Endogenous Choice Between Ultimatum and Dictator Games: Experimental Evidence

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Ultimatum Game

Player 1 (proposer / sender, she) offers $x \in [0, 1]$, **player 2** (responder / receiver, he) either accepts or rejects. If player 2 accepts, then

- player 1 gets $1 - x$, player 2 gets x

If player 2 rejects, then

- player 1 gets 0, player 2 gets 0

Motivation for Studying the Ultimatum Game

1. Ultimatum game helps to measure some characteristics, like
   - inequality aversion (Fehr & Schmidt 1999; Bolton & Ockenfels 2000),
   - fairness (Kahneman, Knetsch, and Thaler 1986; Nowak, Page, and Sigmund 2000),
   - negative reciprocity (Falk & Fischbacher 2006),
   - anger & frustration (Aina, Battigalli, and Gamba 2018),

   etc.

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   etc. *How to measure?* That is the question! $\Rightarrow$ We need to understand what is driving the behavior
2. Ultimatum game is a very simple bargaining protocol. Understanding the behavior in ultimatum game helps to understand the behavior in more complex and more realistic bargaining situations.

We do not discuss whether ultimatum bargaining games can adequately represent real bargaining situations. We are mainly interested in ultimatum bargaining behavior because ***it allows one to analyze in detail certain aspects of bargaining behavior***

Güth et al 1982

SPNE

Offer minimum (positive) amount, accept any positive offer

Literature

Offer: 40-50%. Minimum acceptable offer (MAO): 20%-40%.

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- "Irrational" rejection cannot be explained by efficiency concerns: *rejections create inefficiency* $\leftarrow$ main mystery

$\boxed{\text{Problem: negotiation failure}}$

This is a problem both from the descriptive perspective (we don't know why this is happening) and from the normative perspective (rejection creates inefficient outcome)

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This paper

We propose and show experimentally a novel motive for rejection: *preference for influence*.

Outline

Idea

Motivation (original)

Propose a simple modification of the ultimatum game such that

- it decreases the rate of negotiation failures
- both players would be willing to switch to this modification

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Idea

Allow player 2 to choose between the dictator game (by committing to accept any offer) and the ultimatum game.

- we call this modification the ultimatum game with the commitment option

Experimental Design

Experimental Design

Participants are randomly paired with each other.

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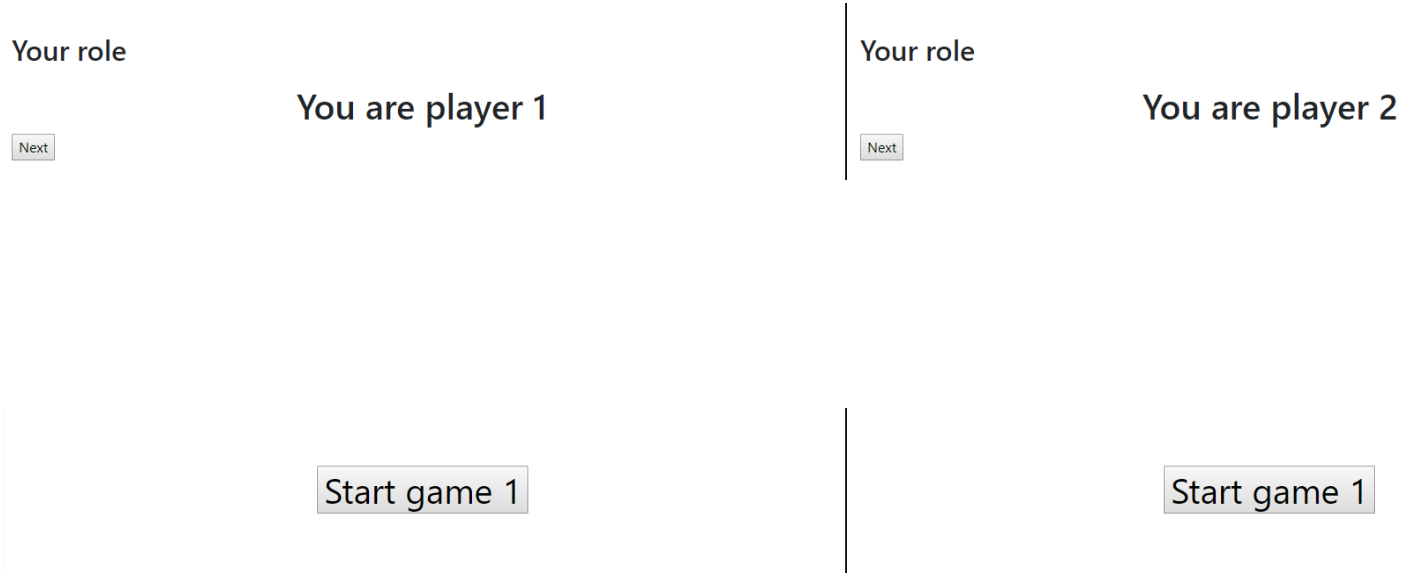

Game 1 = Ultimatum Game. Version 1

Game 1

You are player 1

Choose how many tokens you want to offer to player 2:

- Player 2 gets 0 tokens (you keep 100 tokens)
- Player 2 gets 10 tokens (you keep 90 tokens)
- Player 2 gets 20 tokens (you keep 80 tokens)
- Player 2 gets 30 tokens (you keep 70 tokens)
- Player 2 gets 40 tokens (you keep 60 tokens)
- Player 2 gets 50 tokens (you keep 50 tokens)
- Player 2 gets 60 tokens (you keep 40 tokens)
- Player 2 gets 70 tokens (you keep 30 tokens)
- Player 2 gets 80 tokens (you keep 20 tokens)
- Player 2 gets 90 tokens (you keep 10 tokens)
- Player 2 gets 100 tokens (you keep 0 tokens)

Submit

Game 1

You are player 2

While player 1 is deciding on the offer on how to divide 100 tokens, please choose below how you would respond to each of the possible offers. Remember that when we show you at the end of the experiment how many tokens player 1 actually offered to you, you will not have a chance to change your response.

