

1 **Extended Data 1**

2

3 **Supplementary Note 1: Experimental instructions for Experiments 1-3**

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5 *Instruction for Experiment 1 (Trust Game, TG):*

6

7 Welcome and thanks for participating in this experiment. Please read these instructions
8 carefully. If you have any questions, please raise your hand. One of the experimenters
9 will come to you and answer your questions. From now on, communication with other
10 participants is not allowed. Please switch off your mobile phone. Next, you will enter
11 into a repeated game. Your tokens gained in this game depends on your and your
12 matched participants' choices. Your income in this game is $0.05 \times$ your total tokens of 6
13 randomly selected rounds.

14

15 *The basic game:*

16

1. There are two types of players, namely Player 1 and Player 2.

17

2. In each round, Player 1 is endowed with 100 tokens. Player 2 is endowed with
18 0 tokens.

19

3. Player 1 will determine the amount of investment, while player 2 will
20 determine the ratio of return.

21

4. At the beginning of the experiment, your role will be determined randomly and
22 not change during the whole experiment.

23

5. You will only play one role. At the beginning of the experiment, you will
24 randomly encounter several other participants who play a different role. The partners
25 you are matched and interacted with are fixed across the whole experiment.

26

6. At the beginning of the experiment, you will randomly encounter several other
27 participants who play a different role, and you play the game with them throughout the
28 repeated game. For example, if your role is Player 1, you play the game with several
29 fixed Players 2 and vice versa.

30

31 *The rule of player1:* In the whole process of experiment, you will play the game with
32 several fixed Players 2. The number and people you are interacted with will not change
33 during the experiment.

34

35 In each round, Player 1 interacts with each of his/her matched players by inputting
36 his/her investment p . This means giving p tokens to each partner. This also means
37 Player 1 keeps $100 - p$ tokens, and each matched Player 2 will receive $3 \times p$
38 tokens.

39

40 After all Player 2 determine the return rate q , we will calculate the return amount
41 $Q=3 \times p \times \bar{q}$ (\bar{q} is the average of return rate from matched Player 2) according to the
42 investment of each Player1. The final tokens of Player 1 will be the remaining tokens
43 combined with receiving tokens: $(100 - p) + 3 \times p \times \bar{q}$.

44

45 Player 1 will see the below information in previous round on the screen interface, and
46 make the decision for the current round:

47 Your own investment;

48 Each of the return rate of your matched Player 2 (listed by descending order);

49 The average return rate of all your matched Player 2;

50 Your final tokens.

51

52 *The rule of player2:* In the whole process of experiment, you will play the game with
53 several fixed Players 1. The number and people you are interacted with will not change
54 during the experiment.

55

56 In each round, Player 2 will receive the tripled investment from matched Player 1, i.e.,
57 $3 \times \bar{p}$ tokens (\bar{p} is the average of investments from his/her partners).

58

59 Player 2 should decide on the amount to return to his/her partners by inputting the
60 return rate q . Player 1 will then receive the token corresponding to his/her own
61 investment ,i.e., $3 \times p \times q$.

62

63 Player 2 will see the below information in previous round on the screen interface, and
64 make the decision for the current round:

65 Your own return rate;
66 Each of the tripled investment from your matched Player 1 (listed by descending
67 order);
68 The average tripled investment from all your matched Player 1;
69 Your final tokens.

70

71 *Notice:* Player 1 and Player 2 will play each round and decide their investment/ return
72 rate simultaneously according to the information of the previous round. After each
73 round, the platform will transform the return rate of Player 2 to the return amount for
74 each Player 1 and calculate the final tokens for each player.

75

76 *The procedure of the game:*

77 Instruction document → check questions → power point illustration → 5 test trials →
78 formal game.

79 To make you better understand the rule, after reading the instruction and the specific
80 example, the experimenter will use the power point to illustrate uniformly to all
81 participants. Then you will have 5 test trials before entering the formal game. The
82 game will terminate in 60-65 trials randomly, the whole process of interaction is about
83 40 minutes.

