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What do lab experiments tell us about the real world? The case of lotteries with extreme payoffs

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Abstract: In this study, we conduct a laboratory experiment in which the subjects make choices between real-world lottery tickets typically purchased by lottery customers. In this way, we are able to reliably offer extremely high potential payoffs, something rarely possible in economic experiments. In a between-subject design, we separately manipulate a number of features that distinguish the situation faced by the customers in the field and by subjects in typical laboratory experiments. We also have the unique opportunity to compare our data to actual sales data provided by the operator of the lottery. Overall, we find the distributions to be highly similar (meaning high external validity of the laboratory experiment). The only manipulation that makes a major difference is that when the probabilities of winning specific amounts are explicitly provided (which is not the case in the field), choices shift towards options with lower payoff variance. We also find that standard laboratory measures of risk posture fail to explain our subjects' behavior in the main task.

Keywords: Decision making under risk; External validity; Longshot bias; Perception of randomness; Number preferences in lotteries

JEL codes: C91, D01, D81, D83, D91

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1. Introduction and literature review

As the popularity of the experimental method in economics has grown in recent decades, so has its criticism. Although "the interest that most (…) economists have in economic experiments comes mainly from (…) being able to learn something about human behavior beyond the specific games played in the lab" (Galizzi & Navarro-Martinez, 2019), such external and ecological validity of economic experiments have been questioned. The most prominent among these critics are perhaps Levitt and List (2005): "the lab is characterized by a special type of scrutiny that is unparalleled in the field, a particular type of self-selection of participants who are assigned roles and tasks exogenously, and small stakes".

Of course, claims that these features severely limit the external validity of laboratory experiments can be addressed empirically and are often refuted. For example, Cleave et al. (2013) found that students who volunteered to participate in an experiment did not differ from those who did not volunteer in terms of their risk and social preference (see also Exadaktylos et al., 2013).

Likewise, researchers have investigated how a considerable raise of stakes may affect the behavior of laboratory subjects, typically finding limited effects (Andersen et al., 2011; Fehr-Duda et al., 2010). Still, it is hardly possible to credibly offer possible winnings of, for instance, hundreds of thousands of dollars in the lab. Indeed, subjects will typically easily recognize that such amounts are well above the experimenter's budget and that university authorities and/or granting bodies would object to making such high payments to any individual subject. Choices about such high amounts must thus be made hypothetical. It is therefore debatable to what extent laboratory methods can help us understand real-world choices involving (low) chances of very high payment, as for example in the case of gambling or highly speculative investments, such as in business ventures.

Experiments on decision-making under risk show two further important features that are artificial, in the sense of being unparalleled in out-of-lab decisions. First, in the laboratory, risky lotteries are usually presented in a descriptive form, with probabilities corresponding to specific outcomes being explicitly given. Outside of the lab, by contrast, probabilities are seldom well-defined; sometimes they can only be approximately established through research or experimentation. Even if explicit random number generators are used (for example, in some forms of gambling, when sports teams are matched in groups for a tournament, or when US permanent resident cards (Green Cards) are distributed), specific probabilities are rarely explicitly provided to the audience. Instead, outcomes may be described as being contingent on certain random events described verbally; for example, “4 Winning numbers + 2 Euro numbers”. Armantier and Treich (2015) show that this might make ambiguity attitudes play a role. Specifically, ambiguity aversion is typically observed, making lotteries involving chances presented in such an obscure way rather unattractive. However, for *unlikely* events ambiguity *seeking* is often reported (Trautmann & Van De Kuilen, 2015). Curiously enough, seemingly related literature exploring “decisions from experience” (Hertwig et al., 2004) finds unlikely gains with obscure probability as being relatively *unattractive*. These contradictions beg the question of whether subjects construe the very notion of risk-taking in a fashion similar to the way it is modelled by the researchers. This question has motivated the inclusion of additional non-behavioral measures collected in this project.

There is a second crucial difference between “lotteries” in the lab and lotteries in the field. In the case of the former, the decision makers typically simply *choose* between lotteries. By contrast, they have to *purchase* them with their own money in the field.

In this project, we seek to investigate the behavioral effect of each of these differences between the lab and the field. In a novel design, we reward subjects with lottery tickets, which allows us to credibly offer extremely high payments in the laboratory. We use one of the games provided by a national lottery operator in a European country and focus on the decision that its customers actually make: they choose from a menu of options, ranging from moderate probability/low payoff to extremely low probability/extremely high payoff.

We manipulate the decision-making situation on each of the aforementioned dimensions separately. Specifically, we run a sequence of treatments, ranging from one being completely analogous to the choice that state lottery customers face at the point of sale, to one being a standard hypothetical laboratory choice between lotteries. Along the way, we manipulate:

- whether subjects have to *purchase* the tickets themselves or merely *choose* between the tickets being provided to them for free;
- whether they are explicitly provided with the probabilities corresponding to the possible payoffs (both payoffs and probabilities are fixed in the game we consider);
- whether the choice is framed as in real-world lotteries or as in standard lab tasks;
- whether choices are incentivized.

Furthermore, as well as manipulating laboratory treatments, we have the unique opportunity to compare our subjects’ behavior to the distribution arising in the relevant high-volume sales data, obtained from the operator of the lottery we are using. We therefore check whether a link exists between the field-lab degree of similarity of our treatments and their ecological validity. We hypothesize that as we move further away from the conditions naturally occurring in the field (namely, as we proceed from the most field-like treatment to the most lab-like treatment) the distribution of choices drifts further away from the distribution observed in the field.

In doing so, we control for the effects observed or hypothesized as affecting gambling behavior and beliefs in previous literature: demographics (Coups, Haddock, & Webley, 1998); social influences (Rogers, 1998); gambling experience (Abt, McGurrin, & Smith, 1985; McDaniel & Zuckerman, 2003; Rogers, 1998); personality traits (George, 2002) and superstitious beliefs (Ariyabuddhiphongs & Chanchalermporn, 2007).

In each treatment, we do not merely let the subjects choose one of the options, but also incentivize their declaration of willingness to pay for it. Moreover, in addition to these main tasks, we conduct popular laboratory tasks measuring risk posture (Holt & Laury, 2002; Dohmen et al., 2011). Thus, we are able to verify how predictive they are for the behavior in the main task, depending on the treatment.

We contribute to the current body of knowledge in several ways. We add to the emerging literature seeking to validate how laboratory measures predict real-world behaviors in general (Alm et al., 2015; Dai et al., 2017; Galizzi et al., 2016). Our design presents us with a unique opportunity to comprehensively test the external validity of standard lab methods and explore the specific mechanisms that limit it.

Our approach also allows us to investigate why lotteries enjoy immense popularity in most countries. One pertinent question is if it is due to lottery operators failing to sufficiently inform their customers just how weak the odds are (Rogers & Webley, 2001). Our experimental manipulation of the availability of probabilities of winning may shed light on this conjecture.

The popularity of lotteries is also puzzling given that most people seem to be risk averse in the majority of real-life situations, particularly those involving high payoffs, begging the question of the stability of risk preferences across various domains and frames (Barseghyan et al., 2011; Einav et al., 2012). We try to shed light on the issue with our experimental study. If we observe high ecological validity, then we may be able to explain lotteries' puzzling popularity in terms of positively skewed distributions of payoffs (extremely high, albeit very unlikely payments). Preferring such a distribution would be in accordance with the notion of overweighting of small probabilities (Tversky & Kahneman, 1992) hitherto observed in laboratory experiments involving much lower payoffs. This would be consistent with displaying risk aversion in the majority of real-life situations involving more symmetrical distributions, but not in the case of lottery play.

The preference for the positive skew has indeed been found in studies using laboratory experiments (Grossman & Eckel, 2015). It also appears to be consistent with existing field data on gambling (Golec & Tamarkin, 1998; Griffiths & Wood, 2001). However, both approaches have their limitations. In the lab, one important issue is the maximum stake, as previously mentioned: the "long shot" in Grossman and Eckel's case was a 1% chance for just above $70. Studies using existing data, by contrast, suffered from uncontrollable confounds and did not allow the researchers to obtain much insight into decision makers' cognitions, motivations or even demographics. We are among the first to run an incentivized experiment with such low probabilities and extremely high payoffs.[1]

2. Design and procedures

We run a pen-and-paper between-subject laboratory experiment comprising two parts, followed by a questionnaire. We determine participants' payment by either the first or the second part of the experiment using random draws.

In the first part, the main experimental task, we ask participants to choose how many numbers to bet on in a lottery draw. In the real-world lottery that we work with (one of the most popular lotteries offered by the state-owned lottery monopolist in a European country), as well as in our experiment, one can choose up to 10 numbers. Twenty numbers, ranging from 1 to 80, are then randomly drawn. The number of correct guesses determines the payoff, with a higher quantity of chosen numbers meaning a higher possible payoff, but a lower chance, see Figure 1: the players are effectively choosing one of its columns. For example, choosing four numbers (the fourth column from the right) would yield an equivalent of 5 EUR if two numbers are drawn, 20 EUR if three numbers are drawn, and 210 EUR if all four numbers are drawn. The values of Figure 1 correspond to a purchase of a "10x wager" ticket in the field, normally sold at 6.25 EUR. It is a popular option, corresponding to approximately 8% of all sales. This is the variant that we implement in the experiment (rather than the most typical "1x wager") so that we can offer non-trivial (expected) payoff values to the subjects.

[1] Indeed, surprisingly few authors have used real-world lottery tickets in the lab to explore risk preference. A valued early exception is a paper by Bohm and Lind (1993) documenting that preference reversals are less common in real-world lotteries. An important recent example is Chark et al. (n.d.) who used Chinese state lottery tickets. The experiment was run online, with only a small fraction of subjects receiving choice-dependent payments up to three months after taking the experiment. They observed a peculiar combination of long-shot preference for low expected payoffs and long-shot aversion for high expected payoffs.

An inspection of Figure 1 suggests that choosing a high quantity of numbers (said quantity being is our main dependent variable) corresponds to choosing a long shot. This can be confirmed by inspecting the moments of each of the ten distributions, see Table 1. Indeed, whilst the expected return is nearly constant and the probability of winning anything varies in an unsystematic way, both the standard deviation and skewness of the distribution raise quickly and (almost) monotonically with the quantity of numbers.

MATCHING NUMBERS DRAWN	QUANTITY OF NUMBERS CHOSEN: 10	9	8	7	6	5	4	3	2	1
10	562 500 EUR pr. 1/8 911 711									
9	22 500 EUR pr. 1/163 381	157 500 EUR pr. 1/1 380 688								
8	1 170 EUR pr. 1/7 384	4 500 EUR pr. 1/30 682	49 500 EUR pr. 1/230 115							
7	350 EUR pr. 1/621	675 EUR pr. 1/1 690	1 350 EUR pr. 1/6 232	13 500 EUR pr. 1/40 979						
6	30 EUR pr. 1/87	105 EUR pr. 1/175	150 EUR pr. 1/423	500 EUR pr. 1/1 366	2 925 EUR pr. 1/7 753					
5	10 EUR pr. 1/19	20 EUR pr. 1/31	50 EUR pr. 1/55	50 EUR pr. 1/116	300 EUR pr. 1/323	1 575 EUR pr. 1/1 551				
4	5 EUR pr. 1/8	5 EUR pr. 1/9	10 EUR pr. 1/12	10 EUR pr. 1/19	20 EUR pr. 1/35	50 EUR pr. 1/83	210 EUR pr. 1/326			
3				5 EUR pr. 1/6	5 EUR pr. 1/8	10 EUR pr. 1/12	20 EUR pr. 1/23	135 EUR pr. 1/72		
2							5 EUR pr. 1/5	5 EUR pr. 1/7	40 EUR pr. 1/17	
1										10 EUR pr. 1/4

Figure note: the figure displays the ten options as they are displayed in *ChoiceProbT*. In *PurchT*, *ChoiceT*, as well as in the field, the table is analogous, with the exception that the probabilities are not shown.