You get 0 tokens (player 1 keeps 100 tokens):
Accept Reject

You get 10 tokens (player 1 keeps 90 tokens):
Accept Reject

You get 20 tokens (player 1 keeps 80 tokens):
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You get 60 tokens (player 1 keeps 40 tokens):
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You get 70 tokens (player 1 keeps 30 tokens):
Accept Reject

You get 80 tokens (player 1 keeps 20 tokens):
Accept Reject

You get 90 tokens (player 1 keeps 10 tokens):
Accept Reject

You get 100 tokens (player 1 keeps 0 tokens):
Accept Reject

Submit

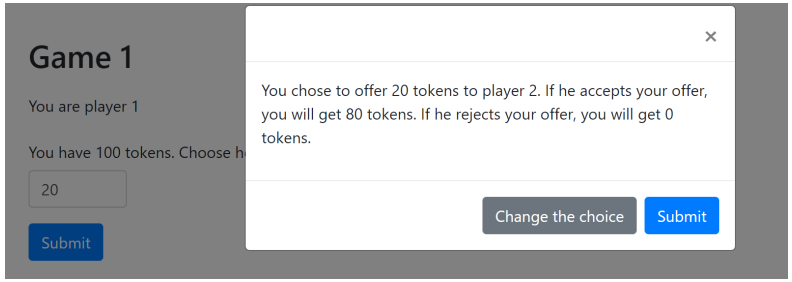
Game 1 = Ultimatum Game. Version 2

Game 1

You are player 1

You have 100 tokens. Choose how many tokens you want to offer to player 2:

Submit



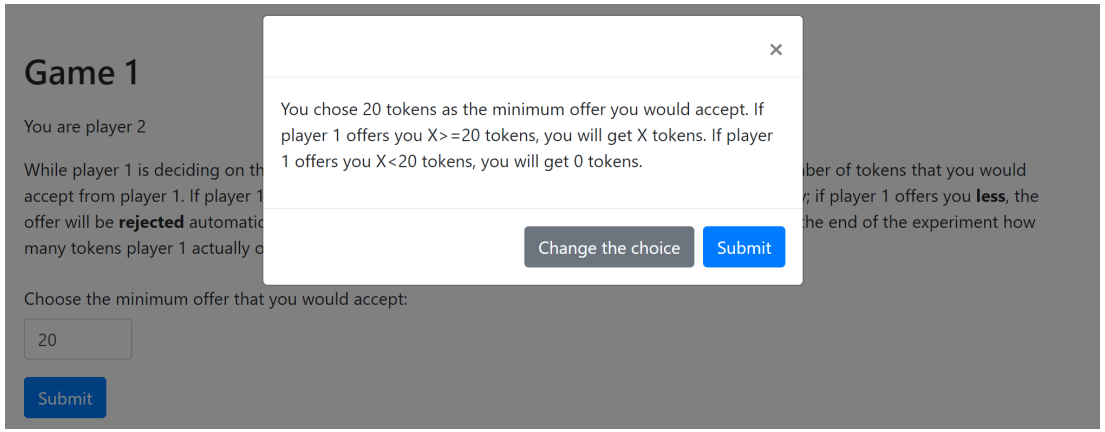
Game 1

You are player 2

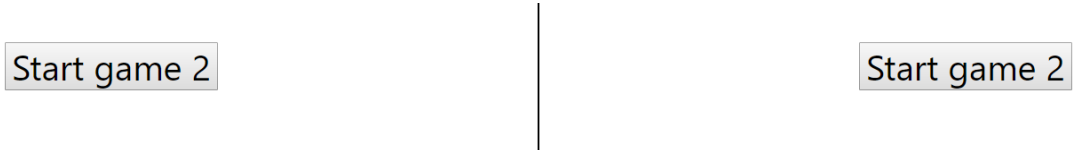
While player 1 is deciding on the offer on how to divide 100 tokens, please indicate the minimum number of tokens that you would accept from player 1. If player 1 offers you **the same or more**, the offer will be **accepted** automatically; if player 1 offers you **less**, the offer will be **rejected** automatically and you both get 0 tokens. Remember that when we show you at the end of the experiment how many tokens player 1 actually offered to you, you will not have a chance to change your response.

Choose the minimum offer that you would accept:

Submit



Participants are randomly paired with each other, keeping the same roles.



Game 2 = Dictator Game. Version 1.

Participants are randomly paired with each other, keeping the same roles.

Start game 2

Start game 2

Game 2

You are player 1

Choose how many tokens you want to offer to player 2:

- Player 2 gets 0 tokens (you keep 100 tokens)
- Player 2 gets 10 tokens (you keep 90 tokens)
- Player 2 gets 20 tokens (you keep 80 tokens)
- Player 2 gets 30 tokens (you keep 70 tokens)
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- Player 2 gets 70 tokens (you keep 30 tokens)
- Player 2 gets 80 tokens (you keep 20 tokens)
- Player 2 gets 90 tokens (you keep 10 tokens)
- Player 2 gets 100 tokens (you keep 0 tokens)

Submit

Game 2

You are player 2

You do not make any choice in this game. Any offer player 1 made is accepted automatically.

