

ONLINE APPENDIX

Complex for Whom? An Experimental Approach to Subjective Complexity

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This online appendix contains the following parts:

- Section 1 discusses alternative measures of effort from the Choice Process Protocol: number of choice revisions and total active thinking time. We show that the distributions of subjective perceptions of complexity defined using these alternative effort measures are qualitatively similar to the ones analyzed in the main paper using response time. In this section we also present the correlation between different effort measures at the task level.
- Section 2 discusses the outliers in our sample and shows that the distributions of perceived complexity in the main paper are robust to including this small set of outliers.
- Section 3 presents additional analysis of the Common Ratio and Common Consequence effects.
- Section 4 details the structure of each treatment and the instructions.

1 Other Measures of Effort

In the main paper we use incentivized response time (RT), i.e., the time to the last click, as the measure of effort. There are, however, other measures of effort that the CPP protocol naturally collects. The first alternative simply counts how many times the participant switched between the available options. The idea is that more switching is a proxy for higher effort. We call this measure Revisions, since it illustrates choice revisions. The second alternative captures the total active consideration time by subtracting the timing of the first click from the timing of the last click; we call it Thinking Time. Figures 1 - 5 present the distributions of perceptions of task complexity using these two alternative measures of effort. The general message that emerges from these figures is that we obtain similar distributions of subjective perceptions of task complexity using either of the three measures of effort.

Figure 1: Distribution of Perceived Complexity in Binary Lottery Tasks

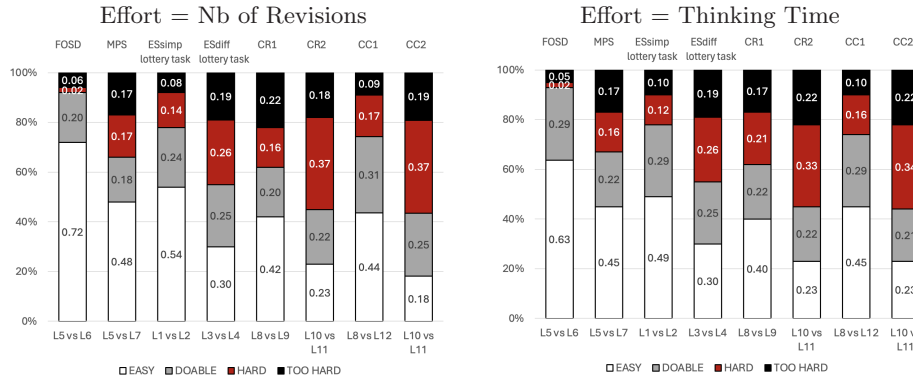


Figure 2: Distribution of Perceived Complexity in Valuations of Lotteries and Mirrors

