On Measuring Risk Preferences

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May 25, 2018

Abstract

Risk elicitation modules have become omnipresent in laboratory and field experiment protocols. We evaluate four context-free techniques for measuring risk preference in a within-subjects experiment: the Holt & Laury (HL) instrument (Holt and Laury, 2002), the Certainty Equivalent (CE), the Uncertainty Equivalent (Andreoni and Sprenger, 2011) and a new technique, the modified Convex Risk Budget (mCRB). We compare them according their success at 1) producing an internally-consistent measure of risk preference, 2) their fit of the data and ability to predict other choices in the lab, and 3) their ability to predict choices outside the lab. While the CE and mCRB produce the most consistent estimates, and highest subject-reported understanding, the HL task predicts laboratory choices best. All tasks fare poorly when predicting behavior outside the lab (although the HL is least poor), suggesting a more context-specific approach to eliciting risk preferences may be needed.

JEL Classifications: D81; D90
Keywords: Risk; Measurement; Experiment

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1 Introduction

Risk elicitation techniques have proliferated immensely in economic data collection. They accompany lab studies, field studies and are embedded in surveys. They are used to produce outcome variables, control variables, to estimate heterogeneous treatment effects, and to determine causal pathways. There are a wide variety of techniques that researchers use, and little research that compares them directly. The most common technique is likely the Holt-Laury (HL) instrument from Holt and Laury (2002), a context-free, discrete choice instrument. These types of instruments are very popular due to their general nature and low-tech portability. In this paper, we compare the HL side-by-side, within-subject, with three other context-free, discrete choice instruments: the classic Certainty Equivalent (CE), the Uncertainty Equivalent (UE) from Andreoni and Sprenger (2011), and our own technique, the modified Convex Risk Budget (mCRB), a discretized version of a technique introduced by Andreoni and Harbaugh (2010).

We find that the CE and mCRB (and to some degree the UE) produce more well-defined behavior that informs preferences than the HL. For example, subjects' self-reports of whether they were confident they knew what they were doing are lowest on the HL. Despite this difference, our implementation of the HL produced preference parameter estimates well within the range of what is considered plausible, and did the best job of predicting individuals' other choices in the study. However, all four techniques do a poor job of predicting subjects' risky behavior outside the laboratory. This is consistent with a survey of separate analyses done by Charness et al. (2013). While the HL technique does the least-poorly, we argue that our results imply caution when using such context-free, discrete choice instruments, especially when using them to control for the 'risky' part of an observed behavior. More contextual tasks like those from Gneezy and Potters (1997) (which involves investment choices), Lejuez et al. (2002) (which involves the visceral risk of a balloon popping), and Weber et al. (2002) (which spans five different domains of risk taking in a questionnaire) are likely more effective at predicting risky behavior in the context of interest. For example, we find that individuals who report gambling, investing in the stock market, and a willingness to trust others are also more likely to purchase warranties (within a very homogenous sample). These behaviors themselves can be considered contextual measures of risk, and they are inversely correlated.

We argue that the ability to predict behavior beyond the elicitation is the most important test for a risk elicitation instrument. This is in opposition to the view that context-free money risk represents an individual's 'true' risk preference, and whether behavior beyond the elicitation is a function of that 'true' risk preference can be determined by whether it correlates with the elicitation (Falk et al., 2018). Instead, we take the view that when it comes to behaviors for which all economic models posit risk preference as a first-order determinant of utility, good experimental instruments should bear out that correlation.[1]

2 Methods

We conducted a laboratory study at UC San Diego's EconLab with 66 undergraduate students in four sessions. The study consisted of 24 total tasks designed to evaluate risk preference. Each session lasted about 30 minutes. At the end of each session we randomly selected one task (and one element from the task, if necessary) for payment. Before the study, we described the payment scheme to subjects and showed them how we would use a random number generator to determine payments. Average earnings were $13.61, which includes a $5 show-up fee.

The 24 tasks consist of six tasks from each of four techniques, the Holt & Laury (HL) instrument (Holt and Laury, 2002), the Certainty Equivalent (CE), the Uncertainty Equivalent (UE, Andreoni and Sprenger (2011)), and our modified Convex Risk Budget (mCRB). All of our instructions and task forms can be found in the online Appendix in a usable format. We balanced the order of presentation of the tasks across subjects.

HL, CE, and UE instruments are all price lists. Each task contains ten rows of binary choices between Option A on the left side of the page, and Option B on the right.[2] Some feature of the options changes monotonically as subjects works their way down the rows of each task, ideally producing a single switch point from Option A to Option B. Every list was designed such that we expected subjects to begin by preferring Option A and end by preferring Option B. Example rows of strictly dominated choices before Row 1 and after Row 10 were pre-filled in for subjects. Figure 1, Panels A, B, and C show examples of our HL, CE and UE instruments, respectively.

[1] In very heterogeneous samples, omitted variable bias that obscures that correlation could be a concern. We do not expect that to be the case in our laboratory study with students.

[2] One of our UE tasks only featured nine rows.

The mCRB instrument is not a price list. Subjects are presented with a list of ten combinations of a prize and a probability of winning that prize. The top option always features the lowest prize and higher probability. Prize increases and probability decreases monotonically through the list. This is a discrete approximation of the Convex Risk Budget implemented by Andreoni and Harbaugh (2010). The advantage of the CRB procedure is that it identifies the risk preference parameter of a one-parameter utility function with a single choice, based on the utility-maximizing demand for prize and probability. In that regard, it is a different take on the continuous-choice risk elicitation technique of Gneezy and Potters (1997). In the Gneezy & Potters instrument, subjects choose a fraction of their endowment to invest in a risky asset. The revealed optimal fraction point-identifies a risk parameter in a single-parameter function. The CRB produces simpler first-order conditions to work with, but is less contextually relevant than the Gneezy & Potters instrument. Specifically, individuals may have experience making investment-style decisions, and use their experience as a guide. The CRB, as with the price list techniques is a more abstract representation of real-world choices.

We discretize the mCRB to make it very easy to implement. Subjects simply select their preferred option from the list, and the experimenter uses that choice as an approximation of the solution to the continuous choice-set problem. Andreoni et al. (2015) analyze a discretization of continuous choice time-discounting problems to a set of six options, and find no evidence of bias from discretization. An advantage of the CRB and mCRB approaches is that they eliminate the problem of multiple switching. Although we show in Section 3.1 that our implementation of the price list elicitations, with clear directions and examples using dominated choices, led to very low rates of multiple switching. An example of the mCRB task is in Figure 2.

Panel A: Holt & Laury Instrument (HL)

	Option A			*or*	**Option B**		
	Chance of $11.25	Chance of $7.50			Chance of $20	Chance of $2.50	
Example	0 in 100	100 in 100	■	*or*	0 in 100	100 in 100	□
1)	28 in 100	72 in 100	□	*or*	28 in 100	72 in 100	□
2)	30 in 100	70 in 100	□	*or*	30 in 100	70 in 100	□
			...				
10)	53 in 100	47 in 100	□	*or*	53 in 100	47 in 100	□
Example	100 in 100	0 in 100	□	*or*	100 in 100	0 in 100	■

Panel B: Certainty Equivalent (CE)

	Option A			*or*	**Option B**	
	Chance of $30	Chance of $0			Sure Amount	
Example	25 in 100	75 in 100	■	*or*	$0.00 for sure	□
1)	25 in 100	75 in 100	□	*or*	$1.40 for sure	□
2)	25 in 100	75 in 100	□	*or*	$2.45 for sure	□
		…				
10)	25 in 100	75 in 100	□	*or*	$10.70 for sure	□
Example	25 in 100	75 in 100	□	*or*	$30.00 for sure	■

Panel C: Uncertainty Equivalent (UE)

	Option A			*or*	**Option B**		
	Chance of $10	Chance of $30			Chance of $0	Chance of $30	
Example	25 in 100	75 in 100	■	*or*	25 in 100	75 in 100	□
1)	25 in 100	75 in 100	□	*or*	19 in 100	81 in 100	□
2)	25 in 100	75 in 100	□	*or*	18 in 100	82 in 100	□
		…					
10)	25 in 100	75 in 100	□	*or*	10 in 100	90 in 100	□
Example	25 in 100	75 in 100	□	*or*	0 in 100	100 in 100	■

Figure 1: Price List Examples

					Options	Check the *one* box for the Option you prefer *most*
1.	Win	\$11.50	with chance	49 in 100		□
2.	Win	\$13.00	with chance	46 in 100		□
				…		
10.	Win	\$20.50	with chance	31 in 100		□

Figure 2: Modified Convex Risk Budget (mCRB) Example

2.1 Price List Estimation

We estimate the α parameter of the CRRA utility function $U(x) = x^{\alpha}$. While the literature uses risk elicitation tasks to estimate a wide variety of functional forms, we restrict our attention to this simple form to compare across methods.

We estimate α from price lists using a maximum-likelihood Logit technique. Every choice on a list reveals an inequality in a binary comparison. The simplest case is the CE. Option A is a gamble with outcomes \$30 and \$0, where p is the probability of winning \$30. Option B is the sure outcome of $\$B$. Everything except B is held fixed within a task, and p is varied across tasks. If Option A is revealed preferred to Option B, we have

$$p \cdot 30^{\alpha} > B^{\alpha} \quad . \tag{1}$$

The Logit model assumes that each utility is measured with random errors, with the difference in those errors distributed according to the logistic distribution. Therefore, the probability of choosing Option A is

$$Pr(A) = \frac{exp(p \cdot 30^{\alpha})}{exp(p \cdot 30^{\alpha}) + exp(B^{\alpha})} \quad . \tag{2}$$

We use this formula to construct and maximize a likelihood function for the data.

The approaches for the UE and HL are the same, except the implication of each revealed preference is different. In the case of the UE, Option A is a gamble with outcomes \$30 and \$10, and Option B is a gamble with outcomes \$30 and \$0. p is the probability of winning \$30 in Option A, and q is the probability of winning \$30 in Option B. Only q varies within a task, and p varies across tasks. If Option A is revealed preferred to Option B, we have

$$p \cdot 30^{\alpha} + (1-p) \cdot 10^{\alpha} > q \cdot 30^{\alpha} \quad . \tag{3}$$

In the case of the HL, Option A is a gamble with outcomes $\$A_1$ and $\$A_2$, and Option B is a gamble with outcomes $\$B_1$ and $\$B_2$ ($B_1 > A_1 > A_2 > B_2$). p is both the probability of winning $\$A_1$ in Option A, and the probability of winning $\$B_1$ in Option B. Only p varies within a task, and the A and B values vary across tasks. If Option A is revealed preferred to Option B, we have

$$p \cdot A_1^{\alpha} + (1-p) \cdot A_2^{\alpha} > p \cdot B_1^{\alpha} + (1-p) \cdot B_2^{\alpha} \quad . \tag{4}$$

2.2 mCRB Estimation

Andreoni and Harbaugh (2010) develop the CRB technique to permit identification of risk preference based on the first-order condition of the utility maximization problem

$$\max_{p,x} \quad U(p,x) = p \cdot x^{\alpha} \quad \text{s.t.} \quad p + Rx = M \quad , \tag{5}$$

where p is the probability of winning a prize, x is the prize itself, M is the probability of winning a worthless prize, and R is the probability cost of increasing the prize by one unit. As this is a Cobb-Douglas utility function, the demand for x is given by

$$x^* = \frac{\alpha}{1+\alpha} \cdot \frac{M}{R} \quad . \tag{6}$$

Thus, α can be estimated using the regression

$$x_j^* = \beta \cdot \frac{M_j}{R_j} + \epsilon_j \quad \text{with} \quad \hat{\alpha} = \frac{1}{1-\hat{\beta}} \quad , \tag{7}$$

where j can represent individuals, tasks, or a combination of both.