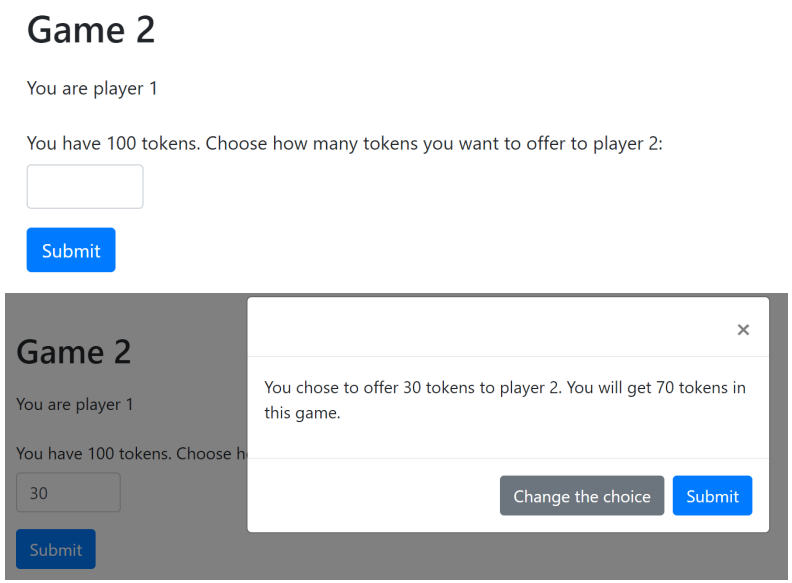
Next

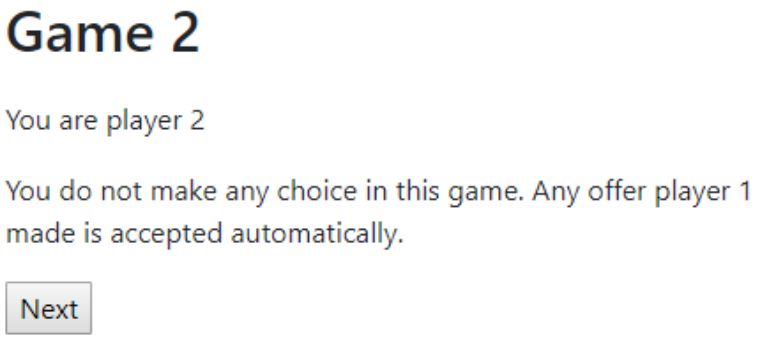
Game 2 = Dictator Game. Version 2.

Participants are randomly paired with each other, keeping the same roles.

Start game 2

Start game 2





Game 3 = Ultimatum Game with the Commitment Option

Participants are randomly paired with each other, keeping the same roles.

Start game 3

Start game 3

Game 3

You are player 1

While player 2 is deciding on which game to play, please choose how many tokens to give to player 2 for each of two games. Remember that when we show you at the end of the experiment the game player 2 actually chose, you will not have a chance to change your response.

Choose how many tokens you want to offer to player 2 if player 2 chooses game 1:

- Player 2 gets 0 tokens (you keep 100 tokens)
- Player 2 gets 10 tokens (you keep 90 tokens)
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Choose how many tokens you want to offer to player 2 if player 2 chooses game 2:

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- Player 2 gets 30 tokens (you keep 70 tokens)
- Player 2 gets 40 tokens (you keep 60 tokens)
- Player 2 gets 50 tokens (you keep 50 tokens)

Game 3

You are player 1

While player 2 is deciding on which game to play, please choose how many tokens to give to player 2 for each of two games. Remember that when we show you at the end of the experiment the game player 2 actually chose, you will not have a chance to change your response.

You have 100 tokens. Choose how many tokens you want to offer to player 2 if player 2 chooses game 1:

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Game 3

You are player 1

While player 2 is deciding on w for each of two games.
Remember that when we show u will not have a chance to
change your response.

×

You chose to offer 40 and 10 tokens in game 3. If player 2 chooses game 1 and accepts 40 tokens, you will get 60 tokens. If player 2 chooses game 1 and rejects 40 tokens, you will get 0 tokens. If player 2 chooses game 2, you will get 90 tokens.

Change the choice | Submit

You have 100 tokens. Choose ne 1:

40

You have 100 tokens. Choose how many tokens you want to offer to player 2 if player 2 chooses game 2:

10

Game 3

You are player 2

Choose which game to play:

Game 1 Game 2

Submit

Game 3

You are player 2

You chose game 1.

While Player 1 is deciding on the offer on how to divide 100 tokens, please choose below how you would respond to each of the possible offers. Remember that when we show you at the end of the experiment how many tokens player 1 actually offered to you, you will not have a chance to change your response.

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You get 100 tokens (player 1 keeps 0 tokens):
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Submit

Game 3

You are player 2

You chose game 2. This means any offer player 1 made is accepted automatically.

Go to results

Game 3

You are player 2

Choose which game to play:

Game 1 Game 2

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Game 3

You are player 2

You chose game 1.

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Choose the minimum offer that you would accept:

Submit

Game 3

You are player 2

You chose game 1.

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Choose the minimum offer that you would accept:

10

Submit

×

You chose 10 tokens as the minimum offer you would accept. If player 1 offers you X>=10 tokens, you will get X tokens. If player 1 offers you X<10 tokens, you will get 0 tokens.

Change the choice Submit

Game 3

You are player 2

You chose game 2. This means any offer player 1 made is accepted automatically.