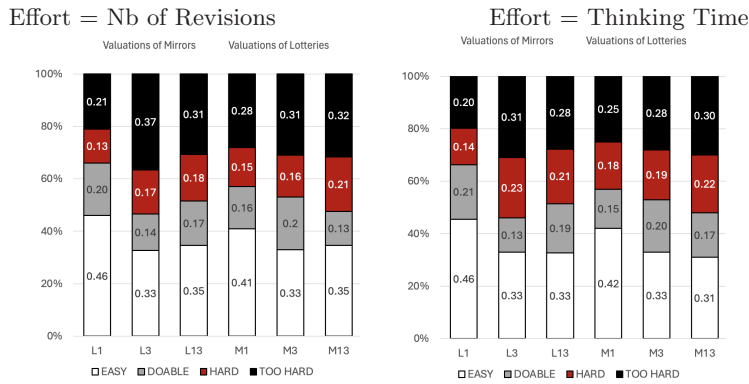


Figure 3: Distribution of Perceived Complexity in Public Good Games

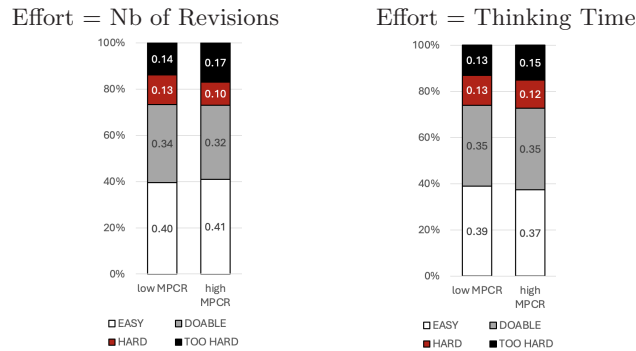


Figure 4: Distribution of Perceived Complexity in Auctions

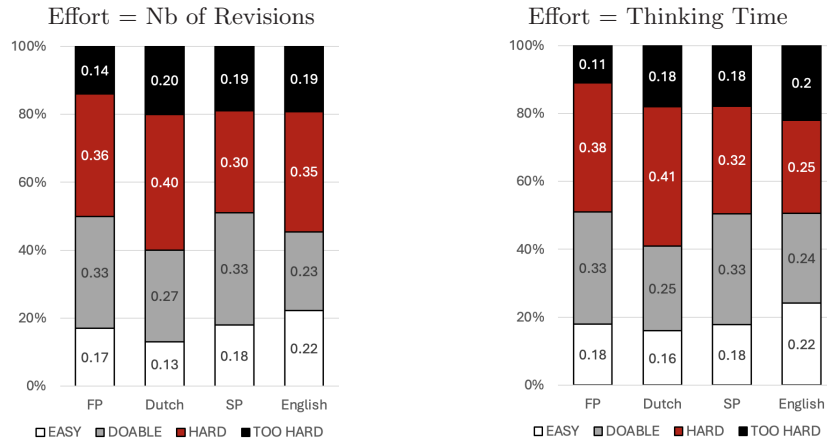


Figure 5: Distribution of Perceived Complexity in Belief-updating Tasks

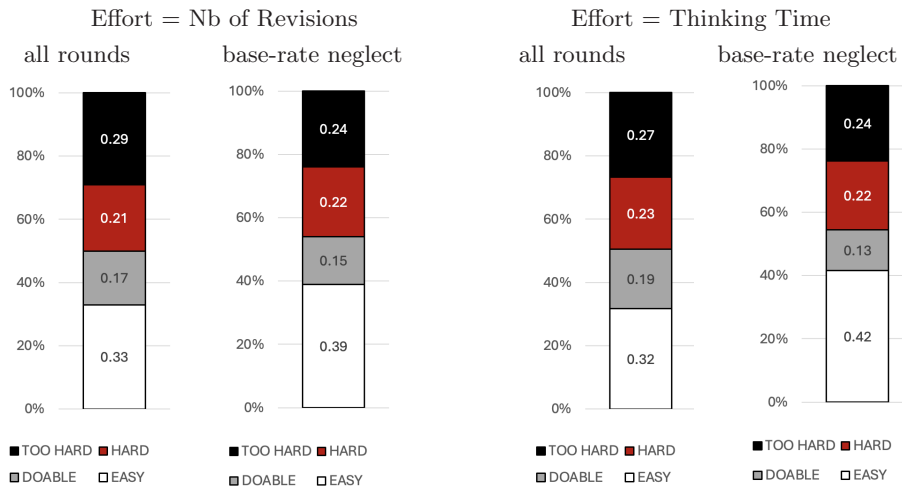


Table 1 presents the correlation between the three effort measures for each task separately. These measures are obviously correlated (all pairwise correlations are significant at the 1% level), but not perfectly. In general, we observe the weakest correlations between incentivized response time and the number of choice revisions within a task. We plan to explore the relationship between these proxies of effort in our future work.

Table 1: Correlation between effort measures, by task

	RT vs Nb Revisions	RT vs Think Time	Nb Revisions vs Think Time
BINARY			
FOSD	0.66	0.87	0.83
MPS	0.66	0.89	0.72
ES simple lottery	0.63	0.89	0.70
ES hard lottery	0.60	0.88	0.66
CR1	0.65	0.89	0.75
CR2	0.69	0.90	0.78
CC1	0.57	0.89	0.63
CC2	0.62	0.92	0.67
ES simple mirror	0.57	0.89	0.64
ES hard mirror	0.47	0.83	0.55
Pivotality (not contingent)	0.60	0.85	0.70
Pivotality (contingent)	0.48	0.83	0.54
NON-BINARY			
Cert Eq Lottery ES simple	0.55	0.89	0.67
Cert Eq of Lottery ES hard	0.49	0.88	0.59
Cert Eq of Lottery Puri	0.48	0.84	0.57
Simp Eq of Mirror ES simple	0.48	0.84	0.60
Simp Eq of Mirror ES hard	0.46	0.75	0.61
Simp Eq of Mirror Puri	0.41	0.78	0.52
Public Goods low MPCR	0.51	0.95	0.56
Public Goods high MPCR	0.53	0.93	0.58
First-price Auction	0.59	0.94	0.65
Dutch Auction	0.61	0.90	0.65
Second-price Auction	0.54	0.95	0.56
English Auction	0.45	0.88	0.50
Beliefs (all)	0.44	0.95	0.52
Beliefs (base-rate neglect)	0.40	0.84	0.50

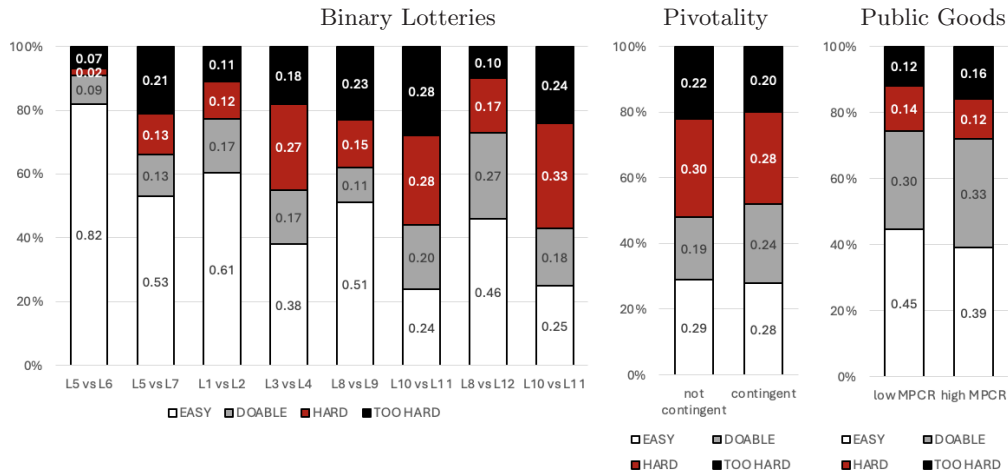
Notes: We present the pairwise correlations between three effort measures in each task separately. All correlations are significant at 1% level. RT stands for incentivized response time (the timing of the last click). Think Time is the active consideration time measured as the difference between the last click and the first click. Nb Revisions is the number of times a person clicked on different choices within a task.