Figure 1: Possible payoffs depending on the quantity of numbers chosen, in Euros, after tax

Table 1:

Quantity of numbers chosen	EV*	SD*	Pearson's moment coefficient of skewness	Probability of a non-zero payoff
10	40%	3160%	2602.23	21%
9	39%	2204%	1084.30	15%
8	40%	1681%	454.60	10%
7	40%	1092%	189.21	23%
6	40%	597%	63.67	16%
5	39%	646%	38.06	10%
4	40%	197%	14.84	25%
3	41%	253%	8.15	16%
2	38%	151%	3.75	6%
1	40%	69%	1.15	25%

*EV and SD are expressed in % of money spent on the ticket (6.25 EUR).

We manipulate the framing of the choice between-subject, see Appendix C for the transcript of all instructions. In *PurchT* (short for Purchase Treatment), participants are given EUR 7.50 to start with and then face the same choice as customers at the point of sale deciding which of the "10x wager" tickets to buy.

To also elicit an incentivized response from those who would not be willing to buy the ticket at the regular price at all, we implement the Becker-DeGroot-Marschak procedure. Participants are told "at the end of the experiment, if Part 1 is randomly selected, you will have an opportunity to purchase such a ticket for the next drawing, with the quantity of numbers chosen corresponding to your choice in the experiment. You may be given an opportunity to buy it cheaply, so that you actually buy it even if you do not value it highly (details soon) (…) because your choices have a real impact on your winnings, it is in your best interest to think carefully and choose the option that you really like best".

The participants are subsequently asked whether they would be willing to purchase the ticket (with the preferred quantity of numbers chosen) for EUR .75, EUR 1.50, …, EUR 7.50, with an understanding that one of these choices would be randomly selected and implemented.

The *ChoiceT* is analogous to *PurchT*, except that participants are only given a show-up fee of EUR 2.50 and asked to choose one of the ten variants of the ticket, which they would get for free. For example, both in *ChoiceT* and in *PurchT*, if a subject was thinking about betting on 3 numbers, she would see in the third column from the right that if all three numbers are drawn, she would win an equivalent of 135 EUR, and if two numbers are drawn, she would win an equivalent of 5 EUR. Subsequently, for each of the ten cash amounts, EUR .75, EUR 1.50, …, EUR 7.50, the participants have to choose between the variant of the ticket they have just chosen and cash.

The *ChoiceProbT* is analogous to *ChoiceT*, except that the payoff table includes the probabilities of winning. In the field, these probabilities are available on the lottery website, but are not displayed at the point of sale, being accessible to only those who actively seek them. For example, if a subject was thinking about betting on 3 numbers, she would see in the third column from the right that if all three numbers are drawn she would win an equivalent of 135 EUR, which will occur with a probability of 1/72, and if two numbers are drawn, she would win an equivalent of 5 EUR, which will occur with a probability of 1/7.

The fourth treatment is *LabProbT*, where we frame the same choice as a standard laboratory decision under risk task. Instead of choosing on how many numbers to choose, in *LabProbT* the subjects see a table with ten possible gambles labelled from A to J, see Figure 2. An example corresponding to that from the previous paragraph, choosing Option H, would entail receiving a 135 EUR payoff with a probability of 1/72 and a 5 EUR payoff with a probability of 1/7. In this case, we mention no lotteries, tickets nor quantities of numbers to be chosen to the participants. Still, we assure them that the choice is real, and all payments are secured.[2]

Option A	Option B	Option C	Option D	Option E	Option F	Option G	Option H	Option I	Option J
562 500 EUR	157 500 EUR	49 500 EUR	13 500 EUR	2 925 EUR	1 575 EUR	210 EUR	135 EUR	40 EUR	10 EUR
pr. 1/8 911 711	pr. 1/1 380 688	pr. 1/230 115	pr. 1/40 979	pr. 1/7 753	pr. 1/1 551	pr. 1/326	pr. 1/72	pr. 1/17	pr. 1/4
22 500 EUR	4 500 EUR	1 350 EUR	500 EUR	300 EUR	50 EUR	20 EUR	5 EUR		
pr. 1/163 381	pr. 1/30 682	pr. 1/6 232	pr. 1/1 366	pr. 1/323	pr. 1/83	pr. 1/23	pr. 1/7		
1 170 EUR	675 EUR	150 EUR	50 EUR	20 EUR	10 EUR	5 EUR			
pr. 1/7 384	pr. 1/1 690	pr. 1/423	pr. 1/116	pr. 1/35	pr. 1/12	pr. 1/5			
350 EUR	105 EUR	50 EUR	10 EUR	5 EUR					
pr. 1/621	pr. 1/175	pr. 1/55	pr. 1/19	pr. 1/8					
30 EUR	20 EUR	5 EUR	5 EUR						
pr. 1/87	pr. 1/31	pr. 1/12	pr. 1/6						
10 EUR	5 EUR								
pr. 1/19	pr. 1/9								
5 EUR									
pr. 1/8									

Figure 2: Table displayed in LabProbT and HypoLabProbT

These four treatments, albeit differing in framing, give the participants the same incentives to choose their most preferred option and to indicate how they value it. Such incentives are absent from our last treatment, *HypoLabProbT*, in which we ask participants to make the same decisions as in *LabProbT* but knowing they would receive 5 EUR (on top of the 2.5 EUR show-up fee) regardless of their choices.

In all treatments, we remind subjects that the lab does not use deception. We also provide examples and control questions to make sure the task is clear; these come in two versions (randomized orthogonally to the main treatment manipulation), to check if perhaps specific numbers have an "anchoring" effect on subjects' choices (although this was not observed). In all the treatments, we ask them to justify their choices and to indicate which of the ten options they considered the "riskiest" and which the "safest" (again, with justification). These additional questions help us to more comprehensively understand subjects' motivation; while

[2] To ensure that these assurances are credible, we ran an online pilot; 48 participants were asked to imagine they had participated in an experiment in our lab, in which extremely high payoffs were possible (albeit with low probabilities) and to answer on a scale from 1 to 10 to what extent they would trust the experimenter and the instructions. 71% chose 9 or 10. The distribution was virtually identical in the control group in which the description was analogous, but we did not mention that the payoffs could be very high.

the choice of the option involving higher variance holding expected value constant is typically automatically interpreted as “risk-seeking” in experimental literature, this categorization is somewhat dubious if we cannot be sure of whether the selected option was indeed construed in the subject’s mind as more risky.

In the second part, subjects’ risk aversion is elicited using a series of binary choices between gambles (Holt & Laury, 2002). In the post-experimental questionnaire, we ask the subjects to fill in the short Big Five personality scale TIPI (Gosling et al., 2003) and answer risk preference questions (Dohmen et al., 2011). Subsequently, they answer questions on gambling experience, superstitious beliefs, demographic characteristics and social influences for lottery choices. The transcript of the translated questionnaire can be found in the Appendix C.

The entire timeline of the experiment is concisely illustrated in Figure 3.

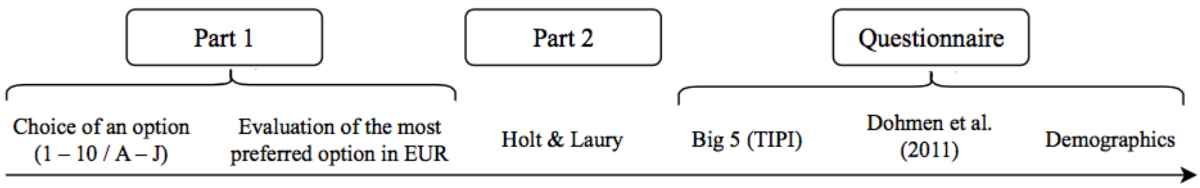


Figure 3: Experiment timeline

2.1 Field data description

Thanks to the unusual availability of the sales data, we can directly compare how our subjects’ behavior differs from that of actual lottery customers. We base our comparisons on three-months’ worth of data obtained directly from the lottery operator. We focus on the purchases equivalent to the lottery tickets available in our experiment: one drawing, one set of numbers, 10x wager (although this restriction makes little difference; for example, the distribution for 1x wager is nearly identical). We have more than a million such transactions in our dataset, so that the distribution over the quantity of numbers chosen can be estimated with extreme precision.

2.2 Hypotheses

In view of the discussion of the field-like and lab-like characteristics of a task of decision-making under risk, we expect that the distribution of the main dependent variable will move further away from the distribution observed in the field as we introduce lab-specific features. Thus, we formulate:

Hypothesis 1 (Ecological Validity): the degree of similarity to the field distribution of the quantity of numbers will not increase as we move from PurchT via *ChoiceT, ChoiceProbT, LabProbT*, to *HypoLabProbT*.

More specifically, very skewed lotteries will be relatively less attractive when subjects are told just how unlikely the highest prizes are. Thus, we formulate:

Hypothesis 2 (Choice: Probability): the average quantity of numbers chosen will be lower in treatments with their probability provided (*ChoiceProbT, LabProbT*, and *HypoLabProbT*) than in treatments without this probability provided (*PurchT* and *ChoiceT*).

Concerning the individual determinants of choice of the quantity of numbers, we expect it to be related to our measures of risk posture.

Hypothesis 3 (Choice: Risk Aversion): the quantity of numbers chosen will be negatively correlated with risk aversion measured as in Holt and Laury (2002) and Dohmen et al. (2011). Specifically, as the standard laboratory risk preference task of Holt and Laury (2002) is based on well-defined probabilities, it may turn out to be more predictive in treatments with their probabilities of winning provided. Thus, we formulate:

Hypothesis 4 (Choice: Risk-Treatment Interaction): the correlation between the quantity of numbers and the Holt & Laury measure of risk aversion will be stronger for treatments with their probability provided (ChoiceProbT, LabProbT, and HypoLabProbT) than for treatments without this probability provided (PurchT and ChoiceT).

We now turn to the perceived value of a ticket (willingness to pay; WTP). We expect the WTP to be reduced if the situation is framed as a purchase, rather than as a choice:

Hypothesis 5 (WTP: Choice vs Purchase): WTP will be higher in *ChoiceT, ChoiceProbT, LabProbT* and *HypoLabProbT* than in *PurchT*.

As argued previously, the effect of ambiguity might itself be ambiguous in the case of low-probability events. Excluding the "extreme" treatments of *PurchT* and *HypoLabProbT*, which may differ for other reasons, as explored in Hypotheses 5 and 7, we are left with:

Hypothesis 6a (ambiguity aversion): WTP will be *higher* in *ChoiceProbT* and *LabProbT* than in *ChoiceT*.

Hypothesis 6b (ambiguity seeking): WTP will be *lower* in *ChoiceProbT* and *LabProbT* than in *ChoiceT*. The voluminous literature on hypothetical bias (Murphy & Stevens, 2004) suggests that WTP may be higher when it is only hypothetical or declarative:

Hypothesis 7 (WTP: Hypothetical Bias): WTP will be higher in *HypoLabProbT* than in other treatments.

Finally, we expect lottery tickets to be less attractive to more risk-averse subjects:

Hypothesis 8 (WTP: Risk Aversion): WTP will be negatively correlated with risk aversion measured as in Holt and Laury (2002) and Dohmen et al. (2011).

3. Results

The experiment was conducted at the experimental laboratory of the Faculty of Economic Sciences at the University of Warsaw. We ran four experimental sessions in August and September 2019, during which we collected 326 observations. The descriptive statistics of our sample are presented in Appendix A1.

3. 1 Quantity of numbers chosen

First, we report the quantity of numbers chosen by treatment, see Table 2 for the means, medians, modes and standard deviations and Figure 4 for the distributions. At first glance, there are non-trivial differences between treatments; specifically in line with Hypothesis 2 (Choice: Probability); providing the subjects with probabilities seems to reduce long-shot seeking, as the average, median and, most dramatically, mode of quantity of numbers chosen goes down.