Go to results

Experimental Design: Main Experiment

1. Role assignment
2. Ultimatum game
3. Dictator game
4. Ultimatum Game with the Commitment Option
5. Participants observe their payoffs (we pay for one randomly chosen game)

Results

You were player 1

Game 1:
- Amount offered: 30
- The offer was rejected
- Your payoff in game 1: 0

Game 2:
- Amount offered: 20
- Your payoff in game 2: 80

Game 3:
- Game chosen: game 2
- Amount offered: 30
- Your payoff in game 3: 70

Game chosen for the payment: game 3

Your final payment: $19

Start the survey

Results

You were player 2

Game 1:
- Amount offered: 30
- The offer was rejected
- Your payoff in game 1: 0

Game 2:
- Amount offered: 20
- Your payoff in game 2: 20

Game 3:
- Game chosen: game 2
- Amount offered: 30
- Your payoff in game 3: 30

Game chosen for the payment: game 2

Your final payment: $9

Start the survey

Experimental Design: Survey

1. Hypothetical questions: how would you behave had your role been different
2. Opinion questions (agree / disagree questions)
3. Risk aversion
4. Prisoner's dilemma
5. (Trust game — only in version 2)
6. Questionnaire

Data

session number	version	number of subjects	pool
1	1	8	university students in Russia
2	1	6	university students in Russia
3	1	22-5*	employees in accounting and financial departments of a firm in Russia
4	1	16	university students in Russia
5	2	16-1*	students in University of South Carolina

*: 5 subjects in session 3 were clearly confused, 1 subject in session 5 made too many mistakes in the quiz

Total number of subjects = 8 + 6 + (22-5) + 16 + (16-1) = $\boxed{62}$

Average payment:

- for sessions 1-4: 981 RUB $\approx$ \$14.5
- for session 5: \$9

Hypothesis 0

The *ultimatum game with the commitment option* decreases the rate of negotiation failures compare to the *ultimatum game*.

▸ direct test

Three channels through which the rate of negotiation failure can change:

1. Player 2 chooses the dictator game $\Rightarrow$ negotiation succeeds automatically
2. Player 1 offers more in the ultimatum game when it is player 2's choice
3. Player 2 accepts more offers in the ultimatum game if it is his choice

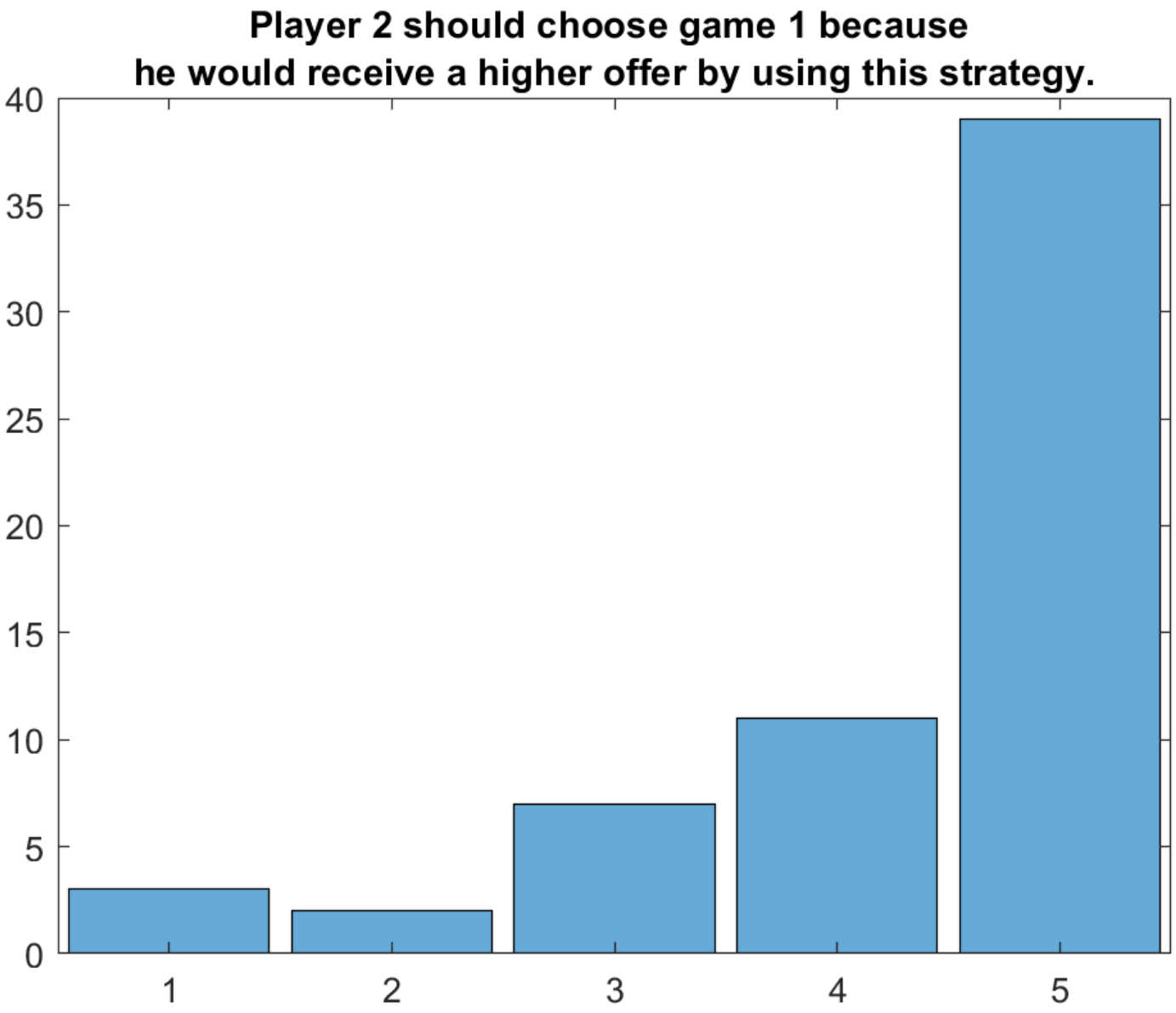
Hypothesis 1: Dictator game effect

There are people who chooses a positive minimum acceptable offer in the *ultimatum game* and the dictator game in the *ultimatum game with the commitment option*.

