When Fairness is Unfair: Norm Abandonment in Bargaining and Its Implications for Peace Negotiations – Online Appendix

Vinh Pham, Linjia Jiang, and Yoshio Kamijo*

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A Additional notes on data cleanup

There were two instances where additional data cleanup was necessary. One subject felt sick and left the laboratory in the last two bargaining rounds, but returned during the demographic questionnaire and reward delivery. Therefore, the data related to this participant and the matched opponent in these two rounds were excluded. Furthermore, one subject seemed to misunderstand the payoff units and made NDG demands of only 3 yens in the first two periods, but later increased them to 500-1000 in subsequent rounds. Therefore, we filtered out the NDG data for the first two pairs involving this participant.

*Pham: Graduate School of Economics, Waseda University, 169-8050 Tokyo, Japan – email: vpham@toki.waseda.jp – corresponding author; Jiang: Comture Corporation, 141-0032 Tokyo, Japan; Kamijo: Faculty of Political Science and Economics, Waseda University, 169-8050 Tokyo, Japan – email: yoshio.kamijo@waseda.jp.

B Additional tables

Session	Number of subjects	Treatment	Average earnings	Minimum earnings	Maximum earnings
1	22	N	2093	1530	2710
2	22	NC	2264	1560	2950
3	22	N	2651	1840	3840
4	26	UB	2543	1600	3350
5	8	UB	2435	1800	2740
6	14	NC	2657	2220	3560
7	10	NC	2660	1600	3700
8	14	UB	2421	1830	3780

Table B.1: Summary of experimental sessions (earnings in JPY)

	Parameter	Coefficient	SE
1	High vs low contributors in Norm ED	0.277***	(0.065)
2	High vs low contributors in Norm EG	0.009	(0.066)
3	High vs low contributors in Norm PD	-0.584***	(0.064)
4	Holding an extra 100 yen in Norm ED (high contributor)	0.279***	(0.078)
5	Holding an extra 100 yen in Norm EG (high contributor)	-0.007	(0.042)
6	Holding an extra 100 yen in Norm PD (high contributor)	-0.017	(0.053)
7	Holding an extra 100 yen in Norm ED (low contributor)	-0.011	(0.084)
8	Holding an extra 100 yen in Norm EG (low contributor)	-0.104***	(0.040)
9	Holding an extra 100 yen in Norm PD (low contributor)	-0.217***	(0.055)
10	Treatment NC (vs N)	0.194**	(0.092)
11	Treatment UB (vs N)	0.263***	(0.098)
12	Treatment UB (vs NC)	0.069	(0.064)

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$.

Estimates for parameters 1, 2, 3, 10 and 11 are taken from Table 1.

Estimates for parameters 4 and 7 are taken from Table 2.

Estimates for parameters 5 and 8 are taken from Table 2, but with the EG as the base norm.

Estimates for parameters 6 and 9 are taken from Table 2, but with the PD as the base norm.

Estimate for parameter 12 is taken from Table 1's Model (4), but with NC as the base treatment.

Table B.2: Summary of main parameters and estimates for their impact on withdrawal from prearranged allocations

	Linear model			Logistic model		
Variable	Estimate	SE	AME	Estimate	SE	AME
Endowment ($\times$ 100 JPY)	0.103***	(0.027)	-0.053	2.637***	(0.963)	-0.033
Norm EG	0.368***	(0.126)	-0.040	12.021**	(4.882)	-0.049
Norm PD	1.083***	(0.131)	0.104	18.976***	(5.164)	0.130
Endowment $\times$ Norm *EG*	-0.118***	(0.031)		-2.747***	(0.985)	
Endowment $\times$ Norm *PD*	-0.284***	(0.033)		-4.738***	(1.095)	
Treatment *NC* (vs *N*)	0.107*	(0.065)	0.107	1.561**	(0.761)	0.128
Treatment *UB* (vs *N*)	0.159**	(0.068)	0.159	1.784**	(0.768)	0.151
Constant	-0.212**	(0.108)		-15.037***	(5.034)	

$^*p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$. *SE* = standard error. *AME* = average marginal effect.
Both models have 368 observations.

Table B.3: Comparisons of estimates from linear and logistic models on withdrawal from prearranged allocations

C Additional figures

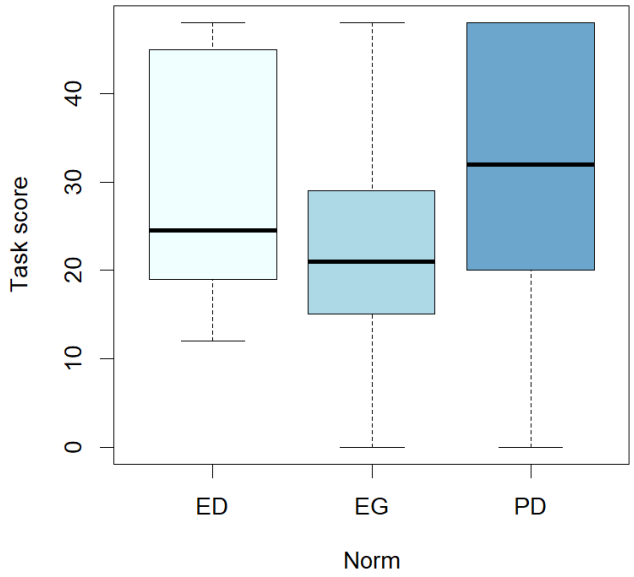
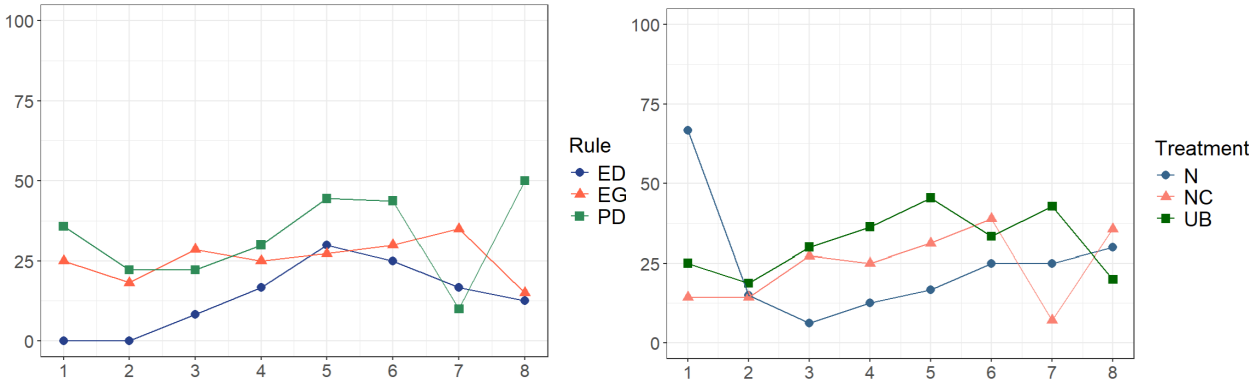