Table 2: Quantity of numbers chosen by treatment and compared to the field

	Quantity of numbers chosen				
	Mean	Median	Mode	SD	N
Field	7.82	8	10	2.05	>1m
PurchT	7.50	7	10	2.35	66
ChoiceT	7.32	8	10	2.53	63
ChoiceProbT	5.26	5	7	2.99	65
LabProbT	4.58	4	1	3.09	66
HypoLabProbT	5.30	6	1	3.66	66

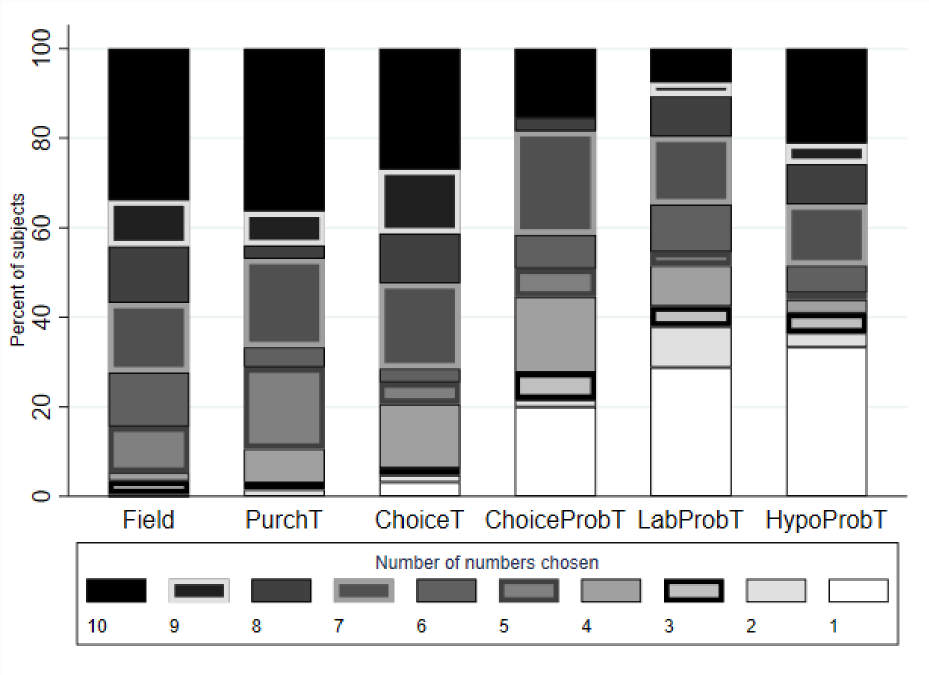


Figure 4: Distribution of the quantity of numbers chosen by treatment

Because the fraction of subjects assigned to particular treatments slightly differed between sessions, we run an Analysis of Variance (ANOVA) allowing for the impact of both treatment and session on the quantity of numbers chosen. The former is highly significant ($F = 12.71, p = 0.00$), while the latter is not ($F = 0.50, p = 0.69$).

As the ANOVA is not fully satisfactory for variables measured on an ordinal rather than interval (or: ratio) scale, we also test for differences between treatments using the Kruskal-Wallis rank test. Again, the differences are highly significant, see Table 3. To identify the cause of these differences, we then run Mann-Whitney and Kolmogorov-Smirnov tests for differences between "neighboring" treatments, i.e. those that are differentiated by one feature only. These tests confirm the previously reported observation very clearly: the only feature that matters is whether probabilities are provided, see also Appendix A2 for all pairwise comparisons in the Conover-Iman test, which bring the same conclusion. The fact that probabilities make a difference is also strongly confirmed if we run a Mann-Whitney test comparing all the treatments with probabilities provided against those without them ($z = 6.36, p = 0.0000$). Correspondingly, *PurchT* and *ChoiceT* show the highest external validity, in that they yield distributions that are not significantly different from those observed in the field, see Table 4. The same cannot be said for the remaining treatments, structured to be less similar to the choice situation encountered in the field. Thus Hypotheses 1 (Ecological Validity) and 2 (Choice: Probability) are clearly confirmed.

Table 3: Tests of treatment effects

Kruskal-Wallis equality of populations rank test:
Chi(2) = 41.81 with 4 d.f., p = 0.0001

	Mann-Whitney		Kolmogorov-Smirnov	
	Z	p-value	D	p-value
Field vs. PurchT	1.00	0.32	0.13	0.20
PurchT vs. ChoiceT	0.43	0.67	0.10	0.90
ChoiceT vs. ChoiceProbT	**3.91**	**0.0001**	**0.34**	**0.001**
ChoiceProbT vs. LabProbT	1.18	0.24	0.16	0.35
LabProbT vs. HypoLabProbT	–1.14	0.25	0.15	0.44

Note: Pairwise comparisons of all "neighboring" treatments, including the field

Table 4: Pairwise comparisons between the field and each of the laboratory treatments

	Mann-Whitney		Kolmogorov-Smirnov	
	z	p-value	D	p-value
Field vs. PurchT	1.00	0.32	0.13	0.20
Field vs. ChoiceT	1.35	0.18	0.15	0.10
Field vs. ChoiceProbT	**6.97**	**0.0000**	**0.39**	**0.0000**
Field vs. LabProbT	**8.32**	**0.0000**	**0.46**	**0.0000**
Field vs. HypoLabProbT	**5.36**	**0.0000**	**0.39**	**0.0000**

Recall that the lab differs from the field in terms of their sample compositions: most of our participants are not regular players. Thus, the fact that there is no difference between *PurchT* or *ChoiceT* and the field in terms of quantity of numbers chosen suggests that players and non-players do not behave significantly differently in this task. Indeed, even after pooling all treatments together to increase statistical power, we find no difference in the quantity of numbers chosen by subjects with different gambling habits (Kruskal-Wallis test: $Chi(2) = 2.88\ with\ 4\ d.f., p = 0.58$). This result also holds true when we merge neighboring response categories to create just two, roughly equally numerous groups (Mann-Whitney test: $z = -1.41, p = 0.16$).

We verify the robustness of these findings using ordered logistic regressions, see Table 5. In model (1), we include only dummies for each treatment, taking LabProbT as a base category. In model (2), we additionally control for all available covariates, be it demographic, psychological or reflecting our risk measures. In model (3), we additionally check for the possibility that the effect of the Holt and Laury relative risk aversion measure is moderated by treatment, as postulated in Hypothesis 4 (Choice: Risk-Treatment Interaction). In model (4), we only keep those variables that are significant in models (2) or (3).

In models (5) and (6), we extend model (4) to check for mediation of the observed treatment effect. Specifically, in model (5), we add the numbers of the options that the subject considered to be “riskiest” and “safest”, respectively. In model (6), we include those of the “justification” variables (categorized answers to the questions of why the subject chose what they did) that were significantly affected by treatment manipulations. These two specifications will be discussed in the Discussion section, whereas the definitions of the justification variables can be found in Appendix B.

Unsurprisingly (given random treatment assignment), the treatment effects reported previously generally remain highly significant across specifications. We also confirm that gambling habits exert a minor effect at best, as they are only weakly significant in some models. Likewise, none of the risk measures (Dohmen risk preference or the relative risk aversion (RRA) coefficient, as measured by the Holt and Laury task) seem to have a systematic effect on the quantity of numbers chosen. The interactions of RRA with treatment introduced in model (3) are also insignificant (both individually and jointly). Thus Hypotheses 3 (Choice: Risk Aversion) and 4 (Choice: Risk-Treatment Interaction) are rejected.

Other variables are not significant either, except that religious subjects are relatively willing to choose highly skewed (long-shot) options, whose odds indeed call for a divine intervention. All the main findings from non-parametric analysis and ologit (ordered logit) hold if we exclude subjects who made mistakes in the control questions (who may have misunderstood the task) or those who reported a low (lower than 5 EUR) WTP (who would be less likely to actually purchase any ticket in the field), see Appendix A3.

Table 5: Ordered logistic regression of the quantity of numbers chosen

Variable	(1)	(2)	(3)	(4)	(5)	(6)
PurchT	1.599***	1.545***	1.095**	1.663***	0.823**	1.252***
ChoiceT	1.498***	1.430***	0.751*	1.510***	0.929***	1.017***
ChoiceProbT	0.36	0.203	-0.1	0.383	0.088	0.201
HypoLabProbT	0.415	0.151	-0.138	0.351	0.196	0.313
dohmen_general		0.061	0.078			
dohmen_people		0.109**	0.117**	0.062	0.027	0.055
dohmen_other* included?		YES	YES	NO	NO	NO
RRA		0.1	0.161			
missing_RRA		0.114	0.155			
Big 5 included?		YES	YES	NO	NO	NO
Male		-0.195	-0.13			
Age		-0.003	-0.004			
Education		0.362	0.332			
Income		0.11	0.083			
gambling_habits_overall		0.207*	0.196*	0.169*	0.091	0.172*
gambling_habits_of_others		0.223*	0.201	0.072	0.125	0.034
Superstitious		-0.34	-0.374			
Religious		0.694***	0.777***	0.539***	0.461**	0.424**
ChoiceT*RRA			0.37			
ChoiceProbT*RRA			-0.353			
LabProbT*RRA			-0.998			
HypoLabProbT*RRA			-0.316			
safest_option					0.175***	
riskiest_option					-0.074**	
WhyThisNmbr_probs						-0.434*
WhyThisNmbr_prz_nmbr						0.426*
safest_probs						0.058
safest_prz_nmbr						0.546*
safest_error						0.993***
riskiest_probs						-0.186
N	326	314	314	326	276	326

legend: * p<.1;** p<.05; *** p<.01

Notes: dohmen_other include: dohmen_car, dohmen_finance, dohmen_sport, dohmen_work, dohmen_health, dohmen_above_median, dohmen_below_median, missing_dohmen_general, missing_dohmen_car, missing_dohmen_work
RRA is calculated based on the Holt & Laury task; ranging from -0.95 to 1.37;
Missing_RRA takes the value of 1 if and only if subject switched more than once in the Holt & Laury;
Education: elementary, secondary, higher;
Income: poor, modest, average, good, very good;
Gamgling_habits_overall: how often does subject engage in any form of gambling; ranges from 1 (never) to 5 (once a week or more often);
Gambling_habits_of_others: whether there are close friends or family members that often gamble; ranges from 1 (there are no such people) to 4 (there are many such people)
Supertitious: considering oneself to be superstitious; binary
Religious: considering oneself to be religious; binary

3.2 Willingness to pay

Now we turn to the WTP for a lottery ticket with the quantity of numbers chosen by the subject. Table 6 portrays the means and standard deviations of the WTP by treatment, while Figure 5 displays the cumulative distribution functions. A Kruskal-Wallis test indicates that there is a difference between the treatments ($Chi(2) = 18.38$ with 4 $d.f., p = 0.001$). As in the case of the choice of quantity of numbers, we run a series of comparisons between "neighboring" treatments, see Table 7 (and Appendix A4 for the comprehensive Conover-Iman test).

In line with Hypothesis 5 (WTP: Choice vs Purchase), we identify a clear effect of having subjects pay for their tickets: it substantially reduces the perceived value of the ticket. WTP in the *PurchT* is also significantly lower than in other treatments taken together ($z = 4.005, p = 0.0001$ in a Mann-Whitney test and $D = 0.2697, p = 0.002$ in a Kolmogorov-Smirnov test).

Unexpectedly, WTP also appears to be slightly different in LabProbT as compared to ChoiceProbT. As we compare the two lab-like treatments (*LabProbT and HypoLabProbT)* to the two field-like treatments (*ChoiceT and ChoiceProbT*) (discarding the clearly different *PurchT*), we find only marginally significant differences in a Mann-Whitney test ($z = -1.610, p = 0.1074$) and none in a Kolmogorov-Smirnov test ($D = 0.1167, p = 0.395$). Coming back to our hypotheses, we find Hypotheses 6a (ambiguity aversion), 6b (ambiguity seeking) and 7 (WTP: Hypothetical Bias) to be rejected.

