A Cognitive Ability

As described in section A all subjects were asked to solve thirty-six matrices from the Raven Test, and took part in six rounds of Race-to-60. The normalized results of these two measures are plotted in Figure 10. Most subjects performed well at the Raven test (median of twenty nine solved matrices), but not in the Race-to-60 game (median of one won round). Interestingly, the lower right quadrant of the scatter plot is completely empty. This implies that while a good score in the Race-to-60 game requires a good score in the Raven Test, the opposite is not true. The correlation between both measures of cognitive ability is positive and significant, as well as with the payments for the 1PG and 2PG (see Table 2).

In the first column of Table 3 we report a linear probability model where the binary dependent variable is having solved the 1PG. In the second column, we report a linear

	Raven	Race	Π^{1PG}	$\bar{\Pi}_i^{2PG}$	Δz_i^*	ΔB_i	Solved 1PG
Raven	1						
Race	0.454***	1					
Π^{1PG}	0.433**	0.462***	1				
$\bar{\Pi}_i^{2PG}$	0.299***	0.203*	0.454***	1			
Δz_i^*	-0.322***	-0.307***	-0.531***	-0.476***	1		
ΔB_i	0.254	-0.042	0.262	0.208	-0.132	1	
Solved 1PG	0.451***	0.415***	0.818***	0.335***	-0.366***	0.065	1

Table 2: Spearman correlation between cognitive ability measures, payoffs, and beliefs.

regression with the payment in the 1PG as the dependent variable.[23] In both cases, the independent variables are the (normalized) cognitive ability test scores. The results show an interesting asymmetry; subjects that fully solve the 1PG scored high both at the the Race-to-60 and the Raven test, while only backward induction seems to have an effect on the payoff for the 1PG.[24]

Result: *Both a high score at the Raven test and Race-to-60 game are important to fully solve the one-player guessing game, while only Race-to-60 seems to matter for the payoff in the one-player guessing game.*

Additionally, in column 3 $\bar{\Pi}_i^{2PG}$ is regressed on both measures of cognitive ability, and only Race-to-60 is marginally important to score high in the 2PG. In column 4 Δz_i^* is the dependent variable, and this time the coefficient for Race-to-60 is highly significant and negative. This means that backward induction abilities are central for a subject to be able to best respond to her own beliefs.

[23] A Tobit model for the 1PG payoff gives the same results.

[24] The Variance Inflation Factor discards any severe case of multicollinearity between both regressors.

	(1)	(2)	(3)	(4)
	Correct 1PG	Π_i^{1PG}	$\bar{\Pi}_i^{2PG}$	Δz_i^*
Raven	0.706**	0.390	1.217	-9.371
	(0.279)	(0.326)	(0.756)	(8.084)
Race	0.505***	0.548***	0.814*	-9.594**
	(0.163)	(0.190)	(0.440)	(4.708)
Constant	-0.409*	1.176***	-0.172	20.90***
	(0.208)	(0.243)	(0.563)	(6.014)
N	80	80	80	80
adj. R^2	0.226	0.133	0.086	0.074

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Linear regression of cognitive ability measures on Correct 1PG, Π_i^{1PG}, $\bar{\Pi}_i^{2PG}$, Δz_i^* and ΔB_i.

B Normalization

The way in which we normalize the distribution for each subject (i) is by adding for each bin (b) all the 2PG choices made across all sessions by all subjects (z_j), except her own choice (z_i) . This results in a distribution of 79 choices spread across all possible 20 bins 0-4, 5-9,..., 95-100. We then normalize this distribution by multiplying the resulting number in each bin by 19/79. Therefore, each bin (b) of the distribution for subject i is: $Bin_{b,i} = \sum_{j \neq i}^{80} \mathbb{1}_{z_j \in b} \frac{19}{79}$, where $\mathbb{1}$ is an indicator function that takes a value of one whenever the subscript is true, zero otherwise.

