Empirical Economics (1996) 21:617–632

An Experimental Note on the Allais Paradox and Monetary Incentives

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Abstract: We test whether violations of expected utility theory in an Allais-paradox environment are sensitive to monetary incentives. Like Harrison (1994), we find that violations are significantly reduced when lotteries are real rather than hypothetical.

JEL-Classification System-Numbers: C91, D81

I Introduction

Pronouncements of the passing of expected utility theory are premature, Harrison (1994) proclaims in a recent article in this journal. He argues that the putative demise of expected utility theory rests largely on experiments that fail the requisite conditions of saliency and dominance. Saliency requires that experimental rewards be systematically related to choices, while dominance demands that rewards outweigh other motivations that might arise from subjective costs or benefits of participation (see Smith (1982)). Harrison reviews a number of influential experiments that involve the Allais paradox, preference reversal, prospect theory, and Bayes rule. He maintains that these experiments fail saliency and/or dominance, because the rewards are hypothetical, fixed, or insufficiently sensitive to alternative choices. Based on this critique and several new experiments of his own, Harrison concludes that expected utility theory is still alive and well.

The question raised by Harrison's critique is whether monetary incentives matter in lottery-choice experiments. In an extensive survey of individual choice experiments, Camerer (1995, p. 634) reports that Harrison's Allais-paradox experiment provides "the only evidence that actually playing a gamble substantially reduce[s] the rate of EU violations." A modest but appropriate response

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0377-7332/96/4/617-632 $2.50

to Harrison's critique then is to explore whether his new evidence on the Allais paradox is robust. Accordingly, in this paper we test whether violations of expected utility are significantly diminished in an Allais-type environment when payoffs are real rather than hypothetical.[2]

II Background

To construct an Allais environment, assume three monetary prizes with fixed values $x_1 < x_2 < x_3$. Alternative lotteries can be constructed by varying the corresponding probabilities p_1, p_2, and p_3. The resulting lotteries take the generic form $P \equiv (p_1 \cdot x_1 + p_2 \cdot x_2 + p_3 \cdot x_3) \equiv (p_1, p_2, p_3)$. Since the probabilities add to one and prizes are fixed, alternative lotteries are defined by values of p_1 and p_3 and can be plotted on a two-dimensional probability triangle. Under expected utility theory, indifference curves defined on the triangle are parallel straight lines, with steeper indifference curves corresponding to greater risk aversion, and with increasing preference to the northwest (see Machina (1987)).

An Allais environment is completed by specifying a suitable combination of lottery-choice pairs, say *A* vs. *A** and *B* vs. *B**, as illustrated in Figure 1. Note that each lottery pair forms a chord, and that the two chords are parallel. Suppose subjects are required to choose their preferred lottery in each pair. Then four choice patterns are possible: *AB*, *A*B**, *AB**, and *A*B*. Assume subjects are expected-utility maximizers. If they are sufficiently risk averse (with indifference curves steeper than the chords), they will choose pattern *AB*; otherwise they will choose *A*B** (assuming no indifference). The other two patterns *AB** and *A*B* are inconsistent with parallel indifference curves. Hence choices of either of these patterns violate expected utility theory and are referred to as the Allais paradox, or more generally, the common consequence effect.

In Harrison's (1994) experiment, the particular environment consisted of fixed prizes \$0, \$5, and \$20, and lottery pairs $A \equiv (0, 1, 0)$ vs. $A^* \equiv (0.01, 0.89, 0.10)$ and $B \equiv (0.89, 0.11, 0)$ vs. $B^* \equiv (0.90, 0, 0.10)$. For one group of twenty subjects, the lotteries were entirely hypothetical with no cash payoffs. For another group of twenty subjects, the lotteries were real, with subjects playing their preferred lottery in each pair and receiving the specified cash prizes. Harrison's results are easily summarized. With hypothetical payoffs, 65% of the subjects chose *A*B** while 35% chose *AB**. With salient payoffs, the corresponding numbers were 85% and 15%. Hence, with salient payoffs the percentage of subjects violating expected utility theory dropped from 35% to 15%. Harrison (1994, p. 231) concluded that there is "a powerful effect simply from ensuring Salient payoffs."

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2 For related discussions pertaining to monetary incentives, see also Harrison (1989; 1992), Smith and Walker (1993), and Wilcox (1993).