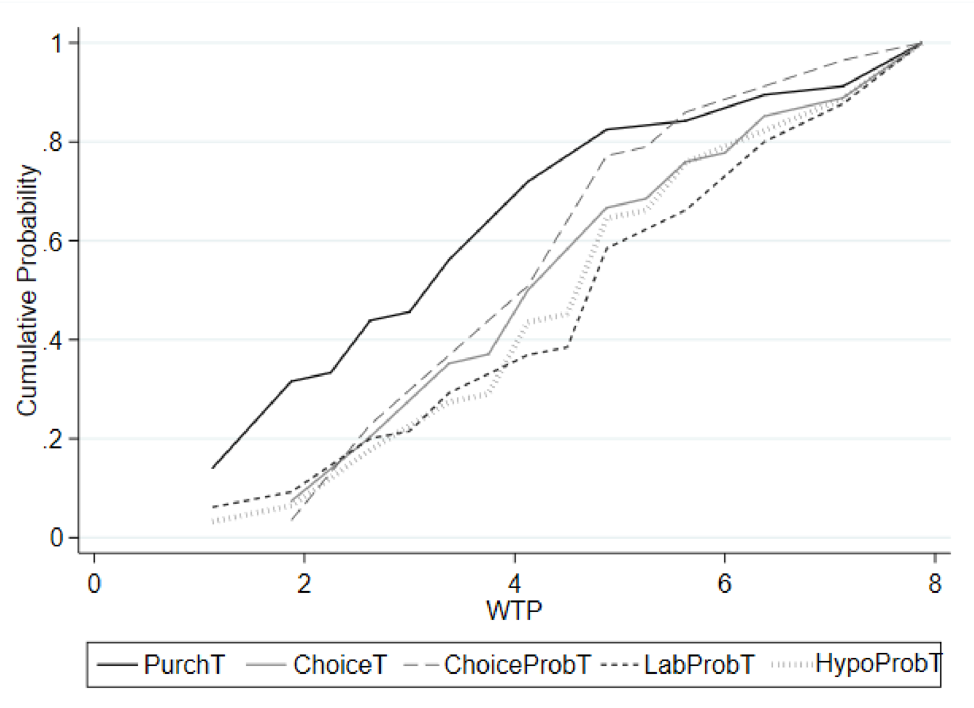
Unlike in the case of the choice of quantity of numbers, this time we find some effects of gambling habits. A Kruskall-Wallis test of differences in WTP between categories defined by self-reported gambling habits is marginally significant ($Chi(2) = 8.664\ with\ 4\ d.f., p = 0.07$): those who gamble at least a few times a year show a higher WTP than those who play less often (Mann-Whitney test: $z = -2.819, p = 0.005$).

Again, we verify the robustness of these findings in regressions, see Appendix A5. The logic of including and excluding variables in the reported specifications is analogous to that of the ologit regression on the quantity of numbers chosen, except that for WTP we ignore the riskiest/safest variables and subjects' justifications, which have little bearing here. Instead, the quantity of numbers is included in model (5). While this variable turns out to be highly significant (subjects choosing many numbers typically value the ticket highly), the size of the coefficient corresponding to the PurchT dummy is unchanged; in this treatment, subjects are willing to pay approximately 1.5 EUR less for their chosen ticket. We conclude that there is no mediation effect: the impact of PurchT is independent of the quantity of numbers chosen. This is not surprising given that making subjects pay for the tickets (as in *PurchT*) per se has no significant effect on the quantity of numbers chosen.

Concerning other variables, we observe that subjects with higher income and those declaring to be more risk-acceptant in the Dohmen et al. general risk attitude question display higher WTP, although these findings show little robustness as we exclude apparently confused subjects (as evidenced by their responses to the control questions). Thus, Hypothesis 8 obtains partial support at best. Additionally, the previously reported effect of (frequent) gambling does not appear to be robust to controlling for other variables.

Table 6: WTP by treatment

	WTP		
	Mean	SD	N
PurchT	3.63	2.03	57
ChoiceT	4.63	1.78	54
ChoiceProbT	4.38	1.49	57
LabProbT	4.91	1.97	65
HypoLabProbT	4.79	1.80	62
Table note: Recall that the market price is 6.25			



Note: linear interpolation used for enhanced readability

Figure 5: Cumulative distribution function of WTP by treatment

Table 7: Pairwise comparisons of neighboring treatments, with respect to WTP

	Mann-Whitney		Kolmogorov-Smirnov	
	z	p-value	D	p-value
PurchT vs. ChoiceT	**–2.94**	**0.003**	**0.26**	**0.05**
ChoiceT vs. ChoiceProbT	0.62	0.53	0.11	0.92
ChoiceProbT vs. LabProbT	–1.73	**0.08**	0.21	**0.16**
LabProbT vs. HypoLabProbT	0.51	0.61	0.10	0.93

4. Discussion: explaining the effect of providing probabilities

Of all the dimensions we have manipulated, only one had an effect – a large one – on the quantity of numbers chosen: whether probabilities corresponding to particular outcomes were displayed. In this section, we try to shed light on the possible mechanisms behind this outcome. It is natural to think that when no probabilities are provided, subjects base their choices on incorrect values. Specifically, our findings could be explained if they overestimated the probabilities of winning specific prizes conditional on choosing a large quantity of numbers – more so than they overestimated the probabilities of winning when choosing a small quantity of numbers.

To address this possibility, we showed a separate sample ($n = 129$) payoff tables identical to the one that our *PurchT* and *ChoiceT* subjects saw and asked them to guess the probabilities of different prizes, see Appendix C2 for the wording of this study. We believed that it would be a highly daunting task to guess the probabilities of seven possible prizes when choosing 10 numbers, six possible prizes when choosing nine numbers and so on. We thus asked only about the probability of getting all the numbers right, which is likely to play a special role. Moreover, we only asked about this in the case of choosing 1, 4, 7 and 10 numbers. These four – equidistant – choices happen to be the most common in our sample. We would thus ask each subject just four rather than 37 questions.

Not surprisingly, most subjects made large mistakes, deviating from the actual probabilities in either direction; we focus on the median values to minimize the undue effects of outliers. The median probability estimate turns out to be very close to the true value for the highest prize in the case of choosing 10 numbers. By contrast, the lower the quantity of numbers, the more our subjects underestimated the probability of winning (the highest possible prize), see Table 8, upper panel. This pattern of findings is wholly consistent with our observation from the main study that choosing a large quantity of numbers is relatively attractive when probabilities are *not* provided.

Then again, this relative attractiveness could be mitigated if the probabilities of winning *minor* prizes were relatively underestimated in the case of choosing a large quantity of numbers. To verify this possibility, we invited yet another sample ($n = 124$), showed them the same payoff tables and asked them to guess the probability of winning the *lowest* possible prize when choosing 3, 6 or 10 numbers. We chose these three because, as can be seen in Figure 1, they involved the same prize (5 EUR) and similar probabilities of winning, in the range of 1/7 – 1/8. The median estimates are provided in the lower panel of Table 8. Again, participants generally underestimated the probability of winning. While the tendency to do so depended on the quantity of numbers, the relationship is non-monotonic and much weaker than in the case of the probability of the highest prize.

To summarize this exercise, guesses about the probabilities of winning involved much stronger underestimation in the case of a low quantity of numbers chosen than in the case of a high quantity of numbers. Again, this pattern is consistent with the shift towards a lower quantity of numbers when true probabilities *are* provided.[3]

Table 8: Probability estimates

Highest prize probability

Quantity of numbers:	Median probability estimate	True probability	Median/true ratio
10	1/10,000,000	1/8,911,711	0.89
7	1/309,589	1/40,979	0.13
4	1/10,000	1/326	0.03
1	1/80	1/4	0.05

Lowest prize probability

Quantity of numbers:	Median probability estimate	True probability	Median/true ratio
10	1/65	1/7	0.11
6	1/40	1/8	0.20
3	1/40	1/7	0.18

[3] Of course, the question arises of why subjects did not tend to report higher WTP when the probabilities were provided (turning out to be higher than most people had thought). This could be understood in terms of mild ambiguity seeking – meaning people's preference towards ambiguity only in the case of high possible payoffs.

We also consider a slightly different (albeit related) mechanism. If subjects misperceived the probabilities of winning, they could also misjudge which options are risky and which are safe. As mentioned previously, we have explicitly asked about this in our main experiment. Overall, these variables show relatively little variance, with 51% of subjects agreeing that choosing just one number is safest and 46% agreeing that choosing 10 numbers is riskiest (consistent with the notion that the options we gave them form, in their perception, a natural continuum ranging from the safest to the riskiest).

However, these joint distributions obscure strong treatment effects: when the probabilities are not provided, subjects tend to report a relatively higher quantity of numbers as the safest. This dependency is presented in Figure 6. Moreover, which option is judged as the safest and which is judged as the riskiest has a significant impact on the quantity of numbers chosen, see model (5) in Table 5. The direction of this impact is plausible: subjects indicating a higher quantity of numbers as safest are willing to choose more numbers and those indicating a higher quantity of numbers as riskiest are willing to choose fewer numbers, a pattern confirming simple correlations (Table 9). Note that while the estimates of the coefficients for treatment dummy retain their sign and significance, they are substantially reduced. We thus conclude that the effect of providing probabilities on the quantity of numbers chosen is partly mediated by the perception of which choices are safe vs. risky.

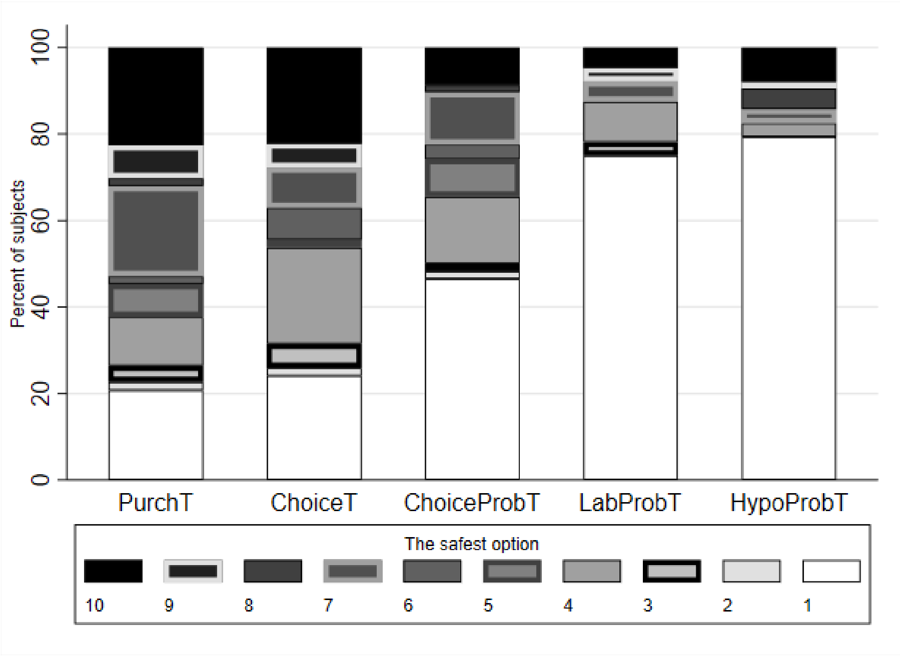


Figure 6: Distribution of the option considered the safest by treatment

Table 9: Correlations between quantity of numbers, the safest, the riskiest option and the WTP

	Quantity of numbers	Safest option	Riskiest option	WTP
Quantity of numbers	1.0000			
Safest option	0.4449	1.0000		
	(0.0000)			
Riskiest option	-0.3067	-0.4624	1.0000	
	(0.0000)	(0.0000)		
WTP	0.0985	0.0065	0.0666	1.0000
	(0.0914)	(0.9158)	(0.2736)	

Note: p values in parentheses

Finally, the justifications that the subjects of the main experiment provided for their choices can shed some light on our treatment effects. To analyze them, we had one of the authors categorize these open-ended justifications, see Appendix B3 for the list of justification categories; additionally, a research assistant independently assigned each justification to one or more category. The kappa measure of agreement between these two raters varies between 0.49 and 0.96, reaching a satisfactory 0.83 on average, see Appendix B4 for details. Acting conservatively, we only judged that justification *i* belonged to category *j* when both raters indicated such an occurrence.

When testing whether the treatment affected the prevalence of any specific category of justification of the choice of quantity of numbers, we found that those including reference to probabilities of winning were, not surprisingly, less often encountered in the treatments in which these probabilities were missing (56.6% vs. 76.6%, $p < .01$). Instead, subjects were more likely to refer to the number of different prizes in such a case (26.4% vs. 14.7%, $p < .01$) Because these variables were also correlated with the quantity of numbers chosen, we included them in our specification (6) in Table 5, thus allowing for the possibility that treatment effects were mediated by cognitions reflected in the “justifications”. In practice, most of these variables turn out to be insignificant and the estimates for treatment dummies only change moderately, thus the mediation turns out to be very weak.