84

85 *Supplementary illustration:*

86 1. Please get familiar with the rule of two roles as your role will be later randomly
87 assigned by the system.

88 2. Your role in formal game will be the same as in the test trials. Your matched partners
89 will always be the same in the whole process including the test trials.

90 3. Your tokens earned in the randomly selected round will be transformed into RMB in
91 the ratio of 20:1.

92

93 *Check questions:*

94 Below are two specific example, please calculate the tokens Player 1 and Player 2 will
95 receive in these conditions.

96 1. A Player 1 interacting with 5 matched Player 2 chooses to invest 60
97 tokens to each of them which be tripled into 180. The Player 1 receive an average
98 return rate of 0.5. Then the final tokens of Player 1 will be?

99 2. A Player 2 interacting with 5 matched Player 1 receives an average
100 investment of 70 tokens from matched partner which be tripled into 210. The
101 Player 2 chooses a return rate of 0.4. Then the final tokens of Player 2 will be?

102
103 *Answer:*

104 1. The tokens of Player 1 will be : $180 \times 50\% + (100 - 60) = 90 + 40 = 130$.

105 2. The tokens of Player 2 will be : $210 \times (1 - 40\%) = 126$.

106
107 ***Instruction for Experiment 2 (ultimatum bargaining game, UBG):***

108 Welcome and thanks for participating in this experiment. Please read these instructions
109 carefully. If you have any questions, please raise your hand. One of the experimenters
110 will come to you and answer your questions. From now on, communication with other
111 participants is not allowed. Please switch off your mobile phone. Next, you will enter
112 into a repeated game. Your tokens gained in this game depends on your and your
113 matched participants' choices. Your income in this game is 0.01 x your total tokens of 6
114 randomly selected rounds.

115
116 *The basic game:*

117 1. There are two types of players, namely Player A and Player B.

118 2. At the beginning of the experiment, your role will be determined
119 randomly and will not change during the whole experiment.

120 3. At the beginning of the experiment, you will randomly encounter several
121 other participants who play a different role, and you play the game with them
122 throughout the repeated game. For example, if your role is Player A, you play the
123 game with several fixed Players B and vice versa.

124 4. In each round, Player A and Player B share 100 tokens with his/her
125 matched player.

126 5. In each round, Player A interacts with each of his/her matched players by

127 inputting offer p , which means giving p tokens to each partner. Player B can then
128 decide whether to accept each of his/her partners' offers by inputting an acceptance
129 level q , where an offer not less than q will be accepted.

130 a) If $p \geq q$, the deal is successful. Then, the 100 tokens are allocated
131 according to Player A's plan. Player A gets $100 - p$ tokens, and Player B gets
132 p tokens.

133 b) If $p < q$, the deal is unsuccessful. Then, both Player A and Player B
134 get 0 tokens.

135 6. The information of the previous round will be shown on the screen
136 interface including choices of you and your partners, and your tokens.

137 7. The total number of rounds is between 60 and 70.

138

139 *Notice:* Player A and Player B make decisions simultaneously. After each round, we
140 will calculate the tokens for each player.

141

142 *Example for Player A*

143 Suppose:

144 1. Each Player A interacts with 4 Player B.

145 2. Player A's offer is p , and the acceptance levels of the 4 Player B are $q_1 >$
146 $q_2 > q_3 > q_4$.

147 3. If $q_1, q_2 > p$, $q_3, q_4 \leq p$

148 a) Player A interacts with q_3, q_4 successfully.

149 b) Player A therefore gets $0 + 0 + (100 - p) + (100 - p) = 200 -$
150 $2p$ tokens in total.

151 c) Player A's tokens are $\frac{200-2p}{4}$ (4 is the number of Player A's partners)

152

153 *Example for Player B*

154 Suppose:

155 1. Each Player B interacts with 4 Player A.

156 2. Player B's acceptance level is q , and the offers of the 4 Player A are

157 $p_1 > p_2 > p_3 > p_4$.

158 3. If $p_1, p_2 > q$, $q_3, q_4 \leq q$

159 a) Player B interacts with p_1, p_2 successfully.