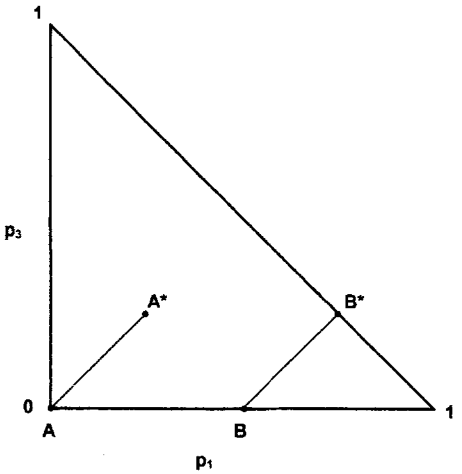

Fig. 1. Probability triangle with Allais environment

As pointed out by Camerer (1995, p. 634), however, the effect is not statistically significant at conventional levels. Using a simple 2 × 2 contingency table, $\chi^2 = 2.133$ with 1 degree of freedom and $p = 0.144$.

III Design and Procedures

The purpose and hence logic of our experiment was the same as Harrison's (1994): we wanted to compare certain lottery choices between subjects with hypothetical versus real payoffs. Our design, however, differed from Harrison's in various details.

We recruited subjects from intermediate and upper-level economics courses at the College of the Holy Cross. They were told that the experiment involved the economics of decision making, used no deception, required thirty minutes or less, and would generate earnings between \$0 and \$20, depending on their decisions and chance. We conducted the experiment in two evening sessions with 36 and 14 subjects. The two sessions were identical and yielded similar results (see note 3 below).

Subjects were asked to complete a questionnaire indicating their preferred lotteries in a fixed sequence of six lottery pairs. Four lottery pairs involved single-stage lotteries, while the other two used compound lotteries. The lotteries and lottery pairs are listed in Table 1. Final prizes in all lotteries were \$0, \$5, and \$10. Lottery pairs 5 (*A* vs. *B*) and 6 (*G* vs. *H*) together formed an Allais or common consequence problem and hence were of central interest. The remaining lottery pairs 1 through 4 will be discussed in the next section.

Table 1. Lotteries and lottery-choice pairs

Lotteries	Lottery-Choice Pairs
$A \equiv 0.00 \cdot \$0 + 1.00 \cdot \$5 + 0.00 \cdot \$10$	1 *A* vs. *C*
$B \equiv 0.05 \cdot \$0 + 0.75 \cdot \$5 + 0.20 \cdot \$10$	2 *M* vs. *N*
$C \equiv 0.20 \cdot \$0 + 0.00 \cdot \$5 + 0.80 \cdot \$10$	3 *K* vs. *L*
$G \equiv 0.75 \cdot \$0 + 0.25 \cdot \$5 + 0.00 \cdot \$10$	4 *B* vs. *C*
$H \equiv 0.80 \cdot \$0 + 0.00 \cdot \$5 + 0.20 \cdot \$10$	5 *A* vs. *B*
$M \equiv 0.75 \cdot \$0 + 0.25 \cdot A$	6 *G* vs. *H*
$N \equiv 0.75 \cdot \$0 + 0.25 \cdot C$	
$K \equiv 0.75 \cdot \$5 + 0.25 \cdot A$	
$L \equiv 0.75 \cdot \$5 + 0.25 \cdot C$	

As subjects arrived at a session, they were randomly assigned in equal numbers to two classrooms corresponding to two payoff cells, which we call Fixed Allais and Salient Allais. In Fixed Allais, all lotteries were hypothetical, including Allais pairs 5 and 6. Subjects were paid a fixed amount of $5 for completing the experiment.

In Salient Allais, while lotteries in pairs 1 through 4 were hypothetical, lotteries in Allais pairs 5 and 6 were real. When all subjects had finished the questionnaire, additional instructions were read explaining how the preferred lotteries in Allais pairs 5 and 6 would be operationalized. Subjects were then directed one at a time to a separate room, where they played their two preferred lotteries. For each lottery, the interval from 1 to 100 was divided into three ranges corresponding to the specified probabilities. Subjects drew a number between 1 and 100 and, depending where the number fell along the interval, won either $0, $5, or $10 for that lottery. They were paid the sum of the cash prizes for their two lotteries. Earnings in Salient Allais ranged from $0 to $20, with an average payoff of $7.