Figure C.1: Scores in the real-effort task by norm group



(a) By norm (b) By treatment

Figure C.2: Percentages of subjects that withdraw from the prearranged allocation across bargaining rounds

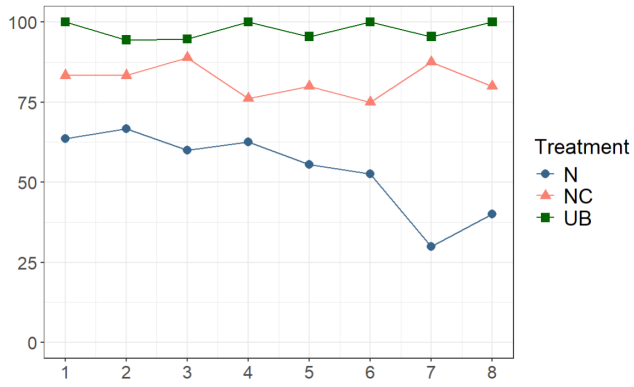
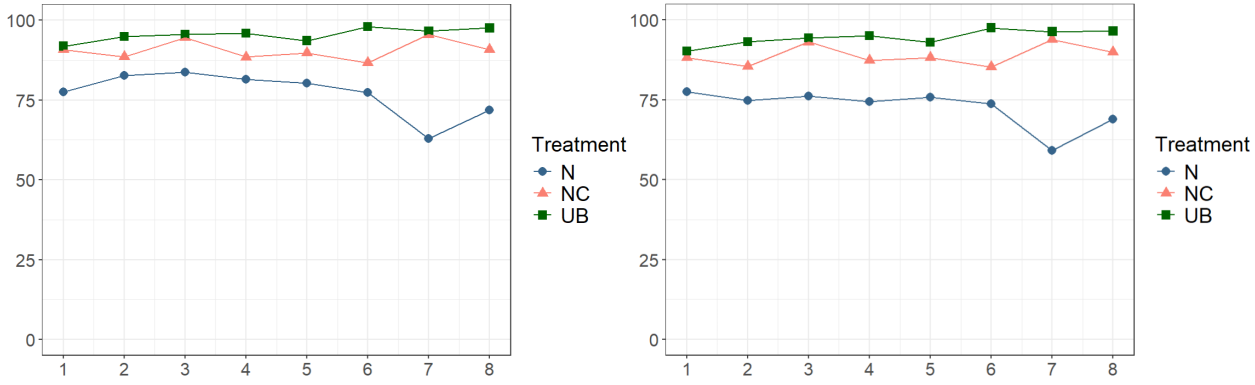


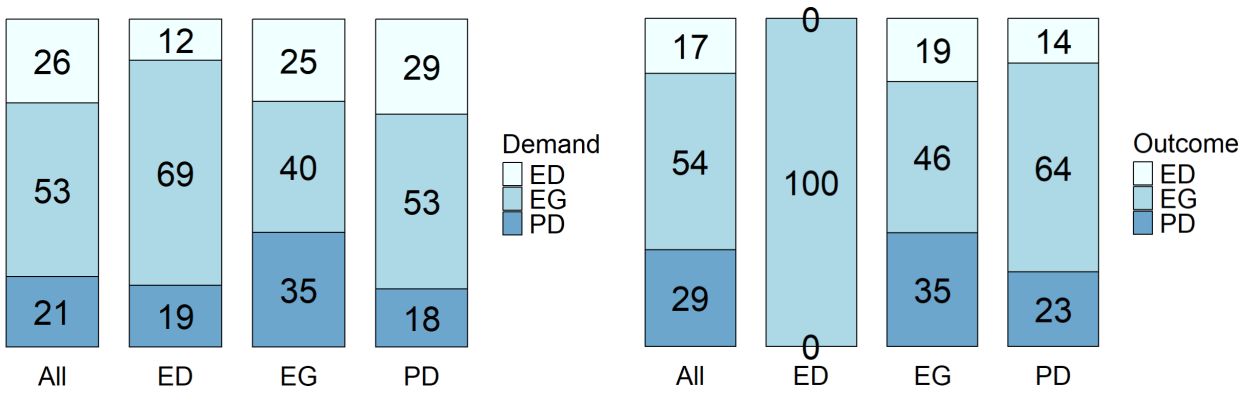
Figure C.3: Percentages of bargaining success by treatment and round



(a) All pairs

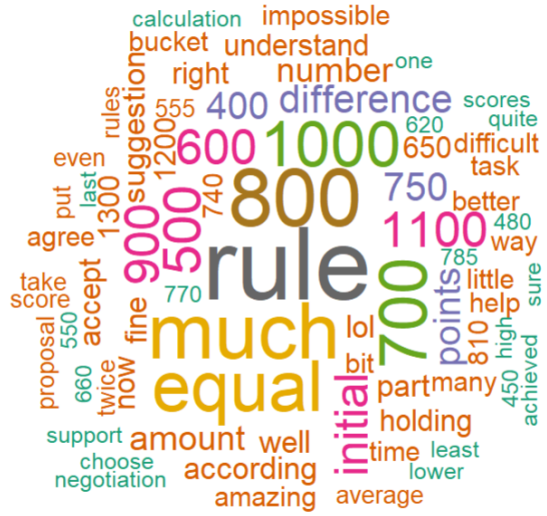
(b) Bargaining pairs only

Figure C.4: Sum of payoffs in each pair as a proportion of the total pie M by treatment and rounds