2 Outliers

As we discuss in the paper, there are a few participants who click uncontrollably in most of the tasks. We exclude them from the main analysis presented in the paper. There are 14 participants like this in the Binary treatment (4% of our Binary sample). These subjects switch more than 15 times on average in each task, while 95% of subjects in the Binary tasks have less than 2 switches, on average, per task. In the Non-Binary treatment, there are 32 participants who switch on average more than 30 times in each task (5% of our Non-Binary sample), while 95% of participants in Non-Binary tasks switch less than 10 times, on average. After excluding these participants, we are left with a total of 930 participants: 366 in the Binary and 564 in the Non-Binary treatments.

Table 2 presents the summary statistics of behavior of these outliers and compares them to the rest of our sample. Figure 6 presents the distributions of perceptions of complexity in the Binary Lottery tasks, the Pivotality tasks, and the Public Good games, for illustration. The results are clear: including these subjects does not change our qualitative results.¹

Figure 6: Distribution of Perceived Complexity, Including Outliers



Notes: The distributions of perceived complexity in Binary Lottery choices, pivotality tasks, and public good games are presented. The dataset consists of all participants including the outliers described in this section.

¹The comparable graphs for the remaining tasks and games are omitted for brevity and available from the authors upon request.

Table 2: Summary Statistics

Binary treatment

	Last click (sec)	First click (sec)	Nb Revisions	Thinking Time (sec)
OUTLIERS <i>n</i> = 14 (4%)				
Binary Lottery Choices	48.4	4.1	25.5	44.1
Binary Mirror Choices	51.5	4.9	26	48.4
Pivotality	36.3	9.7	10.9	26.6
NON OUTLIERS <i>n</i> = 366 (96%)				
Binary Lottery Choices	13.4	6.4	1.4	7.6
Binary Mirror Choices	19.4	8.4	1.7	11.7
Pivotality	19.2	8.9	1.2	10.3

Non-Binary treatment

	Last click (sec)	First click (sec)	Nb Revisions	Thinking Time (sec)
OUTLIERS <i>n</i> = 32 (5%)				
Valuations of Lotteries	84.5	8.3	42.7	76.3
Valuations of Mirrors	87.1	10.1	48.3	77.2
Public Good games	81.2	11.6	46.4	69.8
Auctions	87.7	9.5	51.4	78.1
Belief-updating tasks	80.6	8.7	45.9	73.9
NON OUTLIERS <i>n</i> = 564 (95%)				
Valuations of Lotteries	33.5	14.5	2.7	19.3
Valuations of Mirrors	35.7	16.7	2.3	19.3
Public Good games	37.0	11.1	5.1	25.8
Auctions	47.4	12.8	8.2	34.6
Belief-updating tasks	37.9	14.2	3.7	23.4

Notes: We report summary statistics across different types of tasks and games administered in our experiment. The outliers in the Binary (Non-Binary) treatment are defined as those participants whose average switching rate across all tasks is 15 (30) or higher. There are 5% of outliers in the Non-Binary treatment and 4% in the Binary treatment.

3 Common Ratio and Common Consequence Effects

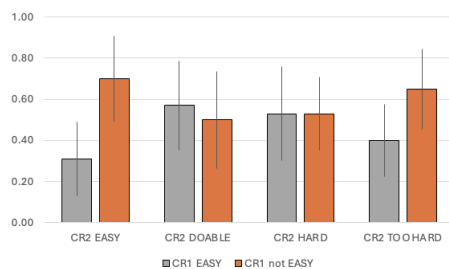
We present here additional analysis of the Common Consequence and Common Ratio effects referenced in the main paper. Table 3 depicts regression analysis exploring how the subjective perception of the two CR questions correlates with Allais-type behavior (being inconsistent across these two questions). Figure 7 plots the fraction of inconsistent subjects for different perception categories.

Table 3: Consistency and Perceptions in Common Ratio Questions

	Inconsistent Choices in CR1 and CR2	
	reg (1)	reg(2)
CR1 EASY	-0.22** (0.08)	
CR2 EASY	-0.01 (0.08)	
CR1 not EASY and CR2 EASY		0.13 (0.12)
CR1 EASY and CR2 not EASY		-0.15* (0.09)
CR1 EASY and CR2 EASY		-0.29** (0.11)
CR1 safe choice	0.31** (0.09)	0.29** (0.09)
Constant	0.41** (0.09)	0.39** (0.09)
# obs	189	189
adj R-squared	0.07	0.08

Notes: The dependent variable is an indicator of inconsistent choices in CR1 and CR2, i.e., choosing L8 in CR1 and L11 in CR2, or choosing L9 in CR1 and L10 in CR2. We control for the order in which CR1 and CR2 questions appear. CR1 (CR2) EASY is an indicator that a subject's perception of the CR1 (CR2) question is EASY. CR1 (CR2) not EASY is the remaining category. CR1 safe choice indicates that a subject chose L8 in CR1 (getting \$12 for sure). The constant in reg (2) represents the frequency of inconsistent choices for subjects who perceive both CR1 and CR2 as any category but EASY.

Figure 7: Fraction of Subjects Displaying Common Ratio Type Inconsistency



Notes: Inconsistent behavior is choosing L8 in CR1 and L11 in CR2 or choosing L9 in CR1 and L10 in CR2. We plot the fraction of inconsistent subjects depending on their subjective perceptions in both questions.

