e., information that will not change their ultimate decision but will allow them to refine their priors. This information could be valuable if it reduces the anxiety or suspense of the decision maker as he or she waits for uncertainty to be resolved.

In this paper, we suggest an experimental approach to studying these anomalous attitudes toward information. The advantage of an experimental approach is that it allows us to control for the noninstrumentality of information, which is often difficult to determine in real life. To illustrate this, we present an example of an experimental design that tests individuals' motives for acquiring information about an irreversible decision that has been made. Specifically, we test the following two hypotheses: (a) when there is a lag between the time a decision has been made and the time all uncertainty about it is resolved, decision makers are willing to pay to refine their priors over the residual uncertainty; and (b) after all uncertainty has been resolved, and the outcome has been revealed, individuals are willing to pay for information on the process that determined that outcome.

The first hypothesis is motivated by the idea, first suggested by David M. Kreps and Evan L. Porteus (1978), that individuals may derive an intrinsic value from altering their prior probabilities while they wait for uncertainty to be resolved, either because they want to cut down on the anxiety they face or increase their positive anticipatory feelings. Our second hypothesis is motivated by the idea that individuals may feel better about not having achieved a positive outcome (change in their status quo utility) if they knew that their chances of obtaining the improvement were low to begin with.

The experimental exercise we present here builds on our previous work (Eliaz and Schotter 2006, henceforth ES). In that paper, we presented experimental evidence for a "confidence effect," the desire of individuals to know the posterior probability that a decision they are about to make is optimal ex post, even when this information has no effect on their decision. The experimental design of ES is simple and

* Eliaz: Department of Economics, New York University, 269 Mercer St., New York, NY 10003 (e-mail: kfir.eliaz@nyu.edu); Schotter: Department of Economics, New York University, 269 Mercer St., New York, NY 10003 (e-mail: andrew.schotter@nyu.edu). We are most grateful to Andrew Caplin for helpful discussions on this topic.

[1] E.g., George A. Akerlof and William T. Dickens (1982), Andrew Caplin and John Leahy (2001, 2004), Markus Brunnermeier and Jonathan Parker (2005), Eliaz and Ran Spiegler (2006).

does not require subjects to understand Bayesian updating or engage in strategic thinking to realize that the information offered is noninstrumental for the decision they face. This design also accommodates different questions on the demand for noninstrumental information by either varying the timing in which subjects are offered to pay for information or the timing in which the outcome is revealed. The next section describes the basic experimental design and the different variations that were tested.

I. The Experimental Design

The instructions described a situation in which \$20 was to be placed in one of two boxes, labeled *A* and *B*, and subjects were to guess which box contained the money. The process determining where the money is placed is as follows. Imagine two urns, *H* and *L*, each containing 100 balls, where each ball is labeled either *A* or *B*. Urn *L* has $l > 50$ balls labeled *A* and $100 - l$ balls labeled *B*, while Urn *H* has $h > l$ balls labeled *A* and $100 - h$ balls labeled *B*. We select one of the urns at random and draw a ball from that urn. If the ball drawn is labeled *A*, we place the \$20 in box *A*. Otherwise, we place it in *B*. Note that no matter which urn is chosen, it is more likely that the \$20 is in Box *A*.

All subjects were recruited from the undergraduate population at New York University. They were paid a show-up fee of \$3 and were also given an initial endowment of \$4, from which they could pay the fees described in the treatments below.

The two treatments of interest in ES are the following. In Treatment 1, subjects were asked, *before guessing a box*, if they were willing to pay a fee to learn which urn would be used to place the \$20 in 15 situations. The situations differed in the composition of the two urns (i.e., in the values of *h* and *l*) and in the size of the fee (which could either be \$0.50, \$2 or \$4). ES showed that the proportion of subjects who paid for this information was at least 13 percent in all the situations, and rose to 78 percent when $h = 100$, $l = 60$, and the fee was \$0.50. Moreover, the proportion of subjects who paid for the information was increasing in $h - l$ and decreasing in the fee (although some subjects were willing to pay \$4 for the information).

Subjects in Treatment 3 of ES were given the opportunity to pay for information on the urn *only after* they had guessed a box. Whether or not they agreed to pay, the outcome of the experiment was revealed to them shortly thereafter. This treatment consisted of three sessions in which 16 subjects, in each session, faced only one situation. The three situations that were used were: (a) $h = 100, l = 60$, \$0.50 fee; (b) $h = 100, l = 51$, \$0.50 fee; and (c) $h = 100$, $l = 51$, \$2 fee. The proportion of subjects who paid for the information in this treatment was substantially lower than in the first treatment. In fact, for situation (a) above, 78 percent of subjects were willing to pay the fee in Treatment 1, while only 6 percent of subjects in Treatment 3 were willing to do so.

The experiment we report on adds two new treatments to those described above. The first treatment, Treatment 4, is identical to Treatment 3 except for one variation, the final outcome was revealed *three weeks after* the date of the experiment, regardless of whether a subject guessed correctly.[2] Hence, for three weeks subjects were in a state of suspense as to whether they had won \$20. They could diminish this uncertainty by paying a fee to discover the urn used to place the \$20. For this new treatment we recruited 33 subjects who faced the situation in which 78 percent of subjects chose to pay the fee in Treatment 1 of ES, i.e., $h = 100$, $l = 60$, and the fee was \$0.50. Comparisons of the behavior of subjects in Treatments 3 and 4 can be used to test our first hypothesis.