C Extra Graphs and Figures

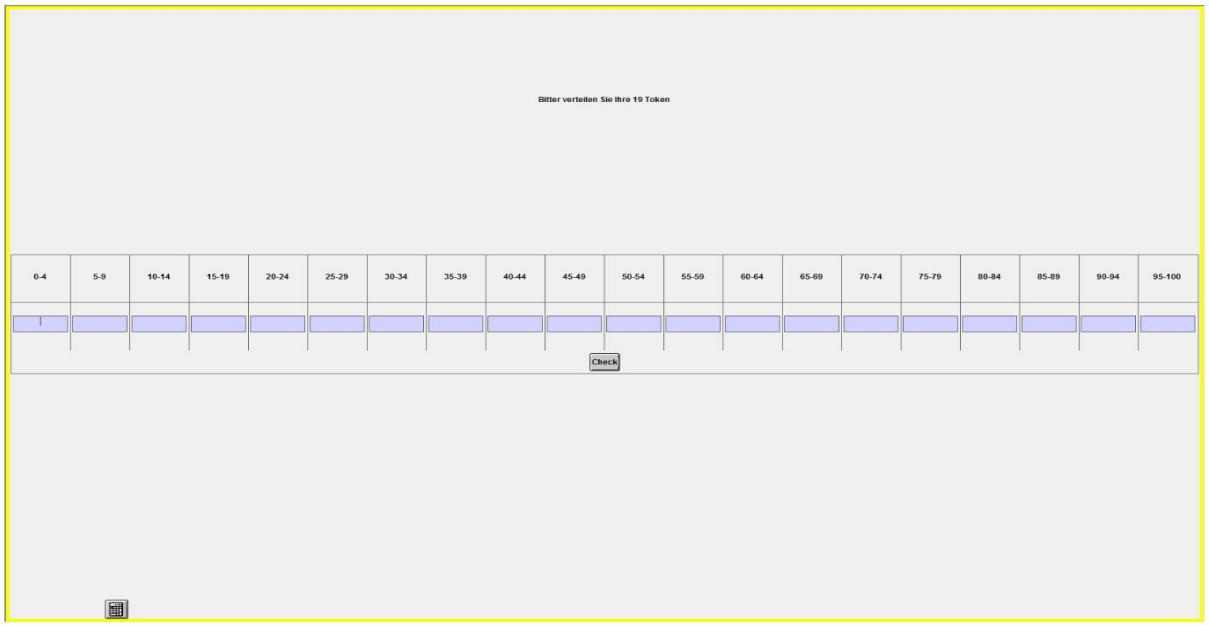

Figure 11: Distribution Screen. Subjects were provided with N-1 tokens to distribute across the 20 bins provided in the screen. The check button counted for them the amount of tokens they had deposited at any moment. Subjects could use less than 19 tokens, but never more.