Table 4: Consistency and Perceptions in Common Consequence Questions

	Inconsistent Choices in CC1 and CC2	
	reg (1)	reg(2)
CC1 EASY	0.04 (0.08)	
CC2 EASY	-0.13 (0.09)	
CC1 not EASY and CC2 EASY		-0.10 (0.13)
CC1 EASY and CC2 not EASY		0.05 (0.09)
CC1 EASY and CC2 EASY		-0.09 (0.12)
CC1 safe choice	0.002 (0.08)	0.001 (0.08)
Constant	0.47** (0.08)	0.46** (0.08)
# obs	177	177
adj R-squared	<0.01	<0.01

Notes: The dependent variable is an indicator of inconsistent choices in CC1 and CC2, i.e., choosing L8 in CC1 and L11 in CC2, or choosing L12 in CC1 and L10 in CC2. We control for the order in which CC1 and CC2 questions appear. CC1 (CC2) EASY is an indicator that a subject's perception of the CR1 (CR2) question is EASY. CC1 (CC2) not EASY is the remaining category. CC1 safe choice indicates that a subject chose L8 in CC1 (getting \$12 for sure). The constant in reg (2) represents the frequency of inconsistent choices for subjects who perceive both CC1 and CC2 as not EASY.

4 Instructions

As described in the paper, we used video instructions in which an avatar read out loud the rules of the experiment that were displayed on the screen (mimicking how instructions are typically read in laboratory experiments). Below we present the transcripts of these instructions and the screenshots of the videos.

Binary Treatments: General Instructions

Instructions



Hi. Welcome to our study. The study is simple and should take you about 25 to 30 minutes to complete.

We will need your undivided attention during this time, so please do not open any other applications on the computers or browse the web.

The study consists of **9 rounds** in total grouped into **three blocks**. Before each block, you will receive the instructions specific to this block.

You will be paid \$5 for completing the study.

In addition, **one out of five participants** (20%) will be randomly selected to receive a **bonus**.

For the selected participants, the computer will randomly choose one of the rounds. Each round is equally likely to be chosen for bonus payment. The earnings in the chosen round will be added to the participation fee of the selected participants and paid at the end of the study.

All payments in today's study are in US dollars.

Since you do not know which round will be chosen for bonus, you should think about each round as if it was the one that determines your bonus payment.



The general instructions in the Non-Binary treatment were similar except there are 8 rounds in the Non-Binary treatments and each participant receives \$7 for completing the experiment, since the Non-Binary treatments lasts longer than the Binary ones.

Binary Treatments: Choice Process Protocol

For the Non-Binary treatments, the only difference was the length of each round: 90 seconds instead of 60 seconds.

What happens in a round

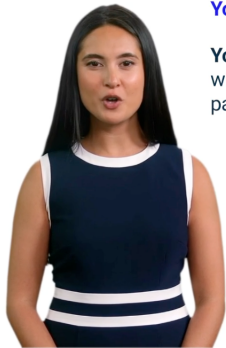


The main part of each round, **the choice problem**, lasts 60 seconds. At the top left corner of the screen, you will see the round number and how many seconds are left in this round.

In each round you will be presented with a choice problem.

Your task is to make a choice for the problem presented to you.

Your choice determines your earnings for the current round. These earnings will be added to your participation fee if the current round is chosen for bonus payment and you are selected into the bonus group (20% chance).



When the round starts, you can make any choice by clicking on it. Once you make a choice that choice stays selected (highlighted) until you click on another one.

You may change your choice as many times as you want as your thinking about the problem changes (if it does).

The computer will record all the choices you click on as well as when you click on them.

To determine your earnings, **the computer will select a second at random from the 60 seconds** allocated to the choice problem in this round.

The choice you made at that second will be entered as your choice.



What does this mean?

The computer will randomly pick a second between 0 and 60. Each second is equally likely to be picked.

The choice you had selected at that second will determine your earnings for this round.

If the second chosen is one for which you had not made a choice, (i.e., at the beginning of the round before you made your first choice), you will receive zero payment for that round. It is therefore important for you to quickly make a choice as soon as a round starts.



IMPORTANT: say you made a choice initially, but then after thinking about it, you decided that you prefer another one.

Then you should change your selection and select the more preferred choice.

Why is that? Because this will increase the chance that your preferred choice will be used to compute your earnings!

Once 60 seconds have elapsed, you will be asked to indicate how certain are you that the final choice you made is the best choice you could make in the problem you faced.

You will specify your answer on the slider from 0 to 100, where 0 means that you are "very uncertain" and 100 means that you are "completely certain."

Pay attention: when you click NEXT to proceed to the next round, the timer starts right away!

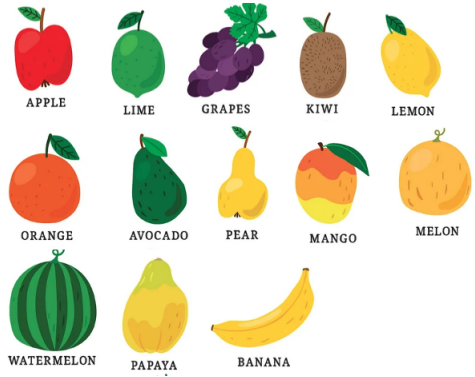
PRACTICE ROUND

Let's practice! Your choices in this round will NOT matter for your bonus payment.

