

## **Instructions**

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

For today's session, you will receive a \$10 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 and consumption allocation decisions. At the beginning of the session you will be matched with other four participants in this room, 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 will either make a costly *production decision* that affects another player's earnings or you and another participant will simultaneously make a *consumption allocation decision* that affects both of your earnings.

1. Period Structure: At the beginning of each period, the participants in your group will be randomly ordered 1<sup>st</sup> through 4<sup>th</sup> 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 2<sup>nd</sup> player decides whether or not to produce a unit for the 1<sup>st</sup> player. The 1<sup>st</sup> player in sequence makes no production decision.

3. Consumption Allocation Decisions: In the final stage 3, the 3<sup>rd</sup> and 4<sup>th</sup> 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 1<sup>st</sup> 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 1<sup>st</sup> player can offer to pass the token to the 2<sup>nd</sup> if the 2<sup>nd</sup> player produces a unit for the 1<sup>st</sup>. In the final stage the 3<sup>rd</sup> player can simply offer to pass his token to the 4<sup>th</sup> 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 3<sup>rd</sup> player decides to produce she incurs a cost of 1 point and the 2<sup>nd</sup> player earns 3 points by consuming the good. If 3<sup>rd</sup> player decides to not produce, she incurs a cost of 0 points, and 2<sup>nd</sup> player earns 0 points from consumption.

In the final stage the 3<sup>rd</sup> and 4<sup>th</sup> 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 1<sup>st</sup> 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 1<sup>st</sup> player, or has previously incurred a production cost for another player.
- c) The 3<sup>rd</sup> player in sequence will make a production decision, but will have no opportunity to consume a good produced by another player.

- d) The 4<sup>th</sup> player in sequence will make no production decision. Rather, the 3<sup>rd</sup> and 4<sup>th</sup> players make a consumption allocation decision simultaneously.
- e) Each period players have a 1/4 chance of being 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, or 4<sup>th</sup>.
- 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 2<sup>nd</sup> in sequence.

Player	<i>b3</i>		
Period 2	Order in Sequence:	2 <sup>nd</sup>	
<b>2nd Player offered to pass you a Token if you produce</b>			
<b>Earnings Possibilities (points)</b>			
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			
<b>Decisions</b>			
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	
			<b>Confirm</b>

**Figure 1.** Screen Display for a 2<sup>nd</sup> 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 3<sup>rd</sup> player. Once the player is comfortable with her decision, she clicks 'confirm' to continue.

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

Player **b3**  
Period 2  
Order in Sequence **3rd**

Time remaining **20** Seconds

The 2nd Player Offers you a Token if you Produce

**Earnings Possibilities from Production**

Don't Produce	0 points
Produce	-1 point

		Other				
		Push Pull				
You	Push	<table> <tr> <td>1.5</td> <td>3</td> </tr> <tr> <td>1.5</td> <td>0</td> </tr> </table>	1.5	3	1.5	0
	1.5	3				
1.5	0					
Pull	<table> <tr> <td>0</td> <td>-0.5</td> </tr> <tr> <td>3</td> <td>-0.5</td> </tr> </table>	0	-0.5	3	-0.5	
0	-0.5					
3	-0.5					

**Decisions**

Produce?	<input type="radio"/> Yes	<input type="radio"/> No
Give Token to 4th player?	<input type="radio"/> Yes	<input type="radio"/> No

**Push Pull**

<input type="radio"/> Push	<input type="radio"/> Pull
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Confirm

**Figure 2.** Screen Display for the 3<sup>rd</sup> Player in Sequence.

Player *b3* was offered a token by the 2<sup>nd</sup> 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 4<sup>th</sup> player in sequence. Finally, she must choose to either ‘push’ an existing unit to the 4<sup>th</sup> player in sequence, or ‘pull’ it toward herself. Once the player is comfortable with her decision, she clicks ‘confirm’ to continue. The 4<sup>th</sup> 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 3<sup>rd</sup> 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 2<sup>nd</sup> in sequence.

Order in Sequence: 2 <sup>nd</sup>	
Actions	Earnings (points)
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
Continue	

**Figure 3.** Display of Period Results for a 2<sup>nd</sup> Player in Sequence

In this period, *b3* chose to produce a unit. The 1<sup>st</sup> player did pass along the token. Subsequently, the 3<sup>rd</sup> player also chose to produce a unit that provides consumption to the 2<sup>nd</sup> player. As a consequence, player *b3* earned 2 points for the period. Earnings results for the 1<sup>st</sup> player will look the same, except that the 1<sup>st</sup> 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 3<sup>rd</sup> in sequence.

Order in Sequence:		3 <sup>rd</sup>
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
		<a href="#">Continue</a>

**Figure 4.** Display of Period Results for a 3<sup>rd</sup> Player in Sequence.

In this period,  $b3$  chose to produce a unit. The 2<sup>nd</sup> player did pass along the token (indicating that 2<sup>nd</sup> player produced for the 1<sup>st</sup> player). Also  $b3$  chose ‘pull’ in the ‘push-pull’ game, while the 4<sup>th</sup> 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 4<sup>th</sup> player will look the same, except that the 4<sup>th</sup> 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 3<sup>rd</sup> in sequence. In period 4 will you be the 3<sup>rd</sup> in sequence again? What about other players, will they keep their order in sequence?
3. Suppose that in a period you are 4<sup>th</sup> 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 1<sup>st</sup> player in sequence?
5. If you are 1<sup>st</sup> 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 1<sup>st</sup> player differ from those for the 2<sup>nd</sup>?
6. In any period what is the chance that you are the 2<sup>nd</sup> or 3<sup>rd</sup> player in sequence?
7. If you are 2<sup>nd</sup> or 3<sup>rd</sup> 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 4<sup>th</sup> player in sequence?
9. If you are 4<sup>th</sup> 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 3<sup>th</sup> player differ from those for the 4<sup>th</sup>?

Any questions?

## Final Period

*Overview:* In this 11<sup>th</sup> 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?