The instructions and questionnaires were adapted from Conlisk (1989). The instructions were kept as parallel as possible between the two cells. The questionnaires were identical except for Allais pairs 5 and 6. Pair 6, for example, with hypothetical lotteries in Fixed Allais was presented as follows:

6. If you had the choice, which would you prefer, Lottery *G* or Lottery *H*? Please answer by circling the letter of your preferred lottery.

G	*H*
75/100 Chance of $0 25/100 Chance of $5.00	80/100 Chance of $0 20/100 Chance of $10.00

The same pair 6 with real lotteries in Salient Allais was presented similarly with the following wording:

REMINDER: You will play your preferred lottery on this page for real cash.

6. Which do you prefer, Lottery *G* or Lottery *H*? Please answer by circling the letter of your preferred lottery.

Copies of the instructions and questionnaires are available in the Appendix.

IV Results

Our research question is whether violations of expected utility theory are decreased when payoffs are real rather than hypothetical. In Table 2 we present four tests that bear evidence on this question. Each test involves a combination of two lottery pairs from the six lottery pairs on the questionnaire. A combination is constructed so as to allow four choice patterns, with two that confirm and two that violate expected utility theory. The number of confirmations versus violations in the Fixed Allais cell versus the Salient Allais cell generates a 2×2 chi-square test with 1 degree of freedom.

In each test, the formal null hypothesis is that the frequency of violations is the same between the two cells. However, recall that only lotteries in pairs 5 and 6 of Salient Allais are real; all other lotteries in both cells are hypothetical. Hence, if real incentives (and only real incentives) matter between the two cells, then our design allows two predictions across the four tests: (1) in the first test, where hypothetical choice in Fixed Allais is compared to real choice in Salient Allais, the null hypothesis should be rejected, but (2) in the remaining three tests, where hypothetical choice in Fixed Allais is set against hypothetical choice in Salient Allais, the null hypothesis should not be rejected. Individual choice data for our sample of 50 subjects is given in the Data Appendix.

Table 2. Lottery-pair combinations and hypothesis tests

Lottery-Pair Combination	Relative Frequency of Expected Utility Violations		Test of Null Hypothesis: No Difference Between Cells	
	Cell 1 Fixed Allais	Cell 2 Salient Allais		
5 (*A* vs. *B*) and 6 (*G* vs. *H*)	9/25 = 0.36	2/25 = 0.08	$\chi^2 = 5.71$	$p = 0.017$
1 (*A* vs. *C*) and 2 (*M* vs. *N*)	8/25 = 0.32	11/25 = 0.44	$\chi^2 = 0.76$	$p = 0.382$
1 (*A* vs. *C*) and 3 (*K* vs. *L*)	6/25 = 0.24	9/25 = 0.36	$\chi^2 = 0.86$	$p = 0.355$
2 (*M* vs. *N*) and 3 (*K* vs. *L*)	6/25 = 0.24	10/25 = 0.40	$\chi^2 = 1.47$	$p = 0.225$

We begin with our central test involving Allais pairs 5 and 6. In pair 5, subjects chose between $A \equiv (0, 1, 0)$ with expected value $E(A) = \$5$ and $B \equiv (0.05, 0.75, 0.20)$ with $E(B) = \$5.75$; in pair 6, they chose between $G \equiv (.75, .25, 0)$ with $E(G) = \$1.25$ and $H \equiv (0.80, 0, .20)$ with $E(H) = \$2$. Choice patterns AG and BH counted as confirmations of expected utility, while AH and BG counted as violations. Subjects in Salient Allais played their preferred lottery in both pairs, so for them the lotteries were real. Note that if they were risk neutral, the expected monetary cost of misreporting their preferred lottery was \$0.75 in each pair. If monetary incentives matter, violations of expected utility should have been lower in Salient Allais.

The results are as follows. For the four patterns AG, BH, AH, and BG, the respective frequencies were 0, 16, 8, and 1 for Fixed Allais and 1, 22, 2, and 0 for Salient Allais. Hence, while $9/25 = 36.0\%$ of the subjects in Fixed Allais violated expected utility theory, only $2/25 = 8\%$ did so in Salient Allais. As shown in Table 2, the null hypothesis of no difference is easily rejected, with $\chi^2 = 5.71$ and $p = 0.017$. Similar to Harrison, we find that the rate of expected utility violations in an Allais-type environment is substantially reduced with salient payoffs.[3]

At this point we should emphasize again that we followed Harrison (1994) in allowing subjects in Salient Allais to play their preferred lotteries in both Allais pairs. This is of no consequence to our analysis if, as argued by Smith (1989, p. 164), expected utility theory "does much better if the prizes are changes in wealth, not absolute wealth." On the other hand, if utility applies to final wealth, then closer consideration of our design is warranted.