(a) NDG (b) Unstructured bargaining

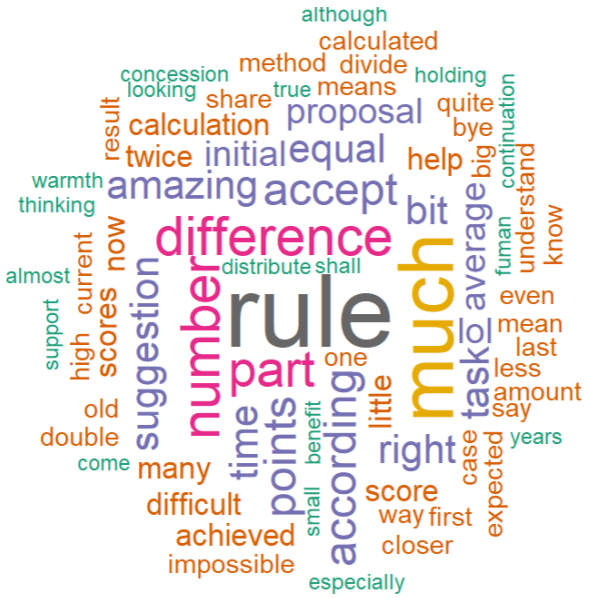
Figure C.5: Percentages of the nearest norm's projections across all subjects (left-most column) and by initial norm (remaining three columns), for pairs sharing the same norm
Note: Analysis is based on individual demands (NDG) and payoffs (unstructured bargaining). To identify the closest norm, we assign a value of 1 to a norm if its projection is closest to a demand or payoff. When it is equally distant between two norms, we assign a value of 1/2 to each norm. In the right panel, only two pairs sharing the *ED* norm engaged in bargaining and both ended up closest to *EG* projections.



(a) All messages

(b) All messages, excluding numbers

(c) Messages in *NC* treatment, excluding numbers



(d) Messages in *UB* treatment, excluding numbers

Figure C.6: Messages exchanged in treatments *NC* and *UB*
Notes: Words of formality, such as *please* and *thanks*, are excluded. The term *equal* also includes *equally*, *equality*, and *half* (when referring to dividing the pie half-half).

D Experimental instructions

The following instructions are translated from the Japanese instructions used in the experiment. The instructions were shown in PowerPoint slides on each subject's computer in the laboratory.

D.1 Part 1: Rule selection and real-effort task

- Cautions
  - Thank you for participating in the experiment today.
  - Please turn off your mobile phone.
  - Please refrain from talking with other participants.
  - Please raise your hand if you have any questions. Our staff will come to assist you.
  - This experiment has a relatively complicated configuration. If you do not understand the explanation initially, reading examples in subsequent slides could help your understanding better.
- Overview of the Experiment
  - This experiment is conducted anonymously. You and other participants will not know each other's personal information.
  - All data will be stored anonymously and processed appropriately.
  - This experiment is scheduled to be completed within an hour and a half, including all processes, such as instructions and reward delivery.
- About rewards obtained from the experiment
  - The final reward is as follows: [Participation fee] + [Randomly selected experimental outcomes in 2 periods].

  - Participation fee is 1,200 yen. You can receive this amount of participation fee regardless of the results of the experiment.
  - Rewards from randomly selected experimental outcomes in two different rounds are determined by your and other participants' decisions in Stage 3.
  - Throughout the experiment, you will earn points, which are the currency unit during the experiment
  - The points you earn will be converted to yen at the end of the experiment and paid in cash.
  - One point during the experiment is equivalent to 1 yen.

- Experimental stages
  - There are three stages in this experiment.
  - In Stage 1, you will be shown 3 allocation rules for payoffs. You need to select your preferred rule.
  - In Stage 2, you will perform a task. Your result in this task will influence your condition in Stage 3.
  - In Stage 3, there will be 8 periods. In each period, you will be randomly matched with another participant. The two of you need to jointly decide how to allocate your reward points between each other.
  - Stages 1 and 2 are conducted in Part 1 of the experiment, and Stage 3 is conducted in Part 2 of the experiment.

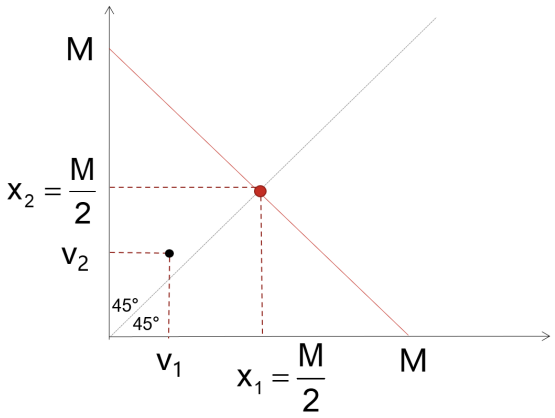
- Explanation of Stage 1
  - In Stage 1, you will be asked to choose one of the rules to allocate common resources between you and a matched participant in Stage 3.

  - However, just your selection of a particular rule does not automatically enforce it.
  - **Please note: Your choice may significantly affect your earnings in Stage 3 and your final payoffs. Choose the rule that you think is closest to your preference.**

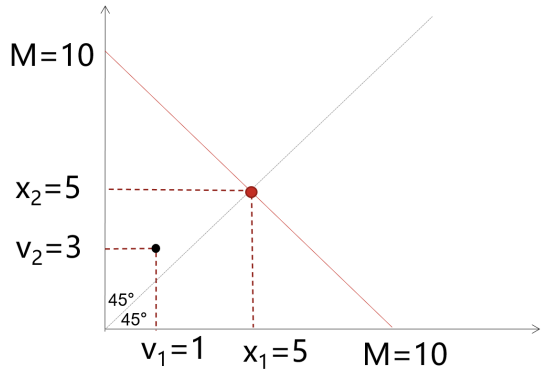
- Preview of Stage 2
  - In order for you to correctly understand the allocation rules of Stage 1, we will outline the tasks in Stage 2.
  - In Stage 2, you will be asked to perform a certain task, and your performance will impact the initial amount you hold in Stage 3.
  - The better your performance in Stage 2, the higher your initial holdings in Stage 3.

- Preview of Stage 3
  - Next, we will provide an overview of joint investment and reward allocation in Stage 3 in order for you to correctly understand the allocation rules of Stage 1.
  - In Stage 3, the following process is repeated in 8 different rounds.
  - You are randomly paired with another participant (referred to as "the other participant" in the following texts).
  - You and the other participant starts with an initial amount of holdings (determined by the performance in Stage 2).
  - Within each pair, the initial holdings are jointly invested in a shared pot. You and the other participant must decide how to divide the joint investment outcome.
  - If you and the other participant are unable to agree on an allocation, the joint investment will not be carried out and the initial holdings will be your payoffs.