We implement a "modified" CRB in which the budget set is discretized to make the elicitation simpler and more portable (as is the case with the other techniques). Andreoni et al. (2015) show that a discretized time preference elicitation estimated using the demand function of a continuous maximization problem produces similar estimates as are obtained from a fully convex choice set. However, we do adjust our estimation protocol to account for choices at the endpoints of our mCRB tasks. This is because a choice at the endpoint reveals only an upper or lower bound on risk preference. Therefore, we adopt a generalized Tobit maximum likelihood technique based on the regression in equation (7):

$$Pr(x_j = x) = \begin{cases} \Phi(x - \beta \cdot \frac{M_j}{R_j}) & \text{if} \quad x = \underline{x_j} \\ \phi(x - \beta \cdot \frac{M_j}{R_j}) & \text{if} \quad x_L < x < x_U \\ 1 - \Phi(x - \beta \cdot \frac{M_j}{R_j}) & \text{if} \quad x = \overline{x_j} \end{cases}, \tag{8}$$

where x_j is the censored version of the latent x^*, and $\underline{x_j}$ and $\overline{x_j}$ are the (potentially task-specific) endpoint choices on a task.

3 Results

3.1 Elicitation Success Rate

We first compare the techniques based on their elicitation success, measured in three ways. First, we consider the common problem of multiple switching within a price list. Second, we define a task as being "non-informative" if it produces either a multiple switch or a choice at one of the two endpoints of the option set. A choice at the endpoint reveals only an upper or lower bound on preferences, as opposed to an interval. This is a conservative measure because subjects may make some choices at endpoints and others in the interior of the option set, allowing for the estimation of preferences while still respecting the censored nature of the data. Third, we measure elicitation success based on subjects' self-reports of confidence in their own behavior in a block of tasks. Specifically, we asked them to rate their confidence from 1 to 5, where 1 is labeled "I was just guessing," and 5 is labeled "I knew exactly what I was doing." Average confidence across all techniques is 3.50 (SD = 0.97). We present confidence results for the entire sample pooled, and then separately by subjects who never produced a non-informative response within the relevant block, and those who did. Results are in Table 1 where we regress each of our measures on indicator variables for the CE, UE and mCRB tasks. The constant term represents

Table 1: Elicitation Success Statistics

Model:	Probit		RE		
DV:	Multiple Switch	Non-informative	Confidence		
Sample:	HL, CE, UE	All		Informative	Non-informative
	(1)	(2)	(3)	(4)	(5)
Constant (HL Level)	0.028*	0.250***	-0.014	-0.072	-0.068
	(0.016)	(0.042)	(0.106)	(0.138)	(0.140)
CE	-0.014	-0.010**	0.188	0.322*	0.212
	(0.015)	(0.041)	(0.123)	(0.166)	(0.178)
UE	0.002	-0.024	-0.110	0.211	-0.255
	(0.017)	(0.043)	(0.129)	(0.207)	(0.157)
mCRB		0.086*	-0.031	0.184	-0.110
		(0.045)	(0.121)	(0.230)	(0.148)
Clusters	66	66	66	53	58
Observations	1188	1584	263	123	140

*** : $p < 0.01$, ** : $p < 0.05$, * : $p < 0.10$. Standard errors clustered by individual. Multiple switching is not possible on the mCRB, so it is excluded from column (1). Non-informative responses include both multiple switching and choices at endpoints. Confidence is reported from 1 (“I was just guessing”) to 5 (“I knew exactly what I was doing”) at the end of each block, and standardized. Estimates from the Probit models are the average marginal effects.

the level of the relevant measure on the HL task. We show marginal effects from Probit models when analyzing multiple switch and non-informative responses, and we use a linear random-effects model to estimate differences in confidence.

In column (1) of Table 1 we find that only 2.8% of tasks produce multiple switch behavior in the HL. This is considerably lower than in many other implementations. Recall that the price list instructions explicitly said, “Most people begin by preferring Option A and then switch to Option B at some point, so one way to view this task is to determine the best row to switch from Option A to Option B,” so perhaps this direction had its intended effect. The UE features an almost identical rate of multiple switching, while the CE features less, although the difference of 1.4 percentage points is not statistically significant ($p = 0.34$). By construction, there is no multiple switching in the mCRB, so it is excluded from this model.

In column (2) of Table 1 we find that 25% of tasks produce non-informative responses in the HL, meaning that the rate of endpoint choice is quite high. Again, the UE is very similar to the HL, and the CE features fewer non-informative choices. The difference between the HL and CE is statistically significant (10.0 percentage points, $p = 0.01$) as is the difference between the UE and CE (7.6 percentage points, $p = 0.05$). We find the highest rate of non-informative tasks in the mCRB, where 33.6% of tasks produce an endpoint choice. This is greater than the HL at a marginally statistically significant level ($p = 0.06$), and clearly greater than the UE and CE ($p < 0.01$ in both cases).

More informative choices on the CE may translate into higher self-reported confidence. Confidence on the CE is 0.19 standard deviations higher than on the HL ($p = 0.13$), 0.30 higher than on the UE ($p = 0.01$), and 0.22 higher than on the mCRB ($p = 0.08$). The pattern changes considerably when we limit the sample to individuals without any non-informative choices on the relevant block: the CE, UE and mCRB all show higher confidence relative to the HL (0.32, 0.21, and 0.18 standard deviations, respectively), although this difference is only statistically significant for the CE ($p = 0.05$, $p = 0.31$, and $p = 0.43$, respectively). Among subjects making uninformative choices, subjects continue to express confidence in the CE (0.21 ($p = 0.23$), 0.46 ($p = 0.02$), and 0.32 ($p = 0.07$) standard deviations higher, relative to HL, UE and mCRB, respectively), and subjects in the UE in particular appear lost (0.25 ($p = 0.11$), 0.46 ($p = 0.02$), and 0.14 ($p = 0.48$) standard deviations lower than HL, CE, and mCRB, respectively).

As mentioned earlier, an endpoint choice on one of six tasks does not prevent the estimation of time preference. Unless all six choices are at the same endpoint, or are a combination of multiple switches and choices at one endpoint, a parameter estimate for a single-parameter utility function can be obtained.[3] When we calculate the number of in-estimable responses, remarkably, we find that not one of our 66 subjects' CE choices are in this category. 9.1% (6 of 66) of subjects produced in-estimable HL choices, 7.6% (5 of 66) produced in-estimable mCRB choices, and 4.5% (3 of 66) produced in-estimable UE choices.[4]

[3]Multiple switches do not prevent preference estimation via an agnostic maximum likelihood procedure, but many researchers prefer to identify preferences using the midpoint of switches on price lists. Similarly, choosing one endpoint repeatedly does not prevent preference estimation via maximum likelihood, but the estimate is simply a product of the relevant bound and the model's distributional assumption.

[4]These 14 in-estimable choices come from eleven subjects, with one subject doing so in three blocks and another doing so on two.

3.2 Estimates of CRRA Utility Parameter

3.2.1 Aggregate Estimates

First, we present aggregate estimates that pool all data from a single technique, except for tasks with multiple switches. For the HL, CE and UE methods, we estimate α with the Logit maximum likelihood technique described in Section 2.1. Because this method is applied at the choice-within-task level, we have (excluding tasks with multiple switching) 3850 HL choices, 3900 CE choices, and 3776 UE choices. Standard errors are clustered at the individual level. Using HL data, we estimate $\alpha_{HL} = 0.749$, with a 95% confidence interval of $(0.709, 0.789)$. The UE produces a very similar estimate of $\alpha_{UE} = 0.755$, CI = $(0.703, 0.806)$. The CE data imply somewhat less risk aversion: $\alpha_{CE} = 0.877$, with a 95% confidence interval of $(0.834, 0.919)$.

We use a generalized Tobit maximum likelihood technique to estimate α from mCRB data is different, as described in Section 2.2. This method is implemented at the task level, so there are 396 mCRB choices. We again cluster standard errors at the individual level. The mCRB estimates similar risk aversion to both the HL and UE: $\alpha_{mCRB} = 0.734$ with a 95% confidence interval of $(0.675, 0.802)$.

Comparing across techniques, we can reject equality of all pairwise comparisons involving the CE ($p < 0.01$ in all cases). The HL, UE and mCRB estimates are indistinguishable. Small stakes risk aversion is thus a feature of all our techniques, but its degree varies. Notably, we find the least risk aversion on the task that produces the fewest multiple switches, the least non-informative choices, and the most subject confidence in their choices.

3.2.2 Individual-level Estimates

Each individual makes choices on six tasks in each technique block. We use those six choices to estimate individual-specific utility parameters from each technique. Using the same techniques as implemented in the previous section, we obtain 66 estimates of α_{CE}, 63 estimates of α_{UE}, 61 estimates of α_{mCRB}, and 60 estimates of α_{HL}. Figure 3 shows the CDFs for the four alpha distributions.

The most notable feature of the graph is the consistency across techniques (except for the single mCRB outlier). The mCRB produces a slightly wider range of estimates than any of the other

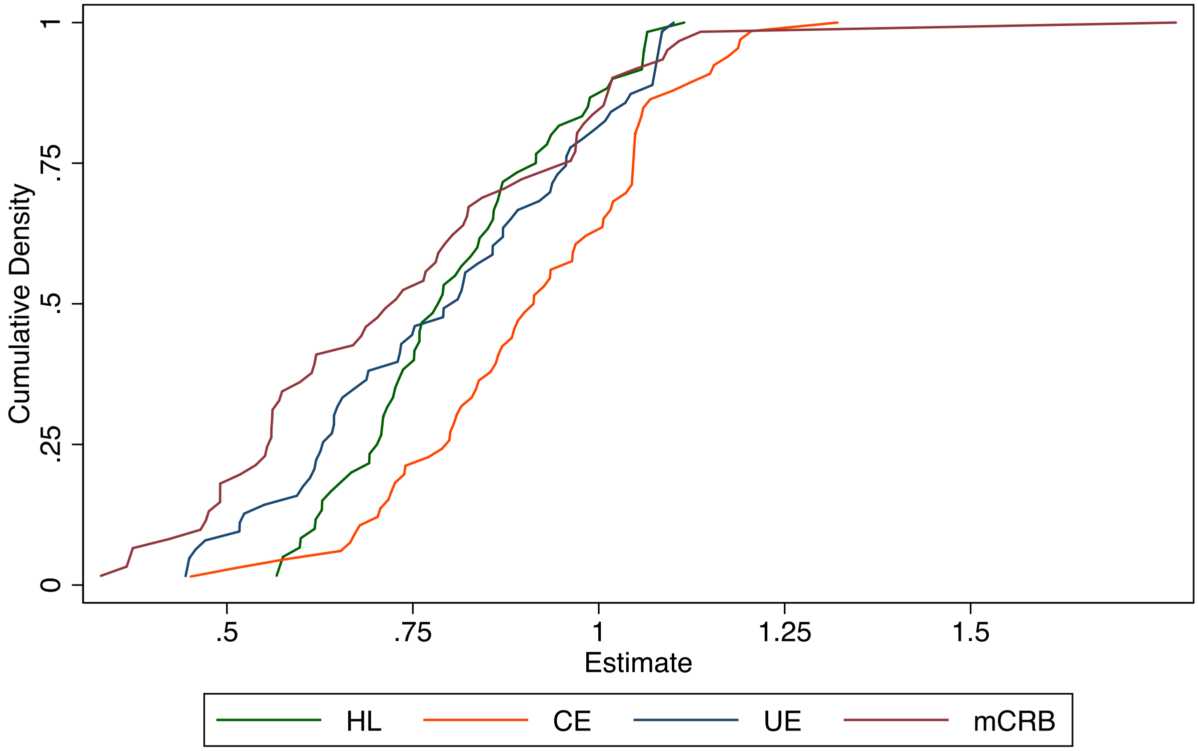

Figure 3: Distribution of Individual-specific Estimates of α

techniques. The HL and CE produce very similar estimates in a tight range. The CE estimates are also low-variance, but the distribution is shifted to the right of the HL and UE estimates. Using Kolmogorov-Smirnov tests to asses the equality of the distributions, we can clearly reject the equality of the CE estimates with the HL ($N = 126$, $D = 0.292$, $p = 0.01$) and UE ($N = 129$, $D = 0.275$, $p = 0.01$) estimates: the CE produces less risk aversion. Despite the positive outlier, the mCRB distribution features more risk aversion overall. We reject that the mCRB distribution is the same as HL and CE (vs. HL: $N = 121$, $D = 0.475$, $p < 0.01$, vs. CE: $N = 127$, $D = 0.498$, $p < 0.01$) and can nearly do so versus the UE ($N = 124$, $D = 0.202$, $p = 0.13$). We cannot reject equality of the HL and UE distributions ($N = 123$, $D = 0.181$, $p = 0.23$).