In the second new treatment, Treatment 5, the opportunity to pay for information about the urn was given to subjects only after they had guessed a box and were told whether they guessed correctly. As mentioned earlier, the idea was to test whether subjects who did not win would want to know their actual odds of winning. In order to ensure that subjects would not be able to infer these odds from the outcome, we had subjects face a situation in which $h = 80$, $l = 51$, and the fee was \$0.50. The behavior of subjects in this treatment can be used to test our second hypothesis.

II. Results

The proportion of subjects who paid the fee in Treatments 1 and 3 was 78 percent and 6 percent,

[2] Subjects were instructed to leave a self-addressed envelope, which we then used to mail them either \$20 or a note saying that their guess was wrong. (At the end of the experiment all subjects were paid whatever balance was left from the initial \$7 they received.)

respectively. This demonstrates that the willingness to pay for information on the urn increases dramatically when the information is offered *before* the guess is made. A test of proportions easily rejects the hypothesis that the proportion of subjects paying the fee is identical across these two treatments (-4.426, $p < 0.0000$). Hence, when information, which is not instrumental for a given decision, is offered shortly before all uncertainty is resolved, far more subjects are willing to pay for it before that decision is made than after it.

A substantial rise in the willingness to pay also occurs when we introduce a delay in the timing in which the outcome is revealed, however. While only 6 percent of the subjects pay the fee in Treatment 3, where the outcome is revealed at the end of the experiment, 18 percent of the subjects paid the fee in Treatment 4, where the outcome was revealed three weeks after the experiment was over. This supports our first hypothesis. Although the difference in proportions is significant only at the 13 percent level, this result suggests that the timing in which uncertainty is resolved might be important, and we might have found significant results had we used a larger prize or allowed for a longer delay.

Finally, only a small proportion of subjects in Treatment 5 (2 out of 16) were willing to pay \$0.50 to learn ex post their odds of winning. These were subjects who actually guessed correctly, however. This may be explained by an income effect, whereby subjects who earned \$20 were willing to pay \$0.50 to satisfy their curiosity and learn their odds of winning, whereas those who did not win were unwilling to spend their initial endowment. Consequently, we obtain no evidence in favor of our second hypothesis.

Before concluding, it is important to note that we found little or no evidence that our subjects did not realize that the information they were purchasing was, in fact, instrumental since we saw almost no people choosing box B.

III. Concluding Remarks

This paper is a small piece in a larger program that aims to investigate anomalous attitudes toward information in an attempt to derive behavioral implications of preferences over beliefs. Here, we have focused on the demand for noninstrumental information that may arise from three possible sources: a desire to feel confident when making a decision, a preference for early resolution of uncertainty, and a desire to know ex post what were the odds one faced. While we obtained strong evidence in favor of the first source, we obtained only weak evidence in favor of the second source and no evidence in favor of the third source.

We believe that the need to feel confident about one's decision may help explain the tendency of physicians to overprescribe diagnostic tests that are unlikely to change their diagnoses, but merely serve to make them "more sure" of their recommendations (see the medical references in ES). Further, we expect this effect to be most salient when a decision maker acts as a fiduciary for another person or a principal. In these cases, the agent may be willing to accept risky lotteries over his posterior belief so that he would be able to defend his decisions if they were to turn sour, and he had to explain why he did what he did. Experiments aimed at studying this possible effect of "justifiability concerns" are likely to be a fruitful area of investigation.

Another promising direction for future research would be to study the tendency of individuals to spend more time in search of the best price for some good after they have already purchased that good. In many cases, this tendency may be viewed as another example of a demand for noninstrumental information, as some of the goods for which this ex post search is observed are durable goods (e.g., real estate or cars), which are bought very infrequently. Such ex post search for information is unlikely to be instrumental (used for a future purchase), but may be caused by a confirmatory bias in which individuals derive an intrinsic benefit from obtaining evidence that reinforces their prior belief that a particular state of nature is more likely than another (e.g., that there is no retailer that offers the good they bought at a lower price).[3]

REFERENCES

Akerlof, George A., and William T. Dickens. 1982. "The Economic Consequences of Cognitive Dissonance." *American Economic Review*, 72(3): 307–19.

[3] See Leeat Yariv (2005) and the references therein.

Brunnermeier, Markus K., and Jonathan A. Parker. 2005. "Optimal Expectations." *American Economic Review*, 95(4): 1092–1118.

Caplin, Andrew, and Kfir Eliaz. 2003. "AIDS Policy and Psychology: A Mechanism-Design Approach." *RAND Journal of Economics*, 34(4): 631–46.

Caplin, Andrew, and John Leahy. 2001. "Psychological Expected Utility Theory and Anticipatory Feelings." *Quarterly Journal of Economics*, 116(1): 55–79.

Caplin, Andrew, and John Leahy. 2004. "The Supply of Information by a Concerned Expert." *Economic Journal*, 114(497): 487–505.

Eliaz, Kfir, and Andrew Schotter. 2006. "Paying for Confidence: An Experimental Study of Preferences over Beliefs." Unpublished.

Eliaz, Kfir, and Ran Spiegler. 2006. "Can Anticipatory Feelings Explain Anomalous Choices of Information Sources?" *Games and Economic Behavior*, 56(1): 87–104.

Kreps, David M., and Evan L. Porteus. 1978. "Temporal Resolution of Uncertainty and Dynamic Choice Theory." *Econometrica*, 46(1): 185–200.

Yariv, Leeat. 2005. "I'll See It When I Believe It — a Simple Model of Cognitive Consistency." Unpublished.