Please press START PRACTICE below and then practice by selecting different objects throughout the round.

START PRACTICE

Please practice by selecting different fruits and changing your selection. You have to select at least three different fruits or more during this practice round.



<u>Your choice</u>	<u>Second</u>
Nothing	until second 7
Banana	second 7
Watermelon	second 34
Orange	second 55

If this was a chosen round for payment and computer randomly selected second 2, what would you receive in this round? _____

If this was a chosen round for payment and computer randomly selected second 28, what would you receive in this round? _____

If this was a chosen round for payment and computer randomly selected second 56, what would you receive in this round? _____

Binary treatment: Binary Lottery Choices

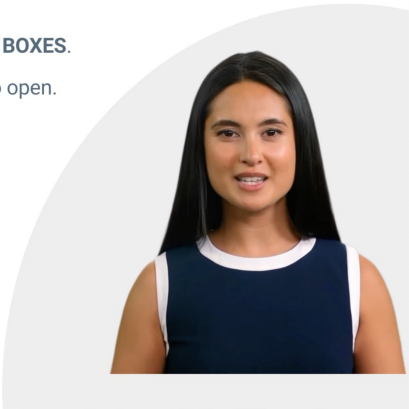
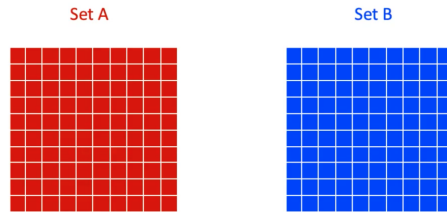
Boxes with Money

In the next few rounds, you will be presented with **sets of BOXES**.

You will choose which set you would like the computer to open.

In all rounds, there will be two sets of boxes:

Set A (consisting of 100 boxes) and **Set B (also consisting of 100 boxes)**.



Each box contains some amount of money. When the computer opens one or more boxes from your chosen set, the amount of money in the opened boxes determines your **EARNINGS**.

The Decision Table

Instead of observing the boxes as squares, each set of boxes will be described as a **TABLE**.

The tables will specify how many boxes contain different amounts of money, for each set. Here is an example:

Set A		Set B
75 boxes	25 boxes	100 boxes
\$20	\$0	\$7

Set A consists of 75 boxes each containing \$20 and 25 boxes each containing \$0. **Set B** consists of 100 boxes all of which contain \$7.



Your job will be to click on the Table to decide which set of boxes you would like the computer to pay you based on. When you click on the Table, the computer highlights it with the yellow border.

A Random Box

Let's talk about how your choices determine your earnings in the next **six rounds**.

In each round, you will see two set of boxes (presented as Tables). You will have 60 seconds to select one of the sets. You can switch as many times as you wish between the two sets throughout these 60 seconds.

The set you select at a randomly chosen second will determine your earnings in this round.

How exactly? The **computer will open ONE of the 100 boxes** in **whichever Set you've chosen at this random second**.

Each box in the set you chose is **EQUALLY** likely to be opened by the computer.

Your earnings will be the amount of money contained in this **one opened box**.



Example

Set A		Set B
50 boxes	50 boxes	100 boxes
\$0	\$16	\$4

There are 100 boxes in each set. For **Set A**, 50 boxes contain \$0 and 50 of them contain \$16. For **Set B**, all 100 boxes contain \$4.

Consider the **set you have selected at a randomly chosen second**.

If that set is **Set A** then there is a 50% chance that your earnings are **\$0** and a 50% chance that your earnings are **\$16**.

If that set is **Set B** then there is a 100% chance that your earnings are **\$4**.



Binary treatment: Binary Mirror Choices

The Average Box

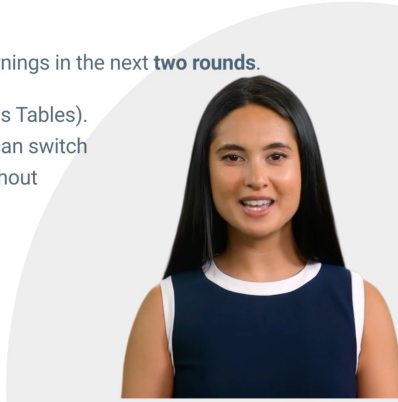
Let's talk about how your choices will determine your earnings in the next **two rounds**.

In each round, you will see two set of boxes (presented as Tables). You will have 60 seconds to select one of the sets. You can switch as many times as you wish between the two sets throughout these 60 seconds.

The set you select at a randomly chosen second will determine your earnings in this round.

How exactly? The **computer will open all 100 boxes in whichever Set you've chosen at this random second**.

Your earnings will be the **AVERAGE** amount across **all 100 boxes**. That is, the computer will add up the amount of money from each of the 100 boxes and divide that sum by 100.



Example

Set A		Set B
50 boxes	50 boxes	100 boxes
\$0	\$16	\$4

There are 100 boxes in each Set. For **Set A**, 50 boxes contain **\$0** and 50 of them contain **\$16**. For **Set B**, all 100 boxes contain **\$4**.

Consider the **set you have selected at a randomly chosen second**.

If that set is **Set A** then you earn $(50 * \$0 + 50 * \$16) / 100 = \$8$.

If that set is **Set B** then you earn $(100 * \$4) / 100 = \4 .

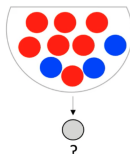


Binary treatment: Pivotality task contingent version

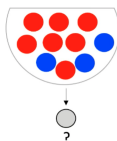
There is a jar with 10 balls: **7 RED** and **3 BLUE**.