In the instructions we directed subjects to work through the lotteries pairs as they appeared on successive pages and to treat each lottery pair as if it were the only pair considered. In Salient Allais, however, the expected wealth of subjects increased between lottery pairs 5 and 6 and therefore might have induced coupling of the Allais pairs. We believe that whatever coupling occurred in this way leaves the analysis above unchanged or even strengthened.

Camerer (1989, p. 66) notes that, under expected utility theory, the slope of the indifference curves in the probability triangle can be written as $(1 + \lambda)$, where λ is the discrete analog of the Arrow-Pratt measure of risk aversion. If λ decreases with wealth, as usually assumed, then as expected wealth increases between pairs 5 and 6, the slope of the indifference curves will decrease and thereby possibly generate the common Allais pattern AH. The less common Allais pattern BG can be generated similarly if λ increases with wealth. Thus, if subjects' risk aversion is sufficiently sensitive to wealth changes, coupling can generate Allais-paradox patterns that in truth are consistent with expected utility theory. For a similar argument, see Conlisk (1989, p. 406).

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[3] The results reported in the text are pooled for the two sessions. In the first session, the violation rates in Fixed Allais versus Salient Allais were $7/18 = 38.9\%$ and $2/18 = 11.1\%$. The corresponding numbers in the second session were $2/7 = 28.6\%$ and $0/7 = 0.0\%$.

Now return to our design. In Fixed Allais, the Allais pairs presumably were uncoupled; in Salient Allais, the Allais pairs were possibly coupled because payoffs were real for both pairs. If behavioral differences between the two treatments were due only to the coupling of the Allais pairs, then the frequency of Allais-paradox patterns should have been higher in Salient Allais. This, of course, is just the opposite of what was observed, thus leaving two possibilities. The first possibility is that coupling was nonexistent or inconsequential in Salient Allais, so that the analysis in Table 2 is correct. The other is that one or both of the two observations of pattern *AH* in Salient Allais were miscounted as violations of expected utility. This would mean that the reduction in violations between the two payoff conditions is actually understated by the analysis in Table 2. In either case, the conclusion remains that violations are reduced with real payoffs.

Can we be confident that the reduction in violations is due to monetary incentives and not to some subtle procedural difference between the two cells of the experiment? We briefly address this question with the remaining three tests in Table 2. Each test is based on hypothetical lotteries in both Fixed Allais and Salient Allais. Therefore, if only saliency matters, for these tests we should be unable to reject the null hypothesis of no behavioral difference between the two cells.

The first of these tests involves the combination of lottery pairs 1 (*A* vs. *C*) and 2 (*M* vs. *N*), where $M \equiv 3/4 \cdot \$0 + 1/4 \cdot A$ and $N \equiv 3/4 \cdot \$0 + 1/4 \cdot C$. Note that in lottery *M*, if *A* is replaced with *C*, the result is lottery *N*, thus setting up a direct test of expected utility theory's substitution axiom. By this axiom, if *A* is more (less) preferred than *C*, then *M* is more (less) preferred than *N*. Hence, for the combination of lottery pairs 1 and 2, choice patterns *AM* and *CN* confirm the substitution axiom while *AN* and *CM* violate it. Referring back to Table 1, similar reasoning applies to the combination of lottery pairs 1 (*A* vs. *C*) and 3 (*K* vs. *L*), with patterns *AL* and *CK* violating the substitution axiom. Likewise, for the combination of lottery pairs 2 (*M* vs. *N*) and 3 (*K* vs. *L*), patterns *ML* and *NK* violate the substitution axiom. For each of these three combinations we compare the violation rates between Fixed Allais and Salient Allais. As shown in Table 2, for none of the tests is the null hypothesis rejected, with $p = 0.382$, 0.355, and 0.225 respectively. Hence, when all lotteries are hypothetical, the rates of violation are similar between the two cells.[4]

V Conclusion

We share Harrison's (1994) concern that the empirical case against expected utility theory might be overstated. Lottery-choice experiments often fail to sat-

[4] From the lottery pairs in Table 1, tests can also be constructed for the reduction of compound lotteries axiom and the common ratio effect. Within Salient Allais, however, this requires combining hypothetical and real lottery pairs.

isfy the precepts of saliency and/or dominance. This is necessarily true when lottery choices are hypothetical (e.g., Chew and Waller (1986) and Conlisk (1989)). The legitimate force of such experiments depends critically on the question of whether financial incentives matter.