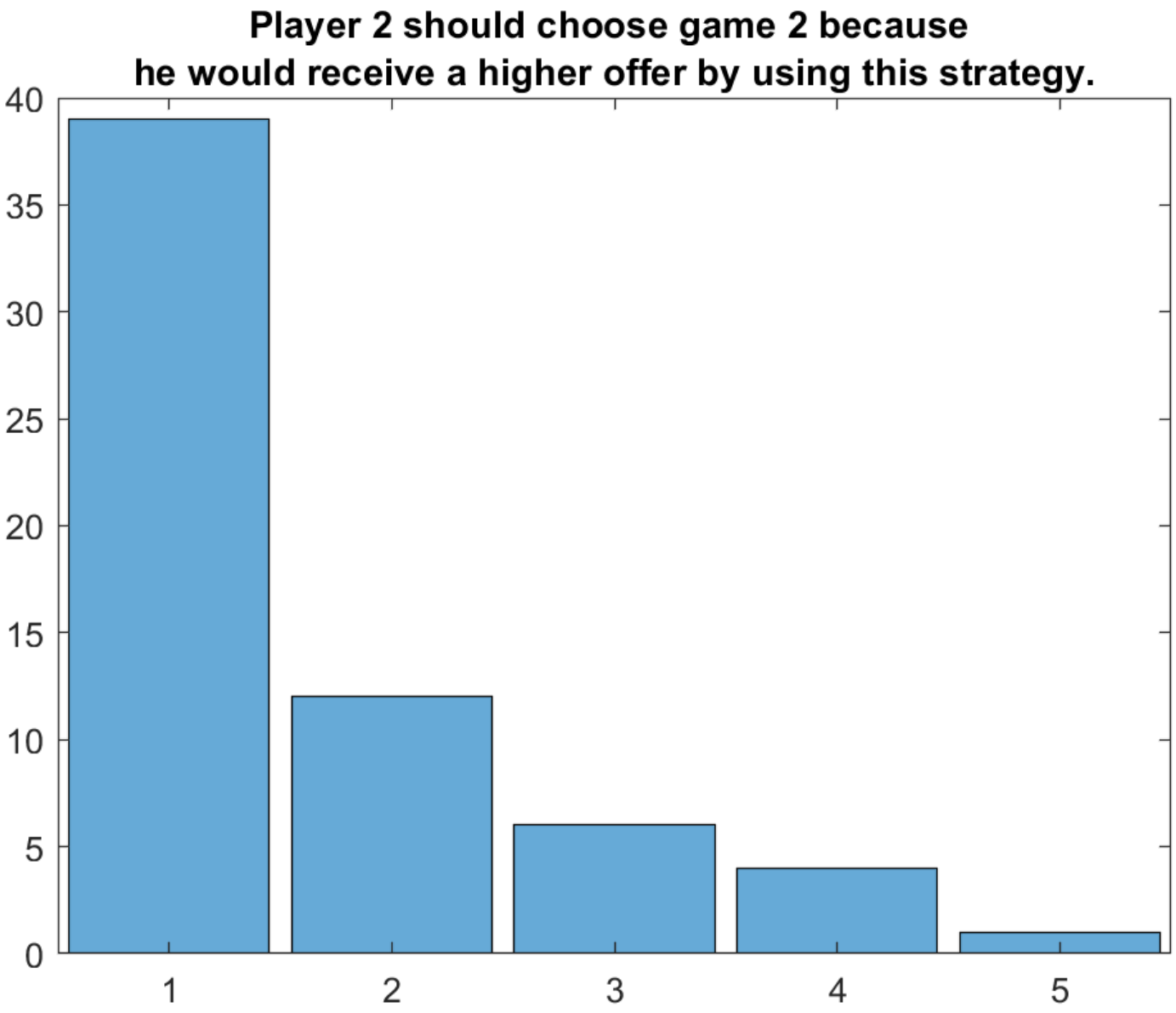
Result: ✗

role	number of subjects who chose game 1	number of subjects who chose game 2
player 1	24	7
player 2	30	1

Game Choice


Player 2 should choose game 1 because
he would receive a higher offer by using this strategy.
40
35
30
25
20
15
10
5
0
1
2
3
4
5

Game Choice


Player 2 should choose game 2 because
he would receive a higher offer by using this strategy.
40
35
30
25
20
15
10
5
0
1
2
3
4
5

Game Choice

Summary

Player 2 chooses game 1 because he expects to get a higher payoff that way

$\Rightarrow$ no "dictator game effect" (hypothesis 1)

Hypothesis 2: Proposer effect

On average, player 1 offers **less** in the *ultimatum game* than in the *ultimatum game with the commitment option*, conditional on player 2 choosing the ultimatum game.

Result: ✗ The offer is on average the same

role	number of subjects who offered the same in games 1 and 3.1	number of subjects whose offers differ in games 1 and 3.1
player 1	27	4
player 2	24	7

Hypothesis 3: Responder effect

On average, player 2's minimum acceptable offer (MAO) is **lower** in the *ultimatum game with the commitment option*, conditional on choosing the ultimatum game.

role	number of subjects who chose the same MAO in games 1 and 3.1	number of subjects who chose different MAOs in games 1 and 3.1*
player 1	22	9
player 2	19	12

*: MAO = 0 if game 2 is chosen

min offer in game 1 = MAO indicated by player 2 in game 1;

min offer in game 3 = MAO indicated by player 2 in game 3 if he chose game 1 and 0 if he chose game 2.

