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**Lecture 10: Sequential-Move Games**

1. The Centipede Game
   1. Suppose I place a dime on the table in front of two players. One player may either take the dime or pass. Taking the dime ends the game.
   2. If the first player passes, I add another dime and ask the second player to take the dimes or pass. Again, taking the money ends the game.
   3. This continues until either one player takes the money or one dollar in dimes is on the table.

10,0

Take

B

A

A

B

0,20

30,0

0,40

Pass

Pass

Take

Pass

Take

Pass

B

0,100

Pass

Take

Take

…

0,0

* 1. Where’s rollback equilibrium?

1. Order advantages
   1. Since we are playing a game with an order of play, sometimes there are advantages to when you play. (You can really see this in the centipede game.)
   2. Acting earlier is nice because you get to exclude whole parts of the decision tree.
   3. Acting later is nice because you get to act with more information.
   4. *First Mover Advantage*—if your payoffs are higher as a first mover than a second mover. First movers are powerful when excluding options is more important than information.
   5. *Second Mover Advantage*—if your payoffs are higher as a second mover than a first mover. Second movers are powerful when information is more important than excluding options.
   6. To compare, simply change the order of play and then replace the payoffs. ***Remember***: make sure the strategy combinations match the same payoffs.
      1. Note that because the order is reversed, the payoff order is also reversed.
   7. Consider the game from last class:

**Alpha**

**Beta**

**Beta**

1,1

3,3

2,4

4,2

Run

Run

Don’t Run

Ads

Don’t Run

No Ads

* 1. Now we reverse the order:

**Alpha**

**Beta**

1,1

3,3

2,4

4,2

Run

Don’t Run

Ads

No Ads

**Alpha**

Ads

No Ads

* 1. We solve the game normally and then determine when Alpha and Beta have the higher payoff: when they moved first or when they move second.
     1. Yes, it is possible for both to have a higher payoff. In that case, there is no mover advantage. There is also no mover advantage if neither have a higher payoff.

1. Limits of Theory: Dictator Game
   1. Consider two players and a single large payoff. One player decides how to split the payoff between the two. The other player than accepts the split (in which case they both what was proposed) or rejects it (in which case they both get nothing). The game is played only once and the participants are strangers.
      1. To simplify, let us assume that the first player can make either a Fair or an Unfair division of the payoff. Let us also assume the payoff is $100.

**Two**

**One**

$99, $1

$50, $50

$0, $0

$0, $0

Unfair

Fair

Accept

Reject

**Two**

Accept

Reject

* + 1. The roll back equilibrium is Unfair/Accept (note there is no mover advantage since One decides how the money is split regardless of the order of play).
  1. What’s interesting about this game is its experimental results. When done in a laboratory setting with real participants and real money, the second player regularly rejects unfair payoffs ($70/$30 splits are about as unfair as they get and $50/$50 are very common).
     1. It suggests that there’s an ingrained sense of fairness in the human psyche. Even if I’m better off by accepting, the sense of pain I’d suffer by implicitly accepting that injustice makes it worth rejecting.