- Definition of main factors
  - Following are details of the initial holdings and joint investment outcome in Stage 3.
  - v_1, v_2: The amount of points initially held by Participant 1 or Participant 2. The participant with a lower score in Stage 2 can randomly receive an initial holding of 100, 200, or 300. The participant with a lower score in Stage 2 can randomly receive an initial holding of 400, 500, or 600.
  - M: The value of the joint investment outcome. To earn the joint investment outcome, both participants in each pair need to invest all of the initial holdings v_1, v_2. The value of M is the sum of the initial holdings multiplied by α, which indicates the return on investment. In other words, $M = \alpha(v_1 + v_2)$.
  - α is in the range from 1.1 to 4. The computer randomly determines α, so that the value of M is between 1000 and 2000.
  - If the participants in each pair cannot agree on how to distribute the joint outcome, then M will not be realized. Each participant then will receive only their initial holdings.
  - x_1, x_2: The number of points Participant 1 and Participant 2 will receive when the two reach an agreement to divide the investment outcome.
- Stage 1: Allocation Rule 1
  - Each participant will get exactly half of the total number of points M.
  - Thus, $x_1 = \frac{M}{2}, x_2 = \frac{M}{2}$
  - In this rule, v_1, v_2 will not impact your payoffs.
  - Graphically, this rule is explained as below. The red dot in the figure is the payoff combination of the two participants.



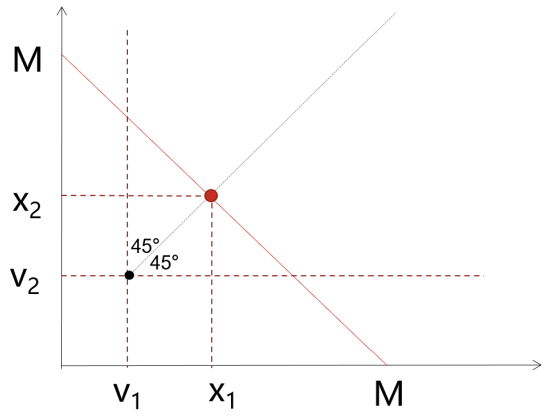
– Example $M = 10, v_1 = 1, v_2 = 3$. Therefore, $x_1 = x_2 = \frac{10}{2} = 5$. Each participant earns exactly half of the total number of points M, regardless of the initial holdings v_1, v_2.



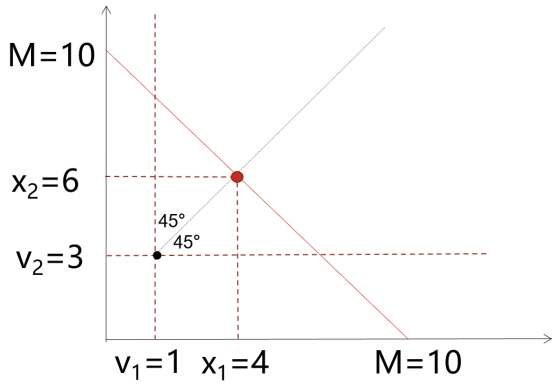
- Stage 1: Allocation Rule 2
  - This rule considers that v_1 already belongs to participant 1 and v_2 already belongs to participant 2, because these values are guaranteed even when no agreement is reached.
  - Therefore, the pure gain is $M - v_1 - v_2$. This value is called the "shared surplus."
  - In Rule 2, this surplus is distributed equally.
  - As a result, each participant will receive half of the surplus plus the corresponding payoff v when no agreement is reached.

– Thus: $x_1 = \frac{M-v_1-v_2}{2} + v_1, x_2 = \frac{M-v_1-v_2}{2} + v_2$.

– Graphically, this rule is explained as below. The red dot in the figure is the payoff combination of the two participants.



– Example $M = 10, v_1 = 1, v_2 = 3$. Therefore, $x_1 = \frac{10-1-3}{2} + 1 = 3 + 1 = 4, x_2 = \frac{10-1-3}{2} + 3 = 3 + 3 = 6$. Each participant earns exactly half of the joint surplus (3 each), in addition to the initial holdings $v_1 = 1, v_2 = 3$.

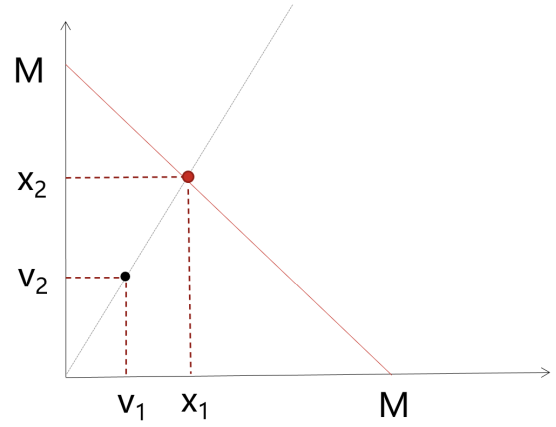


- Stage 1: Allocation Rule 3

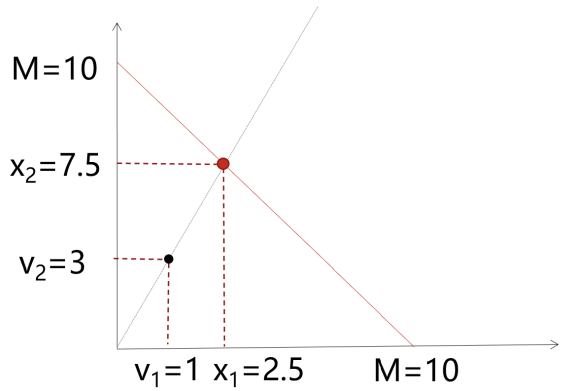
– Rule 3 divides M in proportion to the initial holdings. Therefore, $x_1 = \frac{v_1}{v_1+v_2}M, x_2 = \frac{v_2}{v_1+v_2}M$.

– As explained earlier, the value of M is the sum of the initial holdings multiplied by α, which indicates the return on investment. $M = \alpha(v_1 + v_2)$. Therefore:

- $x_1 = \frac{v_1}{v_1+v_2}M = \frac{v_1}{v_1+v_2}\alpha(v_1+v_2) = \alpha v_1$
- $x_2 = \frac{v_2}{v_1+v_2}M = \frac{v_2}{v_1+v_2}\alpha(v_1+v_2) = \alpha v_2$
- In other words, each participant earns α times their initial holdings.
- Graphically, this rule is explained as below. The red dot in the figure is the payoff combination of the two participants.