The balls are shuffled really well, and then one ball is randomly selected from the jar. Each ball is equally likely to be selected.

We will call it the **selected ball**.



Your task is to vote for either a **red ball** or a **blue ball**, without knowing the color of the selected ball.



You will be paired with two computers who will each vote for a **red** or a **blue** ball.

The guess of your group - yours and the two computers - is determined by the **majority of votes**.



The computers know the selected ball color and are programmed to vote as follows:

if the selected ball is **RED**, they vote **red**

if the selected ball is **BLUE**, they **vote blue** with a 50% chance and **vote red** with a 50% chance

You will have 60 seconds to choose your vote. You may change your vote as many times as you want as your thinking about this task changes, if it does.

If this task is selected for bonus payment, then we will select one of the 60 seconds at random.

Your vote at that random second together with the computers' votes will determine your earnings.

You will earn \$10 if your group vote matches the color of the selected ball and \$0 if it does not.

A ball has been selected.

What is your vote?



For the version without contingent reasoning, we asked participants to provide their vote when one computer voted **red** and another voted **blue**. If this task was selected for payment, then the computers' votes were simulated using the same rule as in the contingent version of the task and if both computers voted the same color, this color was recorded as the group's decision.

Non-Binary treatment: Public Good Game with Low MPCR

The public good game with high MPCR has similar instructions, except for the value of MPCR (three-quarter instead of one-quarter).

Rules of the next round

In this round, you will be paired with four other PROLIFIC participants.

Each of you is endowed with 100 points and will have 90 seconds to decide what portion of this endowment to **keep to yourself** and what portion to **allocate to a Group Project**.

The number of points you and your group members choose to allocate to a Group Project at a randomly selected second will determine your earnings.

How exactly?

Every point you keep to yourself will earn you **one point**.

Every point allocated to the Group Project earns **one-quarters of a point to every member of your group**, not just the person who allocated this point.

That is, the more the group allocates to the Group Project, the more each member of the group earns.

It does not matter who allocates points to the Group Project. Everyone will get a return from every point allocated to the Group Project - whether they personally allocated it or not.



Rules of the next round

Example

Suppose you allocate 20 points in the Group Project and the other four participants allocate a total of 40 points. This makes a total of 60 points allocated to the Group Project.

Thus, your return from the Group Project will be 15 points, which is $1/4 * 60$.

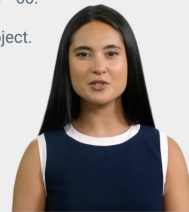
The other participants will receive the same return from the Group Project.

In addition, you will receive 80 points that you kept to yourself.

So, your total in this case is 95 points = 80 + 15 points.

Each point in this round is equal to 5 cents.

The game starts now!



Non-Binary treatment: Auctions

In all auction rounds, participants saw this first screen

Rules of the next round

You will be paired with another participant.

Both of you will bid for an item.

Each of you will know **how much you value the item** you are bidding for, but you will **NOT** know how much your pair member values the item.

How are these values determined?

For each participant, the value of the item they receive from winning the item is randomly determined and is a number between 0 and 100 points. All numbers are equally likely.

Your value of the item is independent of the other participant's value.

You will observe your own value for the item but not the other participant's value.



The remaining screens were auction specific.

First-price Auction

Rules of the next round

You and the other participant will have 90 seconds to submit a bid.

The bid can be any integer number between 0 and 100. Each button on the screen will be labeled with these numbers. You may click on these buttons and change your choice as many times as you want as you are thinking about the game.

To determine the winner in this game, we will select one of the 90 seconds at random.

Whoever submits **the highest bid at that randomly selected second** will **win the item**. If both of you submit the same bid at that second, each has a 50% chance of winning the item. If you did not submit a bid at that second, you lose for sure.

The **winner of the item** will receive their **item value minus their bid**.

The **loser** will receive **zero**.



Rules of the next round

Example

Suppose your value of the item is 65 and you submit a bid of 51 at the randomly selected second. The other participant submits a bid of 40 at that same second. Then you win the item, pay the price of 51, and receive the payoff $65 - 51 = 14$ points.

If, however, the other participant submits a bid of 56, then you don't win the item and your payoff is 0 points.

Each point in this task is worth 50 cents.

The game starts now. Make sure you notice **your value for the item** displayed on the next screen.



Dutch Auction

Rules of the next round

The auction starts with a posted price of 100 points. Every second the price will decrease by 1 point. Your task is to **select the number at which you would like to "freeze" the price.**

You will not watch the price decrease every second. **Instead, you and the other participant will have 90 seconds to submit your freezing price.** This can be any integer number between 0 and 100. Each button will be labeled with these numbers. You may click on these buttons and change your choice as many times as you want as you are thinking about the game.

To determine the winner in this game, we will select one of the 90 seconds at random.

Whoever submits **the highest freezing price at that randomly selected second** will **win the item**. If both of you submit the same bid at that second, each has a 50% chance of winning the item. If you did not submit a price at that second, you lose for sure.

The **winner of the item** will receive their **item value minus the number at which they chose to freeze the price.**

The **loser** will receive **zero**.



Rules of the next round

Example

Suppose your value of the item is 65 and you chose to freeze a price at 51 at the randomly selected second. The other participant chose to freeze a price at 40 at that same second. Then you win the item, pay the price of 51, and receive the payoff $65 - 51 = 14$ points.