Then $\dfrac{\sum_{\substack{\text{subjects with}\\ \text{player 2 role}}} \{\textit{min offer in game } k \leq x\}}{31 = \#\text{ of subjects with player 2 role}}$ is the empirical probability of offer acceptance in game k, $k = 1, 3$, if the offer is x.

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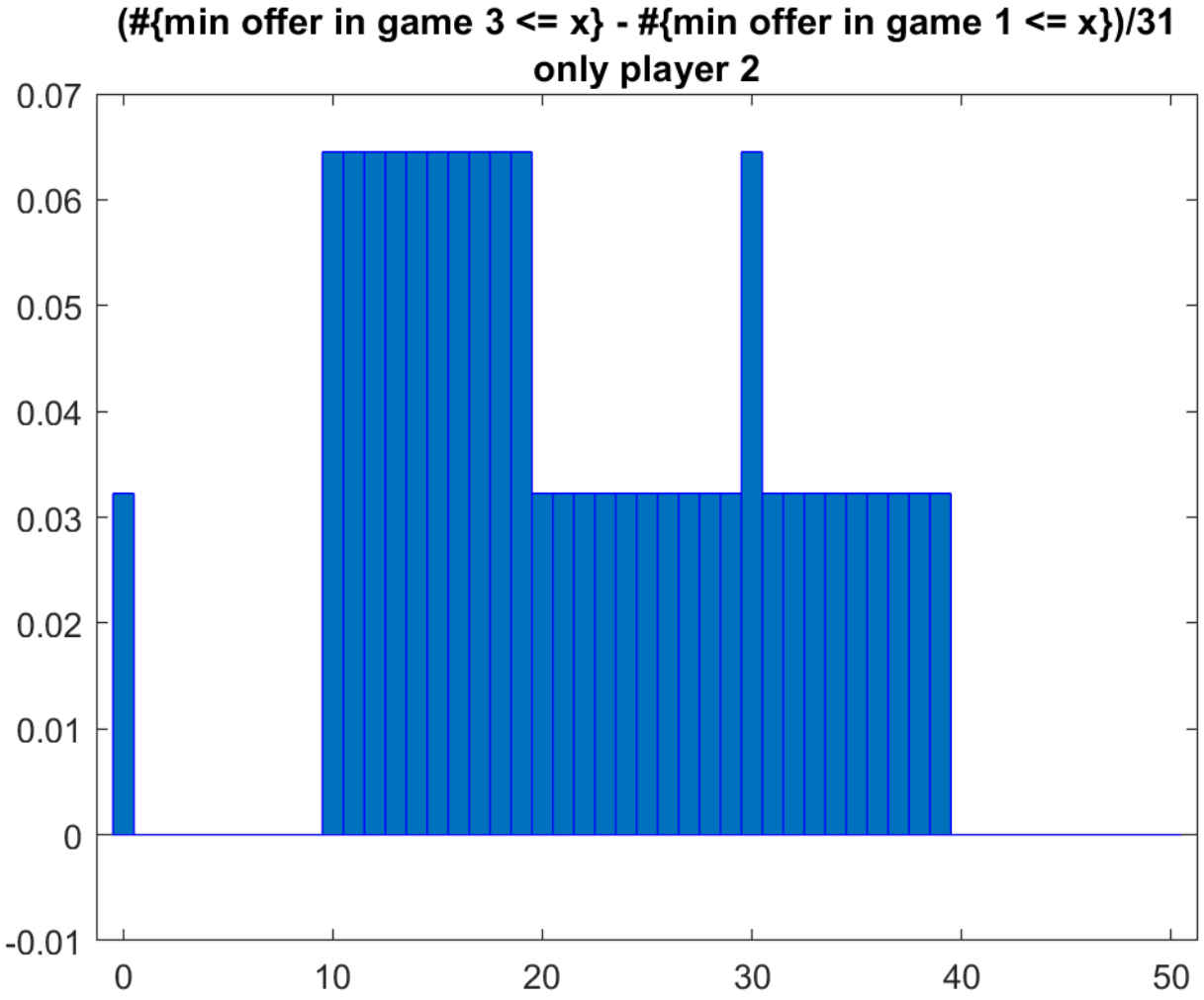