As part of a broader research agenda testing alternative models of choice, Camerer (1989) and Battalio, Kagel, and Jiranyakul (1990) independently examined the question of financial incentives. Both studies found little qualitative difference in behavior with hypothetical versus real lotteries. While these are impressive studies in many respects, they were not well suited for addressing the particular issue of financial incentives. A conjecture worth considering is that these studies found little difference in behavior because the real lotteries did not satisfy the dominance precept. That is, although cash payoffs were used, the financial incentives might have been too small relative to decision costs to assure accurate revelation of lottery preferences.

Experiments in Camerer (1989) and Battalio et al. (1990) employed two design features that worked against payoff dominance. First, many or all of the lottery pairs consisted of lotteries with equal expected values. For risk-neutral subjects, the cost of misreporting the preferred lottery in each such pair was therefore zero; for other subjects, the (certainty-equivalent) cost was presumably small given the size of the monetary prizes. Second, a random payment mechanism was used, whereby one lottery pair was selected, and the chosen lottery in that pair was played. As a consequence, the cost of misreporting in each pair was reduced by the inverse of the number of possible lottery pairs, which ranged from 4 in Camerer to as many as 18 in Battalio et al. Also, in some sessions Battalio et al. augmented the random payment mechanism by applying it to half of the subjects, randomly selected after lottery choices were recorded, hence further reducing the cost of misreporting by one-half.[5]

Our design differed in numerous ways from those of Camerer (1989) and Battalio et al. (1990). Most notably, in each real Allais pair the expected values differed by $0.75 and the chosen lottery was played. The results, similar to Harrison's (1994), indicated that monetary incentives can have a systematic effect on lottery choice. Specifically, violations of expected utility theory in an Allais-type environment were significantly reduced when lotteries were real rather than hypothetical. The conclusion we draw is that the issue of monetary

[5] Our remarks are not intended as general criticisms of the use of either mean-preserving lottery pairs or the random payment mechanism. Rather, our point is simply that, other things equal, they weaken any test of hypothetical versus real lottery choice. We should note that Camerer (1989, p. 82) attempted to test whether random payment affected choice by permitting some subjects to change their recorded choice after a lottery pair was selected for actual play. Because only 2 of 80 subjects reversed their choice, Camerer concluded that subjects chose as if each lottery would be selected for play. An alternative interpretation is that the observed reluctance to change was simply a demand effect in what was perceived by subjects to be a test for consistency. This interpretation is supported by the fact that when a similar opportunity was routinely (and hence more subtly) provided in the questionnaries by repeating a given lottery pair, approximately one-third of the subjects reversed their choices.

incentives in lottery-choice experiments warrants renewed examination, with attention given to role of payoff dominance as well as saliency.

Appendix

I Instructions for Fixed Allais (Cell 1)

This is an experiment that studies how people make decisions when the outcomes to those decisions are uncertain. On the pages that follow, you will be given a series of choices between pairs of lotteries. For each lottery, indicate which of the two lotteries you prefer.

This is not a test of whether you can pick the best lottery in each pair, because one lottery is not necessarily better than another. Which lottery you prefer is a matter of personal taste. Different people have different tastes, and hence will answer differently.

Each pair of lotteries is on a separate page. You should indicate your choice by circling the letter of your preferred lottery.

All lottery choices are hypothetical. Please answer as you think you would if the choice were real rather than hypothetical. Assume that the lotteries cost you nothing.

You will be paid a sum of $5 for indicating your choices in this experiment.

Work through the lottery pairs in the order in which they appear on the successive pages. Approach each pair of lotteries as if it were the only pair you are considering. Think carefully before indicating your preferred lottery. Mark your choice in ink. Once recorded, do not change your answer.

Please flip over your packet when you have completed making your choices on all six pages. Wait for further instructions. You will be paid at the end of this experiment. If you have any questions at this time, please raise your hand and someone will come around to you.

