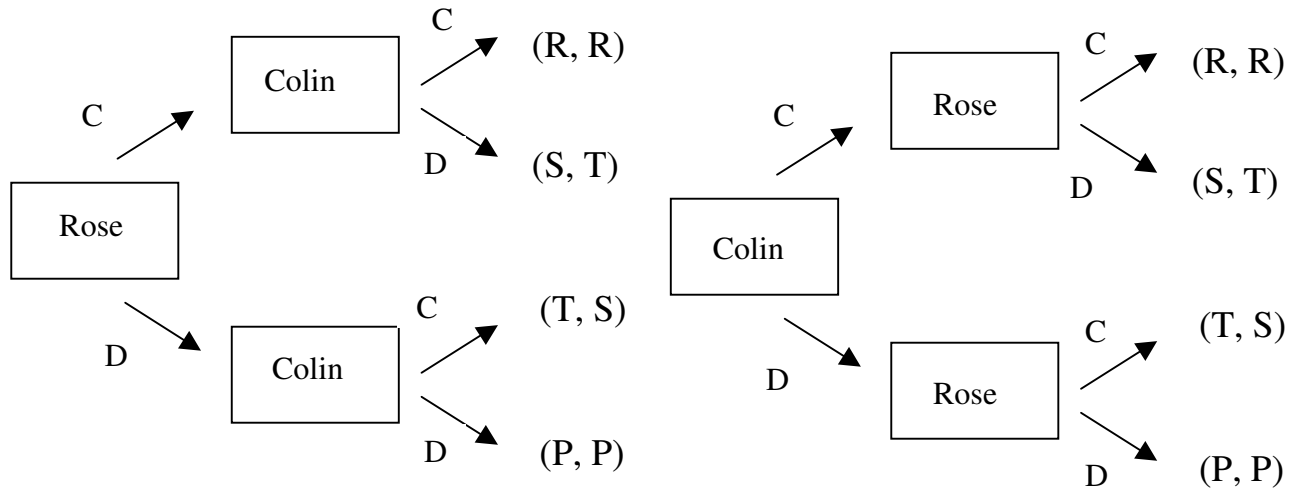


PS 160 Intro to World Politics
Reading and Interpreting Strategic-Form Games

Strategic form games let us consider simultaneous interdependent choices. Most basic games (including all of the ones on the ‘Common Games and Payoffs’ page) involve two players, picking between two choices, but games can involve more players and choices. Look at the following Prisoner’s Dilemma game, where C means ‘cooperate with the other prisoner’ and D means ‘defect- talk to the prosecutor,’ and payoffs are $T > R > P > S$.



Doing the backwards induction, we see that no matter who starts, the outcome is always the same: both defect. This feature allows us to model this as a situation of simultaneous play using a 2x2 game matrix, where Rose plays the *rows* and Colin plays the *columns*.¹ Rose’s payoffs are always listed before Colin’s, since a gentleman always lets a lady go first.

		COLIN	
		C	D
ROSE	C	(R, R)	(S, T)
	D	(T, S)	(P, P)

The equivalent of backwards induction proceeds in a similar way, by pretending to be each player and then asking yourself, “If the other player does _____, what should I do?” Remember, each player is concerned only with his or her own utility. Let’s start with Rose.

		COLIN	
		C	D
ROSE	C	(R, R)	(S, T)
	D	(T, S)	(P, P)

ROSE: “If Colin cooperates, do I prefer R or T?”
 Looking at the preference ordering, Rose prefers T,
 and so she’ll defect if she thinks Colin will cooperate.

¹ This corny piece is not my own; I stole it from Todd Sandler and Keith Hartley, a pair of well-known defense economists.

		COLIN	
		C	D
ROSE	C	(R, R)	(<u>S</u> , T)
	D	(T, S)	(<u>P</u> , P)

ROSE: "If Colin defects, do I prefer S or P?"
Looking at the preference ordering, Rose prefers P, and so she'll defect if she thinks Colin will defect.

The same thing works for Colin.

		COLIN	
		C	D
ROSE	C	(R, <u>R</u>)	(S, <u>T</u>)
	D	(T, S)	(P, P)

COLIN: "If Rose cooperates, do I prefer R or T?"
Looking at the preference ordering, Colin prefers T, and so he'll defect if he thinks Rose will cooperate.

		COLIN	
		C	D
ROSE	C	(R, R)	(S, T)
	D	(T, <u>S</u>)	(P, <u>P</u>)

COLIN: "If Rose defects, do I prefer S or P?"
Looking at the preference ordering, Colin prefers P, and so he'll defect if he thinks Rose will defect.

Let's put it all together now.

		COLIN	
		C	D
ROSE	C	(R, R)	(S, <u>T</u>)
	D	(<u>T</u> , S)	(<u>P</u> , P)

BOTH players have incentives to defect *no matter what the other player does*. This is the key insight of the Prisoner's Dilemma.

The equilibrium in this game is 'both players defect': this is the only box where both players have stable predictions of behavior (are bold in the notation here). Games in strategic form may have more than one equilibria in 'pure strategies,' which is what you are solving for here. (Mixed strategies exist, and BdM walks you through them in a later chapter, but you can ignore them.)

When trying to solve, remember that if you are interested in the ROW player's behavior, you compare the row player's payoffs in each COLUMN. If you're interested in the COLUMN player's behavior, you compare the column player's payoffs in each ROW.

Try some of these. Some of these games have multiple equilibria.

		COLIN	
		C	D
ROSE	C	(1, 3)	(4, 4)
	D	(2, 1)	(3, 2)

		COLIN	
		C	D
ROSE	C	(2, 1)	(3, 4)
	D	(3, 2)	(4, 1)

		COLIN	
		C	D
ROSE	C	(1, 2)	(3, 3)
	D	(4, 4)	(2, 1)

		COLIN	
		C	D
ROSE	C	(4, 1)	(2, 3)
	D	(1, 2)	(3, 4)