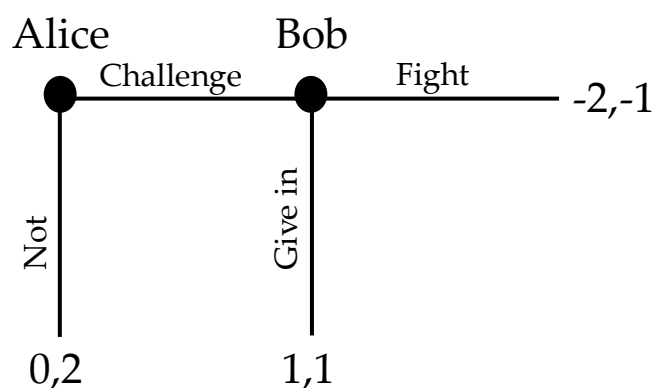


Game Theory

Game theory models strategic interactive behavior. It provides tools to express the interaction between multiple decision makers and is used extensively in a wide variety of settings. It allows us to capture phenomena such as cooperative and competitive behavior, reputation, incentives and organizational elements, information and signaling and many more. In our session we will play and discuss some of the more representative interactive settings. In preparation please read the description of each of the following games, decide how you would play in each possible role in the games. You can use the page at the end of this handout to write down the strategies you would choose. Please note that you do not have to follow these choices when we actually play these games as your reasoning might be different.

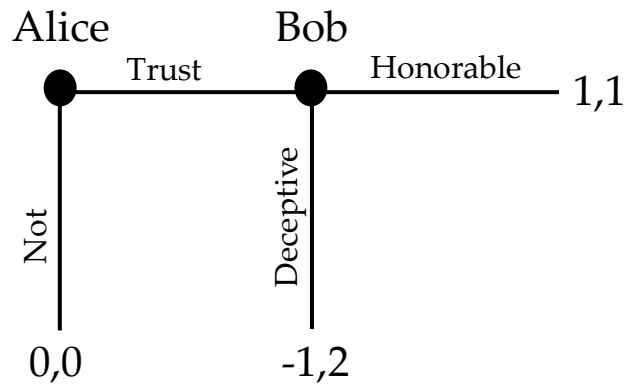
We begin with a few *extensive form* games. We depict these games with “tree diagrams,” as in Game 1 which is named the threat game. This works as follows: Two students are paired at random to play, taking the roles of Alice and Bob. The game begins with Alice choosing between one of two actions – whether to challenge Bob or not. If Alice decides not to challenge and chooses “Not” then the game is over and Alice gets no payoff while Bob receives a payoff of \$2. If Alice decides to “Challenge” Bob, then Bob has to respond to the challenge and can choose either to “Fight” or to “Give in”. The outcome from these choices is denoted with the payoffs in the figure below. Note that the first number is Alice’s payoff while the second number is Bob’s payoff. In particular, if Bob chooses to “Fight” he will lose \$1 and Alice will lose \$2.



Game 1: The Threat Game

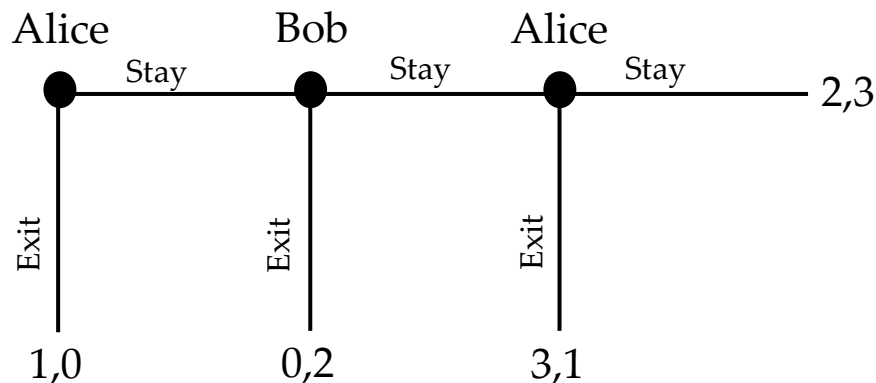
Our second game is called the promises or trust game. In this game Alice chooses whether to “Trust” Bob or not. If she does not the game is over and the payoff is \$0 to both players. If Alice decides to “Trust” Bob then has the choice whether to be

“Abusive” or “Honorable”. In the first case his payoff will be \$2 while in the second it will be \$1. Alice will lose a dollar if Bob is “Deceptive” and will gain \$1 if he chooses “Honorable”.



Game 2: The Promises Game

Our next game involves a player that may need to move twice. Again, decide what you would do in the role of Alice (at both decision points) and what you would do in the role of Bob.



Game 3: The (short) Centipede Game

We turn to a few games described in *strategic form*. In such a game each player chooses from a list of actions. But this time it is done independently and simultaneously, and both players will be asked to make a choice without knowing what the other player is choosing. Then payoffs are made to the two players based on the strategies they pick.

When there are only two players in the game (as will be the case throughout this session), we describe this sort of game with a table. One player chooses a row in the table we'll call this Player 1, and the other, called Player 2, picks a column. The rows are Player 1's strategies, and the columns are Player 2's strategies. In the simulation in class you will be randomly assigned to one of these roles. Based on the row and column picked, we look at the corresponding cell in the table, where we find two numbers: The first number gives Player 1's payoff, and the second gives Player 2's in US\$. So, for instance, in table below, Player 1 has two strategies and Player 2 has three. If Player 1 picks row 1 and Player 2 picks col 3, Player 1's payoff is -\$1 and Player 2 gets \$5. Note, the first number in each pair is always the row player's payoff (Player 1) and the second number is the column player payoff (Player 2).