5. Conclusion

There are several types of lessons we draw from our study. First, there are those related to the notion of the external validity of laboratory experiments. We had a rare opportunity to compare data on a choice under risk made by hundreds of thousands of customers to an analogous choice made in the lab. Our main message here is an optimistic one: the distribution of choices we observed was overall remarkably similar to that recorded in the sales data. Moreover, the WTP was highly plausible, with a non-trivial minority willing to pay the market price (as in the field).

Considering the possible causes of any *discrepancies* between the lab and field conditions, proponents of field experiments in economics have mostly emphasized subject pool effects. For example, in the commonly used categorization of field experiments by Harrison and List (2004), any experiment using a typical student sample is called a “standard lab experiment”. Here we do not find demographic effects; instead, we provide evidence that other aspects distinguishing a typical laboratory experiment from the field may be far more important. We observe that standard laboratory framing of choosing between risky gambles makes subjects behave somewhat differently than they would in the field.

Specifically, presentation of prizes being contingent on particular “physical” events drives more risk/skewness seeking than in the case in which probabilities are provided. We are able to explain this pattern in terms of the relative underestimation of unknown probabilities of winning in the case of less risky/skewed lottery options. Similarly, subjects who are not provided with probabilities are less likely to correctly identify which option is the riskiest and which is the safest. This suggests that the very notion of riskiness of a gamble as defined in economic models may be of less importance in explaining real-world choices involving obscure probabilities.

Another factor affecting observed behavior is whether it is framed in terms of merely choosing a ticket or rather purchasing it with the subject’s own money. Making them purchase the item, rather than simply choose one of the risky options, lowers their WTP.

This brings us to the second type of lessons: those concerning the organization of lotteries. A number of advertisements of the lottery that we used in our experiment emphasize that the customers may enjoy the *choice* between the various options (especially the quantity of numbers chosen). In view of our findings, this framing may indeed increase WTP, as it diverts attention from the fact that none of the options is actually worth the money.

One would also think that *not providing probabilities of winning* is a smart choice on the part of the lottery organizer. This could be because of two distinct effects. First, players could be less likely to consider the (obscure) probabilities of winning at all (and, consequently, less likely to consider the expected value). Indeed, we find that our subjects mention probabilities less often when they are not explicitly given. Instead, they are then more likely to mention such factors as the number of different prize levels, being higher in the case of a large quantity of numbers (which of course does not make them more profitable or less risky). The alternative mechanism, that could make hiding probabilities beneficial for the organizer, is that it makes players generally overestimate them. We do not find this effect; quite the opposite, in fact, the probabilities are generally *under*estimated. Because this effect is smaller for long-shot options (a high quantity of numbers chosen), they become *relatively* more attractive when the probabilities are not provided. From the viewpoint of the lottery organizer, however, this yields no direct benefit, as customers' expected returns (and so the organizer's costs and profits) are identical for all the options. The customers' WTP, a change in which would have had an immediate impact on revenues, is not directly affected by the provision of probabilities.

Still, some *indirect* effects could plausibly make the organizer prefer a situation in which customers choose a relatively large quantity of numbers. The voluminous literature demonstrates that very high winnings have a disproportionately positive effect on lottery popularity. Obviously, with a high fraction of players choosing a large quantity of numbers, the highest prizes will be paid out more often. Furthermore, when choosing a lower quantity of numbers, players may learn much faster from their own experience just how unprofitable the game is and stop playing altogether. Our design involving one-time decisions cannot inform us much as to these long-term, indirect effects. However, the fact that the organizer has occasionally launched short-term promotions increasing the attractiveness of choosing a relatively large quantity of numbers (we are aware of such campaigns involving seven and eight numbers) seems to indicate that, in the long term, long-shot options may indeed be especially beneficial to the lottery organizer.

Third, there are lessons about decision making under risk. Generally speaking, we confirm the (truly) long-shot bias in our unique experiment with extremely high real payments. This is exacerbated when the probabilities are not explicitly provided, an effect parallel to the effect of "complex risk" of Armantier and Treich (2015). The latter effect, however, is not driven by the overestimation of extremely low probabilities of winning, but rather by the relative underestimation of moderately low probabilities. Of course, these two effect in general are not mutually contradictory.

We also find that standard laboratory measures of risk posture (specifically those by Holt and Laury and by Dohmen and colleagues) do a poor job of explaining our subjects' behavior in the main task. This cannot be blamed on non-standard framing, as is true even in *LabProbT*. Two plausible explanations (on top of a very general observation of the low correlation across tasks reported in many experiments) are, first, that our gambles vary quite a bit in terms of the number of possible outcomes (being quite high for some) and, second, that many of them are extremely skewed. This would represent a novel and important limitation of standard laboratory measures of risk aversion.

Moreover, these results speak for including such heterogeneity in similar experiments. Additionally, our findings suggest that researchers could increase the external validity of experiments using proper task framing. In our case, conducting laboratory experiments in which prizes are conditional on states of nature (not just prizes with some well-specified probability). Further investigation of this framing effect will deepen our understanding of human decision making under risk and uncertainty.

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Appendix A

A1. Sample data descriptive statistics

There was a small difference in the age distributions of males and females ($t = 2.16, p < 0.05$). We find no gender differences in terms of education ($t = 1.2, p = 0.23$).

	Frequency	Mean	SD	N
Male	38.0%			124
Age		34.9	14.3	319
female		36.3	15.6	202
male		32.7	11.8	124
Education				324
higher	78.7%			255
secondary	21.0%			68
basic	0.30%			1
Superstitious	48.2%			157
Religious	52.8%			172
Household financial wellbeing:				324
very poor	0.3%			1
modest	3.7%			12
so-so	43.2%			140
doing well	42.6%			138
doing very well	10.2%			33
Engaging in any form of gambling:				326
once a week or more	4.0%			13
one to three times in a month	8.0%			26
a few times a year	24.5%			80
once or a few times in a lifetime	40.8%			133
never	22.7%			74
Dohmen risk preferences:				
general risk		5.4	2.1	318
car driving		4.3	3.2	251
financial risk		2.8	2.5	326
leisure and sport		5.9	2.5	326
occupation		5.8	2.3	289
health		3.8	2.8	326
other people		3.6	2.5	326

Note: Responses to Dohmen's risk preference questions are measured on a scale from 0 to 10, with 0 meaning "not willing to take any risk at all" and 10 meaning "fully willing to take risk".

Open questions were classified into a set of binary variables. More about these variables could be found in Appendix A6.

A2. Conover-Iman Pairwise Comparison of quantity of numbers by treatment

	PurchT	ChoiceT	ChoiceProbT	LabProbT
ChoiceT	0.313533			
	0.3770			
ChoiceProbT	4.304638	3.942306		
	0.0000	**0.0000**		
LabProbT	5.471793	5.094261	1.146230	
	0.0000	**0.0000**	0.1263	
HypoLabProbT	3.896822	3.537710	-0.422719	-1.574972
	0.0001	**0.0002**	0.3364	0.0581

alpha = 0.05

Reject Ho if p = P(T <= |t|) <= alpha/2

A3. Tests and regressions from the main text repeated (A) without subjects who made more than one error in the control questions and (B) without subjects that were willing to pay less than 5 EUR.[4]

(A): without subjects who made more than one error in the control questions

Table 3 from the main text (Tests of treatment effects) repeated without subjects who made more than one error in the control questions:

Kruskal-Wallis equality of populations rank test:				
	Chi(2) = 40.49 with 4 d.f., p = 0.0001			
	Mann-Whitney		Kolmogorov-Smirnov	
	z	p-value	D	p-value
Field vs. PurchT	1.10	0.29	0.13	0.28
PurchT vs. ChoiceT	–0.48	0.63	0.12	0.82
ChoiceT vs. ChoiceProbT	**3.69**	**0.0002**	**0.33**	**0.005**
ChoiceProbT vs. LabProbT	1.21	0.23	0.18	0.30
LabProbT vs. HypoLabProbT	–0.91	0.36	0.14	0.55

[4] While it could have been natural to set the cutoff point at the purchase price of 6.25, this would have left us with too few observations.

Table 4 from the main text (Pairwise comparisons between the field and each of the laboratory treatments) repeated without subjects who made more than one error in the control questions:

	Mann-Whitney		Kolmogorov-Smirnov	
	z	p-value	D	p-value
Field vs. PurchT	1.10	0.29	0.13	0.28
Field vs. ChoiceT	1.54	0.12	0.17	0.10
Field vs. ChoiceProbT	**6.87**	**0.0000**	**0.41**	**0.0000**
Field vs. LabProbT	**8.28**	**0.0000**	**0.49**	**0.0000**
Field vs. HypoLabProbT	**5.81**	**0.0000**	**0.42**	**0.0000**

Table 5 from the main text (Ordered logistic regression of the quantity of numbers chosen) repeated without subjects who made more than one error in the control questions:

Variable	(1)	(2)	(3)	(4)	(5)	(6)
PurchT	1.651***	1.671***	1.339***	1.749***	0.939**	1.328***
ChoiceT	1.532***	1.508***	0.821*	1.584***	1.043***	1.017***
ChoiceProbT	0.393	0.220	-0.119	0.427	0.169	0.196
HypoLabProbT	0.342	0.193	-0.138	0.275	0.207	0.192
dohmen_general		0.015	0.028			
dohmen_people		0.106**	0.112**	0.048	0.018	0.035
dohmen_other* included?		YES	YES	NO	NO	NO
RRA		0.080				
missing_RRA		0.133	0.167			
Big5 included?		YES	YES	NO	NO	NO
male		-0.146	-0.094			
age		-0.001	-0.002			
education		0.404	0.373			
income		0.095	0.062			
gambling_habits_overall		0.244**	0.239*	0.200*	0.099	0.215**
gambling_habits_of_others		0.241	0.217	0.107	0.150	0.057
superstitious		-0.426*	-0.465*			
religious		0.615**	0.698***	0.484**	0.468**	0.394*
ChoiceT*RRA			0.587			
ChoiceProbT*RRA			-0.097			
LabProbT*RRA			-0.812			
HypoLabProbT*RRA			-0.049			
safest_option					0.137***	
riskiest_option					-0.083**	
WhyThisNmbr_probs						-0.509**
WhyThisNmbr_prz_nmbr						0.501*

safest_probs						-0.077
safest_prz_nmbr						0.556*
safest_error						0.810**
riskiest_probs						-0.161
N	298	292	292	298	257	298

(B): without subjects that were willing to pay less than 5 EUR

Table 3 from the main text (Tests of treatment effects) repeated without subjects whose WTP < 5:

Kruskal-Wallis equality of populations rank test:				
	Chi(2) = 30.454 with 4 d.f., p = 0.0001			
	Mann-Whitney		Kolmogorov-Smirnov	
	z	p-value	D	p-value
Field vs. PurchT	–0.99	0.32	0.16	0.56
PurchT vs. ChoiceT	0.98	0.33	0.18	0.70
ChoiceT vs. ChoiceProbT	**4.33**	**0.0000**	**0.47**	**0.001**
ChoiceProbT vs. LabProbT	–0.30	0.77	0.16	0.73
LabProbT vs. HypoLabProbT	–0.64	0.52	0.14	0.86

Table 4 from the main text (Pairwise comparisons between the field and each of the laboratory treatments) repeated without subjects whose WTP < 5:

	Mann-Whitney		Kolmogorov-Smirnov	
	z	p-value	D	p-value
Field vs. PurchT	–0.99	0.32	0.16	0.56
Field vs. ChoiceT	0.19	0.85	0.09	0.95
Field vs. ChoiceProbT	**6.19**	**0.0000**	**0.46**	**0.000**
Field vs. LabProbT	**5.49**	**0.0000**	**0.39**	**0.000**
Field vs. HypoLabProbT	**3.62**	**0.0003**	**0.32**	**0.001**

Table 5 from the main text (Ordered logistic regression of the quantity of numbers chosen) repeated without subjects whose WTP < 5:

Variable	(1)	(2)	(3)	(4)	(5)	(6)
PurchT	1.913***	1.987***	1.969**	2.024***	1.053*	1.479***
ChoiceT	1.479***	1.252***	0.295	1.497***	0.701	1.041**
ChoiceProbT	-0.129	-0.628	-1.279*	-0.265	-0.524	-0.557
HypoLabProbT	0.361	0.037	-0.043	0.260	0.276	0.187

dohmen_general		0.044	0.122			
dohmen_people		0.143*	0.174**	0.075	0.063	0.065
dohmen_other* included?		YES	YES	NO	NO	NO
RRA		0.121	(omitted)			
missing_RRA		0.709	0.744			
Big5 included?		YES	YES	NO	NO	NO
male		-0.350	-0.300			
age		-0.016	-0.018			
education		0.483	0.482			
income		-0.009	-0.102			
gambling_habits_overall		0.326**	0.317*	0.254**	0.163	0.284**
gambling_habits_of_others		0.292	0.253	0.211	0.339*	0.195
superstitious		-0.141	-0.204			
religious		0.211	0.384	0.186	0.290	0.102
ChoiceT*RRA			1.605			
ChoiceProbT*RRA			0.980			
LabProbT*RRA			-0.228			
HypoLabProbT*RRA			0.048			
safest_option					0.138**	
riskiest_option					-0.155***	
WhyThisNmbr_probs						-0.520*
WhyThisNmbr_prz_nmbr						0.712*
safest_probs						0.159
safest_prz_nmbr						0.383
safest_error						1.077**
riskiest_probs						-0.368
N	176	167	167	176	149	176

A4. Conover-Iman Pairwise Comparison of WTP by treatment

	PurchT	ChoiceT	ChoiceProbT	LabProbT
ChoiceT	-2.958307			
	0.0017			
ChoiceProbT	-2.385079	0.605680		
	0.0089	0.2726		
LabProbT	-4.029658	-0.920254	-1.567621	
	0.0000	0.1791	0.0590	
HypoLabProbT	-3.596078	-0.527033	-1.161407	0.401888
	0.0002	0.2993	0.1232	0.3440

alpha = 0.05

Reject Ho if p = P(T <= |t|) <= alpha/2

A5. Linear regression on *willingness to pay for a chosen lottery ticket*

Variable	(1) treats	(2) all	(3) all_i*RRA	(4) sig	(5) sig_beton
PurchT	-1.285***	-1.404***	-0.987*	-1.383***	-1.673***
ChoiceT	-0.278	-0.347	-0.153	-0.263	-0.543
ChoiceProbT	-0.528	-0.525	-0.646	-0.428	-0.518
HypoLabProbT	-0.125	-0.163	0.165	-0.206	-0.256
dohmen_general		0.252**	0.265**	0.177***	0.163***
dohmen_other* included?		YES	YES	NO	NO
RRA		0.150	0.772		
missing_RRA		0.158	0.117		
Big5 included?		YES	YES	NO	NO
male		-0.401*	-0.423*	-0.404*	-0.351
age		0.013	0.013		
education		-0.425	-0.409		
income		0.363**	0.358**	0.120	0.102
gambling_habits_overall		0.134	0.139		
gambling_habits_of_others		0.151	0.151	0.163	
superstitious		-0.007	-0.006		
religious		0.316	0.321		
PurchT*RRA			-1.016		
ChoiceT*RRA			-0.588		
LabProbT*RRA			-0.195		
HypoLabProbT*RRA			-0.884		
number_of_numbers					0.099***
N	295	287	287	294	294

legend: * p<.1; ** p<.05; *** p<.01

Note: *dohmen_other include: dohmen_car, dohmen_finance, dohmen_sport, dohmen_work, dohmen_health, dohmen_above_median, dohmen_below_median, missing_dohmen_general, missing_dohmen_car, missing_dohmen_work
RRA: calculated based on the Holt & Laury task; ranging from -0.95 to 1.37;
Missing_RRA: if subject switched more than once in the Holt & laury task we recorded this as missing RRA;
Education: oridnal- basic, secondary, higher;
Income: ordinal- poor, modest, average, good, very good;
Gamgling_habits_overall: how often does subject engage in any form of gambling; ordinal- from 1 (never) to 5 (once a week or more often);
Gambling_habits_of_others: whether there are close friends or family members that often gamble; ordinal- from 1 (no such people) to 4 (there are many such people)
Supertitious: considering oneself to be superstitious; binary
Religious: considering oneself to be religious; binary

A6. Justification categories: interrater agreement

Variable	N	kappa*
WhyThisNmbr_probs	326	0.96
WhyThisNmbr_prz_size	326	0.85
WhyThisNmbr_prz_nmbr	326	0.90
WhyThisNmbr_superstit	326	0.92
WhyThisNmbr_error	326	0.94
WhyThisNmbr_risk	326	0.93
safest_probs	326	0.93
safest_prz_size	326	0.94
safest_prz_nmbr	326	0.90
safest_superstit	326	0.80
safest_error	326	0.51
safest_risk	326	0.91
riskiest_probs	326	0.89
riskiest_prz_size	326	0.80
riskiest_prz_nmbr	326	0.79
riskiest_superstit	326	0.67
riskiest_error	326	0.58
riskiest_risk	326	0.49
edu_STEM	326	0.96
edu_non_STEM	326	0.93
gmbl_why_unknown	326	0.61
gmbl_why_superstit	326	0.91
gmbl_why_probs	326	0.58
gmbl_why_risk	326	0.92
gmbl_how_quickpick	326	0.94
gmbl_how_superstit	326	0.96
gmbl_how_ownchoice	326	0.95

*where kappa is an interrater agreement indicator

Kappa could be interpreted according to the following classification (Landis and Koch, 1977):

- below 0.0 – poor;
- 0.0 – 0.20 – slight;
- 0.21 – 0.40 – fair;
- 0.41 – 0.60 – moderate;
- 0.61 – 0.80 – substantial;
- 0.81 – 1.00 – almost perfect.

Appendix B

List of justification categories

WhyThisNmbr_probs - the participant explicitly mentioned "probability" or "chance" of winning something (or nothing) in their explanation - see classified variable name.

WhyThisNmbr_prz_size - the participant explicitly mentioned prize size, including, for example, "too low" or "high enough" in their explanation - see classified variable name.

WhyThisNmbr_prz_nmbr - the participant explicitly mentioned the possibility of more than one prize to be won in their explanation - see classified variable name.

WhyThisNmbr_superstit - the participant mentioned that the chosen number has some special meaning for them and is selected not by chance - for example, a "lucky" number or important date - in their explanation. See classified variable name.

WhyThisNmbr_error - the participant made a factually wrong statement about probability or expected value (also in the form of calculations).

WhyThisNmbr_risk - the participant mentioned a certain level of risk associated with the selected option - for example, the chosen option being "safe" or "risky" for him.

safest_probs - the participant explicitly mentioned "probability" or "chance" of winning something (or nothing) in their explanation - see classified variable name.

safest_prz_size - the participant explicitly mentioned prize size, including, for example, "too low" or "high enough" in their explanation - see classified variable name.

safest_prz_nmbr - the participant explicitly mentioned the possibility of more than one prize to be won in their explanation - see classified variable name.

safest_superstit - the participant mentioned that the chosen number has some special meaning for them and is selected not by chance - for example, a "lucky" number or important date - in their explanation. See classified variable name.

safest_error - the participant made a factually wrong statement about the probability or expected value (also in the form of calculations).

safest_risk - the participant mentioned a certain level of risk associated with the selected option - for example, the chosen option being "safe" or "risky" for him.

riskiest_probs - the participant explicitly mentioned the "probability" or "chance" of winning something (or nothing) in their explanation - see classified variable name.

riskiest_prz_size - the participant explicitly mentioned prize size, including, for example, "too low" or "high enough" in their explanation - see classified variable name.

riskiest_prz_nmbr - the participant explicitly mentioned the possibility of more than one prize to be won in their explanation - see classified variable name.

riskiest_superstit - the participant mentioned that the chosen number has some special meaning for them and is selected not by chance - for example, a "lucky" number or important date - in their explanation. See classified variable name.

riskiest_error - the participant made a factually wrong statement about probability or expected value (also in the form of calculations).

riskiest_risk - the participant mentioned a certain level of risk associated with the selected option - for example, the chosen option being "safe" or "risky" for him.

edu_STEM - the participant's highest education level attained field is within the "Science, technology, engineering, and mathematics" group of academic disciplines, according to https://www.ice.gov/sites/default/files/documents/Document/2016/stem-list.pdf

edu_non_STEM - the participant's highest education level attained field is not within the "Science, technology, engineering, and mathematics" group of academic disciplines, according to https://www.ice.gov/sites/default/files/documents/Document/2016/stem-list.pdf

gmbl_why_unknown - there is no explicit reason provided by the participant in choosing a previously mentioned amount of numbers during usual lottery play.

gmbl_why_superstit - the chosen number has some special meaning for the participant and is selected during usual lottery play not by chance - for example, a "lucky" number or important date.

gmbl_why_probs - the participant explicitly mentioned the "probability" or "chance" of winning something (or nothing) in their explanation - see classified variable name.

gmbl_why_risk - the participant mentioned a certain level of risk associated with the selected option - for example, the chosen option being "safe" or "risky" for him.

gmbl_how_quickpick - the numbers are chosen using pre-defined numbers by the lottery organizer - so-called "quick-picks". Other option - participant uses a random number generator.

gmbl_how_superstit - the chosen number has some special meaning for the participant and is selected during usual lottery play not by chance - for example, a “lucky" number or important date.

gmbl_how_ownchoice - the chosen number is the choice of the participant.

Appendix C

C1. Wording of Part 1, contingent on the treatment; and of Part 2 and the Questionnaire, same for all treatments

The following pages contain instructions for all 5 treatments: PurchT, ChoiceT, ChoiceProbT, LabProbT, HypoLabProbT.

Although the treatments differ in minor ways only, compiling them all into one document would probably not be clear to the reader, thus we compiled them in the following way:

- page 1 of PurchT, ChoiceT, ChoiceProbT
- page 1 of LabProbT, HypoLabProbT

- page 2 of PurchT, ChoiceT, ChoiceProbT
- page 2 of LabProbT, HypoLabProbT

- page 3 of PurchT, ChoiceT, ChoiceProbT
- page 3 of LabProbT, HypoLabProbT

- page 4 of PurchT
- page 4 of ChoiceT, ChoiceProbT
- page 4 of LabProbT, HypoLabProbT

- Part 2 and questionnaire for all treatments

All the instructions, on their 1st page, contain two examples and two control questions. The order presented here is what we called *example version A*, while in the experimental sessions half of the instructions contained *example version B*, where the same examples and control questions were used, but in a reversed order.

[page 1 for PurchT, ChoiceT, ChoiceProbT] **Instructions**

Welcome to the experiment. We ask you to turn off your mobile phones and not to communicate with other participants in any way. If you have a question - raise your hand.

The experiment consists of two parts (and a questionnaire). [***not*** *in PurchT:* You will receive 2.5 € for the participation in this study, regardless of your decisions.] In addition, at the end of the experiment, one of the two parts (Part 1 or Part 2) will be randomly drawn and you will receive remuneration depending on your own decisions in this drawn part. To make this happen, approach the payout desk outside the room with this form when you answer all the questions it contains. The entire study is anonymous. If you run out of space while answering, write VERTE and write on the other side of the page.

Part 1

[*in PurchT:* To start with, we give you 7.5 € in this part. With this money, you'll be able to purchase a [name] lottery ticket for the nearest drawing, and you'll receive the rest in cash. We'll explain the details later.] [*in ChoiceT & ChoiceProbT:* In this part, an already paid for [name] lottery ticket for the nearest drawing may be your remuneration.] In the lottery office lottery tickets like mentioned here cost 6.25 €. [name] is [operator's] game (which also offers, among others, Lotto game).

In [name], 20 numbers are drawn from 1 to 80 numbers. The decision you are about to make is to choose how many numbers (minimum: one, maximum: ten) you want to bet on. You will therefore choose one of the numbers marked in yellow in the table on the next page. In each column under a given number you can see the prizes for the chosen (bet on) quantity of numbers, depending on how many of them will be drawn. [*in ChoiceProbT*: The probability of winning each prize is also given underneath each of them.] All prizes are already given in net, i.e. after the tax due on high winnings - that is, if you win, you will receive exactly the amount stated in the table.