II Instructions for Salient Allais (Cell 2)

This is an experiment that studies how people make decisions when the outcomes to those decisions are uncertain. On the pages that follow, you will be given a series of choices between pairs of lotteries. For each lottery, indicate which of the two lotteries you prefer.

This is not a test of whether you can pick the best lottery in each pair, because one lottery is not necessarily better than another. Which lottery you prefer is a matter of personal taste. Different people have different tastes, and hence will answer differently.

Each pair of lotteries is on a separate page. You should indicate your choice by circling the letter of your preferred lottery.

The lottery choices on the first four pages are hypothetical. Please answer as you think you would if the choice were real rather than hypothetical. Assume that the lotteries cost you nothing.

On the last two pages, the lottery choices are real. Later in this experiment you will play your preferred lottery on each of these pages. You will then be paid an amount of cash equal to your winnings from the two lotteries you have played. The money you receive will depend partly on your choices and partly on luck.

Work through the lottery pairs in the order in which they appear on the successive pages. Approach each pair of lotteries as if it were the only pair you are considering. Think carefully before indicating your preferred lottery. Mark your choice in ink. Once recorded, do not change your answer.

Please flip over your packet when you have completed making your choices on all six pages. Wait for further instructions. You will be paid at the end of this experiment. If you have any questions at this time, please raise your hand and someone will come around to you.

[Questionnaires completed, then additional instructions]

On each of the last two pages, you have chosen one lottery which you prefer. In a moment you will be asked, one at a time, to go into another room where you will proceed to play each lottery you have chosen. After playing your chosen lotteries, you will receive the actual cash amount of the prize you have won in each lottery.

Each lottery will be played in the following manner. There are three different prizes associated with each lottery. For each prize there is a probability of receiving that prize. That probability will be converted to an appropriate cutoff number between 1 and 100. A random number between 1 and 100 will be drawn from a bowl. If the number drawn falls within the cutoff numbers for Prize A, then Prize A is won. If the number drawn falls within the cutoff numbers for Prize B, then Prize B is won. Prize C is won in the same manner.

Consider a hypothetical lottery. In this lottery, there exists a 30% chance of winning Prize A. Therefore, the cutoff numbers are 1 and 30. Prize B has a 50% chance of winning. Its cutoff numbers are 31 and 80. Prize C has a 20% chance of winning. Its cutoff numbers are 81 and 100. Below is shown a diagram depicting this hypothetical lottery.

Prize A	Prize B	Prize C
1 — 30	31 — 80	81 — 100

In this example, if a number between 1 and 30 is randomly picked, Prize A will be won. If a number between 31 and 80 is chosen, Prize B is won. Likewise, if a number between 81 and 100 is chosen, Prize C will be won. If you have any questions on the playing of your preferred lotteries, they will be answered when you go to the other room to play your lotteries.

III Questionnaire for Fixed Allais (Cell 1) [with each item on a separate page]

1. If you had the choice, which would you prefer, Lottery *A* or Lottery *C*? Please answer by circling the letter of your preferred lottery.

A	*C*
Certainty of $5.00	20/100 Chance of $0 80/100 Chance of $10.00

2. If you had the choice, which would you prefer, Lottery *M* or Lottery *N*? Please answer by circling the letter of your preferred lottery.

M	*N*
75/100 Chance of $0 25/100 Chance of Lottery *A*	75/100 Chance of $0 25/100 Chance of Lottery *C*

where Lotteries *A* and *C* are defined on the preceding page. They are repeated below for your convenience, but you need not choose again between them:

A	*C*
Certainty of $5.00	20/100 Chance of $0 80/100 Chance of $10.00

3. If you had the choice, which would you prefer, Lottery *K* or Lottery *L*? Please answer by circling the letter of your preferred lottery.

K	*L*
75/100 Chance of $5.00	75/100 Chance of $5.00
25/100 Chance of Lottery *A*	25/100 Chance of Lottery *C*

where Lotteries *A* and *C* are defined as previously. They are repeated below for your convenience, but you need not choose again between them:

A	*C*
Certainty of $5.00	20/100 Chance of $0
	80/100 Chance of $10.00

4. If you had the choice, which would you prefer, Lottery *B* or Lottery *C*? Please answer by circling the letter of your preferred lottery.