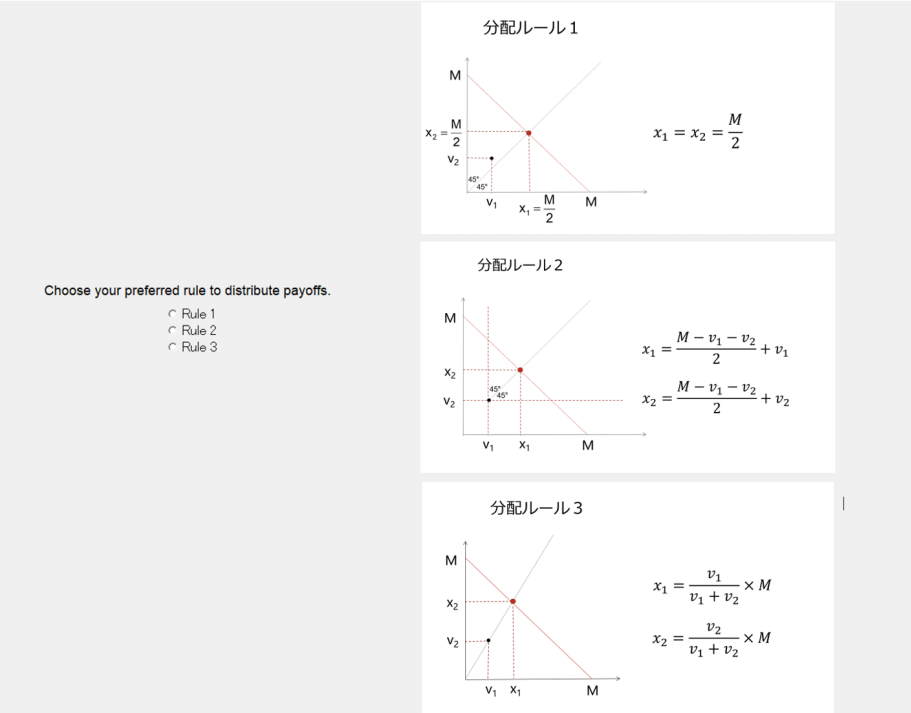
- Example $M = 10, v_1 = 1, v_2 = 3$. Therefore, $x_1 = \frac{1}{1+3}10 = 2.5, x_2 = \frac{3}{1+3}10 = 7.5$. Each participant earns a part of M that is proportional to their initial holding.



- Summary of examples
  - When the total number of points $M = 10$ and the initial holdings $v_1 = 1, v_2 = 3$:
  - If Rule 1 is selected, the points awarded to two participants are $x_1 = x_2 = \frac{10}{2} = 5$.
  - If Rule 2 is selected, the points awarded to the two participants are $x_1 = 4, x_2 = 6$.

– If Rule 3 is selected, the points awarded to two participants are $x_1 = 2.5, x_2 = 7.5$.

- Sample screen of Stage 1



- Overview of Stage 2

  – In Stage 2, you will perform a task. There are 48 sliders. Each slider has a scale from 0 to 100.

  – You need to use the mouse and mark as many sliders as possible at the 50 position.

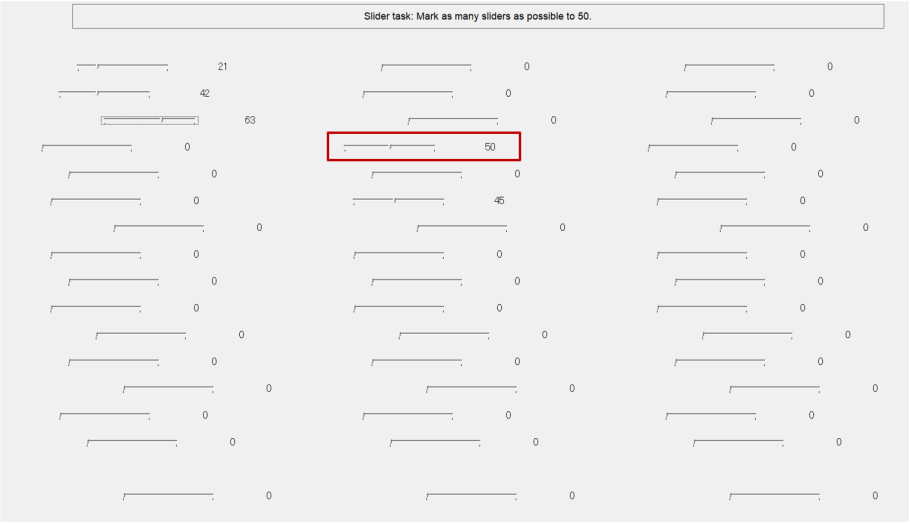
  – This stage begins with a 30-second practice round.

  – After the practice round, the actual task begins. The time limit for the actual round is 3 minutes.

  – **Please note: The score in Stage 2 is closely related to your initial holdings in Stage 3. Performance can affect your final payoffs, so please do your task carefully**.

- Sample screenshot of Stage 2

– To earn points, you need to move the slider to the 50 position, as in the slider highlighted within the red box below.



D.2 Quiz 1

This quiz tests your understanding. Please answer the following questions in the designated spaces. Please stick the yellow magnet on the side of the partition when you finish answering the questions.

Notions used in the following questions:

- M: the value of the joint investment outcome
- α: the return on investment, in the range from 1.1 to 4
- v: the number of points a participant receives if no agreement is reached
- x: the number of points a participant receives if an agreement is reached

1. How is M determined?

A. $\alpha(v_1 + v_2)$

B. $\alpha + (v_1 + v_2)$

2. Recall the rules to calculate x_1 and x_2:

- Rule 1: $x_1 = \frac{M}{2}, x_2 = \frac{M}{2}$
- Rule 2: $x_1 = \frac{M-v_1-v_2}{2} + v_1, x_2 = \frac{M-v_1-v_2}{2} + v_2$
- Rule 3: $x_1 = \frac{v_1}{v_1+v_2}M, x_2 = \frac{v_2}{v_1+v_2}M$

We know that $M = 18, v_1 = 2, v_2 = 4$:

- If you choose Rule 1, determine x_1 and x_2:
- If you choose Rule 2, determine x_1 and x_2:
- If you choose Rule 3, determine x_1 and x_2:

D.3 Part 2: Payoff allocation

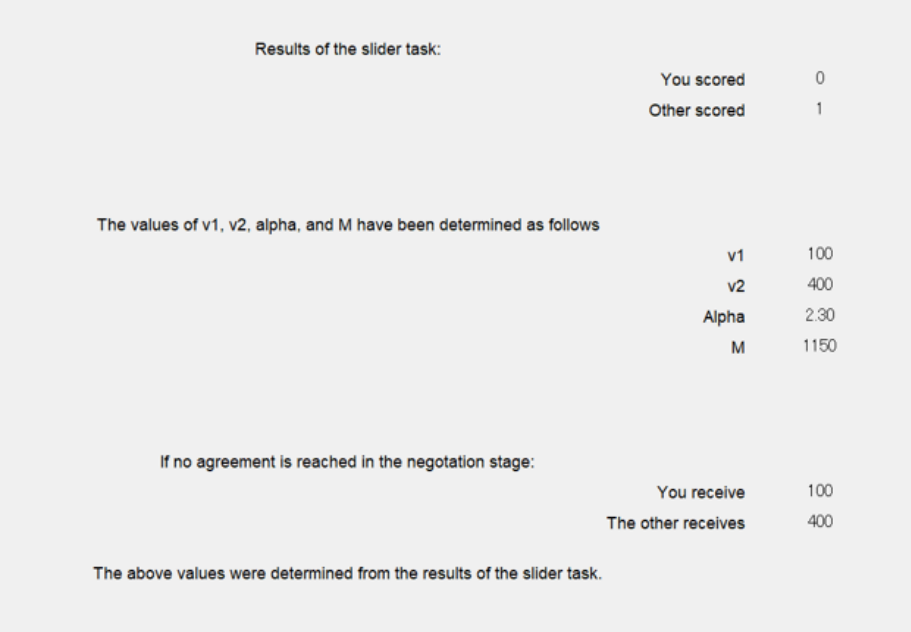
- Overview of Stage 3
  - Stage 3 has 8 rounds.
  - For each round, you will be randomly matched another participant (referred to as *the other participant* in the following texts).
  - For each round, you and the other participant will decide how to divide M, the joint investment outcome.
  - Each round of Stage 3 is divided into four parts.
  - Part A. The initial holding points of you and the other participant (v_1, v_2), the return on investment α and the joint investment outcome M are determined.
  - Part B. The screen displays the allocation rules that you and the other participant have selected in Stage 1.
  - Part C. You and the other participant decide whether or not to follow the preselected rules (only if the same rule is selected).

- Part D. You and the other participant will negotiate to divide the investment outcome between each other (if different rules are chosen in Stage 1, or if you or the other participant decides not to follow the rule in Part C).
- Each part is described in more detail on the next pages.

- Stage 3 - Part A
  - The initial holdings of you and the other participant (v_1, v_2), the return on investment α and the joint investment outcome M are shown.
  - As mentioned earlier, these values are determined as follows:
  - v_1, v_2: The amount of points initially held by Participant 1 or Participant 2. The participant with a lower score in Stage 2 can randomly receive an initial holding of 100, 200, or 300. The participant with a higher score in Stage 2 can randomly receive an initial holding of 400, 500, or 600.
  - M: The value of the joint investment outcome. To earn the joint investment outcome, both participants in each pair need to invest all of the initial holdings v_1, v_2. The value of M is the sum of the initial holdings multiplied by α, which indicates the return on investment. In other words, $M = \alpha(v_1 + v_2)$.
  - α is in the range from 1.1 to 4. The computer randomly determines α, so that the value of M is between 1000 and 2000.
  - If negotiation fails, you and the other participant will only receive the initial holdings.
  - The order is always $v_2 > v_1$, and the value is determined by the scores of both participants in the task in Stage 2.
  - The participant with the higher score earns higher points (v_2), and the participant with the lower score earns lower points (v_1).

  - However, if you and the other participant get the same score, you and the other will be randomly assigned to v_1, v_2.

- Sample screenshot of Stage 3 - Part A



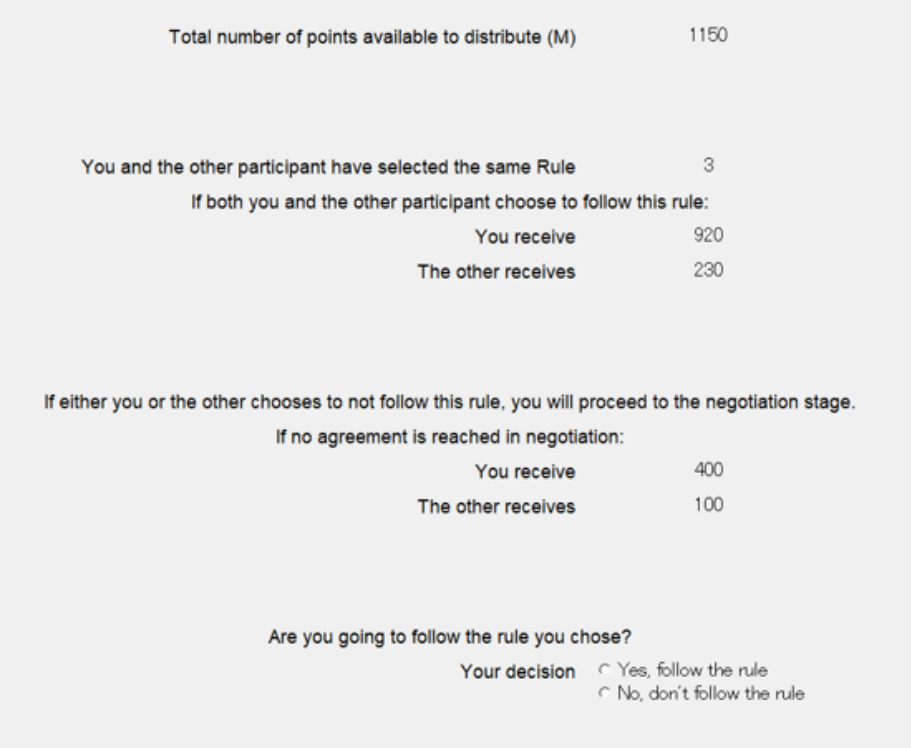
- Stage 3 - Part B
  - The allocation rules that you and the other participant have chosen in Stage 1 are announced.
  - If the rules match, you and the other participant proceed to Part C.
  - If the rules do not match, you and the other participant skip Part C and proceed to Part D.

- Stage 3 - Part C
  - If you and the other participant have chosen the same allocation rule, both of you will be asked whether to follow the selected rule.
  - If both agree to follow the rule, you and the other participant will earn payoff points determined by the chosen allocation rule. In this case, an agreement is

reached, and Part D is skipped.

  - If either participant chooses not to follow the rule, you and the other participant will proceed to Part D.