For example, based on the table on the next page, when you choose (bet on):

- 9 numbers and all of them will be among the 20 drawn numbers, [which happens with a probability 1/1 380 688,] you win 157,500 €.
- 4 numbers and you hit two, [which happens with a probability 1/5,] you win 5 €.

In the following examples, based on the table on the next page, enter the correct numbers in place of the dots and answer the question. When you choose (bet on):

- 2 numbers and hit both, [which happens with a probability 1/17,] you win ……………… €; in other case you win nothing.
- 7 numbers and hit all of them, how much do you win? ……………… €. [And what is the probability that this will happen? …../………………]

Can you bet on the quantity of numbers for which you will definitely win something? Underline the correct answer: YES / NO

  - if YES, which quantity of numbers? ………………

If you have any doubts what answers to enter, raise your hand.

[page 1 for LabProbT, HypoLabProbT]

Instructions

Welcome to the experiment. We ask you to turn off your mobile phones and not to communicate with other participants in any way. If you have a question - raise your hand.

The experiment consists of two parts (and a questionnaire). You will receive 2.5 € for the participation in this study, regardless of your decisions. In addition, at the end of the experiment, one of the two parts (Part 1 or Part 2) will be randomly drawn and you will receive remuneration depending on your own decisions in this drawn part. *[in HypoLabProbT*: ~~dependent on your own decisions in this drawn part~~ → which may depend on your own decisions in this drawn part.]. To make this happen, approach the payout desk outside the room with this form when you answer all the questions it contains. The entire study is anonymous. If you run out of space while answering, write VERTE and write on the other side of the page.

Part 1

In this part, you will be choosing between options with uncertain payouts. Each of these options costs us 6.25 €.

You will have to choose one of the options– from A to J marked in yellow in the table on the next page. In each column under the given option you can see what the payouts for a given option and the probabilities of given payouts are.

[in HypoLabProbT: Imagine that] The chances of getting a payout and its amount depend on the option you choose, according to the table on the next page. All payouts are already given net, i.e. after a tax deduction.

For example, based on the table on the next page, when you choose:

- Option B, you can get up to 157 500 €, which happens with a probability 1/1 380 688.
- Option G, it may happen that you get 5 €. This will happen with a probability 1/5.

In the following examples, based on the table on the next page, enter the correct numbers in place of the dots and answer the question. When you choose:

- Option I, probability of getting a payout in the amount of ……………… € is 1/17; in other case you get nothing.
- Option D, how much can you get at most? ………………. €. And what is the probability that this will happen? …../………………

Can you choose an option in which you will definitely get something? Underline the correct answer: YES / NO

 - if YES, which one? ……………….

If you have any doubts what answers to enter, raise your hand.

[page 2 for PurchT, ChoiceT, ChoiceProbT]

MATCHING NUMBERS DRAWN	QUANTITY OF NUMBERS CHOSEN									
	10	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
10	562 500 € pr. 1/8 911 711									
9	22 500 € pr. 1/163 381	157 500 € pr. 1/1 380 688								
8	1 170 € pr. 1/7 384	4 500 € pr. 1/30 682	49 500 € pr. 1/230 115							
7	350 € pr. 1/621	675 € pr. 1/1 690	1 350 € pr. 1/6 232	13 500 € pr. 1/40 979						
6	30 € pr. 1/87	105 € pr. 1/175	150 € pr. 1/423	500 € pr. 1/1 366	2 925 € pr. 1/7 753					
5	10 € pr. 1/19	20 € pr. 1/31	50 € pr. 1/55	50 € pr. 1/116	300 € pr. 1/323	1 575 € pr. 1/1 551				
4	5 € pr. 1/8	5 € pr. 1/9	10 € pr. 1/12	10 € pr. 1/19	20 € pr. 1/35	50 € pr. 1/83	210 € pr. 1/326			
3				5 € pr. 1/6	5 € pr. 1/8	10 € pr. 1/12	20 € pr. 1/23	135 € pr. 1/72		
2							5 € pr. 1/5	5 € pr. 1/7	40 € pr. 1/17	
1										10 € pr. 1/4

[page 2 for LabProbT, HypoLabProbT]

Option A	Option B	Option C	Option D	Option E	Option F	Option G	Option H	Option I	Option J
562 500 € pr. 1/8 911 711	157 500 € pr. 1/1 380 688	49 500 € pr. 1/230 115	13 500 € pr. 1/40 979	2 925 € pr. 1/7 753	1 575 € pr. 1/1 551	210 € pr. 1/326	135 € pr. 1/72	40 € pr. 1/17	10 € pr. 1/4
22 500 € pr. 1/163 381	4 500 € pr. 1/30 682	1 350 € pr. 1/6 232	500 € pr. 1/1 366	300 € pr. 1/323	50 € pr. 1/83	20 € pr. 1/23	5 € pr. 1/7		
1 170 € pr. 1/7 384	675 € pr. 1/1 690	150 € pr. 1/423	50 € pr. 1/116	20 € pr. 1/35	10 € pr. 1/12	5 € pr. 1/5			
350 € pr. 1/621	105 € pr. 1/175	50 € pr. 1/55	10 € pr. 1/19	5 € pr. 1/8					
30 € pr. 1/87	20 € pr. 1/31	5 € pr. 1/12	5 € pr. 1/6						
10 € pr. 1/19	5 € pr. 1/9								
5 € pr. 1/8									

[page 3 for PurchT, ChoiceT, ChoiceProbT]

You must now decide how many numbers you want to choose (bet on). At the end of the experiment, if Part 1 is drawn, you will receive a [name] ticket for the nearest drawing. *[in PurchT:* The price at which you will be able to purchase it may differ from the standard lottery office price. That is why it is possible that you will actually buy it, regardless of how much it is worth to you (but more on that on the next page).] The ticket will be bet on as many numbers as you choose, with the chances to win exactly the amounts specified in the table. The specific numbers on the lottery ticket will be chosen at random. In [name], winnings are guaranteed, which means they don't depend on how others bet.

Remember that during experiments at the Faculty of Economic Sciences of the University of Warsaw, we never mislead participants nor lie. The payouts we offer here are secured and actually possible to receive.

Because your choices have a real impact on your winnings, it's in your own interest to think about it and choose the option that you actually prefer the most.

How many numbers do you choose (bet on)? ……

And now answer the following questions.

Why did you choose (bet on) this particular quantity of numbers? What were your reasons for making the decision?

……

……

Choosing which quantity of numbers do you consider to be the safest option and why?

……

……

Choosing which quantity of numbers do you consider to be the riskiest option and why?

……

……

[page 3 for LabProbT, HypoLabProbT]

You must now decide which of the options from A to J you choose. At the end of the experiment, if Part 1 is drawn, you will receive the option of your choice. [in *HypoLabProbT*: ~~the option of your choice~~ → 5 € in cash. Imagine, however, that you could actually get the option you choose, with exactly the chances to win exactly the amounts specified in the table.]

[in *LabProbT*: Remember that during experiments at the Faculty of Economic Sciences of the University of Warsaw, we never mislead participants nor lie. The payouts we offer here are secured and actually possible to receive. If you have any doubts about how we can guarantee such high payouts, ask the experimenter, for example while returning the form.

Because your choices have a real impact on your payouts, it's in your own interest to think about it and choose the option that you actually prefer the most.]

Which of the A – J options do you choose? ……

And now answer the following questions.

Why did you choose this particular option? What were your reasons for making the decision?

……

……

Which one of the A – J options do you consider to be the safest one and why?

……

……

Which one of the A – J options do you consider to be the riskiest one and why?

……

……

[page 4 for PurchT]

What quantity of numbers did you choose on the previous page? …… Now we will only ask you about the lottery ticket with as many numbers as you have just chosen.

In a moment you will be able to purchase your chosen lottery ticket. For each lottery ticket price in the table below, i.e. in each row in the table below, select whether you want to buy your lottery ticket for the given price. At the end of the experiment, if Part 1 is drawn, we will roll a 10-sided die with numbers from 1 to 10 and the rolled number will indicate a row from the table below with the price at which you purchase or not your lottery ticket. Depending on your decision in the drawn row, you will either purchase your chosen [name] lottery ticket for the price specified in the row (and you will receive the selected ticket and the rest of the promised 7.5 € in cash) or you will not purchase it.

For example, if on the previous page you have chosen a ticket with 3 numbers, then in the table below in each row mark whether you will purchase this lottery ticket with 3 numbers from us if it will cost you 0.75 €, 1.50 €, 2.25 €, 3.00 €, etc. If, at the end of the experiment, Part 1 will be drawn, we will roll a die and for example a number 6 comes up, then we will look at your decision in the row marked with the number 6 in the table below. If you marked YES in this row, you will purchase and get your chosen lottery ticket with 3 numbers for 4.50 €, and the rest of 7.5 €, that is 3 €, you will get in cash. If you marked NO, you will receive 7.5 € in cash. It is in your best interest to think about it and indicate in each row whether you will buy your chosen lottery ticket for the price given there or not:

Die roll result	**Ticket price**	**Will you buy it?**
1.	0.75 €	YES / NO
2.	1.50 €	YES / NO
3.	2.25 €	YES / NO
4.	3.00 €	YES / NO
5.	3.75 €	YES / NO
6.	4.50 €	YES / NO
7.	5.25 €	YES / NO
8.	6.00 €	YES / NO
9.	6.75 €	YES / NO
10.	7.50 €	YES / NO

The end of Part 1.

[page 4 for ChoiceT, ChoiceProbT]

What quantity of numbers did you choose on the previous page? …… Now we will only ask you about the lottery ticket with as many numbers as you have just chosen.

We ask you for a series of choices between the lottery ticket you have just chosen with as many numbers as you have chosen and a certain amount in cash. In each row in the table below, select what do you prefer to receive. At the end of the experiment, if Part 1 is drawn, we will roll a 10-sided die with numbers from 1 to 10 and the rolled number will indicate a row from the table below. Depending on your decision in the drawn row you will either receive Option X (your [name] lottery ticket with the quantity of numbers you have chosen) or Option Y (cash).

For example, if on the previous page you have chosen a ticket with 3 numbers, then in the table below in each row mark whether you would prefer to get X – your chosen lottery ticket or Y – given amount in cash. If, at the end of the experiment Part 1 will be drawn, we will roll a die and for example a number 6 comes up, then we will look at your decision in the row marked with the number 6 in the table below. If you marked X in this row, you will receive your chosen lottery ticket with 3 numbers. If you marked Y in this row, you will get 4.50 € in cash. It is in your best interest to think about it and indicate in each row the option that you actually prefer:

Die roll result	**Option X**	**Option Y**	**Which do you choose?**
1.	Your ticket	0.75 € in cash	X / Y
2.	Your ticket	1.50 € in cash	X / Y
3.	Your ticket	2.25 € in cash	X / Y
4.	Your ticket	3.00 € in cash	X / Y
5.	Your ticket	3.75 € in cash	X / Y
6.	Your ticket	4.50 € in cash	X / Y
7.	Your ticket	5.25 € in cash	X / Y
8.	Your ticket	6.00 € in cash	X / Y
9.	Your ticket	6.75 € in cash	X / Y
10.	Your ticket	7.50 € in cash	X / Y

[page 4 for LabProbT, HypoLabProbT]

Which option did you choose on the previous page? …… Now we will only ask you about the option you have just chosen.
We ask you for a series of choices between your just selected option A - J and a certain amount in cash. In each row in the table below, select what do you prefer to receive. [in HypoLabProbT: Imagine that...] At the end of the experiment, if Part 1 is drawn, we will roll a 10-sided die with numbers from 1 to 10 and the rolled number will indicate a row from the table below. Depending on your decision in the drawn row you will receive either Option X (access to your chosen option A-J) or Option Y (cash).
For example, if on the previous page you have chosen option H, then in the table below in each row you mark whether you prefer to receive X - option H or Y - given amount in cash. If, at the end of the experiment Part 1 will be drawn, we will roll a die and for example a number 6 comes up, then we will look at your decision in the row marked with the number 6 in the table below. If you marked X in this row, you will receive option H. If you marked Y, you will get 4.5 € in cash. [in LabProbT: It is in your best interest to think about it and indicate in each row the option that you actually prefer:]

Die roll result	Option X	Option Y	Which do you choose?
1.	Your chosen Option A-J	0.75 € in cash	X / Y
2.	Your chosen Option A-J	1.50 € in cash	X / Y
3.	Your chosen Option A-J	2.25 € in cash	X / Y
4.	Your chosen Option A-J	3.00 € in cash	X / Y
5.	Your chosen Option A-J	3.75 € in cash	X / Y
6.	Your chosen Option A-J	4.50 € in cash	X / Y
7.	Your chosen Option A-J	5.25 € in cash	X / Y
8.	Your chosen Option A-J	6.00 € in cash	X / Y
9.	Your chosen Option A-J	6.75 € in cash	X / Y
10.	Your chosen Option A-J	7.50 € in cash	X / Y

The end of Part 1.