B	*C*
5/100 Chance of $0	20/100 Chance of $0
75/100 Chance of $5.00	
20/100 Chance of $10.00	80/100 Chance of $10.00

5. If you had the choice, which would you prefer, Lottery *A* or Lottery *B*? Please answer by circling the letter of your preferred lottery.

A	*B*
Certainty of $5.00	5/100 Chance of $0 75/100 Chance of $5.00 20/100 Chance of $10.00

6. If you had the choice, which would you prefer, Lottery *G* or Lottery *H*? Please answer by circling the letter of your preferred lottery.

G	*H*
75/100 Chance of $0 25/100 Chance of $5.00	80/100 Chance of $0 20/100 Chance of $10.00

IV Questionnaire for Salient Allais (Cell 2) [Pairs 5 and 6 Only]

REMINDER: You will play your preferred lottery on this page for real cash.

5. Which do you prefer, Lottery *A* or Lottery *B*? Please answer by circling the letter of your preferred lottery.

A	*B*
Certainty of $5.00	5/100 Chance of $0 75/100 Chance of $5.00 20/100 Chance of $10.00

REMINDER: You will play your preferred lottery on this page for real cash.

6. Which do you prefer, Lottery *G* or Lottery *H*? Please answer by circling the letter of your preferred lottery.

G	*H*
75/100 Chance of $0 25/100 Chance of $5.00	80/100 Chance of $0 20/100 Chance of $10.00

Data Appendix*

Subject	Cell	Pair 1 *A* vs. *C*	Pair 2 *M* vs. *N*	Pair 3 *K* vs. *L*	Pair 4 *B* vs. *C*	Pair 5 *A* vs. *B*	Pair 6 *G* vs. *H*
1	1	2	1	2	1	2	2
2	1	2	2	2	2	2	2
3	1	1	2	2	1	2	2
4	1	1	1	2	1	2	1
5	1	1	1	2	1	1	2
6	1	2	2	2	2	2	2
7	1	2	1	2	1	1	2
8	1	2	2	2	2	2	2
9	1	1	2	2	1	2	2
10	1	2	2	2	1	2	2
11	1	2	1	1	2	2	2
12	1	1	2	2	1	1	2
13	1	2	2	2	2	1	2
14	1	2	2	2	2	2	2
15	1	2	2	2	1	2	2
16	1	2	2	2	2	2	2
17	1	2	2	2	2	1	2
18	1	1	1	1	2	1	2
19	2	1	1	1	1	1	1
20	2	2	2	2	2	1	2
21	2	1	1	1	1	1	2
22	2	1	2	1	1	2	2
23	2	2	2	2	2	2	2
24	2	1	2	2	1	2	2
25	2	1	1	2	1	2	2
26	2	2	1	2	1	2	2
27	2	2	1	1	1	2	2

Subject	Cell	Pair 1 A vs. C	Pair 2 M vs. N	Pair 3 K vs. L	Pair 4 B vs. C	Pair 5 A vs. B	Pair 6 G vs. H
28	2	2	2	1	2	2	2
29	2	1	1	2	1	2	2
30	2	2	2	2	1	2	2
31	2	2	2	2	1	2	2
32	2	2	1	2	1	2	2
33	2	2	2	2	2	2	2
34	2	1	2	2	1	2	2
35	2	1	2	2	2	2	2
36	2	2	2	2	1	2	2
37	1	2	2	2	2	2	2
38	1	1	1	1	1	1	2
39	1	2	2	2	2	2	2
40	1	1	2	1	1	2	2
41	1	2	2	2	2	1	2
42	1	2	1	2	1	2	2
43	1	2	2	2	1	2	2
44	2	2	1	2	2	2	2
45	2	2	2	2	2	2	2
46	2	2	1	2	1	2	2
47	2	2	2	1	1	2	2
48	2	2	2	2	1	2	2
49	2	2	1	2	1	2	2
50	2	2	1	1	1	2	2

* Cell 1 is Fixed Allais, with hypothetical lotteries in all pairs. Cell 2 is Salient Allais, with hypothetical lotteries in pairs 1 through 4 and real lotteries in pairs 5 and 6. For each lottery pair (e.g., pair 1), 1 indicates that the subject chose the first lottery (e.g., *A*), and 2 indicates the subject chose the second lottery (e.g., *C*). See Table 1 for lottery definitions.

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First version received: September, 1995
Final version received: May 1996