		Player 2		
		col 1	col 2	col 3
Player 1	row 1	2,2	-3,3	-1,5
	row 2	-2,0	-1,1	2,0

How would you play as in Games 4 and 5 below? You can write your answers at the end of this handout. Please remember that row player receives the first payoff, and column player receives the second payoff in each pair.

		col 1	col 2
	row 1	0,0	1,1
	row 2	1.5,1.5	0,0

Game 4: Easy Coordination

		Safe	Risky
	Safe	1,1	1,-1
	Risky	-1,1	1.5,1.5

Game 5: Risky Coordination

Finally, we may play some of these matrix form games repeatedly. In this case, you will be paired randomly with a participant and you will play a matrix game similarly to the games above. However, you will play the game for multiple rounds with the same partner. You will also get to observe how they played in previous rounds.

Game 6 is the repeated prisoners' dilemma:

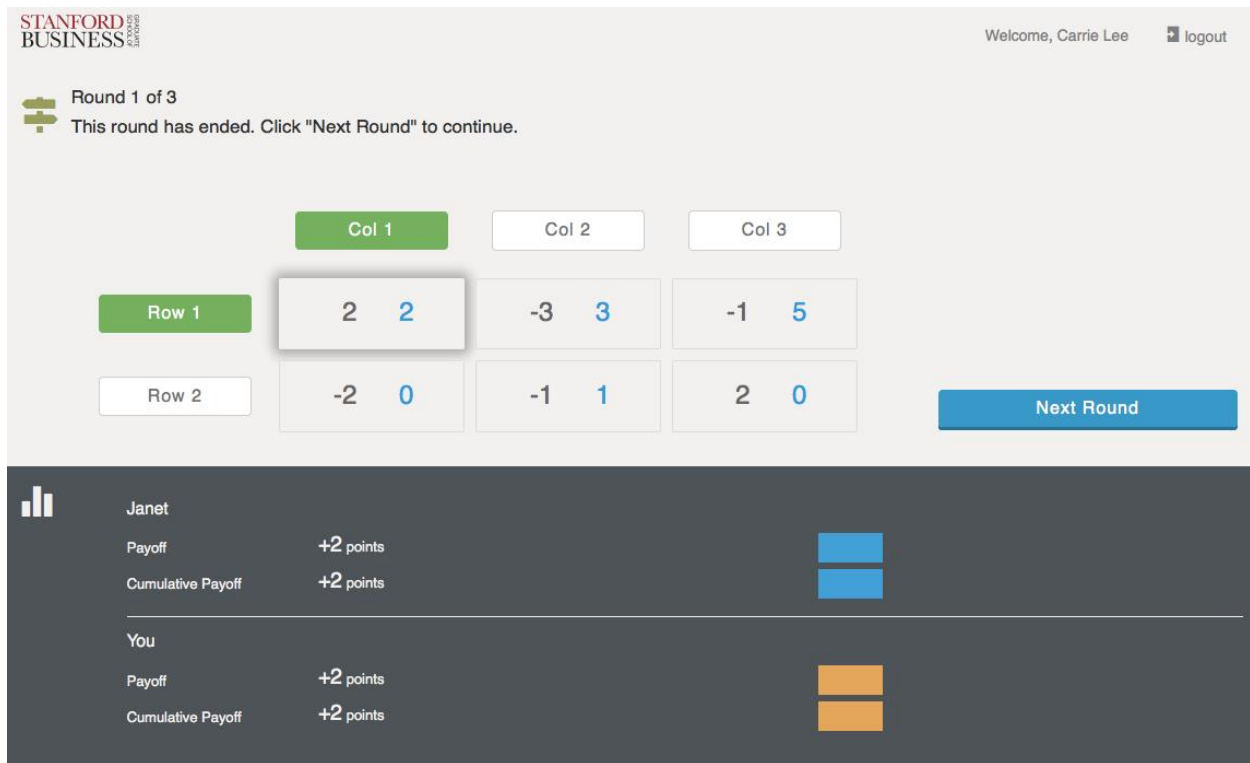
	Defect	Cooperate
Defect	0,0	3,-1
Cooperate	-1,3	2,2

Game 6: Repeated Prisoners' Dilemma

Assume that Game 6 above is repeated many times. Pick a strategy for playing this game, note that a strategy must describe how you will react to past behavior of the other player over time. You may want to pick different strategies based on how many rounds will be played.

Here is how the simulation will represent the game when you are a column player. Note that you will not see the choice made by the other player until both of you have made a choice. Similarly, they will not see the action you take before making their choice.

Once both players have made their choices you will see the following page indicating what the players chose and the payoffs to both players. If the game is played repeatedly both players need to select "Next Round" to continue to the next round. The number of rounds is indicated on the top left.



In preparation for class describe your strategies below:

Game 1: The Threat Game

As Alice I will	Challenge	Not
As Bob I will	Fight	Give in

Game 2: The Promises Game

As Alice I will	Trust	Not
As Bob I will	Honorable	Abusive

Game 3: The (short) Centipede Game

As Alice I will	Stay / Exit	in the first decision point and	Stay / Exit	in the last decision point.
As Bob I will	Stay		Exit	

Game 4: Easy Coordination

As row player I will choose	row 1	row 2
As column player I will choose	col1	col 2

Game 5: Risky Coordination

As row I will choose	Safe	Risky
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(this game is symmetric)

My strategy for game 6 (the repeated prisoners' dilemma) is:
