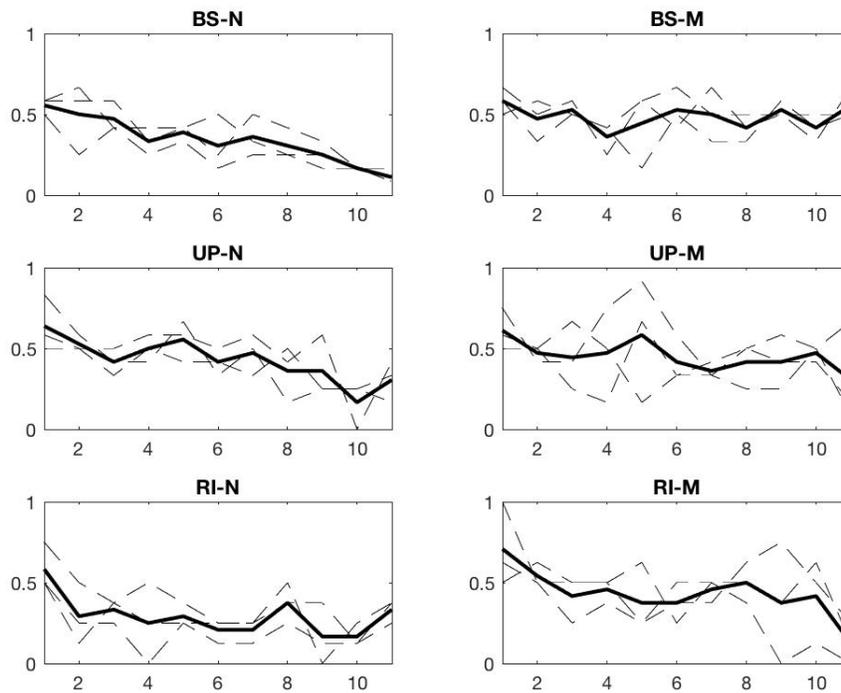


Online Appendix - Individual Results

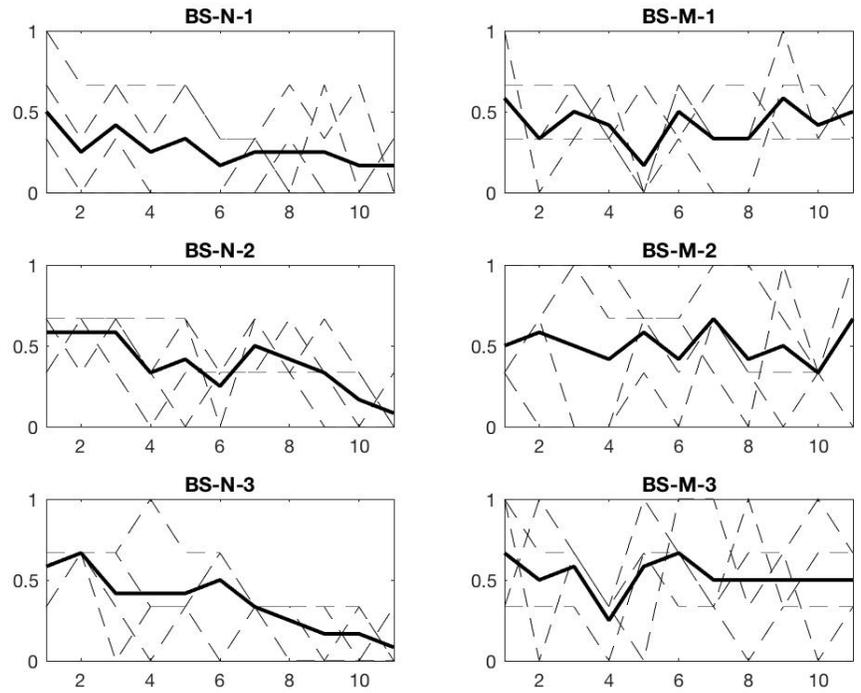
Below we show individual group and session results in addition to the treatment average. Figure 1 shows that session averages track treatment averages closely. So different sessions in the treatment have similar results. Figures 2, 3, and 4, on the other hand, show big variances in group averages. This is not surprising given that there are only 3 subjects that produce per period in BS and UP treatments, and 2 subjects in RI treatments. Thus, different groups often have very different results in a particular period.

Figure 1: Treatments and Sessions Average Production Rates



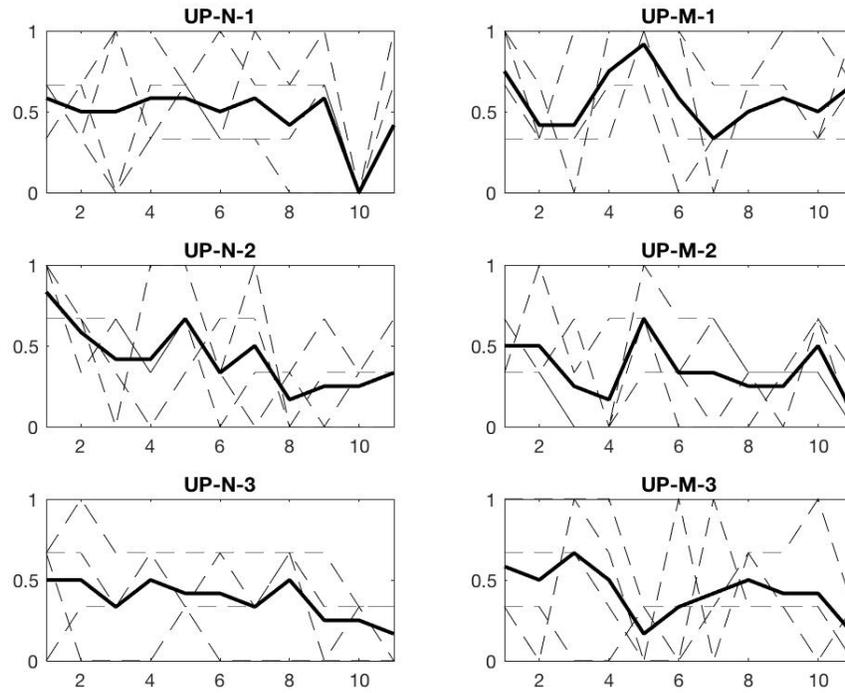
Note: Treatments averages are solid lines, while sessions averages are dashed lines.

Figure 2: Sessions and Groups Average Production Rates in Baseline Treatments



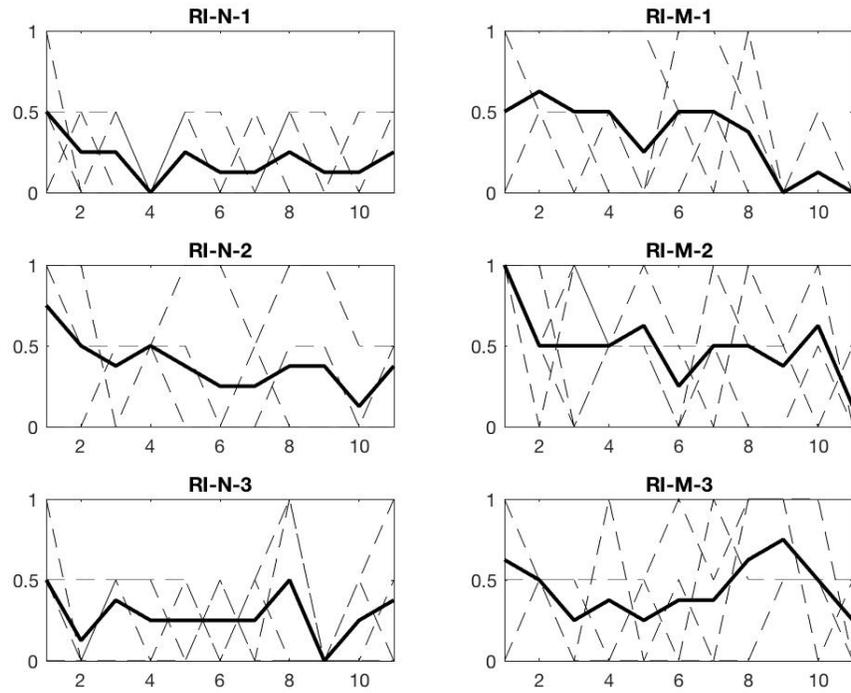
Note: Sessions averages are solid lines, while group averages are dashed lines.

Figure 3: Sessions and Groups Average Production Rates in Uncertain Position Treatments



Note: Sessions averages are solid lines, while group averages are dashed lines.

Figure 4: Sessions and Groups Average Production Rates in Role Identification Treatments



Note: Sessions averages are solid lines, while group averages are dashed lines.

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1. Period Structure: At the beginning of each period, the participants in your group will be randomly ordered 1st through 4th in sequence. Periods will consist of three *stages*. Following the third stage the period ends, earnings are calculated and the next period begins.

2. Production Decision: In each stage the 2nd, 3rd, or 4th player makes a production decision for the player that precedes her in sequence. In stage 1, for example, the 2nd player decides whether or not to produce a unit for the 1st player, etc. The 1st player in sequence makes no production decision.

3. Earnings: If a producer decides to produce a unit, it costs her 1 point. The preceding player, who consumes the unit, earns 3 points. For example, if in stage 2, the 3rd player decides to produce, she incurs a cost of 1 point, and the 2nd player earns 3 points by consuming the good. If 3rd player decides to not produce, she incurs a cost of 0 points, and 2nd player earns 0 points from consumption.

4. Some observations:

a) The 1st player in sequence makes no production decision and will know that she is first in sequence.

b) 2nd, 3rd, and 4th players will not know their positions in sequence when they make production decisions.

c) The 4th (last) player in sequence will have no opportunity to consume a good produced by a subsequent player.

d) Each period players have a 1/4 chance of being 1st, 2nd, 3rd, or 4th.

e) In the first part of the session your point earnings from all periods will be summed. The sum will be converted to cash at a rate of \$1 per point. You will earn this in addition to your \$6 appearance fee.

5. Screen Displays and the Sequence of Decisions. Figure 1 illustrates the screen for a participant *b3* at the beginning of period 2. The player is presented with the earnings for possible combinations of own production and consumption decisions. If the player is the 1st in sequence she will see only the first two lines because she does not produce.

| | | | |
|---|-----------------------|-----|--|
| Player | <i>b3</i> | | |
| Period | 2 | | |
| Earnings Possibilities | | | |
| If you consume but don't produce | | | 3 points |
| If you consume and produce | | | 2 points |
| If you don't consume and don't produce | | | 0 points |
| If you don't consume but produce | | | -1 point |
| Note: The 4th player in sequence CANNOT Consume | | | |
| Decisions | | | |
| Produce? | <input type="radio"/> | Yes | |
| | <input type="radio"/> | No | <input type="button" value="Confirm"/> |

Figure 1. Screen Display at the Beginning of a Period.

Player *b3* must decide whether or not to produce. To make a decision she must click on the radio dial to the left of the ‘Yes’ or ‘No’ headings. Once the player is comfortable with her decision, she clicks ‘confirm’. If the player is the 1st in sequence she will not see production decision at the bottom of the screen.

After all players have completed decisions for the period, results are tabulated and illustrated. Figure 2 illustrates results for a period where *b3* turned out to have been 3rd in sequence.

| | | |
|---|---|---------------------------------------|
| Order in Sequence | <input type="text" value="3<sup>rd</sup>"/> | |
| Actions | | Earnings |
| 1) Your action | Produce | -1 point |
| 2) Next Player's action | Produce | 3 points |
| This Period Earnings | | <input type="text" value="2 points"/> |
| Cumulative Earnings | | <input type="text" value="4 points"/> |
| <input type="button" value="Continue"/> | | |

Figure 2. Display of Period Results.

In this period, *b3* chose to produce a unit. Subsequently, the 4th player also chose to produce a unit that provides consumption to the 3rd. As a consequence, player *b3* earned 2 points for the period. The bottom portion of a player’s screen displays period and cumulative earnings. Once the player has reviewed earnings she should press ‘continue’.

Questionnaire

Prior to beginning please complete the following questionnaire.

1. Suppose in period 2 you are paired with three other players. In period 3 will you be paired with the same or different players?
2. Suppose in period 3 you were the 3rd in sequence. In period 4 will you be the 3rd in sequence again? What about other players, will they keep their order in sequence?
3. When you make a production decision, do you know your order in the sequence? What do you know about production decisions of other players?
4. In any period what is the chance that you are the 2nd or 3rd player in sequence?
5. If you are 2nd or 3rd, what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount?
6. In any period what is the chance that you are the 1st or 4th player in sequence?
7. If you are 1st in a sequence, what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount?
8. If you are 4th in a sequence, what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount?

Any questions?

Final Period

Overview: In this 11th and final period you will make production and consumption decisions as before with the following two differences

1. *New groups.* Until this moment, you have been paired with a constant group of four players. Now we will place you in a new group. Your new group will consist of people who have never been paired together.
2. *Increased Earnings.* We will *triple* the value of consumption and the cost of production. If a consumption unit is produced for you, you will earn 9 points. If you produce a unit for someone else, it will cost you 3 points.

Following this last period the session will end. The points that you earn in this final period will be converted to U.S. dollars at the rate \$1 per point. These earnings will be added to your appearance fee and your earnings from the first portion of this session.

Any questions?

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1. Period Structure: At the beginning of each period, the participants in your group will be randomly ordered 1st through 4th in sequence. Periods will consist of three *stages*. Following the third stage the period ends, earnings are calculated and the next period begins.

2. Production Decisions: In stages 1 and 2, a player makes a production decision for the player that precedes her in sequence. In stage 1, for example, the 2nd player decides whether or not to produce a unit for the 1st player. The 1st player in sequence makes no production decision.

3. Consumption Allocation Decisions: In the final stage 3, the 3rd and 4th players in sequence are each endowed with a unit and simultaneously decide whether to 'push' the unit to the other player or 'pull' it toward themselves.

4. Earnings: In stages 1 and 2, if a producer decides to produce a unit, it costs her 1 point. The preceding player, who consumes the unit, earns 3 points. For example, if in stage 2, the 3rd player decides to produce she incurs a cost of 1 point and the 2nd player earns 3 points by consuming the good. If 3rd player decides to not produce, she incurs a cost of 0 points, and 2nd player earns 0 points from consumption.

In the final stage the 3rd and 4th players simultaneously decide to either 'push' an existing unit to the other, or 'pull' it to themselves. If they both 'push' each player earns 1.5 points. If one 'pushes' and the other 'pulls', the 'pull' player earns 3 points, while the 'push' player earns 0 points. If they both 'pull' they each lose 0.5 points.

5. Some observations:

- a) The 1st player in sequence makes no production decisions.
- b) The 3rd player in sequence will make a production decision, but will have no opportunity to consume a good produced by another player.
- c) The 4th player in sequence will make no production decision. Rather, the 3rd and 4th players make a consumption allocation decision simultaneously.
- d) Each period players have a 1/4 chance of being 1st, 2nd, 3rd, or 4th.
- e) In the first part of this session your point earnings from all periods will be summed. The sum will be converted to cash at a rate of \$1 per point. You will earn this in addition to your \$10 appearance fee.

6. Screen Displays and the Sequence of Decisions. Figure 1 illustrates the screen for a participant *b3* at the beginning of period 2. The player is presented with the earnings for possible combinations of own production and consumption decisions. Notice that in this period player *b3* is 2nd in sequence.

| | | | |
|--|-----------------------|-----------------|---------|
| Player | <i>b3</i> | | |
| Period 2 | Order in Sequence: | 2 nd | |
| Earnings Possibilities (points) | | | |
| If you consume but don't produce | | | 3 |
| If you consume and produce | | | 2 |
| If you don't consume and don't produce | | | 0 |
| If you don't consume but produce | | | -1 |
| Notes: The 1th payer CANNOT produce | | | |
| Decisions | | | |
| Produce? | <input type="radio"/> | Yes | Confirm |
| | <input type="radio"/> | No | |

Figure 1. Screen Display for a 2nd Player in Sequence.

Player *b3* must decide whether or not to produce. To make a decision she must click on the radio dial to the left of the ‘Yes’ or ‘No’ headings. Once the player is comfortable with her decision, she clicks ‘confirm’ to continue.

The screen display is different for the 3rd and 4th players in sequence. Figure 2 illustrates the screen for a participant *b3* when she is the 3rd player in sequence.

| | | | | | |
|---|-----------------------|-----|------------------|----------------|------|
| Player | <i>b3</i> | | Time remaining | 20 Seconds | |
| Period 2 | Order in Sequence | 3rd | | | |
| Earnings Possibilities from Production | | | Other | | |
| | | | Push Pull | | |
| Don't Produce | 0 points | | You | Push Pull | |
| Produce | -1 point | | | 1.5 | 3 |
| | | | | 1.5 | 0 |
| | | | | 0 | -0.5 |
| | | | 3 | -0.5 | |
| Decisions | | | Push Pull | | |
| Produce? | <input type="radio"/> | Yes | Confirm | | |
| | <input type="radio"/> | No | | | |

Figure 2. Screen Display for the 3rd Player in Sequence.

Player *b3* must decide whether to produce or not. Also, she must choose to either ‘push’ an existing unit to the 4th player in sequence, or ‘pull’ it toward herself. Once the player is comfortable with her decision, she clicks ‘confirm’ to continue. The 4th player in sequence will be presented with only the right side of the screen shown in Figure 2.

This player makes no production decision, and decides only whether to ‘push’ a unit to the 4th player in sequence or ‘pull’ it toward herself.

After all players have completed decisions for the period, results are tabulated and illustrated. Figure 3 illustrates results for a period where *b3* was 2nd in sequence.

| Order in Sequence: 2 nd | | Earnings (points) |
|---|---------|-------------------|
| Actions | | |
| 1) Your action | Produce | -1.0 |
| 2) Next Player's action | Produce | 3.0 |
| This Period Earnings | | 2.0 |
| Cumulative Earnings | | 4.0 |
| <input type="button" value="Continue"/> | | |

Figure 3. Display of Period Results for a 2nd Player in Sequence

In this period, *b3* chose to produce a unit. Subsequently, the 3rd player also chose to produce a unit that provides consumption to the 2nd player. As a consequence, player *b3* earned 2 points for the period. Earnings results for the 1st player will look the same, except that the 1st player makes no production decision. The bottom portion of a player’s screen displays period and cumulative earnings. Once the player has reviewed earnings she should press ‘continue’.

Figure 4 illustrates results for a period where *b3* was 3rd in sequence.

| Order in Sequence: 3 rd | | Earnings (points) |
|---|---------|-------------------|
| Actions | | |
| 1) Production Decision | Produce | -1.0 |
| 2) Push or Pull | Pull | |
| 3) Other player | Push | 3.0 |
| This Period Earnings | | 2.0 |
| Cumulative Earnings | | 4.0 |
| <input type="button" value="Continue"/> | | |

Figure 4. Display of Period Results for a 3rd Player in Sequence.

In this period, *b3* chose to produce a unit and chose ‘pull’ in the ‘push-pull’ game, while the 4th player ‘pushed.’ So *b3* incurred a cost of 1 point from producing and earned 3 points from the ‘push-pull’ game. On net then player *b3* earned 2 points for the period. Earnings results for the 4th player will look the same, except that the 4th player makes no production decision.

Questionnaire

Prior to beginning please complete the following questionnaire.

1. Suppose in period 2 you are paired with three other players. In period 3 will you be paired with the same or different players?
2. Suppose in period 3 you were the 3rd in sequence. In period 4 will you be the 3rd in sequence again? What about other players, will they keep their order in sequence?
3. In any period what is the chance that you are the 1st player in sequence?
4. If you are 1st in a sequence, what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount? How can earnings for the 1st player differ from those for the 2nd?
5. In any period what is the chance that you are the 2nd or 3rd player in sequence?
6. If you are 2nd or 3rd what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount?
7. In any period what is the chance that you are the 4th player in sequence?
8. If you are 4th in a sequence, what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount? How can earnings for the 3th player differ from those for the 4th?

Any questions?

Final Period

Overview: In this 11th and final period you will make production and consumption decisions as before with the following two differences

1. *New groups.* Until this moment, you have been paired with a constant group of four players. Now we will place you in a new group. Your new group will consist of people who have never been paired together.
2. *Increased Earnings.* We will *triple* the value of consumption and the cost of production. If a consumption unit is produced for you, you will earn 9 points. If you produce a unit for someone else, it will cost you 3 points.

Following this last period the session will end. The points that you earn in this final period will be converted to U.S. dollars at the rate \$1 per point. These earnings will be added to your appearance fee and your earnings from the first portion of this session.

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1. Period Structure: At the beginning of each period, the participants in your group will be randomly ordered 1st through 4th in sequence. Periods will consist of three *stages*. Following the third stage the period ends, earnings are calculated and the next period begins.

2. Production Decisions: In stages 1 and 2, a player makes a production decision for the player that precedes her in sequence. In stage 1, for example, the 2nd player decides whether or not to produce a unit for the 1st player. The 1st player in sequence makes no production decision.

3. Consumption Allocation Decisions: In the final stage 3, the 3rd and 4th players in sequence are each endowed with a unit and simultaneously decide whether to 'push' the unit to the other player or 'pull' it toward themselves.

4. Tokens. In a period's first stage, the 1st player in sequence is endowed with a *token*. The token has no value and can be offered to the next player if the next player produces a unit. In stage 1, for example, the 1st player can offer to pass the token to the 2nd if the 2nd player produces a unit for the 1st. In the final stage the 3rd player can simply offer to pass his token to the 4th player without any conditions.

5. Earnings: In stages 1 and 2, if a producer decides to produce a unit, it costs her 1 point. The preceding player, who consumes the unit, earns 3 points. For example, if in stage 2, the 3rd player decides to produce she incurs a cost of 1 point and the 2nd player earns 3 points by consuming the good. If 3rd player decides to not produce, she incurs a cost of 0 points, and 2nd player earns 0 points from consumption.

In the final stage the 3rd and 4th players simultaneously decide to either 'push' an existing unit to the other, or 'pull' it to themselves. If they both 'push' each player earns 1.5 points. If one 'pushes' and the other 'pulls', the 'pull' player earns 3 points, while the 'push' player earns 0 points. If they both 'pull' they each lose 0.5 points.

6. Some observations:

- a) The 1st player in sequence makes no production decisions.
- b) If a player is offered a token, she can infer that the preceding player was either the 1st player, or has previously incurred a production cost for another player.
- c) The 3rd player in sequence will make a production decision, but will have no opportunity to consume a good produced by another player.

- d) The 4th player in sequence will make no production decision. Rather, the 3rd and 4th players make a consumption allocation decision simultaneously.
- e) Each period players have a 1/4 chance of being 1st, 2nd, 3rd, or 4th.
- f) In the first part of this session your point earnings from all periods will be summed. The sum will be converted to cash at a rate of \$1 per point. You will earn this in addition to your \$10 appearance fee.

7. Screen Displays and the Sequence of Decisions. Figure 1 illustrates the screen for a participant *b3* at the beginning of period 2. The player is presented with the earnings for possible combinations of own production and consumption decisions. Notice that in this period player *b3* is 2nd in sequence.

| | | |
|--|-----------------------|--|
| Player | <i>b3</i> | |
| Period 2 | Order in Sequence: | 2 nd |
| 2nd Player offered to pass you a Token if you produce | | |
| Earnings Possibilities (points) | | |
| If you consume but don't produce | | 3 |
| If you consume and produce | | 2 |
| If you don't consume and don't produce | | 0 |
| If you don't consume but produce | | -1 |
| Notes: The 1th payer CANNOT produce | | |
| Decisions | | |
| Produce? | <input type="radio"/> | Yes |
| | <input type="radio"/> | No |
| Offer Token to 3rd Player if she produces? | <input type="radio"/> | Yes |
| | <input type="radio"/> | No |
| | | <input type="button" value="Confirm"/> |

Figure 1. Screen Display for a 2nd Player in Sequence.

Player *b3* was offered a token, and must decide whether or not to produce. To make a decision she must click on the radio dial to the left of the ‘Yes’ or ‘No’ headings. If she does produce, she must also decide whether or not to offer the token to the 3rd player. Once the player is comfortable with her decision, she clicks ‘confirm’ to continue.

The screen display is different for the 3rd and 4th players in sequence. Figure 2 illustrates the screen for a participant *b3*, when she is the 3rd player in sequence.

Player *b3* Time remaining 20 Seconds

Period 2

Order in Sequence

The 2nd Player Offers you a Token if you Produce

Earnings Possibilities from Production

| | |
|---------------|----------|
| Don't Produce | 0 points |
| Produce | -1 point |

Decisions

Produce? Yes No

Give Token to 4th player? Yes No

Other

| | | |
|------|------|------|
| | Push | Pull |
| Push | 1.5 | 3 |
| Pull | 0 | -0.5 |

Push Pull

Push Pull

Figure 2. Screen Display for the 3rd Player in Sequence.

Player *b3* was offered a token by the 2nd player in sequence, and must decide whether to produce or not to produce. If she produces she must also decide whether to give the token to the 4th player in sequence. Finally, she must choose to either ‘push’ an existing unit to the 4th player in sequence, or ‘pull’ it toward herself. Once the player is comfortable with her decision, she clicks ‘confirm’ to continue. The 4th player in sequence will be presented with only the right side of the screen shown in Figure 2. This player makes no production decision, and decides only whether to ‘push’ a unit to the 3rd player in sequence or ‘pull’ it toward herself.