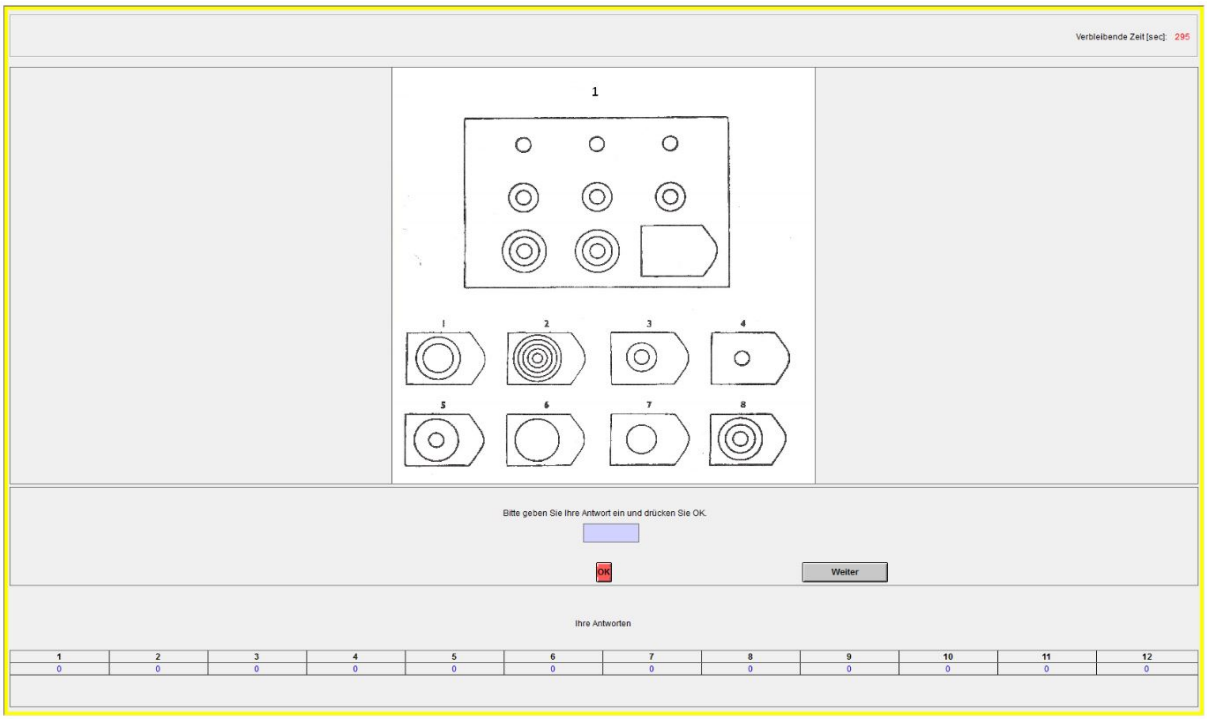

Figure 12: Raven Test Screen

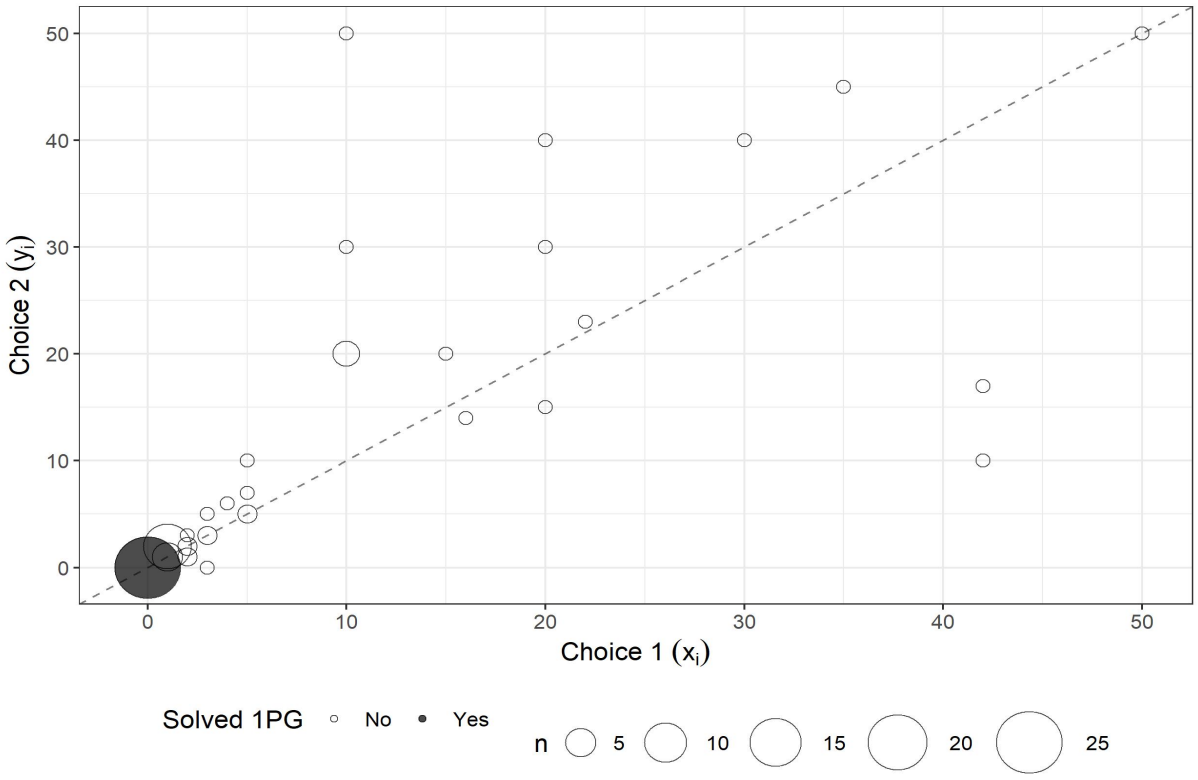

Figure 13: Zoom-in depicting only choices [0, 50] of Figure 1. In black the choices made by those that fully solved the 1PG.