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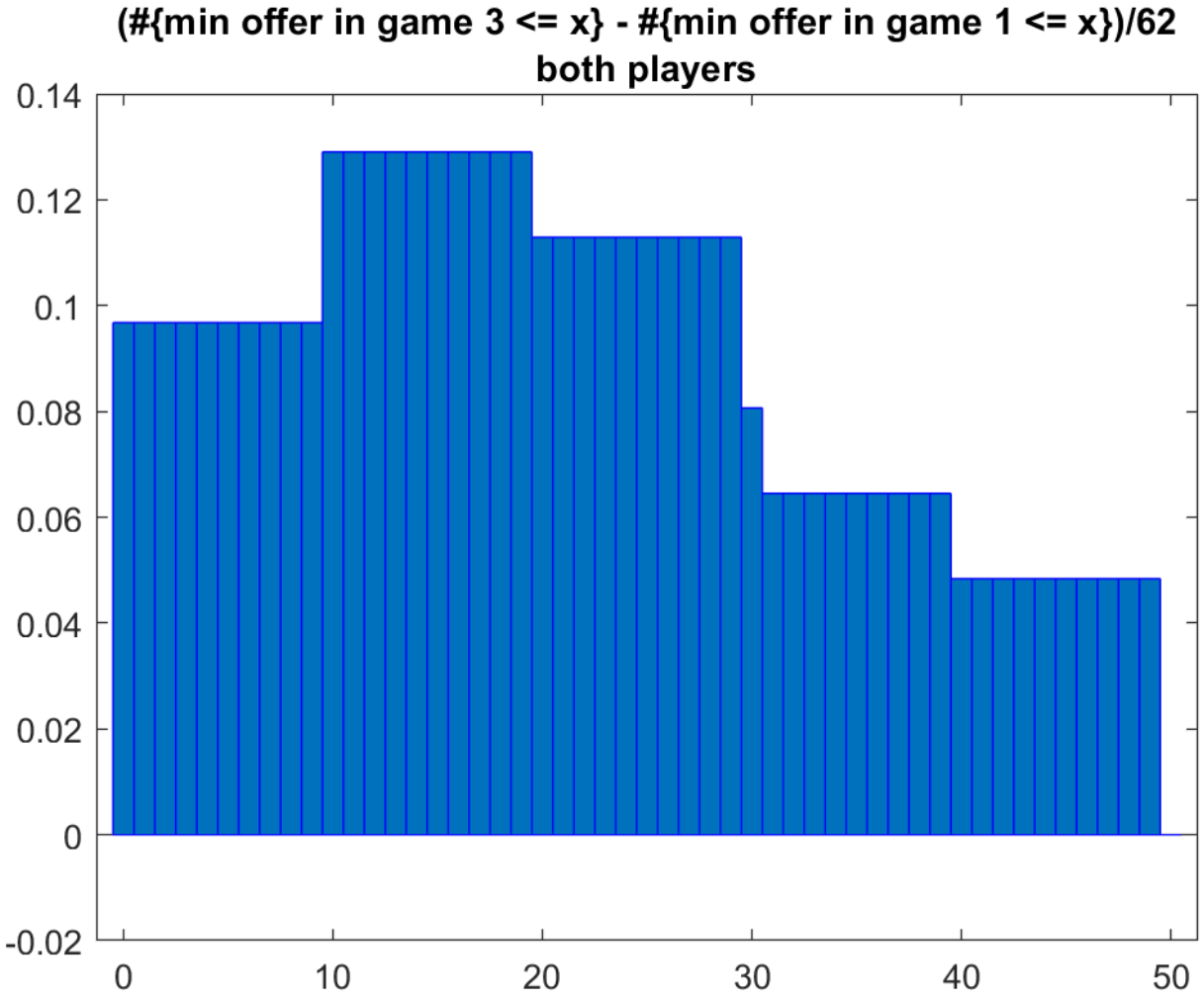
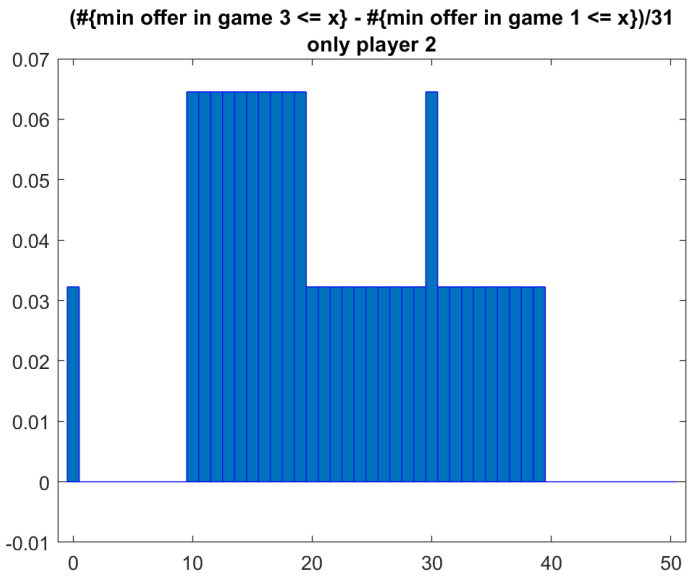
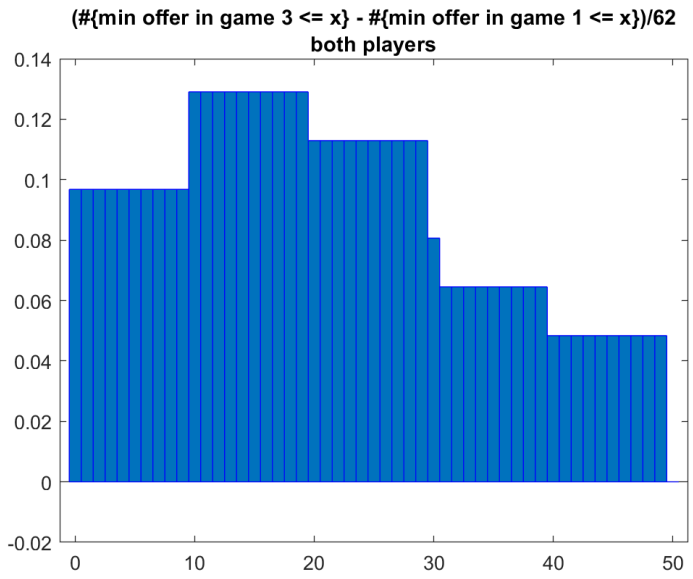


Hypothesis 3: Responder effect

On average, player 2's minimum acceptance payoff is **lower** in the *ultimatum game with the commitment option*, conditional on choosing the ultimatum game.