After all players have completed decisions for the period, results are tabulated and illustrated. Figure 3 illustrates results for a period where *b3* was 2nd in sequence.

| Order in Sequence: 2 nd | | Earnings (points) |
|------------------------------------|---|-------------------|
| Actions | | |
| 1) Previous player | Offered Token | |
| 2) Your action | Produce | -1.0 |
| 3) Next Player's action | Produce | 3.0 |
| | This Period Earnings | 2.0 |
| | Cumulative Earnings | 4.0 |
| | <input type="button" value="Continue"/> | |

Figure 3. Display of Period Results for a 2nd Player in Sequence

In this period, *b3* chose to produce a unit. The 1st player did pass along the token. Subsequently, the 3rd player also chose to produce a unit that provides consumption to the 2nd player. As a consequence, player *b3* earned 2 points for the period. Earnings results for the 1st player will look the same, except that the 1st player makes no production decision. The bottom portion of a player’s screen displays period and cumulative earnings. Once the player has reviewed earnings she should press ‘continue’.

Figure 4 illustrates results for a period where $b3$ was 3rd in sequence.

| Order in Sequence: | | 3 rd |
|---|---------------|-------------------|
| Actions | | Earnings (points) |
| 1) Previous player | Offered Token | |
| 2) Production Decision | Produce | -1.0 |
| 3) Push or Pull | Pull | |
| 4) Other player | Push | 3.0 |
| This Period Earnings | | 2.0 |
| Cumulative Earnings | | 4.0 |
| <input type="button" value="Continue"/> | | |

Figure 4. Display of Period Results for a 3rd Player in Sequence.

In this period, $b3$ chose to produce a unit. The 2nd player did pass along the token (indicating that 2nd player produced for the 1st player). Also $b3$ chose ‘pull’ in the ‘push-pull’ game, while the 4th player ‘pushed.’ So $b3$ incurred a cost of 1 point from producing and 3 points from the ‘push-pull’ game. On net then player $b3$ earned 2 points for the period. Earnings results for the 4th player will look the same, except that the 4th player makes no production decision.

Questionnaire

Prior to beginning please complete the following questionnaire.

1. Suppose in period 2 you are paired with three other players. In period 3 will you be paired with the same or different players?
2. Suppose in period 3 you were the 3rd in sequence. In period 4 will you be the 3rd in sequence again? What about other players, will they keep their order in sequence?
3. Suppose that in a period you are 4th in sequence and you are passed a token, what can you infer about the player who preceded you?
4. In any period what is the chance that you are the 1st player in sequence?
5. If you are 1st in a sequence, what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount? How can earnings for the 1st player differ from those for the 2nd?
6. In any period what is the chance that you are the 2nd or 3rd player in sequence?
7. If you are 2nd or 3rd what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount?
8. In any period what is the chance that you are the 4th player in sequence?
9. If you are 4th in a sequence, what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount? How can earnings for the 3th player differ from those for the 4th?

Any questions?

Final Period

Overview: In this 11th and final period you will make production and consumption decisions as before with the following two differences

1. *New groups.* Until this moment, you have been paired with a constant group of four players. Now we will place you in a new group. Your new group will consist of people who have never been paired together.
2. *Increased Earnings.* We will *triple* the value of consumption and the cost of production. If a consumption unit is produced for you, you will earn 9 points. If you produce a unit for someone else, it will cost you 3 points.

Following this last period the session will end. The points that you earn in this final period will be converted to U.S. dollars at the rate \$1 per point. These earnings will be added to your appearance fee and your earnings from the first portion of this session.

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1. Period Structure: At the beginning of each period, the participants in your group will be randomly ordered 1st through 4th in sequence. Periods will consist of three *stages*. Following the third stage the period ends, earnings are calculated and the next period begins.

2. Production Decision: In each stage the 2nd, 3rd, or 4th player makes a production decision for the player that precedes her in sequence. In stage 1, for example, the 2nd player decides whether or not to produce a unit for the 1st player, etc. The 1st player in sequence makes no production decision.

3. Tokens. In a period's first stage, the 1st player in sequence is endowed with a *token*. The token has no value and can be offered to the next player if the next player produces a unit. In stage 1, for example, the 1st player can offer to pass the token to the 2nd if the 2nd player produces a unit for the 1st, etc.

4. Earnings: To repeat, tokens have no value. Rather your earnings come from points. If a producer decides to produce a unit, it costs her 1 point. The preceding player, who consumes the unit, earns 3 points. For example, if in stage 2, the 3rd player decides to produce she incurs a cost of 1 point and the 2nd player earns 3 points by consuming the good. If 3rd player decides to not produce, she incurs a cost of 0 points, and 2nd player earns 0 points from consumption.

5. Some observations:

a) The 1st player in sequence makes no production decision, and will know her order in sequence.

b) 2nd, 3rd, and 4th players will also know their position in sequence when they make production decisions, as well as whether or not they were offered a token.

c) If a player is offered a token by the 2nd or 3rd player, she can infer that the preceding player has previously produced a unit for another player, since only the 1st player is endowed with a token.

d) The 4th (last) player in sequence will have no opportunity to consume a good produced by a subsequent player.

e) Each period players have a 1/4 chance of being 1st, 2nd, 3rd, or 4th.

f) In the first part of this session your point earnings from all periods will be summed. The sum will be converted to cash at a rate of \$1 per point. You will earn this in addition to your \$6 appearance fee.

5. Screen Displays and the Sequence of Decisions. Figure 1 illustrates the screen for a participant *b3* at the beginning of period 2. The player is informed that the 2nd Player offered to pass her a token if she will produce. The player is presented with the earnings for possible combinations of own production and consumption decisions. Notice that in this period player *b3* is 3rd in sequence. If the player is the 1st in sequence she will see only the first two lines because she does not produce. If the player is 4th in sequence, there is no one who will produce for her, thus she will see only the last two lines that describe earnings without consumption.

| | | |
|--|-----------------------|---|
| Player | <i>b3</i> | |
| Period 2 | Order in Sequence | <input type="text" value="3<sup>rd</sup>"/> |
| The 2nd Player Offers you a Token if you Produce | | |
| Earnings Possibilities | | |
| If you consume but don't produce | | 3 points |
| If you consume and produce | | 2 points |
| If you don't consume and don't produce | | 0 points |
| If you don't consume but produce | | -1 point |
| Notes: the 1st player CANNOT produce. The 4th Player CANNOT consume. | | |
| Decisions | | |
| Produce? | <input type="radio"/> | Yes |
| | <input type="radio"/> | No |
| Offer Token to 4th Player if she Produces? | <input type="radio"/> | Yes |
| | <input type="radio"/> | No |
| | | <input type="button" value="Confirm"/> |

Figure 1. Screen Display at the Beginning of a Period.

Player *b3* must decide whether or not to produce. To make a decision she must click on the radio dial to the left of the ‘Yes’ or ‘No’ headings. If the player is the 1st in sequence she will not see production decision part.

If Player *b3* was passed a token, she must also decide whether or not to offer to pass a token to the 4th player if she will produce. Once the player is comfortable with her decision, she clicks ‘confirm’ to continue.

After all players have completed decisions for the period, results are tabulated and illustrated. Figure 2 illustrates results for a period where *b3* was 3rd in sequence.

| | |
|---|---|
| Order in Sequence | <input type="text" value="3<sup>rd</sup>"/> |
| Actions | Earnings |
| 1) Previous player Offered Token | |
| 2) Your action Produce | -1 point |
| 3) Next Player's action Produce | 3 points |
| This Period Earnings | <input type="text" value="2 points"/> |
| Cumulative Earnings | <input type="text" value="4 points"/> |
| <input type="button" value="Continue"/> | |

Figure 2. Display of Period Results.

In this period, *b3* chose to produce a unit. The 2nd player did pass along the token (indicating that 2nd player produced for the 1st player). Subsequently, the 4th player chose to produce a unit that provides consumption to the 3rd player. As a consequence, player *b3* earned 2 points for the period. The bottom portion of a player’s screen displays period

and cumulative earnings. Once the player has reviewed earnings she should press 'continue'.

Questionnaire

Prior to beginning please complete the following questionnaire.

1. Suppose in period 2 you are paired with three other players. In period 3 will you be paired with the same or different players?
2. Suppose in period 3 you were the 3rd in sequence. In period 4 will you be the 3rd in sequence again? What about other players, will they keep their order in sequence?
3. Suppose that in a period you are 4th in sequence and you are offered a token, what can you infer about production decisions of the players who preceded you?
4. In any period what is the chance that you are the 2nd or 3rd player in sequence?
5. If you are 2nd or 3rd, what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount?
6. In any period what is the chance that you are the 1th or 4th player in sequence?
7. If you are 1st in a sequence, what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount?
8. If you are 4th in a sequence, what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount?

Any questions?

Final Period

Overview: In this 11th and final period you will make production and consumption decisions as before with the following two differences

1. *New groups.* Until this moment, you have been paired with a constant group of four players. Now we will place you in a new group. Your new group will consist of people who have never been paired together.
2. *Increased Earnings.* We will *triple* the value of consumption and the cost of production. If a consumption unit is produced for you, you will earn 9 points. If you produce a unit for someone else, it will cost you 3 points.

Following this last period the session will end. The points that you earn in this final period will be converted to U.S. dollars at the rate \$1 per point. These earnings will be added to your appearance fee and your earnings from the first portion of this session.

Any questions?

Instructions

Welcome! This is an experiment in economics. Funding for this experiment has been provided by the National Science Foundation and Virginia Commonwealth University.

For today's session, you will receive a \$6 show-up fee. In addition, you will have the opportunity to earn money during the session. Your decisions are likely to considerably affect your earnings. If you follow the instructions and make good decisions, you can earn more money.

Caution: Talking or looking at others' screens is not allowed. Should you have any questions please raise your hand and an experimenter will come to you.

A. Overview. Today's session involves making production decisions for others. At the beginning of the session you will be matched with other four participants in this room. The participants are labeled $a\#$, $b\#$, $c\#$ or $d\#$. Where the # sign indicates a group number, 1 to 4. You will remain matched with these same people throughout the first portion of this session. The first part of this session consists of a series of 10 *periods*. In each period you and the other participants in your group will make costly *production decisions* that affect another player's earnings.

1. Period Structure: At the beginning of each period, the participants in your group will be randomly ordered 1st through 4th in sequence. Periods will consist of three *stages*. Following the third stage the period ends, earnings are calculated and the next period begins.

2. Production Decision: In each stage 2nd, 3rd, or 4th player makes a production decision for the player that precedes her in sequence. In stage 1, for example, the 2nd player decides whether or not to produce a unit for the 1st player, etc. The 1st player in sequence makes no production decision.

3. Tokens. In a period's first stage, the 1st player in sequence is endowed with a *token*. The token has no value and can be offered to the next player if the next player produces a unit. In stage 1, for example, the 1st player can offer to pass the token to the 2nd if the 2nd player produces a unit for the 1st, etc.

4. Earnings: To repeat, tokens have no value. Rather your earnings come from points. If a producer decides to produce a unit, it costs her 1 point. The preceding player, who consumes the unit, earns 3 points. For example, if in stage 2, the 3rd player decides to produce, she incurs a cost of 1 point, and the 2nd player earns 3 points by consuming the good. If 3rd player decides to not produce, she incurs a cost of 0, and 3rd player earns 0 from consumption.

5. Some observations:

a) The 1st player in sequence makes no production decision and will know that she is first in sequence

b) 2nd, 3rd, and 4th players will not know their position in sequence when they make a production decision.

c) If a player is offered a token, she can infer that the preceding player was either the 1st player or that the preceding player has previously produced a unit for another player.

d) The 4th (last) player in sequence will have no opportunity to consume a good produced by a subsequent player.

e) Each period players have a 1/4 chance of being 1st, 2nd, 3rd or 4th.

f) In the first part of this session your point earnings from all periods will be summed. The sum will be converted to cash at a rate of \$1 per point. You will earn this in addition to your \$6 appearance fee.

5. Screen Displays and the Sequence of Decisions. Figure 1 illustrates the screen for a participant *b3* at the beginning of period 2. The player is presented with the earnings for possible combinations of own production and consumption decisions. If the player is the 1st in sequence she will see only the first two lines because she does not produce.

Player *b3*
Period 2

Earnings Possibilities

| | |
|--|----------|
| If you consume but don't produce | 3 points |
| If you consume and produce | 2 points |
| If you don't consume and don't produce | 0 points |
| If you don't consume but produce | -1 point |

Notes: the 1st player CANNOT produce. The 4th Player CANNOT consume.

| Decisions if offered token | |
|---|---|
| Produce? | <input type="radio"/> Yes <input type="radio"/> No |
| Offer Token to next Player if she produces? | <input type="radio"/> Yes <input type="radio"/> No |

| Decisions if NOT offered token | |
|--------------------------------|---|
| Produce? | <input type="radio"/> Yes <input type="radio"/> No |

Confirm

Figure 1. Screen Display at the Beginning of a Period.

Player *b3* must decide whether or not to produce and whether or not to offer to pass a token to the next player if she will produce in the case she is offered a token and in the case she is not offered a token. To make a decision she must click on the radio dials to the left of the 'Yes' or 'No' headings. If the player is the 1st in sequence she will see her order in sequence. She will see only the 'Offer Token' decision that appears in the bottom portion of the left side of Figure 1. Once the player is comfortable with her decisions, she clicks 'confirm'.

After all players have completed decisions for the period, results are tabulated and illustrated. Figure 2 illustrates results for a period where *b3* turned out to have been 3rd in sequence.

| | | |
|-------------------------|----------------------|-----------------|
| Order in Sequence | 3 rd | |
| Actions | | Earnings |
| 1) Previous player | Offered Token | |
| 2) Your action | Produce | -1 point |
| 3) Next Player's action | Produce | 3 points |
| | This Period Earnings | 2 points |
| | Cumulative Earnings | 4 points |
| | Continue | |

Figure 2. Display of Period Results.

In this period, *b3* chose to produce a unit if passed a token. The 2nd player did pass along the token (indicating that 2nd player produced for the 1st player). Subsequently, the 4th player chose to produce a unit that provides consumption to the 3rd player. As a consequence, player *b3* earned 2 points for the period. The bottom portion of a player's screen displays period and cumulative earnings. Once the player has reviewed earnings she should press 'continue'.

Questionnaire

Prior to beginning please complete the following questionnaire.

1. Suppose in period 2 you are paired with three other players. In period 3 will you be paired with the same or different players?
2. Suppose in period 3 you were the 3rd in sequence. In period 4 will you be the 3rd in sequence again? What about other players, will they keep their order in sequence?
3. When you make a production decision, do you know your order in the sequence? What do you know about production decisions of other players?
4. Suppose that in a period you were 4th in sequence and you were passed a token, what can you infer about production decisions of the players who preceded you?
5. In any period what is the chance that you are the 2nd or 3rd player in sequence?
6. If you are 2nd or 3rd, what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount?
7. In any period what is the chance that you are the 1th or 4th player in sequence?
8. If you are 1st in a sequence, what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount?
9. If you are 4th in a sequence, what are your highest and lowest earnings? What should happen for you to earn the highest amount? What should happen for you to earn the lowest amount?

Any questions?

Final Period

Overview: In this 11th and final period you will make production and consumption decisions as before with the following two differences

1. *New groups.* Until this moment, you have been paired with a constant group of four . Now we will place you in a new group. Your new group will consist of people who have never been paired together.
2. *Increased Earnings.* We will *triple* the value of consumption and the cost of production. If a consumption unit is produced for you, you will earn 9 points. If you produce a unit for someone else, it will cost you 3 points.

Following this last period the session will end. The points that you earn in this final period will be converted to U.S. dollars at the rate \$1 per point. These earnings will be added to you appearance fee and your earnings from the first portion of this session.

Any questions?