160 b) Player B gets $p_1 + p_2 + 0 + 0 = p_1 + p_2$ tokens in total.

161 c) Player B's token are $\frac{p_1+p_2}{4}$ (4 is the number of Player B's partners)

162

163 *Check questions:*

164 Below are two specific example, please calculate the tokens Player A and Player B will
165 receive in these conditions.

166 1. One Player A interacting with 4 matched Player B proposes an offer of p and
167 receives the acceptance level of Player B to be q_1, q_2, q_3, q_4 , in which $q_1 <$
168 $q_2 < q_3 < p < q_4$. Then the final tokens of Player A will be?

169 2. One Player B interacting with 4 matched Player A inputs the acceptance level of q ,
170 and the matched Player A propose offer to be p_1, p_2, p_3, p_4 , where $p_1 < q < p_2 <$
171 $p_3 < p_4$. Then the final tokens of Player A will be?

172

173 *Answer:*

174 1. The tokens of Player A will be : $(300 - 3p) / 4$.

175 2. The tokens of Player B will be : $(p_2 + p_3 + p_4) / 3$.

176

177 ***Instruction for Experiment 3 (two-stage Prisoner's Dilemma game, tPD):***

178 Welcome and thanks for participating in this experiment. Please read these instructions
179 carefully. If you have any questions, please raise your hand. One of the experimenters
180 will come to you and answer your questions. From now on, communication with other
181 participants is not allowed. Please switch off your mobile phone. Next, you will enter
182 into a repeated game. Your tokens gained in game depends on your and your matched
183 participants' choices. Your income in this game is 2 x your total tokens of 20 randomly
184 selected rounds.

185

186 *The basic game:* The experiment consists of two stages: stage 1 and stage 2. The total

187 number of rounds is between 30 and 40.

188 In stage 1:

- 189 1. You and your partners should make choices between A and B.
 190 2. Your tokens depend on your and your partners' choices.

(Your tokens, Your partners' tokens)		Your partner's choice	
		A	B
Your choice	A	(3,3)	(1,4)
	B	(4,1)	(2,2)

191 Your tokens in stage 1 = $\frac{\text{the total score you get from interactions with all the partners}}{\text{the number of your partners}}$
 192

- 193 3. The information of the previous round will be shown on the screen
 194 interface including choices of you and your partners, and your tokens.

195

196 In stage 2:

- 197 1. You and your partners have to choose either ♦ and ♣.
 198 2. Suppose you interact with one partner
 199 a) If you choose ♦
 200 i. If your partner chose A in stage 1, you and your partner won't lose
 201 points in this stage.
 202 ii. If your partner chose B in stage 1, you have to pay 2 points. Your
 203 partner loses 3 points.
 204 b) If you choose ♣
 205 i. You and your partner won't lose any points in this stage.

206 Your tokens in stage 2 = $\frac{\text{the total score you get from interactions with all the partners}}{\text{the number of your partners}}$.

- 207 2. The information of stage 1 will be shown on the screen interface
 208 including you and your partners' choices.

209

210 **Tokens calculation**

Your choice in	Your choice in	No. of partners who	No. of partners who	No. of partners who	Your tokens in stage 1	Your tokens in stage 2
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stage 1	stage 2	choose A in stage 1	choose B in stage 1	choose \diamond in stage 2		
A	\diamond	N_A	N_B	N_P	$\frac{3 \times N_A + 1 \times N_B}{N_A + N_B}$	$\frac{-2 \times N_B}{N_A + N_B}$
	\clubsuit				$\frac{3 \times N_A + 1 \times N_B}{N_A + N_B}$	0
B	\diamond				$\frac{4 \times N_A + 2 \times N_B}{N_A + N_B}$	$\frac{-2 \times N_B - 3 \times N_P}{N_A + N_B}$
	\clubsuit				$\frac{4 \times N_A + 2 \times N_B}{N_A + N_B}$	$\frac{-3 \times N_P}{N_A + N_B}$

211

212