- Sample screenshot of Stage 3 - Part C



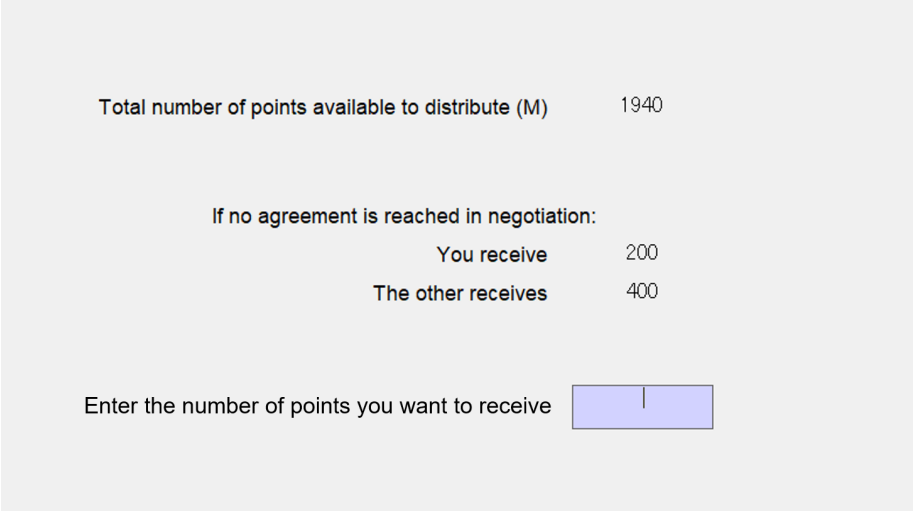
- Stage 3 - Part D (only shown in N treatment)

  - In the negotiation phase, you must make a demand for your payoff points. At the same time, the other participant makes the demand for their payoff points.

  - If the sum of the points demanded by you and the other participant is less than or equal to M, the negotiation is successful and you earn the points you demand.

  - If the sum of points demanded by you and the other participant is greater than M, the negotiation fails and you receive the initial holdings of v assigned to you.

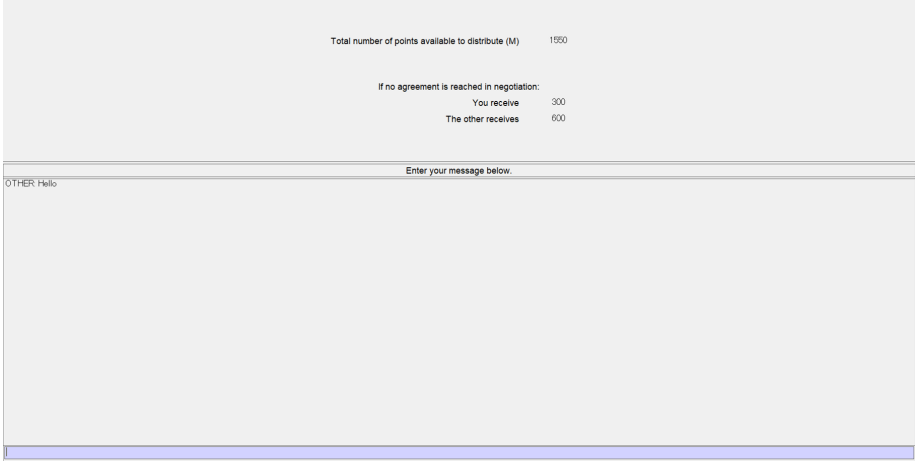
  - A sample screenshot is below.



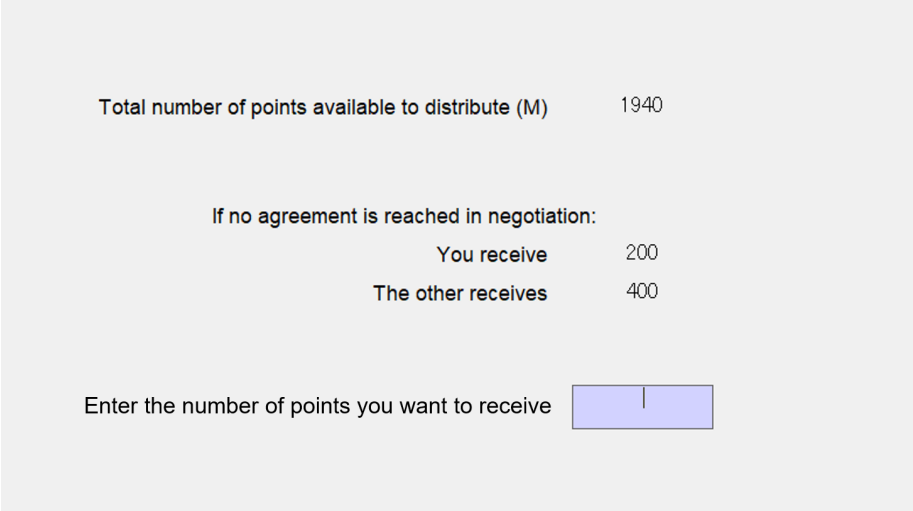
- Example 1:
  - $M = 10, v_1 = 1, v_2 = 3$, you are Participant 1.
  - If no agreement is reached, you receive v_1 and the other participant receives v_2.
  - Number of points you demand: 5
  - Number of points the other participant demands: 4
  - Negotiation is successful $(5 + 4 < 10)$.
  - Number of points you receive: 5
  - Number of points the other participant receives: 4
- Example 2:
  - $M = 10, v_1 = 1, v_2 = 3$, you are Participant 1.
  - If no agreement is reached, you receive v_1 and the other participant receives v_2.
  - Number of points you demand: 5
  - Number of points the other participant demands: 6

    - Negotiation fails ($5 + 6 > 10$).
    - Number of points you receive: 1
    - Number of points the other participant receives: 3

- Stage 3 - Part D (only shown in *NC* treatment)
  - In the negotiation phase, you must make a demand for your payoff points. At the same time, the other participant makes the demand for their payoff points.
  - If the sum of the points demanded by you and the other participant is less than or equal to M, the negotiation is successful and you earn the points you demand.
  - If the sum of points demanded by you and the other participant is greater than M, the negotiation fails and you receive the initial holdings of v assigned to you.
  - Before you and the other participants make demands, the two of you can communicate with each other in the chat screen. The chat screen will disappear after 1 minute. A sample screenshot is below.