In addition to producing similar distributions of individual estimates, each technique produces estimates that are highly correlated within an individual, across techniques. In other words, both the distribution and the location of an individuals within the distribution, are similar for each technique. Figure 4 shows the relationship between each pair of estimates.[5]

[5] All slope and intercept parameters are statistically significant: linear regression, robust standard errors.

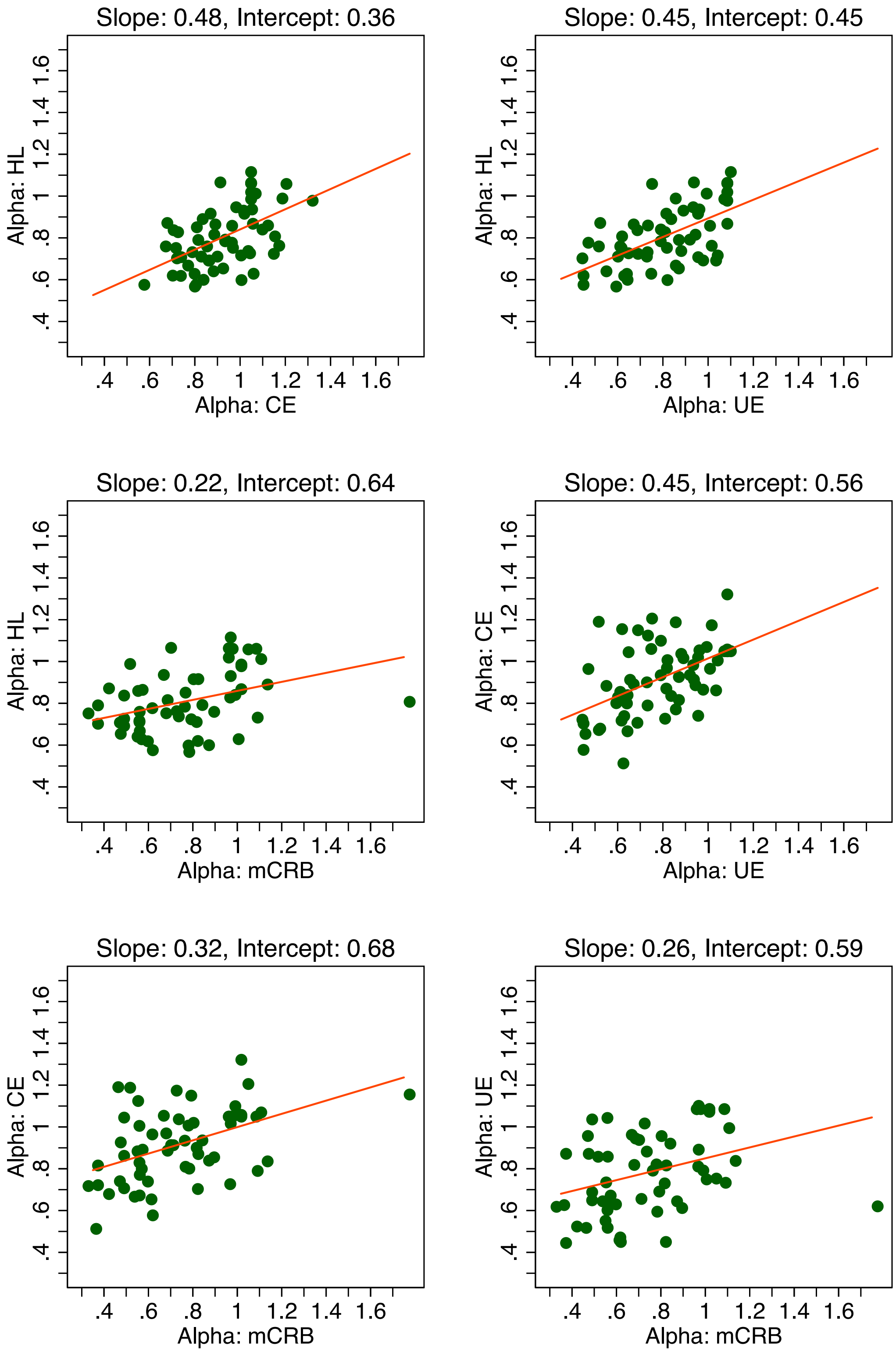

Figure 4: Within-individual Correlations of α Estimates

Overall, these results are consistent with the differences in aggregate estimates, but showcase that the mCRB produces a slightly higher variance in estimates. This is likely related to the higher frequency of endpoint choice in the mCRB. This could be a good or bad feature of the estimates: perhaps this increased variance will yield a better ability to predict differences in choices in other domains. We return to this issue in Section 3.4. Either way, it indicates that larger endpoint bounds on mCRB elicitations is warranted.

3.2.3 Task-level Estimates

By restricting our attention to a one-parameter utility function, each choice a subject makes identifies a small interval containing α, provided the choice is not at an endpoint. We can use this to examine the degree to which each technique produces overlapping intervals for an individual within a task. In the case of the price list techniques, when an individual is observed switching, it bounds their α parameter between the value at which the options prior to the switch are equalized, and the value at which the options at the switch are equalized. These values range between roughly 0.45 and 1.35 for all of the techniques. An advantage of the CE and UE techniques is that there are closed-form solutions for these α values. In the case of the CE, we have that

$$p \cdot 30^{\alpha} = B^{\alpha} \Rightarrow \alpha = \frac{ln(p)}{ln(B/30)} \quad , \tag{9}$$

where p is the probability of winning \$30 in the uncertain option, and A is the certain option. In the case of the UE, we have that

$$p \cdot 30^{\alpha} + (1-p) \cdot 10^{\alpha} = q \cdot 30^{\alpha} \Rightarrow \alpha = \frac{ln((1-p)/(q-p))}{ln(3)} \quad , \tag{10}$$

where p is the probability of winning \$30 in the uncertain option with a downside of \$10, and q is the probability of winning \$30 in the uncertain option with a downside of \$0. In the case of the HL, we have that

$$p \cdot A_1^{\alpha} + (1-p) \cdot A_2^{\alpha} = p \cdot B_1^{\alpha} + (1-p) \cdot B_2^{\alpha} \quad , \tag{11}$$

where A_1 and A_2 are the high and low outcomes of the low-variance option, respectively, B_1 and B_2 are the high and low outcomes of the high-variance option, respectively, and p and q are the

Table 2: Within-individual Parameter Consistency

Model:	Probit		OLS
DV:	∃ Parameter Interval		Parameter SD
Sample:	All	Bounded Intervals	Non-endpoint
	(1)	(2)	(3)
Constant (HL Level)	0.167***	0.083**	0.120***
	(0.046)	(0.036)	(0.009)
CE	-0.068	0.026	0.015
	(0.057)	(0.046)	(0.014)
UE	-0.015	0.031	0.045**
	(0.059)	(0.053)	(0.018)
mCRB	0.053	0.078	-0.004
	(0.061)	(0.056)	(0.012)
Clusters	66	66	64
Observations	264	250	207

*** : $p < 0.01$, ** : $p < 0.05$, * : $p < 0.10$. Standard errors clustered by individual. Estimates from the Probit models are the average marginal effects.

probabilities of winning the high outcome in the low- and high-variance options, respectively. We solve numerically for the α in this case. When an individual chooses the endpoint associated with the most risk aversion (seeking), it provides an upper (lower) bound on α.

In the case of the mCRB, when an individual selects their preferred option, it bounds α between the values at which the two adjacent choices are utility-maximizing outcomes according to equation (6). Again, these values range between roughly 0.45 and 1.35. When they select an endpoint option, it provides either a lower or upper bound at the adjacent choice.

We define a variable called 'parameter interval' that is equal to one if the maximum lower bound on α across all tasks in a block is below the minimum upper bound α across all tasks in a block. In other words, we ask whether choices are consistent with a strict interpretation of the theoretical implications of the CRRA form we assume, in which they are a product of a noise-less utility function. We regress this variable on technique indicators in column (1) of Table 2.

Overall, the frequency of parameter interval existence is low. With the HL, 16.7% of subjects make choices that are internally consistent with the CRRA utility model. The CE produces 6.8 fewer parameter intervals, and the mCRB produce more, and the 12 percentage point gap between these rates is the only statistically significant difference across techniques ($p = 0.01$). Some parameter intervals are created by subjects choosing only lower bound estimates or only upper bound estimates through non-informative choices. Therefore, we apply the bounded intervals restriction in column (2) that requires at least one of the six tasks in a block to produce a lower bound and at least one to produce an upper bound for inclusion. This lowers the frequency of interval existence: the level in HL is only 8.3%. While the CE no longer underperforms relative to the HL, the mCRB remains (marginally) statistically more likely to produce an interval relative to the CE ($p = 0.09$).

One problem with the analysis of parameter interval existence is that the mCRB creates wider intervals around each choice. If we order the mCRB choice options from 1-10, and an individual selects choice option 5, then we know the utility maximizing outcome with a continuous choice space lies between option 4 and 6. If we order the price list choice options from 1-10, and an switches from left to right at choice option 5, then we know that the utility of each option is equalized somewhere between option 4 and 5. These more generous intervals in the mCRB may overlap and lead to the findings in the first two columns of Table 2. As such, we also examine the standard deviation of the α value at the midpoint of well-defined intervals. To be specific, we consider all tasks with non-endpoint choices, use the midpoint of the implied α interval as our estimate, and then calculate the standard deviation of the task-specific estimate across the six tasks of that technique an individual completes. If the mCRB produces α estimates with a higher standard deviation, this indicates that the more generous intervals could be driving the parameter interval results. However, when we regress parameter standard deviation on technique indicators in column (3) of Table 2, we find that this is not the case. The within-individual standard deviation of α estimates for the HL task is 0.120, and it is almost identical for the mCRB. The UE produces the noisiest estimates, and we can reject the equality of standard-deviations against the other three techniques (vs. HL: $p = 0.02$, vs. CE: $p = 0.09$, vs. mCRB: $p = 0.01$).

3.3 Internal Validity

We take three approaches to assessing the within-study consistency of our estimates. The first is a measure of fit, where we predict in-sample choices using the parameter estimate derived from them. The second is a within-task predictive validity task where we predict each task using every other task within a technique. Finally, we consider a within-study, across-technique predictive validity task where we predict choices on each task using α estimates the other techniques.

Table 3: Predicting Behavior in the Study: Absolute Prediction Errors

Prediction:	$\alpha_T^i \to c_{T,j}^i$	$\alpha_{T,j}^i \to c_{T,-j}^i$	$\alpha_T^i \to c_{-T,j}^i$			
Sample:	All	All	HL	CE	UE	mCRB
	(1)	(2)	(3)	(4)	(5)	(6)
Constant (HL Level)	1.467***	1.474***		2.119***	1.797***	2.181***
	(0.057)	(0.102)		(0.148)	(0.130)	(0.160)
CE (Constant in (3))	0.079	0.523***	2.618***		0.593***	0.312*
	(0.117)	(0.160)	(0.192)		(0.144)	(0.165)
UE	-0.078	0.355**	-0.656***	0.243		0.097
	(0.090)	(0.151)	(0.193)	(0.157)		(0.126)
mCRB	0.017	0.567***	-0.618***	0.408**	0.225	
	(0.128)	(0.152)	(0.216)	(0.193)	(0.170)	
Clusters	66	66	66	65	66	66
Observations	1475	1452	385/367/355	354/373/361	350/384/354	360/396/378

*** : $p < 0.01$, ** : $p < 0.05$, * : $p < 0.10$. Observation counts depend on whether whether both the predicting α exists, and whether the choice-to-be-predicted is non-multiple switch. In columns (3)-(6), we estimate the mean prediction errors separately for each of the three techniques. The observation counts are for each of these mean estimations, where top-to-bottom in the table reads left-to-right in the count. Standard errors are clustered at the individual level when these means are re-estimated simultaneously, and we present linear combinations of these means to match typical regression output.