[Part 2 and the questionnaire for all treatments]

Part 2

This part of the experiment is not related to the first part in any way and the decisions made here are separate decisions. At the end of the experiment, you will draw whether your remuneration will be determined based on your decisions in this part or in Part 1.

[*only in PurchT:* In this part you start with a guaranteed amount of 2.5 €. All payouts referred to below should be understood as additional, on top of this amount.]

In this part of the experiment we present you a table with ten pairs of lotteries, which we call Option A and Option B. The table is on the next page. Each pair is presented in a separate row. In each row we will ask you to choose (and mark) your preferred option: A or B. You can make decisions in any order and change them if you change your mind.

If this part of the experiment is drawn, it will be decisive for determining your remuneration. Each row of the table is a pair of two lotteries (A and B). One of the ten rows on the next page will be selected at random. From a given row, you will get the lottery you chose in that row. This lottery will be settled at the end of the experiment and you will receive the remuneration resulting from it.

Example

With the use of a 10-sided die we will draw a number from 1 to 10 ("0" on the die will be treated as "10"). A number that comes up will indicate the row that will determine your payout. Let's assume that as a result of the die roll the number "3" came up. Thus, the following (exemplary) row would be selected:

Dice roll result	**Option A**	**Option B**	**Do you choose: A or B?**
3.	8/10 for 5 € 2/10 for 6.25 €	8/10 for 4.5 € 2/10 for 10 €	A / (B)

Let's assume that in this row you have decided that you prefer Option B, i.e. a prize of 4.5 € with a probability 8/10 or a prize of 10 € with a probability 2/10.

We roll the die for the second time. If a number between 1 and 8 comes up (for which you have 8/10 chances), you will receive 4.5 €, and if 9 or 10 comes up (2/10 chances), you will receive 10 €.

The table with the options to choose from is on the next page.

Because any of the rows can be drawn, that is, every decision you make can be put into practice, it is in your best interest to choose the option you indeed prefer in each row.

Die roll result	**Option A**	**Option B**	**Do you choose: A or B?**
1.	9/10 for 4 € 1/10 for 5 €	9/10 for 0.25 € 1/10 for 9.65 €	A / B
2.	8/10 for 4 € 2/10 for 5 €	8/10 for 0.25 € 2/10 for 9.65 €	A / B
3.	7/10 for 4 € 3/10 for 5 €	7/10 for 0.25 € 3/10 for 9.65 €	A / B
4.	6/10 for 4 € 4/10 for 5 €	6/10 for 0.25 € 4/10 for 9.65 €	A / B
5.	5/10 for 4 € 5/10 for 5 €	5/10 for 0.25 € 5/10 for 9.65 €	A / B
6.	4/10 for 4 € 6/10 for 5 €	4/10 for 0.25 € 6/10 for 9.65 €	A / B
7.	3/10 for 4 € 7/10 for 5 €	3/10 for 0.25 € 7/10 for 9.65 €	A / B
8.	2/10 for 4 € 8/10 for 5 €	2/10 for 0.25 € 8/10 for 9.65 €	A / B
9.	1/10 for 4 € 9/10 for 5 €	1/10 for 0.25 € 9/10 for 9.65 €	A / B
10.	0/10 for 4 € 10/10 for 5 €	0/10 for 0.25 € 10/10 for 9.65 €	A / B

The end of Part 2.
Begin the Questionnaire on the next page.

Questionnaire

Part A

Here are a number of personality traits that may or may not apply to you. Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement. You should rate the extent to which the pair of traits applies to you, even if one characteristic applies more strongly than the other.

Disagree strongly	Disagree moderately	Disagree a little	Neither agree nor disagree	Agree a little	Agree moderately	Agree strongly
1	**2**	**3**	**4**	**5**	**6**	**7**

I see myself as:

1. ………… Extraverted, enthusiastic.
2. ………… Critical, quarrelsome.
3. ………… Dependable, self-disciplined.
4. ………… Anxious, easily upset.
5. ………… Open to new experiences, complex.
6. ………… Reserved, quiet.
7. ………… Sympathetic, warm.
8. ………… Disorganized, careless.
9. ………… Calm, emotionally stable.
10. ………… Conventional, uncreative.

Part B

Now we again ask you to answer questions about yourself.

Please answer to the below questions on a scale from 0 to 10, where 0 means "completely unwilling to take risk", and 0 means "completely willing to take risk".

1) How willing are you to take risks, in general?

Completely unwilling to take risk										Completely willing to take risk
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

People might behave differently in various situations. How willing are you to take risk in the following specific contexts:

2) ...driving a car? [if this situation doesn't concern you, write "NA"]

Completely willing to take risk										Completely willing to take risk
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

3) …financial matters?

Completely willing to take risk										Completely willing to take risk
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

4) …sports and leisure?

Completely willing to take risk										Completely willing to take risk
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

5) …career? [if this situation doesn't concern you, write "NA"]

Completely willing to take risk										Completely willing to take risk
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

6) … health?

Completely willing to take risk										Completely willing to take risk
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

7) … other people?

Completely willing to take risk										Completely willing to take risk
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

Part C

1. **A)** How often do you play [name] (this is one of the lottery games offered by [operator]?
    - Once a week or more often
    - Once, twice or three times a month
    - Several times a year
    - Once or several times in my life
    - Never, but I knew the rules of this game before the experiment
    - Never and I didn't know the rules of this game before the experiment
    - Other: ………………….

    B) If you play [name], how many numbers do you usually bet on?………………….

    Why this many? ……………………………………………………………………….

……

……………………………………………………………………………………………………

How do you choose specific numbers? Or maybe you use the "at random" option?

Why so/why not? ………………………………………………………………….

……

……………………………………………………………………………………………………

2. And how often do you play other lotteries, [operator's] number games (e.g. Lotto, scratch cards), bet on sport results, play cards for money, visit (online) casinos or do similar things?
    - Once a week or more often
    - Once, twice or three times a month
    - Several times a year
    - Once or several times in my life
    - Never
    - Other: ………………….

3. If you happen to play, do you sometimes do it together with friends or family?
    - Yes
    - No

4. Are there people who often play games of chance among your close friends or family?
    - There are no such people
    - There is one such person
    - There are several such people

- There are many such people

5. Do you sometimes knock on unpainted wood, blow on a found coin or perform any activities of this type?
- Yes
- No

6. Do you consider yourself as a religious person?
- Yes
- No

7. In what year were you born? ………………….

8. Gender:
- female
- male

9. What is your education level?
- primary
- secondary
- higher or studying
  - field of study: ……………………..……………….

10. Which of the following terms best describes your household?
- We live very poorly – we don't have enough for our basic needs
- We live modestly – we have to manage economically every day
- We live on average – we have enough money for everyday living, but we have to save for major purchases
- We live well – we can afford much without saving
- We live very well – we can afford some luxury

<u>If you have already answered **all** of the questions in this form, please go with it to the payout desk to receive remuneration.</u>

C2. Design and wording of the Probability Estimates study

The following text contains instructions for the probability estimates experiment where we asked participants between subjects, in two treatments, to estimate the probabilities of winning particular prizes. In the max probability treatment (*maxT*) (**prizes in bold and the bold text**), we asked participants to estimate the probabilities of winning the maximum prizes when choosing 1, 4, 7 and 10 numbers. In the min probability treatment (*minT*) (<u>underlined prizes and underlined text</u>), we asked participants to estimate the probabilities of winning the minimum prize when choosing 3, 6 or 10 numbers.

To ensure that it is not the order of the questions that impacts the probability estimates, the questions were asked in different orders. There were 24 versions (4!) for *maxT*, and 6 versions (3!) for *minT*. For the purposes of analyses, we divided *maxT* into four groups (each starting with a different number), and *minT* into 3 groups. Kruskal-Wallis tests in *maxT* indicate that the order did not matter for probability estimates for 10, 4 or 1 numbers (respectively $Chi(2) = 6.711\ with\ 3\ d.f., p = 0.0817$; $Chi(2) = 6.076\ with\ 3\ d.f., p = 0.108$; $Chi(2) = 1.194\ with\ 3\ d.f., p = 0.7545$), with perhaps some effect on the probability estimate for 7 numbers ($Chi(2) = 11.822\ with\ 3\ d.f., p = 0.008$). Kruskal-Wallis tests in *minT* indicate that the order did not matter neither for 10, 6, nor 3 numbers (respectively: $Chi(2) = 1.659\ with\ 2\ d.f., p = 0.4362$; $Chi(2) = 2.136\ with\ 2\ d.f., = 0.3438$; $Chi(2) = 3.802\ with\ 2\ d.f., p = 0.1494$).

Instructions

Please answer the questions on this page. As a token of gratitude, you will receive a single lottery ticket for the [name] game to which the questions relate.

In the [name] game, which is offered by [operator], a player decides how many numbers, from 1 to 10, to choose. Next, 20 numbers are drawn from numbers ranging from 1 to 80.

In the below table, in each column under a given quantity of numbers chosen, you can see the prize depending on how many of these numbers are drawn. The prizes presented in the table below correspond to a lottery ticket worth 6.25 EUR. For your convenience, some of the prizes are marked in yellow *[here for clarity– in **bold** for maxT, <u>underlined</u> for MinT]*. These are the ones you will be asked about in a moment.

The probabilities of events can be written as a fraction. For example, if you throw a regular dice, the probability of getting the number four is 1/6. Similarly, each possible outcome in [name] has its own probability.

We now ask you to answer the questions below. It is obvious that you might not know and have no time to calculate the exact value. However, please think for a moment and enter a specific number, which in your opinion may be close to the actual number.

MATCHING NUMBERS DRAWN	QUANTITY OF NUMBERS CHOSEN									
	10	9	8	7	6	5	4	3	2	1
10	**562 500 €**									
9	22 500 €	157 500 €								
8	1 170 €	4 500 €	49 500 €							
7	350 €	675 €	1 350 €	**13 500 €**						
6	30 €	105 €	150 €	500 €	2 925 €					
5	10 €	20 €	50 €	50 €	300 €	1 575 €				
4	5 €	5 €	10 €	10 €	20 €	50 €	**210 €**			
3				5 €	5 €	10 €	20 €	135 €		
2							5 €	5 €	40 €	
1										**10 €**

Please estimate the probability of winning the highest prize in a given column, if you choose:

- **10 numbers? 1 / ………………………………**
- **7 numbers? 1 / ………………………………**
- **4 numbers? 1 / ………………………………**
- **1 number? 1 / ………………………………**

Please estimate the probability of winning the lowest prize in a given column, if you choose:

- 10 numbers? 1 / ………………………………
- 6 numbers? 1 / ………………………………
- 3 numbers? 1 / ………………………………

Now, please answer a couple of demographic questions:

- In what year were you born? ……………
- Gender: female / male
- What is your education level?primary / secondary / higher or I am currently a student
  - If you have selected higher education level or you are currently a student, what is your field of study? ……………………………………………
- How often do you play lottery games (e.g. Lotto, scratch cards), bet on sports matches, play cards for money, visit (online) casinos or the like?

i) Once a week or more often, ii) Once, two or three times a month, iii) Several times a year,
iv) Once or several times in my life, v) Never

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