

One way to describe a game is by listing the players (or individuals) participating in the game, and for each player, listing the alternative choices (called actions or strategies) available to that player. In the case of a two-player game, the actions of the first player form the rows, and the actions of the second player the columns, of a matrix. The entries in the matrix are two numbers representing the utility or payoff to the first and second player respectively. A very famous game is the Prisoner's Dilemma game. In this game the two players are partners in a crime who have been captured by the police. Each suspect is placed in a separate cell, and offered the opportunity to confess to the crime. The game can be represented by the following matrix of payoffs

	not confess	confess
not confess	5,5	0,10
confess	10,0	1,1

Note that higher numbers are better (more utility). If neither suspect confesses, they go free, and split the proceeds of their crime which we represent by 5 units of utility for each suspect. However, if one prisoner confesses and the other does not, the prisoner who confesses testifies against the other in exchange for going free and gets the entire 10 units of utility, while the prisoner who did not confess goes to prison and gets nothing. If both prisoners confess, then both are given a reduced term, but both are convicted, which we represent by giving each 1 unit of utility: better than having the other prisoner confess, but not so good as going free.

This game has fascinated game theorists for a variety of reasons. First, it is a simple representation of a variety of important situations. For example, instead of confess/not confess we could label the strategies "contribute to the common good" or "behave selfishly." This captures a variety of situations economists describe as public goods problems. An example is the construction of a bridge. It is best for everyone if the bridge is built, but best for each individual if someone else builds the bridge. This is sometimes referred to in economics as an externality. Similarly this game could describe the alternative of two firms competing in the same market, and instead of confess/not confess we could label the strategies "set a high price" and "set a low price." Naturally it is best for both firms if they both set high prices, but best for each individual firm to set a low price while the opposition sets a high price.

A second feature of this game, is that it is self-evident how an intelligent individual should behave. No matter what a suspect believes his partner is going to do, it is always best to confess. If the partner in the other cell is not confessing, it is possible to get 10 instead of 5. If the partner in the other cell is confessing, it is possible to get 1 instead of 0. Yet the pursuit of individually sensible behavior results in each player getting only 1 unit of utility, much less than the 5 units each that they would get if neither confessed. This conflict between the pursuit of individual goals and the common good is at the heart of many game theoretic problems.

A third feature of this game is that it changes in a very significant way if the game is repeated, or if the players will interact with each other again in the future. Suppose for example that after this game is over, and the suspects either are freed or are released from jail they will commit another crime and the game will be played again. In this case in the first period the suspects may reason that they should not confess because if they do not their partner will not confess in the second game. Strictly speaking, this conclusion is not valid, since in the second game both suspects will confess no matter what happened in the first game. However, repetition opens up the possibility of being rewarded or punished in the future for current behavior, and game theorists have provided a number of theories to explain the obvious intuition that if the game is repeated often enough, the suspects ought to cooperate.