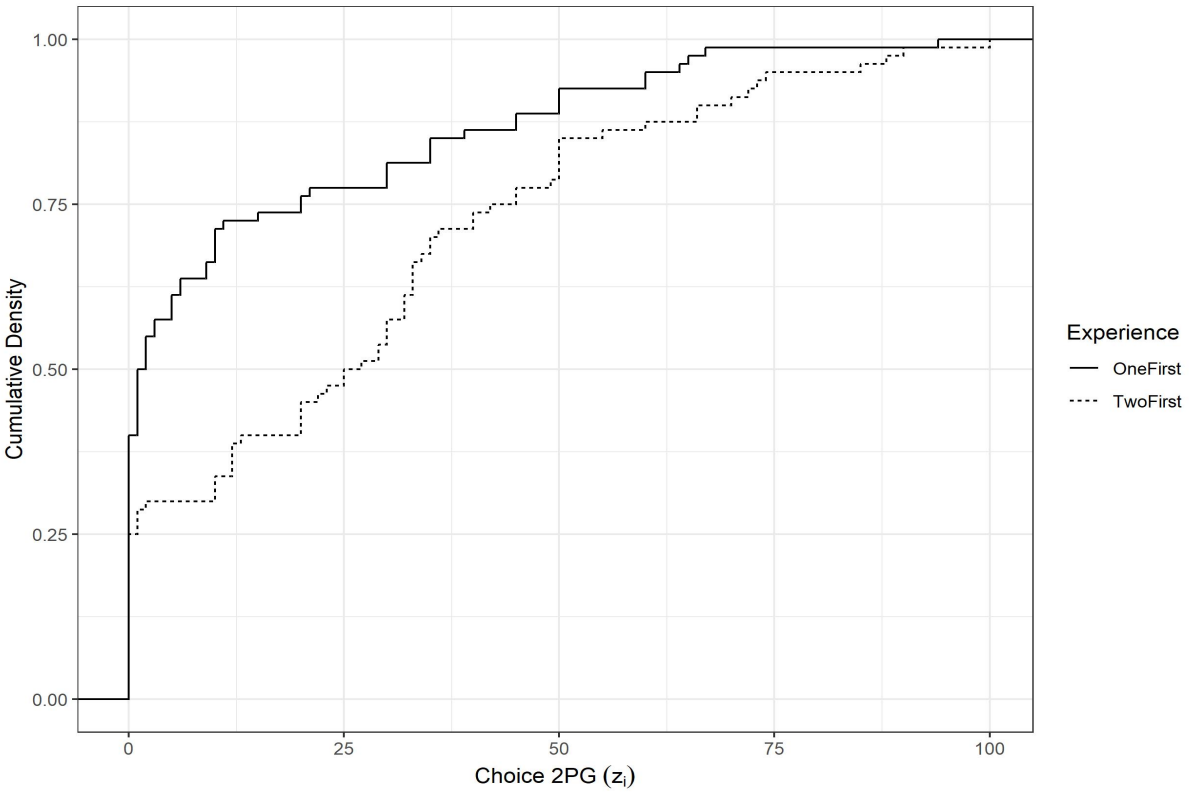

Figure 14: Cumulative density plot of 2PG play, with and without prior experience in the 1PG.