Result: ✓





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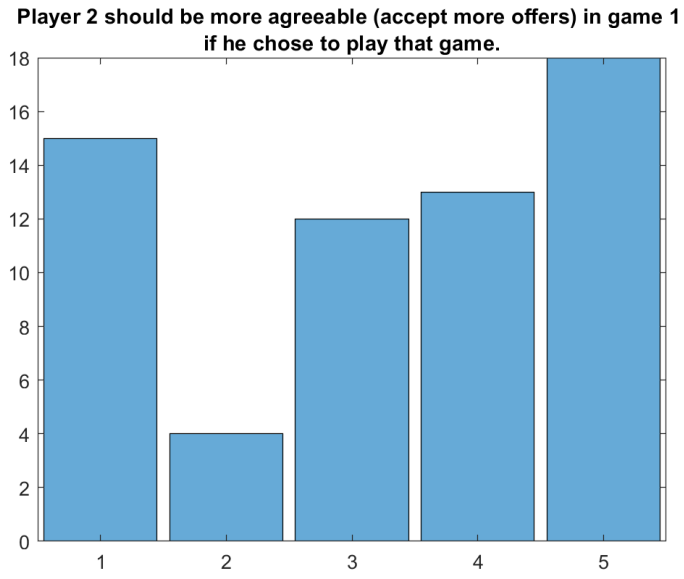

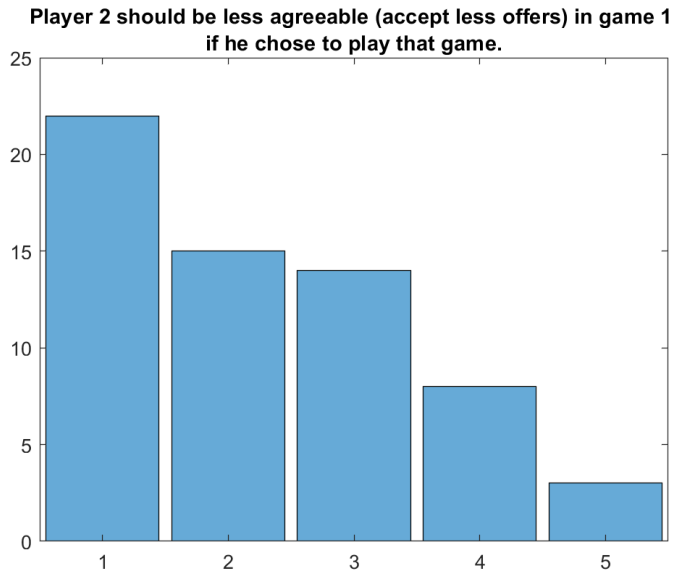

Hypothesis 3: Responder effect

MAO	=	20.681	−4.5323	×indicator_for_game_3
st.error:		(5.9606)	(3.2899)	
p-value:		[0.0007]	[0.1710]	
			−1.5621	×indicator_for_player_1
			(3.4214)	
			[0.6488]	
			+	risk measures
			+	cooperation rate in PD

Conclusion

Pilot data provide some evidence in favor

Hypothesis

Due to *preference for influence, for "making a difference"*, the Responder rejects because that way he (thinks he) makes a higher influence on the outcome

- player 2 accepts more after choosing the ultimatum game himself because he already partly satisfied his preference for influence

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- Unpopular reforms raise less protests when they are implemented right *after* an election. *video* YT file

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   1.1 preference for influence
   1.2 fairness concern: when player 2 chooses the ultimatum game himself, he thinks it is more fair to offer less

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3. Some players raise MAO in game 3. Possible explanation: *Player 2 "warned" player 1 $\Rightarrow$ he expects to receive a higher offer.*

Bottom line

We want a design where player 2 faces the same game in treatment and control rounds.

Experimental Design

Split participants into groups of 4. In each group the roles are **Player 1A**, **Player 1B**, **Player 2C**, **Player 2D**.

Stage 1. Player 1A and Player 1B simultaneously choose how much to propose. *This information remains hidden during the whole experiment until the payoffs are shown at the end.*

Stage 2. Computer randomly chooses C or D. All 4 players observe this choice. WLOG, suppose the computer chose **C**.

Stage 3. Player 2**C** chooses A or B. All 4 players observe this choice. WLOG, suppose the he chose **A**.

Stage 4. Player 2C and Player 2D simultaneously choose the minimum acceptance offer.

Payoff is determined based on the ultimatum game rules in the pairs Player 1**A** / Player 2**C** and Player 1B / Player 2D.

Experimental Design

Split participants into groups of 4. In each group the roles are **Player 1A**, **Player 1B**, **Player 2C**, **Player 2D**.

Stage 1. Player 1A and Player 1B simultaneously choose how much to propose. *This information remains hidden during the whole experiment until the payoffs are shown at the end.*

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Stage 4. Player 2C and Player 2D simultaneously choose the minimum acceptance offer.

Payoff is determined based on the ultimatum game rules in the pairs Player 1**A** / Player 2**C** and Player 1B / Player 2D.

Hypothesis

Player 2**C** systematically chooses a lower minimum acceptance offer than Player 2D.

Direct Test of Hypothesis 0

agree	=	0.8991	+0.0062	×indicator_for_game_3
st.error:		(0.0096)	(0.0136)	
p-value:		[0.0000]	[0.6452]	

- $\text{agree}_i = \mathbf{1}$ (pair i agrees), for all possible pairs.
- The roles are kept the same as they were during the experiment.

agree	=	0.8287	0.0304	×indicator_for_game_3
st.error:		(0.0059)	(0.0083)	
p-value:		[0.0000]	[0.0003]	

- $\text{agree}_i = \mathbf{1}$ (pair i agrees), for all possible pairs.
- Both actual and hypothetical responses are counted.

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