Call α_T^i the estimate of α for individual i using technique T, where $T \in \{HL, CE, UE, mCRB\}$. Call $c_{T,j}^i$ individual i's choice on Task j of technique T. Our measure of in-sample fit uses α_T^i to predict $c_{T,j}^i$. In the case of the mCRB, we use α to predict the utility of each of the ten options in the choice set and using the maximum as our predicted choice. In the cases of the price-list techniques, we use α to predict the utility of each option in each row of the list. This generates a predicted switch point. In both cases, we define the prediction error as the absolute value of the difference between the predicted choice and the observed choice. This measure is only defined when α_T^i is estimable, and $c_{T,j}^i$ is not missing due to a multiple-switch. In column (1) of Table 3 we show regressions of the absolute prediction error from this procedure on indicator variables for each technique. We find similar performance across techniques in average performance, with an average error across all techniques of 1.47 options. There is a substantial difference in performance at the extremes: whereas the HL, CE and UE predict 18.3%, 24.8%, and 21.6% choices with no error, respectively, the mCRB predicts 36.6% of choices with no error ($p < 0.01$ in all cases). On the other hand, the mCRB is the only technique to produce errors larger than seven options in magnitude. Figure 5, Panel A shows the cumulative distribution of these errors by technique, where both the high rate of zero error and the large outliers from the mCRB.

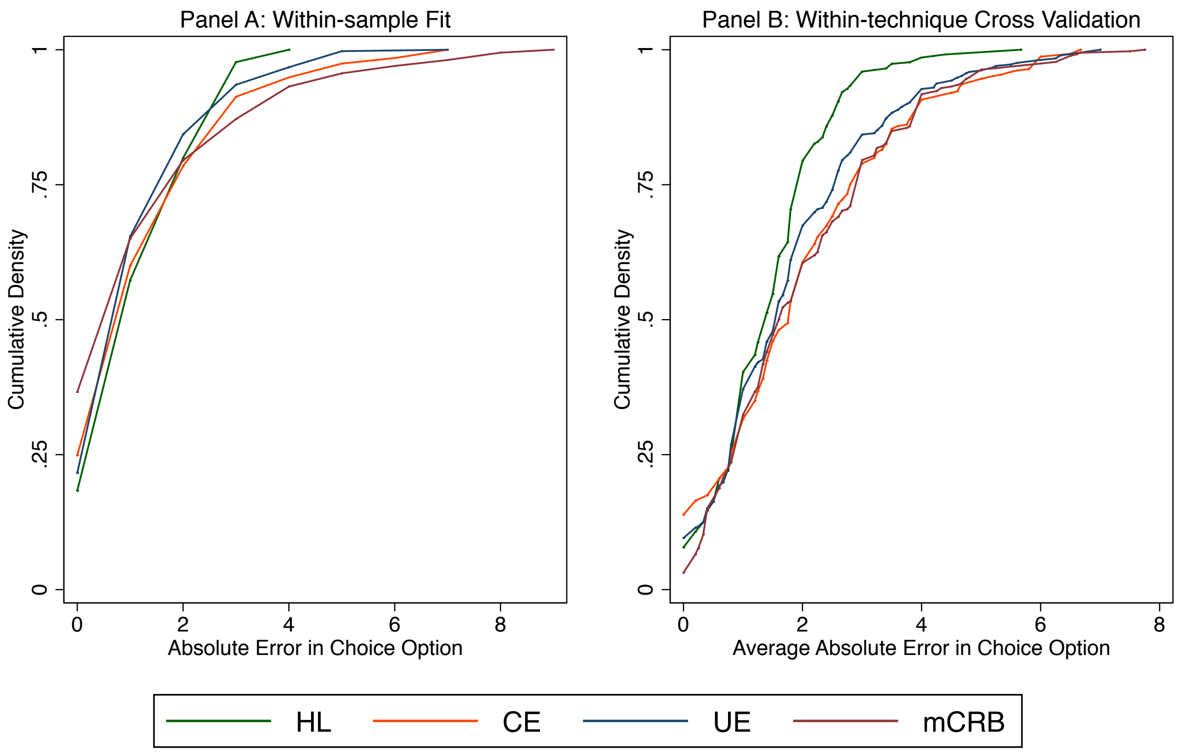

Figure 5: Distribution of Choice Prediction Errors

We now consider a cross-validation exercise, where we use choices from each task to predict choices on every other task within that technique. For example, if an individual switched between rows six and seven on the first task of the HL block, we use the α implied by that switch to predict their choices on the next five tasks. We then use their choice on Task 2 to predict choices on Task 1, Task 3, etc. We call $\alpha^i_{T,j}$ the α implied by individual i's choice on Task j of technique T. We call $c^i_{T,-j}$ individual i's choice on tasks other than j for technique T. For the mCRB tasks, we define this α to be the midpoint of the parameter interval defined by their choice (see Section 3.2.3 for more detail). Using this α, we predict utility and choice $c^i_{T,-j}$ as described earlier. When considering any particular non-multiple switch choice, this procedure generates up to five predictions (depending on how many of the other choices on that task are non-endpoint, non-multiple switch choices) that we average to keep the unit of observation fixed at individual-technique-task. Column (2) of Table 3 shows regressions of these average absolute cross-validation errors on technique indicators. We find that the CE ($p < 0.01$), UE ($p = 0.02$) and mCRB ($p < 0.01$) all produce larger errors than the HL. This advantage is driven by fewer large outliers in the HL predictions. Figure 5, Panel

B shows the cumulative distribution of these errors by technique. The techniques feature similar density over low error predictions, but the HL, and to a lesser extent the UE, accumulate density faster over moderate error predictions, and thus feature fewer big mistakes.

Finally, we consider the across-technique predictive validity of our estimates. We take α^i_T and predict utility and choice, $c^i_{-T,j}$, for all techniques other than T. Each task on technique T is thus predicted by up to three α values, one from each of the other techniques. In order to avoid losing observations when α^i_T is estimable for some techniques but not others, we separately estimate mean absolute prediction errors for each technique and then estimate the differences in those means in a framework that matches the other regressions in this section. This is reflected in the observation counts for these tests. Results are presented in columns (3)-(6) of Table 3 for each technique. Note that when predicting HL choices in column (3), the CE predictions play the role of the constant term in the regression. As with the cross-validation results, the estimates favor the HL technique here. HL predictions feature the smallest errors when predicting the CE (vs. UE: $p = 0.12$, vs. mCRB: $p = 0.04$), the UE (vs. CE: $p < 0.01$, vs. mCRB: $p = 0.018$), and the mCRB (vs. CE: $p = 0.06$, vs. UE: $p = 0.44$). We can never reject the the UE and HL estimates are the same, however. When predicting HL data, the UE and mCRB both significantly outperform the CE ($p < 0.01$ in both cases).

3.4 External Validity

In our questionnaire, we asked our subjects eight questions about risky behavior. Two questions were about safety (seatbelt and bicycle helmet use), and two were about gambling (whether they gamble and whether they prefer games of chance or skill). The others were about trusting others, assessing future uncertainty, investing, purchasing warranties. We also asked them to self-report their risk tolerance on a scale from one to ten. Nearly everyone reported always wearing their seatbelt while in the car, so we drop this question from our analysis. We report the signs of the correlations between our individual-specific estimates of α and the risk variables in columns (2)-5) of Table 4. We also show the correlation between the risk variables and self-reported risk tolerance in column (6).[6] Column (1) shows the expected sign of the correlation for reference. In the second-

[6]While the large number of hypothesis tests in this table should be of concern for spurious results, because we will interpret the results as essentially null, we choose to include p-values at standard confidence levels in order to be

Table 4: Predicting Behavior outside the Laboratory: Correlations with α

	Expected Sign	Prediction Technique				
		α_{HL}	α_{CE}	α_{UE}	α_{mCRB}	Self-reported Tolerance
Outcome	(1)	(2)	(3)	(4)	(5)	(6)
Helmet frequency	$-$	$-$	$+$	$-^{*}$	$-$	$-$
Trust others	$+$	$+^{***}$	$+$	$+$	$-$	$+$
Gambles	$+$	$+$	$+$	$+$	$-$	$+^{**}$
Chance $\succ$ skill	$+$	$+^{*}$	$-$	$-$	$-$	$-$
Forward looking	$-$	$-$	$-$	$-$	$-$	$-$
Invests in stock market	$+$	$+^{*}$	$-$	$+$	$-$	$+^{**}$
Warranty frequency	$-$	$+$	$-$	$-$	$-$	$-$
Risk factor	$+^{\dagger}$	$+$	$-$	$+$	$-$	$-$
Self-reported tolerance	$+$	$+$	$+$	$-$	$+$	

$^{***}: p < 0.01$, $^{**}: p < 0.05$, $^{*}: p < 0.10$. †: trust, gambling and investment all load strongly and positively onto this factor, suggesting a positive correlation with α, however, warranty purchase frequency also loads strongly and positively onto this factor. Among the 36 subjects who rode a bike in the last twelve months. Trust in others is measured in response to "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?" Gambling is measured in response to "In the past 12 months, have you gambled, either at a casino or amongst friends?" Preference for chance over skill is measured in response to "If you have gambled, do you prefer games of chance (like roulette) or games of skill (like poker)?" among the 41 subjects who have ever gambled. Forward looking behavior is measured in response to "If there is something unpleasant in your future, would you rather know exactly what it is and wait for it, or not know what it is and deal with it when it arises?" Stock market participation is measured as "Yes" or "No" for ever participating. Warranty purchasing is measured with reports of "Yes," "No," and "Sometimes" in response to "When you purchase expensive electronic products, do you purchase extended warranty policies?" among the 62 subjects that have purchased expensive electronics.

to-last row of the table, we present correlations of our risk measure with a constructed factor of risky behaviors. We do this by taking the risk variables that nearly the whole sample responds to (trust, gambling, forward looking, investing, and warranty frequency) and use factor analysis to construct a single measure that best represents the shared variation in these measures.[7] Trust, gambling and investing all load positively and strongly onto this factor, therefore we expect it to correlate positively with our measured α values.

Overall, our estimates of α do a poor job predicting risky behaviors. Recall that because of the design of our study, α is simply a re-scaled version of an individual's average choice on a task, and therefore we reach the same conclusion if we take a reduced-form approach to the data. The only statistically significant finding at a 1% level is that the HL estimate of α correlates with willingness to trust others in the expected direction. Because of the number of hypothesis tests, the

conservative.

[7]We use the largest factor from a Varimax rotation.

other marginally significant correlations we identify between the risk variables and α estimates are likely to be spurious. Self-reported risk tolerance predicts gambling and investment in the expected direction, but significance at 5% is marginal at best given the number of tests. Overall, we argue that the results paint a grim picture of the external validity of the preferences elicited with these tools.

However, there are clear differences between our four elicitation techniques, within the realm of techniques with poor predictive power. In addition to predicting trust in others, the sign of the risky behavior correlation matches the expected sign six out of seven times with the α_{HL} estimate, and is also matches the risk factor and the self-report. In fact, while we expected the correlation between warranty purchase and α to be negative, warranty purchase loads positively (and strongly) on to the risk factor, which does match its correlation with α_{HL}. The HL actually outperforms the self-report, which also predicts six of seven risky behavior measures, but does not match the risk factor. The UE has a similar success rate with risky behaviors, without any strong correlations, and does not match the self report. The other elicitation techniques substantially underperform: α_{CE} matches the expected sign four of seven times and does not match the risk factor, and α_{mCRB} matches the expected sign three of seven times and does not match the risk factor.

Practitioners in need of a quick, easy risk elicitation for their lab or fields study may be curious to know which, of the 24 elicitations of risk preference across four techniques, was the biggest positive outlier in terms of performance? Summing over the same risk variables we included in our risk factor (standardized), we add up the correlations between these variables and each of the 24 choices a subject made. Five of the top six tasks in terms of predicting these risky behaviors were HL tasks, with HL Task 4 performing the best overall.

4 Discussion

Charness et al. (2013) looks across many studies in both economics and psychology to assess risk preference elicitation techniques. They come to the conclusion that "Given their stylized nature... experiments may not be ideal for identifying levels of risk aversions, to the extent that the estimated risk preferences and parameters may not have predictive power for behavior across domains." We find evidence consistent with this in a within-subjects evaluation of four stylized techniques.

They predicted one another quite accurately: within the domain of stylized risk elicitations, these questions capture subjects' risk preferences. They performed poorly in predicting behavior across domains. While the popular HL technique fared the best, we expect there remains considerable improvement from a switch to themed, contextual elicitation.

One critique of this interpretation is that contextual factors that help determine risky behaviors should enter models through other avenues than risk preference. In other words, there should remain a risk preference parameter that is a fixed individual characteristic across scenarios that is modified by contextual factors. If this is the case, then either our existing stylized toolkit is not refined enough to detect that factor, or that factor plays such a small role relative to contextual modifiers that our goal of individual-level predictions from a stylized instrument is not attainable.

Some contextual risk elicitation tools already exist. Weber et al. (2002) developed the Domain-Specific Risk-Taking (DOSPERT) scale that uses 40 questions across five domains (financial, health, recreational, ethical, social). While not widely used in economics, it has had some notable success in predicting risky behavior in the relevant domain (Dohmen et al., 2010). Gneezy and Potters (1997) and Lejuez et al. (2002) developed techniques have been widely used in economics and psychology to measure investment and visceral risk preference, respectively. However, an unexplored avenue that may be useful across domains are contextual frames applied to standard stylized instruments. It may be relatively simple to adjust the Certainty Equivalent, for example, to risky health choices. I.e., "Would you prefer a treatment with probability p of a painless recovery, and probability $1 - p$ of a very painful recovery, or a treatment with a moderately painful recovery with certainty?" Such a technique exacerbates the problem of individual differences in utility across options (relative to choices with money consequences), but may offer a sharper control variable in laboratory and field applications.

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A Online Appendix: Subjects' Instructions and Decision Sheets

PARTICIPANT ID: ___

Hello and Welcome.

ELIGIBILITY FOR THIS STUDY: To be in this study, you must be a UCSD student. There are no other requirements. The study will be completely anonymous. We will not collect your name, student PID or any other identifying information. You have been assigned a participant number and it is on the note card in front of you. This number will be used throughout the study. Please inform us if you do not know or cannot read your participant number.

EARNING MONEY:

To begin, you will be given a $5 minimum payment. This $5 is yours. Whatever you earn from the study today will be added to this minimum payment. All payments will be made in cash at the end of the study today.

In this study you will make choices between various options. These decisions will be made in 4 separate blocks of tasks. Each block of tasks is different, and so new instructions will be read at the beginning of each task block.

Once all of the decision tasks have been completed, we will randomly select **one** decision as the ***decision that counts***. Whichever option you chose on that decision will determine how much you earn today (in addition to your $5 minimum payment). Since all decisions are equally likely to be chosen, you should treat each decision as though it will be the decision that counts.

THE TASKS:

Throughout the tasks, the options you must choose from involve chance. You will be fully informed of the chance involved for every decision. For example, OPTION A could be a 75 in 100 chance of receiving $10 and a 25 in 100 chance of receiving $20. This might be compared to OPTION B of a 50 in 100 chance of receiving $20 and a 50 in 100 chance of receiving $6. Imagine for a moment which one you would prefer. You have been provided with a calculator to help you in your decisions if you find it necessary. If this was chosen as the decision-that-counts, and you preferred OPTION A, we would then randomly choose a number from 1 to 100. This will be done by throwing two ten-sided die: one for the tens digit and one for the ones digit (0-0 will be 100). If the chosen number was between 1 and 75 (including 1 and 75) you would receive $10 (plus $5 minimum payment). If the number was between 76 and 100 (including 76 and 100) you would receive $20 (plus the $5 minimum payment). If, instead, you preferred OPTION B, we would again randomly choose a number from 1 to 100. If the chosen number was between 1 and 50 (including 1 and 50) you'd receive $6 (plus the $5 minimum payment). If the number was between 51 and 100 (including 51 and 100) you'd receive $20 (plus the $5 minimum payment).

In a moment we will begin the first task. In addition to choosing options that determine your payment, we will also be asking you about how confident you are in your choices. These questions will not affect your payment in any way.

Please wait to turn the page until you are instructed to do so. At the end of each block, we will wait for everyone to finish so that we can go over the instructions for the next block together. We would greatly appreciate if you do not continue past this point until instructed to do so, and that you do not look ahead at the next blocks and tasks.

BLOCK 1

On the following pages you will complete 6 tasks. In each task you are asked to make a series of decisions between two uncertain options: Option A and Option B.

In each task, Option A will be fixed, while Option B will vary. For example, in Task 1 Option A will be a 10 in 100 chance of $10 and a 90 in 100 chance of $30. This will remain the same for all decisions in the task. Option B will vary across decisions. Initially Option B will be a 9 in 100 chance of $0 and a 91 in 100 chance of $30. As you proceed, Option B will change. The chance of receiving $30 will increase, while the chance of receiving $0 will decrease.

For each row, all you have to do is decide whether you prefer Option A or Option B. Indicate your preference by checking the corresponding box. Most people begin by preferring Option A and then switch to Option B, so one way to view this task is to determine the best row to switch from Option A to Option B.

The first question from Task 1 is reproduced as an example.

EXAMPLE

	Option A				**Option B**		
	Chance of $10	Chance of $30			Chance of $0	Chance of $30	
1)	10 in 100	90 in 100	□	*or*	9 in 100	91 in 100	□
If you prefer Option A, fill in the box on the left…							
1)	10 in 100	90 in 100	■	*or*	9 in 100	91 in 100	□
If you prefer Option A, fill in the box on the right…							
1)	10 in 100	90 in 100	□	*or*	9 in 100	91 in 100	■

Remember, each decision could be the decision-that-counts. So, it is in your best interest to treat each decision as if it could be the one that determines your payments. Please wait to turn the page until you are instructed to do so.

TASK 1

On this page you will make a series of decisions between two uncertain options. Option A will be a 10 in 100 chance of $10 and a 90 in 100 chance of $30. Option B will vary across decisions: initially, Option B will be a 10 in 100 chance of $0 and a 90 in 100 chance of $30. As you proceed down the rows, Option B will change. The chance of receiving $0 will decrease, while the chance of receiving $30 will increase.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Notice that prior to row 1 Options A and B offer you the same chance of winning $30. Since most people would prefer the alternative of receiving $10 to the alternative of receiving $0, we checked Option A in this case. Notice also after row 9 Option B offers you $30 for sure. Since most people would prefer the sure gain of $30 to the 90 in 100 chance of $30, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**		
	Chance of $10	Chance of $30			Chance of $0	Chance of $30	
Example	10 in 100	90 in 100	■	*or*	10 in 100	90 in 100	□
1)	10 in 100	90 in 100	□	*or*	9 in 100	91 in 100	□
2)	10 in 100	90 in 100	□	*or*	8 in 100	92 in 100	□
3)	10 in 100	90 in 100	□	*or*	7 in 100	93 in 100	□
4)	10 in 100	90 in 100	□	*or*	6 in 100	94 in 100	□
5)	10 in 100	90 in 100	□	*or*	5 in 100	95 in 100	□
6)	10 in 100	90 in 100	□	*or*	4 in 100	96 in 100	□
7)	10 in 100	90 in 100	□	*or*	3 in 100	97 in 100	□
8)	10 in 100	90 in 100	□	*or*	2 in 100	98 in 100	□
9)	10 in 100	90 in 100	□	*or*	1 in 100	99 in 100	□
Example	10 in 100	90 in 100	□	*or*	0 in 100	100 in 100	■

TASK 2

On this page you will make a series of decisions between two uncertain options. Option A will be a 25 in 100 chance of $10 and a 75 in 100 chance of $30. Option B will vary across decisions: initially, Option B will be a 25 in 100 chance of $0 and a 75 in 100 chance of $30. As you proceed down the rows, Option B will change. The chance of receiving $0 will decrease, while the chance of receiving $30 will increase.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Notice that prior to row 1 Options A and B offer you the same odds of winning $30. Since most people would prefer the alternative of receiving $10 to the alternative of receiving $0, we checked Option A in this case. Notice also after row 13 Option B offers you $30 for sure. Since most people would prefer the sure gain of $30 to the 75 in 100 chance of $30, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**		
	Chance of $10	Chance of $30			Chance of $0	Chance of $30	
Example	25 in 100	75 in 100	■	*or*	25 in 100	75 in 100	□
1)	25 in 100	75 in 100	□	*or*	19 in 100	81 in 100	□
2)	25 in 100	75 in 100	□	*or*	18 in 100	82 in 100	□
3)	25 in 100	75 in 100	□	*or*	17 in 100	83 in 100	□
4)	25 in 100	75 in 100	□	*or*	16 in 100	84 in 100	□
5)	25 in 100	75 in 100	□	*or*	15 in 100	85 in 100	□
6)	25 in 100	75 in 100	□	*or*	14 in 100	86 in 100	□
7)	25 in 100	75 in 100	□	*or*	13 in 100	87 in 100	□
8)	25 in 100	75 in 100	□	*or*	12 in 100	88 in 100	□
9)	25 in 100	75 in 100	□	*or*	11 in 100	89 in 100	□
10)	25 in 100	75 in 100	□	*or*	10 in 100	90 in 100	□
Example	25 in 100	75 in 100	□	*or*	0 in 100	100 in 100	■

TASK 3

On this page you will make a series of decisions between two uncertain options. Option A will be a 40 in 100 chance of $10 and a 60 in 100 chance of $30. Option B will vary across decisions: initially, Option B will be a 40 in 100 chance of $0 and a 60 in 100 chance of $30. As you proceed down the rows, Option B will change. The chance of receiving $0 will decrease, while the chance of receiving $30 will increase.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Notice that prior to row 1 Options A and B offer you the same odds of winning $30. Since most people would prefer the alternative of receiving $10 to the alternative of receiving $0, we checked Option A in this case. Notice also after row 10 Option B offers you $30 for sure. Since most people would prefer the sure gain of $30 to the 60 in 100 chance of $30, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**		
	Chance of $10	Chance of $30			Chance of $0	Chance of $30	
Example	40 in 100	60 in 100	■	*or*	40 in 100	60 in 100	□
1)	40 in 100	60 in 100	□	*or*	31 in 100	69 in 100	□
2)	40 in 100	60 in 100	□	*or*	30 in 100	70 in 100	□
3)	40 in 100	60 in 100	□	*or*	29 in 100	71 in 100	□
4)	40 in 100	60 in 100	□	*or*	28 in 100	72 in 100	□
5)	40 in 100	60 in 100	□	*or*	26 in 100	74 in 100	□
6)	40 in 100	60 in 100	□	*or*	24 in 100	76 in 100	□
7)	40 in 100	60 in 100	□	*or*	22 in 100	78 in 100	□
8)	40 in 100	60 in 100	□	*or*	20 in 100	80 in 100	□
9)	40 in 100	60 in 100	□	*or*	18 in 100	82 in 100	□
10)	40 in 100	60 in 100	□	*or*	16 in 100	84 in 100	□
Example	40 in 100	60 in 100	□	*or*	0 in 100	100 in 100	■

TASK 4

On this page you will make a series of decisions between two uncertain options. Option A will be a 60 in 100 chance of $10 and a 40 in 100 chance of $30. Option B will vary across decisions: initially, Option B will be a 60 in 100 chance of $0 and a 40 in 100 chance of $30. As you proceed down the rows, Option B will change. The chance of receiving $0 will decrease, while the chance of receiving $30 will increase.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Notice that prior to row 1 Options A and B offer you the same odds of winning $30. Since most people would prefer the alternative of receiving $10 to the alternative of receiving $0, we checked Option A in this case. Notice also after row 10 Option B offers you $30 for sure. Since most people would prefer the sure gain of $30 to the 40 in 100 chance of $30, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**		
	Chance of $10	Chance of $30			Chance of $0	Chance of $30	
Example	60 in 100	40 in 100	■	*or*	60 in 100	40 in 100	□
1)	60 in 100	40 in 100	□	*or*	47 in 100	53 in 100	□
2)	60 in 100	40 in 100	□	*or*	45 in 100	55 in 100	□
3)	60 in 100	40 in 100	□	*or*	43 in 100	57 in 100	□
4)	60 in 100	40 in 100	□	*or*	41 in 100	59 in 100	□
5)	60 in 100	40 in 100	□	*or*	39 in 100	61 in 100	□
6)	60 in 100	40 in 100	□	*or*	36 in 100	64 in 100	□
7)	60 in 100	40 in 100	□	*or*	33 in 100	67 in 100	□
8)	60 in 100	40 in 100	□	*or*	30 in 100	70 in 100	□
9)	60 in 100	40 in 100	□	*or*	27 in 100	73 in 100	□
10)	60 in 100	40 in 100	□	*or*	23 in 100	77 in 100	□
Example	60 in 100	40 in 100	□	*or*	0 in 100	100 in 100	■

TASK 5

On this page you will make a series of decisions between two uncertain options. Option A will be a 75 in 100 chance of $10 and a 25 in 100 chance of $30. Option B will vary across decisions: initially, Option B will be a 75 in 100 chance of $0 and a 25 in 100 chance of $30. As you proceed down the rows, Option B will change. The chance of receiving $0 will decrease, while the chance of receiving $30 will increase.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Notice that prior to row 1 Options A and B offer you the same odds of winning $30. Since most people would prefer the alternative of receiving $10 to the alternative of receiving $0, we checked Option A in this case. Notice also after row 10 Option offers you $30 for sure. Since most people would prefer the sure gain of $30 to the 25 in 100 chance of $30, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**		
	Chance of $10	Chance of $30			Chance of $0	Chance of $30	
Example	75 in 100	25 in 100	■	*or*	75 in 100	25 in 100	□
1)	75 in 100	25 in 100	□	*or*	58 in 100	42 in 100	□
2)	75 in 100	25 in 100	□	*or*	56 in 100	44 in 100	□
3)	75 in 100	25 in 100	□	*or*	54 in 100	46 in 100	□
4)	75 in 100	25 in 100	□	*or*	52 in 100	48 in 100	□
5)	75 in 100	25 in 100	□	*or*	49 in 100	51 in 100	□
6)	75 in 100	25 in 100	□	*or*	46 in 100	54 in 100	□
7)	75 in 100	25 in 100	□	*or*	42 in 100	58 in 100	□
8)	75 in 100	25 in 100	□	*or*	38 in 100	62 in 100	□
9)	75 in 100	25 in 100	□	*or*	34 in 100	66 in 100	□
10)	75 in 100	25 in 100	□	*or*	30 in 100	70 in 100	□
Example	75 in 100	25 in 100	□	*or*	0 in 100	100 in 100	■

TASK 6

On this page you will make a series of decisions between two uncertain options. Option A will be a 90 in 100 chance of $10 and a 10 in 100 chance of $30. Option B will vary across decisions: initially, Option B will be a 90 in 100 chance of $0 and a 10 in 100 chance of $30. As you proceed down the rows, Option B will change. The chance of receiving $0 will decrease, while the chance of receiving $30 will increase.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Notice that prior to row 1 Options A and B offer you the same odds of winning $30. Since most people would prefer the alternative of receiving $10 to the alternative of receiving $0, we checked Option A in this case. Notice also after row 10 Option B offers you $30 for sure. Since most people would prefer the sure gain of $30 to the 10 in 100 chance of $30, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**		
	Chance of $10	Chance of $30			Chance of $0	Chance of $30	
Example	90 in 100	10 in 100	■	*or*	90 in 100	10 in 100	□
1)	90 in 100	10 in 100	□	*or*	69 in 100	31 in 100	□
2)	90 in 100	10 in 100	□	*or*	67 in 100	33 in 100	□
3)	90 in 100	10 in 100	□	*or*	65 in 100	35 in 100	□
4)	90 in 100	10 in 100	□	*or*	62 in 100	38 in 100	□
5)	90 in 100	10 in 100	□	*or*	59 in 100	41 in 100	□
6)	90 in 100	10 in 100	□	*or*	55 in 100	45 in 100	□
7)	90 in 100	10 in 100	□	*or*	51 in 100	49 in 100	□
8)	90 in 100	10 in 100	□	*or*	46 in 100	54 in 100	□
9)	90 in 100	10 in 100	□	*or*	41 in 100	59 in 100	□
10)	90 in 100	10 in 100	□	*or*	35 in 100	65 in 100	□
Example	90 in 100	10 in 100	□	*or*	0 in 100	100 in 100	■

You have now completed the first block of tasks. We will wait for others to finish before we begin the second block. At this point, please do not go back to change choices you have already made.

About the decisions you made in block 1: on a scale of 1 to 5, where a 1 indicates least confident and a 5 indicates most confident, please rate how confident you feel about your choices in block 1? Circle the number below to indicate your answer:

1	2	3	4	5
(I was just guessing)				(I knew exactly what I was doing)

Please wait to turn the page until you are instructed to do so.

BLOCK 2

On the following pages you will complete 6 tasks. In each task you are asked to make a decision between ten uncertain options: Option1 through Option 10.

In each task, each option will offer you an amount, in dollars, and a chance of winning that amount. In each task, all ten options will present you with a different combination of amounts and chances. Higher amounts always come with a lower chance of winning and lower amounts always come with a higher chance of winning. Option 1 at the top, will always offer the lowest amount and the highest probability. As you move down, towards Option 10, the amounts will go up, but the chances of winning will go down.

For each task, all you have to do is decide which option is you prefer most. Indicate your preference by checking the corresponding box.

Task 1 is reproduced as an example on the next page.

Remember, each decision could be the decision-that-counts. So, it is in your best interest to treat each decision as if it could be the one that determines your payments.

EXAMPLE

Options					Check the *one* box for the Option you prefer *most*
1.	Win	$11.10	with chance	83 in 100	□
2.	Win	$12.60	with chance	78 in 100	□
3.	Win	$14.10	with chance	73 in 100	□
4.	Win	$15.30	with chance	69 in 100	□
5.	Win	$16.50	with chance	65 in 100	□
6.	Win	$17.70	with chance	61 in 100	□
7.	Win	$18.60	with chance	58 in 100	□
8.	Win	$19.20	with chance	56 in 100	□
9.	Win	$19.80	with chance	54 in 100	□
10.	Win	$20.70	with chance	51 in 100	□

If Option 1 is your most preferred, fill in the box associated with it on the right…

1.	Win	$11.10	with chance	83 in 100	■

If Option 10 is your most preferred, fill in the box associated with it on the right…

10.	Win	$20.70	with chance	51 in 100	■

If any of the other options is your most preferred, fill in the box associated with that option in the column on the right.

Please wait to turn the page until you are instructed to do so.

TASK 1

On this page you will make a decision between ten options. Each option offers you an amount you can win and a chance of winning it. As you move from Option 1 at the top to Option 10 on the bottom, the amount you can win goes up but the chance of winning it goes down. The higher the amount you choose, the lower the chance you win it.

For this task, all you have to do is decide which option you prefer most. Indicate your preference by filling in the _one_ box next to your _most_ preferred option.

Options					Check the _one_ box for the Option you prefer _most_
1.	Win	$11.10	with chance	83 in 100	☐
2.	Win	$12.60	with chance	78 in 100	☐
3.	Win	$14.10	with chance	73 in 100	☐
4.	Win	$15.30	with chance	69 in 100	☐
5.	Win	$16.50	with chance	65 in 100	☐
6.	Win	$17.70	with chance	61 in 100	☐
7.	Win	$18.60	with chance	58 in 100	☐
8.	Win	$19.20	with chance	56 in 100	☐
9.	Win	$19.80	with chance	54 in 100	☐
10.	Win	$20.70	with chance	51 in 100	☐

TASK 2

On this page you will make a decision between ten options. Each option offers you an amount you can win and a chance of winning it. As you move from Option 1 at the top to Option 10 on the bottom, the amount you can win goes up but the chance of winning it goes down. The higher the amount you choose, the lower the chance you win it.

For this task, all you have to do is decide which option you prefer most. Indicate your preference by filling in the *one* box next to your *most* preferred option.

Options					Check the *one* box for the Option you prefer *most*
1.	Win	$11.50	with chance	49 in 100	☐
2.	Win	$13.00	with chance	46 in 100	☐
3.	Win	$14.50	with chance	43 in 100	☐
4.	Win	$15.50	with chance	41 in 100	☐
5.	Win	$16.50	with chance	39 in 100	☐
6.	Win	$17.50	with chance	37 in 100	☐
7.	Win	$18.50	with chance	35 in 100	☐
8.	Win	$19.50	with chance	33 in 100	☐
9.	Win	$20.00	with chance	32 in 100	☐
10.	Win	$20.50	with chance	31 in 100	☐

TASK 3

On this page you will make a decision between ten options. Each option offers you an amount you can win and a chance of winning it. As you move from Option 1 at the top to Option 10 on the bottom, the amount you can win goes up but the chance of winning it goes down. The higher the amount you choose, the lower the chance you win it.

For this task, all you have to do is decide which option you prefer most. Indicate your preference by filling in the _one_ box next to your _most_ preferred option.

Options					Check the _one_ box for the Option you prefer _most_
1.	Win	$18.50	with chance	83 in 100	☐
2.	Win	$21.00	with chance	78 in 100	☐
3.	Win	$23.50	with chance	73 in 100	☐
4.	Win	$25.50	with chance	69 in 100	☐
5.	Win	$27.50	with chance	65 in 100	☐
6.	Win	$29.50	with chance	61 in 100	☐
7.	Win	$31.00	with chance	58 in 100	☐
8.	Win	$32.00	with chance	56 in 100	☐
9.	Win	$33.00	with chance	54 in 100	☐
10.	Win	$34.50	with chance	51 in 100	☐

TASK 4

On this page you will make a decision between ten options. Each option offers you an amount you can win and a chance of winning it. As you move from Option 1 at the top to Option 10 on the bottom, the amount you can win goes up but the chance of winning it goes down. The higher the amount you choose, the lower the chance you win it.

For this task, all you have to do is decide which option you prefer most. Indicate your preference by filling in the *one* box next to your *most* preferred option.

Options					Check the *one* box for the Option you prefer *most*
1.	Win	$15.00	with chance	66 in 100	☐
2.	Win	$17.00	with chance	62 in 100	☐
3.	Win	$19.00	with chance	58 in 100	☐
4.	Win	$20.50	with chance	55 in 100	☐
5.	Win	$22.00	with chance	52 in 100	☐
6.	Win	$23.50	with chance	49 in 100	☐
7.	Win	$24.50	with chance	47 in 100	☐
8.	Win	$25.50	with chance	45 in 100	☐
9.	Win	$26.50	with chance	43 in 100	☐
10.	Win	$27.50	with chance	41 in 100	☐

;[‘

TASK 5

On this page you will make a decision between ten options. Each option offers you an amount you can win and a chance of winning it. As you move from Option 1 at the top to Option 10 on the bottom, the amount you can win goes up but the chance of winning it goes down. The higher the amount you choose, the lower the chance you win it.

For this task, all you have to do is decide which option you prefer most. Indicate your preference by filling in the *one* box next to your *most* preferred option.

Options					Check the *one* box for the Option you prefer *most*
1.	Win	$23.00	with chance	49 in 100	◻
2.	Win	$26.00	with chance	46 in 100	◻
3.	Win	$29.00	with chance	43 in 100	◻
4.	Win	$31.00	with chance	41 in 100	◻
5.	Win	$33.00	with chance	39 in 100	◻
6.	Win	$35.00	with chance	37 in 100	◻
7.	Win	$37.00	with chance	35 in 100	◻
8.	Win	$39.00	with chance	33 in 100	◻
9.	Win	$40.00	with chance	32 in 100	◻
10.	Win	$41.00	with chance	31 in 100	◻

TASK 6

On this page you will make a decision between ten options. Each option offers you an amount you can win and a chance of winning it. As you move from Option 1 at the top to Option 10 on the bottom, the amount you can win goes up but the chance of winning it goes down. The higher the amount you choose, the lower the chance you win it.

For this task, all you have to do is decide which option you prefer most. Indicate your preference by filling in the *one* box next to your *most* preferred option.

Options					Check the *one* box for the Option you prefer *most*
1.	Win	$15.00	with chance	33 in 100	☐
2.	Win	$17.00	with chance	31 in 100	☐
3.	Win	$19.00	with chance	29 in 100	☐
4.	Win	$20.00	with chance	28 in 100	☐
5.	Win	$22.00	with chance	26 in 100	☐
6.	Win	$23.00	with chance	25 in 100	☐
7.	Win	$24.00	with chance	24 in 100	☐
8.	Win	$25.00	with chance	23 in 100	☐
9.	Win	$26.00	with chance	22 in 100	☐
10.	Win	$27.00	with chance	21 in 100	☐

You have now completed the second block of tasks. We will wait for others to finish before we begin the third block. At this point, please do not go back to change choices you have already made.

About the decisions you made in block 2: on a scale of 1 to 5, where a 1 indicates least confident and a 5 indicates most confident, please rate how confident you feel about your choices in block 2? Circle the number below to indicate your answer:

1	2	3	4	5
(I was just guessing)				(I knew exactly what I was doing)

Please wait to turn the page until you are instructed to do so.

BLOCK 3

On the following pages you will complete 6 tasks. In each task you are asked to make a series of decisions between two options: Option A and Option B.

In each task, Option A will be fixed, while Option B will vary. For example, in Task 1, Option A will be a 10 in 100 chance of $30 and a 90 in 100 chance of $0. This will remain the same for all decisions in the task. Option B will always be a sure amount. Initially, Option B will be $0 for sure. As you proceed down the rows, Option B will change: the sure amount will increase.

For each row, all you have to do is decide whether you prefer Option A or Option B. Indicate your preference by filling in the corresponding box. Most people begin by preferring Option A and then switch to Option B at some point, so one way to view this task is to determine the best row to switch from Option A to Option B.

The first question from Task 1 is reproduced as an example.

EXAMPLE

	Option A				**Option B**	
	Chance of $30	Chance of $0			Sure Amount	
1)	10 in 100	90 in 100	□	*or*	$0.20 for sure	□

If you prefer Option A, fill in the box on the left…

1)	10 in 100	90 in 100	■	*or*	$0.20 for sure	□

If you prefer Option A, fill in the box on the right…

1)	10 in 100	90 in 100	□	*or*	$0.20 for sure	■

Remember, each decision could be the decision-that-counts. So, it is in your best interest to treat each decision as if it could be the one that determines your payments. Please wait to turn the page until you are instructed to do so.

TASK 1

On this page you will make a series of decisions between two options. Option A will be a 10 in 100 chance of $30 and a 90 in 100 chance of $0. Option B will vary across decisions. Initially, Option B will be $0 for sure. As you proceed down the rows, Option B will change: the sure amount will increase.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Before row 1, since most people would prefer the possibility of receiving $30 to the receiving $0 for sure, we checked Option A in this case. After row 10, since most people would prefer $30 for sure to the possibility of $30, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**	
	Chance of $30	Chance of $0			Sure Amount	
Example	10 in 100	90 in 100	■	*or*	$0.00 for sure	□
1)	10 in 100	90 in 100	□	*or*	$0.20 for sure	□
2)	10 in 100	90 in 100	□	*or*	$0.45 for sure	□
3)	10 in 100	90 in 100	□	*or*	$0.85 for sure	□
4)	10 in 100	90 in 100	□	*or*	$1.40 for sure	□
5)	10 in 100	90 in 100	□	*or*	$2.00 for sure	□
6)	10 in 100	90 in 100	□	*or*	$2.65 for sure	□
7)	10 in 100	90 in 100	□	*or*	$3.35 for sure	□
8)	10 in 100	90 in 100	□	*or*	$4.05 for sure	□
9)	10 in 100	90 in 100	□	*or*	$4.75 for sure	□
10)	10 in 100	90 in 100	□	*or*	$5.45 for sure	□
Example	10 in 100	90 in 100	□	*or*	$30.00 for sure	■

TASK 2

On this page you will make a series of decisions between two options. Option A will be a 25 in 100 chance of $30 and a 75 in 100 chance of $0. Option B will vary across decisions. Initially, Option B will be $0 for sure. As you proceed down the rows, Option B will change: the sure amount will increase.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Before row 1, since most people would prefer the possibility of receiving $30 to the receiving $0 for sure, we checked Option A in this case. After row 10, since most people would prefer $30 for sure to the possibility of $30, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**	
	Chance of $30	Chance of $0			Sure Amount	
Example	25 in 100	75 in 100	■	*or*	$0.00 for sure	□
1)	25 in 100	75 in 100	□	*or*	$1.40 for sure	□
2)	25 in 100	75 in 100	□	*or*	$2.45 for sure	□
3)	25 in 100	75 in 100	□	*or*	$3.55 for sure	□
4)	25 in 100	75 in 100	□	*or*	$4.70 for sure	□
5)	25 in 100	75 in 100	□	*or*	$5.85 for sure	□
6)	25 in 100	75 in 100	□	*or*	$6.95 for sure	□
7)	25 in 100	75 in 100	□	*or*	$8.00 for sure	□
8)	25 in 100	75 in 100	□	*or*	$8.95 for sure	□
9)	25 in 100	75 in 100	□	*or*	$9.85 for sure	□
10)	25 in 100	75 in 100	□	*or*	$10.70 for sure	□
Example	25 in 100	75 in 100	□	*or*	$30.00 for sure	■

TASK 3

On this page you will make a series of decisions between two options. Option A will be a 40 in 100 chance of $30 and a 60 in 100 chance of $0. Option B will vary across decisions. Initially, Option B will be $0 for sure. As you proceed down the rows, Option B will change: the sure amount will increase.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Before row 1, since most people would prefer the possibility of receiving $30 to the receiving $0 for sure, we checked Option A in this case. After row 10, since most people would prefer $30 for sure to the possibility of $30, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**	
	Chance of $30	Chance of $0			Sure Amount	
Example	40 in 100	60 in 100	■	*or*	$0.00 for sure	□
1)	40 in 100	60 in 100	□	*or*	$3.90 for sure	□
2)	40 in 100	60 in 100	□	*or*	$5.65 for sure	□
3)	40 in 100	60 in 100	□	*or*	$7.30 for sure	□
4)	40 in 100	60 in 100	□	*or*	$8.80 for sure	□
5)	40 in 100	60 in 100	□	*or*	$10.15 for sure	□
6)	40 in 100	60 in 100	□	*or*	$11.40 for sure	□
7)	40 in 100	60 in 100	□	*or*	$12.50 for sure	□
8)	40 in 100	60 in 100	□	*or*	$13.50 for sure	□
9)	40 in 100	60 in 100	□	*or*	$14.40 for sure	□
10)	40 in 100	60 in 100	□	*or*	$15.20 for sure	□
Example	40 in 100	60 in 100	□	*or*	$30.00 for sure	■

TASK 4

On this page you will make a series of decisions between two options. Option A will be a 60 in 100 chance of $30 and a 40 in 100 chance of $0. Option B will vary across decisions. Initially, Option B will be $0 for sure. As you proceed down the rows, Option B will change: the sure amount will increase.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Before row 1, since most people would prefer the possibility of receiving $30 to the receiving $0 for sure, we checked Option A in this case. After row 10, since most people would prefer $30 for sure to the possibility of $30, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**	
	Chance of $30	Chance of $0			Sure Amount	
Example	60 in 100	40 in 100	■	*or*	$0.00 for sure	□
1)	60 in 100	40 in 100	□	*or*	$9.60 for sure	□
2)	60 in 100	40 in 100	□	*or*	$11.80 for sure	□
3)	60 in 100	40 in 100	□	*or*	$13.65 for sure	□
4)	60 in 100	40 in 100	□	*or*	$15.15 for sure	□
5)	60 in 100	40 in 100	□	*or*	$16.40 for sure	□
6)	60 in 100	40 in 100	□	*or*	$17.50 for sure	□
7)	60 in 100	40 in 100	□	*or*	$18.45 for sure	□
8)	60 in 100	40 in 100	□	*or*	$19.25 for sure	□
9)	60 in 100	40 in 100	□	*or*	$19.95 for sure	□
10)	60 in 100	40 in 100	□	*or*	$20.55 for sure	□
Example	60 in 100	40 in 100	□	*or*	$30.00 for sure	■

TASK 5

On this page you will make a series of decisions between two options. Option A will be a 75 in 100 chance of $30 and a 25 in 100 chance of $0. Option B will vary across decisions. Initially, Option B will be $0 for sure. As you proceed down the rows, Option B will change: the sure amount will increase.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Before row 1, since most people would prefer the possibility of receiving $30 to the receiving $0 for sure, we checked Option A in this case. After row 10, since most people would prefer $30 for sure to the possibility of $30, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**	
	Chance of $30	Chance of $0			Sure Amount	
Example	75 in 100	25 in 100	■	*or*	$0.00 for sure	□
1)	75 in 100	25 in 100	□	*or*	$15.75 for sure	□
2)	75 in 100	25 in 100	□	*or*	$17.75 for sure	□
3)	75 in 100	25 in 100	□	*or*	$19.25 for sure	□
4)	75 in 100	25 in 100	□	*or*	$20.40 for sure	□
5)	75 in 100	25 in 100	□	*or*	$21.35 for sure	□
6)	75 in 100	25 in 100	□	*or*	$22.15 for sure	□
7)	75 in 100	25 in 100	□	*or*	$22.80 for sure	□
8)	75 in 100	25 in 100	□	*or*	$23.35 for sure	□
9)	75 in 100	25 in 100	□	*or*	$23.80 for sure	□
10)	75 in 100	25 in 100	□	*or*	$24.20 for sure	□
Example	75 in 100	25 in 100	□	*or*	$30.00 for sure	■

TASK 6

On this page you will make a series of decisions between two options. Option A will be a 90 in 100 chance of $30 and a 10 in 100 chance of $0. Option B will vary across decisions. Initially, Option B will be $0 for sure. As you proceed down the rows, Option B will change: the sure amount will increase.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Before row 1, since most people would prefer the possibility of receiving $30 to the receiving $0 for sure, we checked Option A in this case. After row 10, since most people would prefer $30 for sure to the possibility of $30, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**	
	Chance of $30	Chance of $0			Sure Amount	
Example	90 in 100	10 in 100	■	*or*	$0.00 for sure	□
1)	90 in 100	10 in 100	□	*or*	$23.70 for sure	□
2)	90 in 100	10 in 100	□	*or*	$24.75 for sure	□
3)	90 in 100	10 in 100	□	*or*	$25.50 for sure	□
4)	90 in 100	10 in 100	□	*or*	$26.05 for sure	□
5)	90 in 100	10 in 100	□	*or*	$26.50 for sure	□
6)	90 in 100	10 in 100	□	*or*	$26.85 for sure	□
7)	90 in 100	10 in 100	□	*or*	$27.15 for sure	□
8)	90 in 100	10 in 100	□	*or*	$27.40 for sure	□
9)	90 in 100	10 in 100	□	*or*	$27.60 for sure	□
10)	90 in 100	10 in 100	□	*or*	$27.75 for sure	□
Example	90 in 100	10 in 100	□	*or*	$30.00 for sure	■

You have now completed the third block of tasks. We will wait for others to finish before we begin the fourth block. At this point, please do not go back to change choices you have already made.

About the decisions you made in block 3: on a scale of 1 to 5, where a 1 indicates least confident and a 5 indicates most confident, please rate how confident you feel about your choices in block 3? Circle the number below to indicate your answer:

1	2	3	4	5
(I was just guessing)				(I knew exactly what I was doing)

Please wait to turn the page until you are instructed to do so.

BLOCK 4

On the following pages you will complete 6 tasks. In each task you are asked to make a series of decisions between two uncertain options: Option A and Option B.

In each task, both Option A and Option B will vary. For example, in Task 1, question 1 Option A will be a 34 in 100 chance of $15 and a 66 in 100 chance of $12 Option B will be a 34 in 100 chance of $28.88 and a 66 in 100 chance of $0.75. As you proceed, both Option A and Option B will change. For Option A, the chance of receiving $15 will increase and the chance of receiving $12 will decrease. For Option B, the chance of receiving $28.88 will increase, while the chance of receiving $0.75 will decrease.

For each row, all you have to do is decide whether you prefer Option A or Option B. Most people begin by preferring Option A and then switch to Option B, so one way to view this task is to determine the best row to switch from Option A to Option B.

The first question from Task 1 is reproduced as an example.

EXAMPLE

	Option A				**Option B**		
	Chance of $15	Chance of $12			Chance of $28.88	Chance of $0.75	
1)	34 in 100	66 in 100	□	*or*	34 in 100	66 in 100	□
If you prefer Option A, fill in the box on the left…							
1)	34 in 100	66 in 100	■	*or*	34 in 100	66 in 100	□
If you prefer Option A, fill in the box on the right…							
1)	34 in 100	66 in 100	□	*or*	34 in 100	66 in 100	■

Remember, each decision could be the decision-that-counts. So, it is in your best interest to treat each decision as if it could be the one that determines your payments. Please wait to turn the page until you are instructed to do so.

TASK 1

On this page you will make a series of decisions between two uncertain options. Option A involves payments of $15 and $12. Option B involves payments of $28.88 and $0.75. As you proceed, both Option A and Option B will change. For Option A, the chance of receiving $15 will increase and the chance of receiving $12 will decrease. For Option B, the chance of receiving $28.88 will increase, while the chance of receiving $0.75 will decrease.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Notice that prior to row 1, Option A offers you $12 for sure and Option B offers you $0.75 for sure. Since most people would prefer receiving $12 to receiving $0.75, we checked Option A in this case. Notice also after row 10, Option A offers you $15 for sure and Option B offers you $28.88 for sure. Since most people would prefer receiving $28.88 to receiving $15, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**		
	Chance of $15	Chance of $12			Chance of $28.88	Chance of $0.75	
Example	0 in 100	100 in 100	■	*or*	0 in 100	100 in 100	□
1)	34 in 100	66 in 100	□	*or*	34 in 100	66 in 100	□
2)	37 in 100	63 in 100	□	*or*	37 in 100	63 in 100	□
3)	40 in 100	60 in 100	□	*or*	40 in 100	60 in 100	□
4)	43 in 100	57 in 100	□	*or*	43 in 100	57 in 100	□
5)	46 in 100	54 in 100	□	*or*	46 in 100	54 in 100	□
6)	50 in 100	50 in 100	□	*or*	50 in 100	50 in 100	□
7)	54 in 100	46 in 100	□	*or*	54 in 100	46 in 100	□
8)	58 in 100	42 in 100	□	*or*	58 in 100	42 in 100	□
9)	62 in 100	38 in 100	□	*or*	62 in 100	38 in 100	□
10)	65 in 100	35 in 100	□	*or*	65 in 100	35 in 100	□
Example	100 in 100	0 in 100	□	*or*	100 in 100	0 in 100	■

TASK 2

On this page you will make a series of decisions between two uncertain options. Option A involves payments of $11.25 and $7.50. Option B involves payments of $20 and $2.50. As you proceed, both Option A and Option B will change. For Option A, the chance of receiving $11.25 will increase and the chance of receiving $7.50 will decrease. For Option B, the chance of receiving $20 will increase, while the chance of receiving $2.50 will decrease.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Notice that prior to row 1, Option A offers you $7.50 for sure and Option B offers you $2.50 for sure. Since most people would prefer receiving $7.50 to receiving $2.50, we checked Option A in this case. Notice also after row 10, Option A offers you $11.25 for sure and Option B offers you $20 for sure. Since most people would prefer receiving $20 to receiving $11.25, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**		
	Chance of $11.25	Chance of $7.50			Chance of $20	Chance of $2.50	
Example	0 in 100	100 in 100	■	*or*	0 in 100	100 in 100	□
1)	28 in 100	72 in 100	□	*or*	28 in 100	72 in 100	□
2)	30 in 100	70 in 100	□	*or*	30 in 100	70 in 100	□
3)	32 in 100	68 in 100	□	*or*	32 in 100	68 in 100	□
4)	35 in 100	65 in 100	□	*or*	35 in 100	65 in 100	□
5)	38 in 100	62 in 100	□	*or*	38 in 100	62 in 100	□
6)	41 in 100	59 in 100	□	*or*	41 in 100	59 in 100	□
7)	44 in 100	56 in 100	□	*or*	44 in 100	56 in 100	□
8)	47 in 100	53 in 100	□	*or*	47 in 100	53 in 100	□
9)	50 in 100	50 in 100	□	*or*	50 in 100	50 in 100	□
10)	53 in 100	47 in 100	□	*or*	53 in 100	47 in 100	□
Example	100 in 100	0 in 100	□	*or*	100 in 100	0 in 100	■

TASK 3

On this page you will make a series of decisions between two uncertain options. Option A involves payments of $20 and $16. Option B involves payments of $38.50 and $1. As you proceed, both Option A and Option B will change. For Option A, the chance of receiving $20 will increase and the chance of receiving $16 will decrease. For Option B, the chance of receiving $38.50 will increase, while the chance of receiving $1 will decrease.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Notice that prior to row 1, Option A offers you $16 for sure and Option B offers you $1 for sure. Since most people would prefer receiving $16 to receiving $1, we checked Option A in this case. Notice also after row 10, Option A offers you $20 for sure and Option B offers you $38.50 for sure. Since most people would prefer receiving $38.50 to receiving $20, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**		
	Chance of $20	Chance of $16			Chance of $38.50	Chance of $1	
Example	0 in 100	100 in 100	■	*or*	0 in 100	100 in 100	□
1)	34 in 100	66 in 100	□	*or*	34 in 100	66 in 100	□
2)	37 in 100	63 in 100	□	*or*	37 in 100	63 in 100	□
3)	40 in 100	60 in 100	□	*or*	40 in 100	60 in 100	□
4)	43 in 100	57 in 100	□	*or*	43 in 100	57 in 100	□
5)	46 in 100	54 in 100	□	*or*	46 in 100	54 in 100	□
6)	50 in 100	50 in 100	□	*or*	50 in 100	50 in 100	□
7)	54 in 100	46 in 100	□	*or*	54 in 100	46 in 100	□
8)	58 in 100	42 in 100	□	*or*	58 in 100	42 in 100	□
9)	62 in 100	38 in 100	□	*or*	62 in 100	38 in 100	□
10)	65 in 100	35 in 100	□	*or*	65 in 100	35 in 100	□
Example	100 in 100	0 in 100	□	*or*	100 in 100	0 in 100	■

TASK 4

On this page you will make a series of decisions between two uncertain options. Option A involves payments of $16.88 and $11.25. Option B involves payments of $30 and $3.75. As you proceed, both Option A and Option B will change. For Option A, the chance of receiving $16.88 will increase and the chance of receiving $11.25 will decrease. For Option B, the chance of receiving $30 will increase, while the chance of receiving $3.75 will decrease.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Notice that prior to row 1, Option A offers you $11.25 for sure and Option B offers you $3.75 for sure. Since most people would prefer receiving $11.25 to receiving $3.75, we checked Option A in this case. Notice also after row 10, Option A offers you $16.88 for sure and Option B offers you $30 for sure. Since most people would prefer receiving $30 to receiving $16.88, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**		
	Chance of $16.88	Chance of $11.25			Chance of $30	Chance of $3.75	
Example	0 in 100	100 in 100	■	*or*	0 in 100	100 in 100	□
1)	28 in 100	72 in 100	□	*or*	28 in 100	72 in 100	□
2)	30 in 100	70 in 100	□	*or*	30 in 100	70 in 100	□
3)	32 in 100	68 in 100	□	*or*	32 in 100	68 in 100	□
4)	35 in 100	65 in 100	□	*or*	35 in 100	65 in 100	□
5)	38 in 100	62 in 100	□	*or*	38 in 100	62 in 100	□
6)	41 in 100	59 in 100	□	*or*	41 in 100	59 in 100	□
7)	44 in 100	56 in 100	□	*or*	44 in 100	56 in 100	□
8)	47 in 100	53 in 100	□	*or*	47 in 100	53 in 100	□
9)	50 in 100	50 in 100	□	*or*	50 in 100	50 in 100	□
10)	53 in 100	47 in 100	□	*or*	53 in 100	47 in 100	□
Example	100 in 100	0 in 100	□	*or*	100 in 100	0 in 100	■

TASK 5

On this page you will make a series of decisions between two uncertain options. Option A involves payments of $10 and $8. Option B involves payments of $19.25 and $0.50. As you proceed, both Option A and Option B will change. For Option A, the chance of receiving $10 will increase and the chance of receiving $8 will decrease. For Option B, the chance of receiving $19.25 will increase, while the chance of receiving $0.50 will decrease.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Notice that prior to row 1, Option A offers you $8 for sure and Option B offers you $0.50 for sure. Since most people would prefer receiving $8 to receiving $0.50, we checked Option A in this case. Notice also after row 10, Option A offers you $19.25 for sure and Option B offers you $10 for sure. Since most people would prefer receiving $19.25 to receiving $10, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**		
	Chance of $10	Chance of $8			Chance of $19.25	Chance of $0.50	
Example	0 in 100	100 in 100	■	*or*	0 in 100	100 in 100	□
1)	34 in 100	66 in 100	□	*or*	34 in 100	66 in 100	□
2)	37 in 100	63 in 100	□	*or*	37 in 100	63 in 100	□
3)	40 in 100	60 in 100	□	*or*	40 in 100	60 in 100	□
4)	43 in 100	57 in 100	□	*or*	43 in 100	57 in 100	□
5)	46 in 100	54 in 100	□	*or*	46 in 100	54 in 100	□
6)	50 in 100	50 in 100	□	*or*	50 in 100	50 in 100	□
7)	54 in 100	46 in 100	□	*or*	54 in 100	46 in 100	□
8)	58 in 100	42 in 100	□	*or*	58 in 100	42 in 100	□
9)	62 in 100	38 in 100	□	*or*	62 in 100	38 in 100	□
10)	65 in 100	35 in 100	□	*or*	65 in 100	35 in 100	□
Example	100 in 100	0 in 100	□	*or*	100 in 100	0 in 100	■

TASK 6

On this page you will make a series of decisions between two uncertain options. Option A involves payments of $22.50 and $15. Option B involves payments of $40 and $5. As you proceed, both Option A and Option B will change. For Option A, the chance of receiving $22.50 will increase and the chance of receiving $15 will decrease. For Option B, the chance of receiving $40 will increase, while the chance of receiving $5 will decrease.

For each row, all you have to do is decide whether you prefer Option A or Option B and mark your preference by filling in the appropriate square.

We provide two examples for you. Notice that prior to row 1, Option A offers you $15 for sure and Option B offers you $5 for sure. Since most people would prefer receiving $15 to receiving $5, we checked Option A in this case. Notice also after row 9, Option A offers you $22.50 for sure and Option B offers you $40 for sure. Since most people would prefer receiving $40 to receiving $22.50, we checked Option B in this case. Notice that one way to organize your choices is to decide at which row, if ever, your preference switches between Option A and Option B.

	Option A			*or*	**Option B**		
	Chance of $22.50	Chance of $15			Chance of $40	Chance of $5	
Example	0 in 100	100 in 100	■	*or*	0 in 100	100 in 100	□
1)	28 in 100	72 in 100	□	*or*	28 in 100	72 in 100	□
2)	30 in 100	70 in 100	□	*or*	30 in 100	70 in 100	□
3)	32 in 100	68 in 100	□	*or*	32 in 100	68 in 100	□
4)	35 in 100	65 in 100	□	*or*	35 in 100	65 in 100	□
5)	38 in 100	62 in 100	□	*or*	38 in 100	62 in 100	□
6)	41 in 100	59 in 100	□	*or*	41 in 100	59 in 100	□
7)	44 in 100	56 in 100	□	*or*	44 in 100	56 in 100	□
8)	47 in 100	53 in 100	□	*or*	47 in 100	53 in 100	□
9)	50 in 100	50 in 100	□	*or*	50 in 100	50 in 100	□
10)	53 in 100	47 in 100	□	*or*	53 in 100	47 in 100	□
Example	100 in 100	0 in 100	□	*or*	100 in 100	0 in 100	■

You have now completed the fourth block of tasks. We will wait for others to finish before we collect your responses. At this point, please do not go back to change choices you have already made.

About the decisions you made in block 4: on a scale of 1 to 5, where a 1 indicates least confident and a 5 indicates most confident, please rate how confident you feel about your choices in block 4? Circle the number below to indicate your answer:

1	2	3	4	5
(I was just guessing)				(I knew exactly what I was doing)