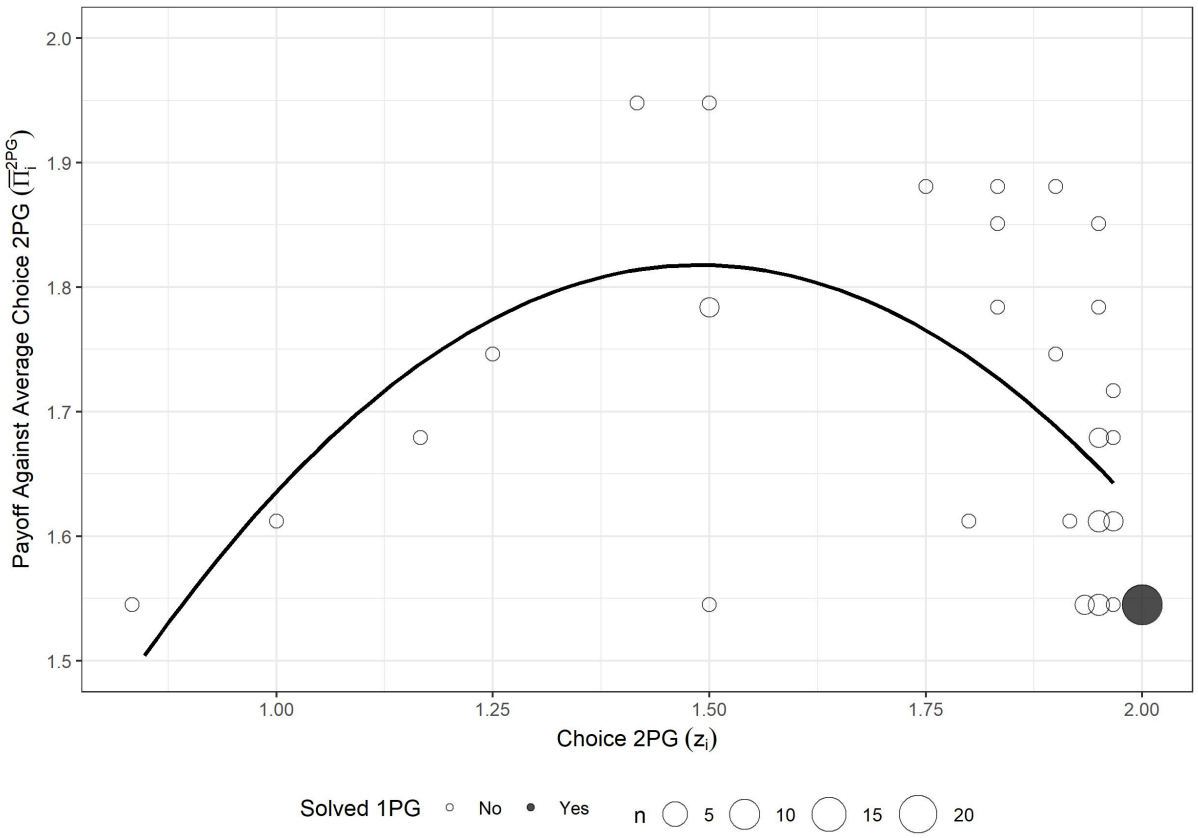

Figure 15: Zoom-in depicting payoffs [1.5, 2] of Figure 4. In black the choices made by those that fully solved the 1PG.