If, however, the other participant chose to freeze the price at 56, then you don't win the item and your payoff is 0 points.

Each point in this task is worth 50 cents.

The game starts now. Make sure you notice **your value for the item** displayed on the next screen.



Second-price Auction

Rules of the next round

You and the other participant will have 90 seconds to submit a bid.

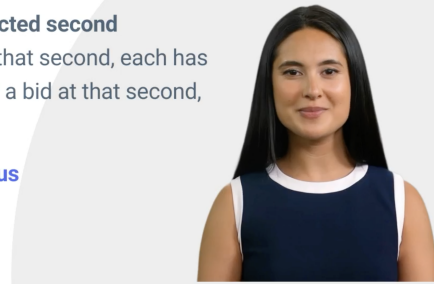
The bid can be any integer number between 0 and 100. Each button on the screen will be labeled with these numbers. You may click on these buttons and change your choice as many times as you want as you are thinking about the game.

To determine the winner in this game, we will select one of the 90 seconds at random.

Whoever submits **the highest bid at that randomly selected second** will **win the item**. If both of you submit the same bid at that second, each has a 50% chance of winning the item. If you did not submit a bid at that second, you lose for sure.

The **winner of the item** will receive their **item value minus the bid of the other participant**.

The **loser** will receive **zero**.



Rules of the next round

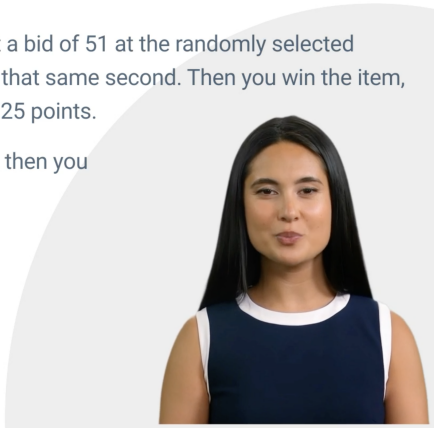
Example

Suppose your value of the item is 65 and you submit a bid of 51 at the randomly selected second. The other participant submits a bid of 40 at that same second. Then you win the item, pay the price of 40, and receive the payoff $65 - 40 = 25$ points.

If, however, the other participant submits a bid of 56, then you don't win the item and your payoff is 0 points.

Each point in this task is worth 50 cents.

The game starts now. Make sure you notice **your value for the item** displayed on the next screen.



English Auction

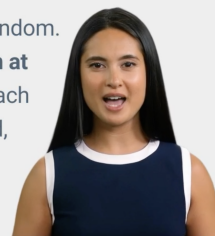
Rules of the next round

The auction starts with a posted price of 0 points. Every second the price will increase by 1 point. Your task is to **select the number at which you would like to drop out of the auction**, meaning that you are not willing to pay the current price for the item.

You will not watch the price increase every second. **Instead, you and the other participant will have 90 seconds to choose a number at which you want to drop out of the auction.** This can be any integer number between 0 and 100. Each button on the screen will be labeled with one of these numbers. You may click on these buttons and change your choice as many times as you want as you are thinking about the game.

To determine the winner in this game, we will select one of the 90 seconds at random. If you are the last person among the two of you to drop out **you will win the item at the price that your partner dropped out.** If both of you submit the same price, each has a 50% chance of winning the item. If you did not submit a bid at that second, you lose for sure.

The **winner of the item** will receive their **item value minus the other participant's dropping out price.** The **loser** will receive **zero.**



Rules of the next round

Example

Suppose your value of the item is 65 and you dropped out at a price at 51 at the randomly selected second. The other participant dropped out at a price at 40 at that same second. Then you win the item, pay the price of 40, and receive the payoff $65 - 40 = 25$ points.

If, however, the other participant chose to drop out at the price of 56, then you don't win the item and your payoff is 0 points.

Each point in this task is worth 50 cents.

The game starts now. Make sure you notice **your value for the item** displayed on the next screen.



Non-Binary treatment: Belief-updating task

Rules of the next few rounds

There is a **pool of 100 projects**: some are **Successes** and others are **Failures**. You will be told the exact composition of the pool, that is, how many projects are Successes out of 100 projects.

ONE project is **randomly selected** from this pool; all projects are equally likely to be selected.

Your task is to assess the chance that the selected project is a Success.

To aid your assessment, the computer will run a test on the selected project.

You will be told the **test reliability**.

Say, the test reliability is 75 percent. What does this mean? It means

if the selected project is a Success, the test result will be **POSITIVE** with 75% chance and **NEGATIVE** with 25% chance.

if the selected project is a Failure, the test result will be **NEGATIVE** with 75% chance and **POSITIVE** with 25% chance.



Rules of the next few rounds

When the round starts, you will see **how many projects are Successes out of 100 projects**, the **test reliability**, and the **test result (POSITIVE or NEGATIVE)**

You will have 90 seconds to assess the chances that the selected project is a Success.

You will see a screen with buttons, where each button represents the % chance that the selected project is a Success (from 0% to 100%). You can click on any button and change your choice as many times as you want as you are thinking about this question.

If this round is chosen for bonus, the button you have selected at the randomly chosen second will be recorded as your choice and will determine your earnings.



How Earnings are Calculated

Say this round is selected for bonus.

Say, number **X** is recorded as your choice. **This is the chance that you think the selected project is a Success given the test result** (the number on the button you selected at a randomly chosen second).