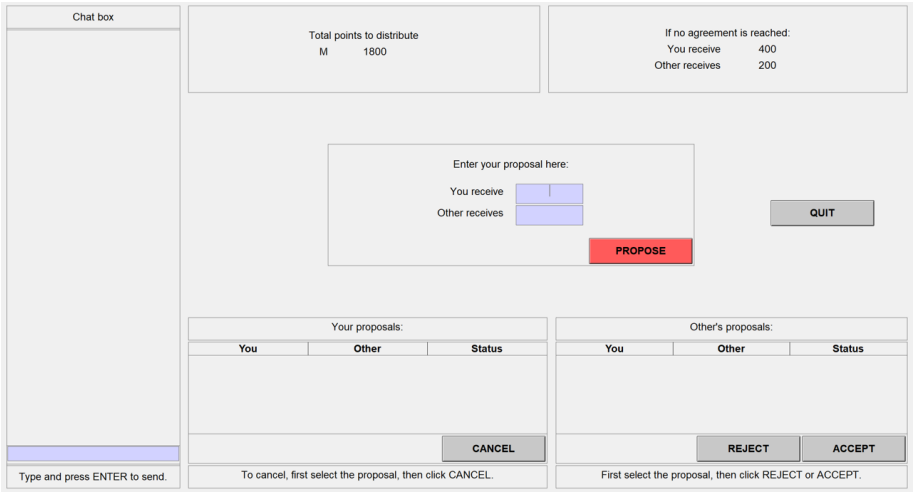
  - Afterwards, you will see a screen like the one below, where you make your demand.



- Example 1:
  - $M = 10, v_1 = 1, v_2 = 3$, you are Participant 1.
  - If no agreement is reached, you receive v_1 and the other participant receives v_2.
  - Number of points you demand: 5
  - Number of points the other participant demands: 4
  - Negotiation is successful $(5 + 4 < 10)$.
  - Number of points you receive: 5
  - Number of points the other participant receives: 4
- Example 2:
  - $M = 10, v_1 = 1, v_2 = 3$, you are Participant 1.
  - If no agreement is reached, you receive v_1 and the other participant receives v_2.
  - Number of points you demand: 5
  - Number of points the other participant demands: 6

    - Negotiation fails ($5 + 6 > 10$).
    - Number of points you receive: 1
    - Number of points the other participant receives: 3

- Stage 3 - Part D (only shown in *UB* treatment)
  - If you reach Part D, you and the other participant will see the following screen:



  - During the negotiation, you can freely communicate with the other participant in the chat box (left-hand side). You can send a message by typing the texts and pressing ENTER.
  - On top of the screen, you can see the following information (identical to the previous screen): total number of points to be distributed, initial holdings of you and the other opponent (payoffs when negotiation fails).
  - In the center of the screen, you and the other participant can propose an allocation of payoff points. To make a proposal, type a valid number (from 0 to the value of M) in the box and click PROPOSE.
  - At the bottom left of the screen, you can see all the proposals you have sent to the other participant. To cancel a proposal, click on it then press CANCEL. Once a proposal is canceled, it cannot be reverted to an active proposal.

– At the bottom right of the screen, you can see all proposals the other participant has sent you.

  * To reject a proposal, click on it then press REJECT.

  * To accept a proposal, click on it then press ACCEPT.

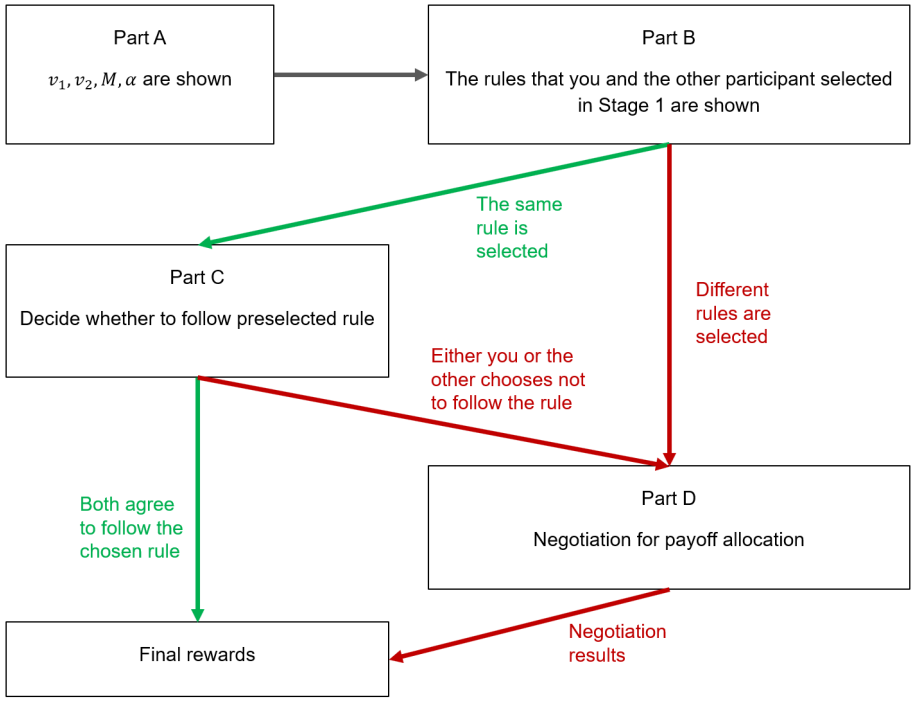
  * Acceptance or rejection of a proposal cannot be reverted.

– When either you or the other participant accepts a proposal, an agreement is reached. Your earning for the round is according to the agreed allocation.

– You can click QUIT to end the negotiation early. By doing so, you and the other participant will receive the initial holdings v_1, v_2 for the round.

– If you have not reached an agreement when the clock on top of the screen runs out (3 minutes total), you and the other participant will receive the initial holdings v_1, v_2 for the round.

- Summary of Stage 3 - Part D



D.4 Quiz 2

This quiz tests your understanding. Please answer the following questions in the designated spaces. Please stick the yellow magnet on the side of the partition when you finish answering the questions.

1. (Shown in Treatments N and NC) Fill in the blank

As a reminder:

- M: the value of the joint investment outcome
- v: the number of points a participant receives if no agreement is reached

We know that $M = 18, v_1 = 3, v_2 = 4$.You are Participant 1 and the other is Participant 2. In the demand screen:

- If you demand 6 for yourself and the other participant demands 8 for themselves, you will get _____ points, the other participant will get _____ points.
- If you demand 8 for yourself and the other participant demands 10 for themselves, you will get _____ points, the other participant will get _____ points.
- If you demand 9 for yourself and the other participant demands 10 for themselves, you will get _____ points, the other participant will get _____ points.

1. (Shown in Treatment UB) If you see the screen below in negotiation, which of the following proposals are valid?

- Proposal 1: You = 200, Other = 400
- Proposal 2: You = 2500, Other = 0
- Proposal 3: You = 1200, Other = 800
- Proposal 4: You = 1000, Other = 1001

A. Proposals 1 and 3

B. Proposals 1 and 4

C. Proposals 2 and 3

2. True / False: If you score higher than the other participant in Stage 2, you will get a higher payoff if no agreement is reached in Stage 3.