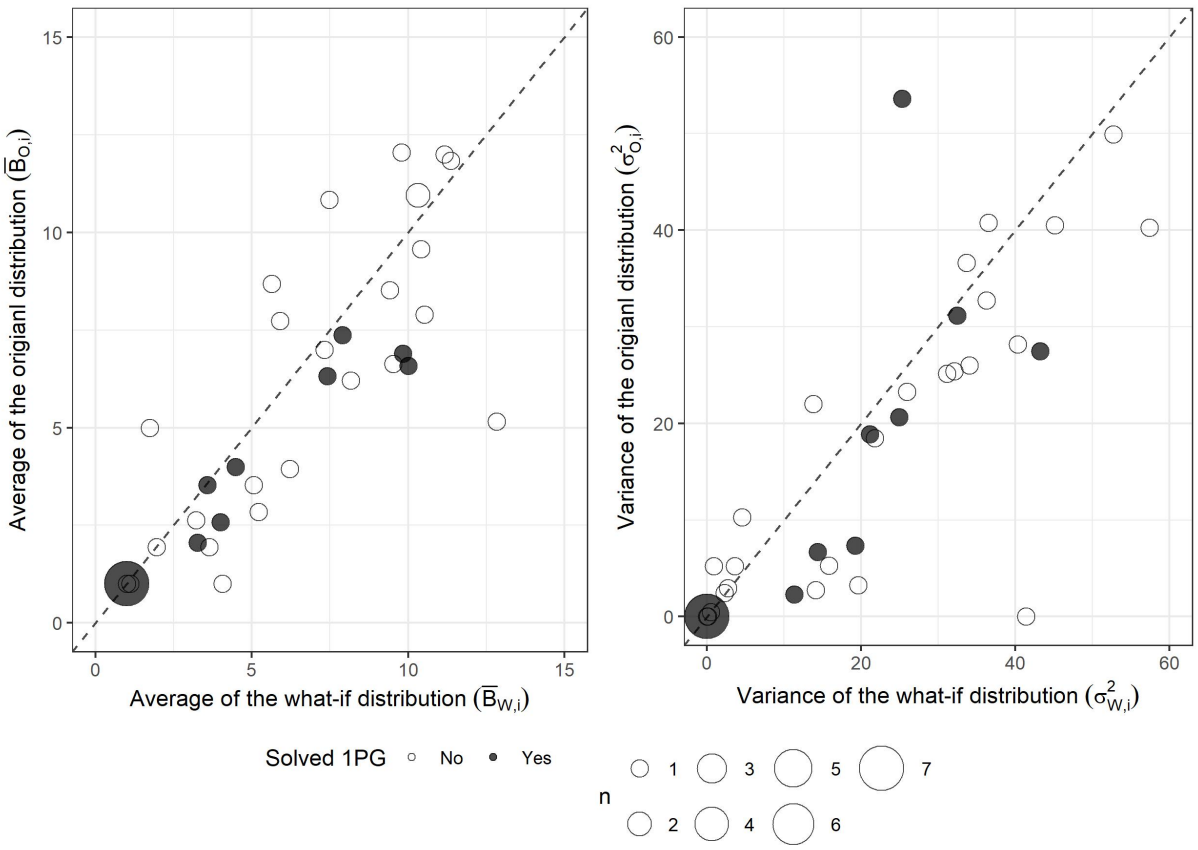

Figure 16: Figure depicting the change in distribution across the First and Second belief elicitation tasks. In the left(right) panel on the vertical axis the average value(variance) of the First distribution for subject i, in the horizontal axis the average value(variance) for the Second distribution for subject i. In both cases the dotted line is a 45 degree line; any value to the right of it represents an increase in the parameter in the Second distribution with respect to the First distribution.

D Instructions

The instructions below are translated from the original German instructions. The instructions were distributed sequentially, each of the following subsections at a time. After reading instructions, subjects completed the tasks, and then received instructions for the following task. Subjects were given time to carefully read the instructions and ask questions.

D.1 Overview

Today's experiment consists of a sequence of questionnaires and games. After each game or questionnaire, you receive instructions for the next game or questionnaire. In total, the experiment will last about 1.5 hours. For your participation your will receive a show-up fee of 5€. Depending on how you answer/play the questionnaires/games you can earn money on top of that. After you have finished all questionnaires and games, your final payoff will be shown on your screen. You will then receive a receipt, which you please fill out with the shown payoff and your name and address. After this you will be called to the adjoining room to receive your payment.

You will now receive the specific instructions for the first game.

D.2 Task 1

In this task, you have to pick two numbers (named X and Y) between 0 and 100 (both inclusive). Your payment for this task depends on how close these two numbers (X and Y) are to the so called "target number". The closer your numbers are to the target number, the higher your payment.

Caclulation of the target number The target number depends on your picked numbers. It is calculated as the mean of both numbers (X and Y), multiplied by two thirds:

$$\text{target number} = \frac{2}{3}\left(\frac{X+Y}{2}\right)$$

Your payment Your Payment depends on absolute distance of your numbers to the target number. For each number, if the number is exactly equal to the target number, you receive 1€. Should you not hit the target number exactly, some money will be deducted.

For each absolute unit distance of your numbers to the target number, 0.05€ will be deducted:

$$\text{payment for X} = 1€ - 0.05€\,|X - \text{target number}|$$

$$\text{payment for Y} = 1€ - 0.05€\,|Y - \text{target number}|$$

Because only the absolute difference between your number and the target number is used to calculate your payment (indicated with by the vertical bars "|"), it does not matter whether you deviate upwards or downwards - only the absolute difference counts. Please note that your payment can not become negative. Should your payment according to the above formula become negative, you will receive 0€ instead.

You have four minutes time to pick both numbers. After you have chosen your numbers, please confirm your choice by clicking the red "continue" button. Otherwise, your answer will not be recorded.

D.3 Task 2

This task is similar to the previous task. This time, however, you will play against another person in this room, who will be matched with you randomly. This time, you choose only one number between 0 and 100 (both inclusive). The other person also chooses a number between 0 and 100. Your payment now depends on how close your number is to the so called "target number". The closer your number is to the target number, the higher your payment.

Caclulation of the target number The target number depends your number, and the number stated by the other person. It is calculated as the mean of both numbers, multiplied by two thirds:

$$\text{target number} = \frac{2}{3}\left(\frac{\text{your number} + \text{other player's number}}{2}\right)$$

Your payment Your Payment depends on absolute distance of your numbers to the target number. If your number is exactly equal to the target number, you receive 2€.

Should you not hit the target number exactly, some money will be deducted. For each absolute unit distance of your number to the target number, 0.1€ will be deducted:

$$\text{payment} = 2€ - 1€\,|\text{your number} - \text{target number}|$$

Because only the absolute difference between your number and the target number is used to calculate your payment (indicated with by the vertical bars "|"), it does not matter whether you deviate upwards or downwards - only the absolute difference counts. Please note that your payment can not become negative. Should your payment according to the above formula become negative, you will receive 0€ instead.