To determine your earnings, the computer will generate a **number between 0 and 100**; each number is equally likely. Call this **number Y**:

If **Y** is greater than or equal to **X**, you win \$10 with **Y%** chance

If **Y** is less than **X**, then you win \$10 if the selected **project is a Success**

You win \$10 either if the selected project is a Success or with some percent chance. Thus, you should report the chance that maximizes the likelihood of winning \$10. What is this chance? It is exactly the chance that you believe the Selected Project is a Success given the test result.

It is always in your best interest to choose X which represents your best evaluation of the chances that the selected project is a Success given the test result.



Non-Binary treatment: Certainty Equivalents of Lotteries

Boxes with Money

In the next few rounds, you will evaluate **sets of BOXES**.
Here is the set of 100 boxes:



Each box contains some amount of money.

Instead of observing the boxes as squares, we will describe each set of boxes as a **TABLE**.
The table will specify how many boxes contain different amounts of money.

Set of boxes	
25 boxes	75 boxes
\$0	\$20

In the example above, the Set consists of 25 boxes with \$0 each and 75 boxes with \$20 each.

Paying for a Random Box

In the next few rounds, we will ask you to evaluate different Sets of boxes and tell us **how much you value** that the computer will open **ONE box from the Set** and will pay you **the amount it contains**.

Each box is **EQUALLY** likely to be opened.

In the example below, there is a 25% chance that a randomly selected box contains \$0 and a 75% chance that a randomly selected box contains \$20.

Set of boxes	
25 boxes	75 boxes
\$0	\$20



How will you be making your choices?

On the screen, you will see the table describing the set of boxes you are asked to evaluate.

You have to decide whether you prefer Set of boxes or different dollar amounts that vary from \$0 to \$25, in increments of \$0.25. You will have 90 seconds to make your choice.

Remember, your choice should indicate **how much this Set of boxes is worth to you**.

You will see a table with two columns and a number of rows.

We sorted the dollar amounts from the lowest to the highest and created a list of rows.

In each row, the left column corresponds to the amount you would get by selecting the Set of boxes, while the right column is the dollar amount that increases in increments of \$0.25, so the dollar amount in the first row is \$0, in the second it is \$0.25, in the third it is \$0.50, etc... all the way up to \$25 in the last row.



Here is how the screen will look like

Set of boxes	
25 boxes	75 boxes
\$0	\$20

If you get this Set, the computer will open **ONE box at random** from the Set above and will **pay you the amount contained in that box.**

How much is this Set of boxes worth to you?

Please choose the button corresponding to the lowest dollar amount that you prefer over getting the Set of boxes above. You may change your choice as many times as you want.

ONE random box from the set of boxes above	-or-	\$0.00
ONE random box from the set of boxes above	-or-	\$0.25
ONE random box from the set of boxes above	-or-	\$0.50
ONE random box from the set of boxes above	-or-	\$0.75
ONE random box from the set of boxes above	-or-	\$1.00
ONE random box from the set of boxes above	-or-	\$1.25
ONE random box from the set of boxes above	-or-	\$1.50



How will you be making your choice?

Your job is to indicate **whether you prefer the Set of boxes or the dollar amount for each row.**

Since the Set of boxes is worth more than \$0, you would start by choosing the Set of boxes (the left column) and continue choosing it when the dollar amounts are low, but at some point, you might prefer to switch to the right column and pick the dollar amounts over the current Set of boxes.

Instead of indicating whether you prefer the Set of boxes or the dollar amount in each single row, we are simply asking you to **indicate the dollar amount at which you would like to switch from the left column (choosing the Set of boxes) to the right column (choosing dollar amounts).** To answer this question, you need to choose the button on your screen that shows that switching point.

Each button corresponds to one row and when you choose it, it automatically selects the Set of boxes for all the previous rows (lower dollar amounts) and the dollar amount for the rows that follow (larger dollar amounts). That is, **your choice highlights the switching point at which you prefer the dollar amount over the Set of boxes for all subsequent dollar amounts.**



Here is an example

ONE random box from the set of boxes above	-or-	\$17.50
ONE random box from the set of boxes above	-or-	\$17.75
ONE random box from the set of boxes above	-or-	\$18.00
ONE random box from the set of boxes above	-or-	\$18.25
ONE random box from the set of boxes above	-or-	\$18.50
ONE random box from the set of boxes above	-or-	\$18.75
ONE random box from the set of boxes above	-or-	\$19.00
ONE random box from the set of boxes above	-or-	\$19.25
ONE random box from the set of boxes above	-or-	\$19.50
ONE random box from the set of boxes above	-or-	\$19.75



Your payment

As we said, on the screen, you will see a table consisting of rows that compare the payoff you would get from the Set of boxes to dollar amounts that go from \$0 to \$25 in increments of \$0.25.

You may click on these buttons and change your choice as many times as you want as you are thinking about the problem. A button stays selected until you click on another button.

If this round is selected for a bonus payment, then the computer will select one second from the 90 seconds this round lasts. After that, the computer will select one row at random from the list of rows (each row is equally likely to be selected).

If you selected the Set of boxes in the chosen row at the chosen second, then the computer will open one of the boxes from the Set and will pay you the amount contained in that box. If you selected the dollar amount in the chosen row at the chosen second, then you will get that amount.



The rounds with simplicity equivalents of mirrors are described similarly except that when choosing a set of boxes, subjects get paid the average amount across all boxes instead of a random box as is the case for the lotteries.