Since the payoff of the other player is calculated in the same way, s/he also has the incentive to state the closest number possible to the target number.

You have four minutes time to pick your number. After you have chosen your number, please confirm your choice by clicking the red "continue" button. Otherwise, your answer will not be recorded.

D.4 Task 3

Reminder: in the previous task every participant was asked to pick a number between 0 and 100 (both inclusive). The payment for this game depended on how close this number was from the target number (mean of the numbers of both players, multiplied by two thirds).

In this task we would like to ask you to estimate how the other 19 participants who are participating in this experiment, behaved in the previous game. For this purpose, you receive 19 "token", that you can distribute in a number of bins (see screenshot below [Figure 11]).

Each token represents your estimate for one participant. The bins represent an interval for your estimation. To distribute tokens into bins, you type the number of participants, who you estimate to play a number in the interval of the respective bin, into the respective field on your screen. If you believe that no participant played a number in any interval, you can leave the field empty (or type in 0).

Example: You believe that 5 participants chose numbers between 75 and 79, and 14 participants chose numbers between 20 and 24. In this case you type "14" in the field 20-24 and "5" in the field 75-79.

For each token that coincides with a decision of a participant, you receive 0.20€.

Example: You have put 5 tokens in a bin, and 2 participants have actually played numbers in this bin. In this case, you receive 2*0.20€. If 5 people have actually played numbers in this bin, you receive 5*0.20€. If you estimate all 19 participants correctly, you receive 19*0.2€=3.80€.

Note: because it is difficult to keep track of how many tokens you have already distributed, we have built in a "check-button", that sums up all distributed tokens. Should not all 19 tokens be distributed, or more 19 tokens distributed, a pop up will tell you this. If you are happy with your distribution, and have distributed 19 token, you can finish this task by clicking "Ok".

D.5 Task 4

[Only a subset of 40 subjects participated in this task]

A few weeks ago, we conducted an experiment with 20 participants, who also solved Task 2. The participants received the exact same instructions as you, however, they have not solved Task 1 before they solved Task 2. That means, they played directly against another player, without picking two numbers before in Task 1.

We would like to ask you, similarly to the previous task, to estimate how these participants have played in Task 2. Again you receive 19 token, that you can distribute in a number of bins.

Since 20 participants took part in this experiment, but you have 19 tokens, we will randomly choose 19 participants from these 20 participants.

Again, for each correctly placed token, you receive 0.20€.

D.6 Task 5

In this task, you see a puzzle on every screen: a matrix containing 8 graphical entries and one empty field. There are 8 given option to complete the puzzle - only one is correct. For each puzzle, you have to select one of the 8 options. To this, you type in the corresponding number, and confirm by clicking OK.

[screenshot of Figure 12]

In total you will complete 36 such puzzles, divided into 3 blocks of 12 puzzles. Within each block you can move back and forth between puzzles, and correct previously stated answers. You have 5 minutes to solve each of the first two blocks, and 8 minutes for the remaining block. The remaining time will be displayed in the header of your screen. After you have completed all puzzles, or the time runs out, you have to confirm your answers by clicking "send answers". If you do not confirm your choices, they will not be recorded.

For each correctly answered puzzle, you earn 0.10€.

D.7 Task 6

This task consist of the game "Race to 60", that you play repeatedly against the computer. Your task is to win this game as often as possible against the computer.

In this game, you and the computer player state numbers between 1 and 10 sequentially. The numbers are added up, and whoever is first to push the sum of all stated numbers to or above 60 wins the game.

The game functions as follows: You start the game by stating a number between 1 and 10 (both inclusive). Then the game continues as follows:

1. The computer chooses a number between 1 and 10. This number wil be added to your number.

2. The screen shows the sum of all numbers chosen so far. If the sum is smaller than 60, you again choose a number between 1 and 10, which again will be added to all previously stated numbers.

This will be repeated until the sum of all numbers is greater or equal to 60. Whoever states the number that pushes the sum to or above 60, wins the game. You will play this game 6 times against the computer, and you have 90 seconds time for each repetition. For each game won, you receive 0.50€.

Your payment This is the last game for today's experiment. After completing this game, you will receive a questionnaire that you please complete. After that, your payments will be summarized on the screen. You then receive a receipt, that you please fill out. After you have done that, an experimenter will come to your place to check if everything is in order. After that you can go to the adjoining room to receive your payment.