The Prisoners' Dilemma

Two accomplices, Ms Red and Mr Blue, have been arrested on suspicion of robbing a bank together. They have been placed in two different cells, with no communication between them. Both care much more about their own freedom than that of the other.
A clever prosecutor makes the following offer to each prisoner:

You may each choose either to confess to the crime or not.

- *If you confess and your accomplice does not, I will let you go free, and use your confession to ensure that your accomplice serves a 3 year jail sentence.*
- *Likewise, if your accomplice confesses and you do not, they will go free while you serve a 3 year sentence.*
- *If you both confess, I get two convictions, but I'll see to it that you will each serve a 2 year sentence.*
- *If you both do not confess, I'll have to settle for less severe convictions, and you'll each serve a 1 year jail sentence.*

Imagine that you are one of these prisoners, interested in spending as little time in jail as you can.

What should you do? Confess to the crime, or not?

It might help to see the information formatted in a table called a *payoff matrix.* The numbers in the four boxes show the outcome for each decision combination:

		Ms Red	
		Confess	Do not confess
Mr Blue	Confess	$(2,2)$	$(3,0)$
	Do not confess	$(0,3)$	$(1,1)$

For example, the $(0,3)$ in the bottom left box shows that if Ms Red confesses, and Mr Blue does not, then Ms Red will have 0 years in jail, and Mr Blue will get 3 years in jail.

So, imagine that you are one of these two characters, Ms Red say. You have a single choice, confess or not, but your outcome not only depends on what *you* choose, but also on what *Mr Blue* chooses.

- If Mr Blue chooses to confess, then only the top row of the table is relevant:

		Ms Red	
		Confess	Do not confess
Mr Blue	Confess	(2,2)	(3,0)

To spend as little time in jail as possible (2 years rather than 3 years), Ms Red should confess.

- If Mr Blue chooses not to confess, then only the bottom row of the table is relevant:

		Ms Red	
		Confess	Do not confess
Mr Blue	Do not confess	(0,3)	(1,1)

To spend as little time in jail as possible (0 years rather than 1 year), Ms Red should confess.

So, whichever choice Mr Blue makes, Ms Red should confess in order to minimise her time spent in jail.

And because the prosecutor's offer is the same to each prisoner, Mr Blue should come to the same conclusion, and should confess.

It might be surprising to have reached the logical conclusion that both should confess, because, from the table, we see that the smallest total jail sentence, (1,1), will happen if both prisoners *cooperate* by both not confessing.

This situation shows how two completely rational individuals might not cooperate, even if it appears that it is in their best interests to do so. These so-called *Game Theory* ideas can be applied to many real-world situations, for example in Business, replacing Ms Red and Mr Blue with two competing companies.

We should remember that what we worked out in our prisoners' dilemma example assumed that each prisoner was only interested in making *their own* prison sentence as short as possible. In the real world, we probably tend to *want* to cooperate more than this, for the greater good, partly because helping others is generally believed to make you happier.

The Prisoners' Dilemma: Comprehension Questions:

1. For the Prisoners' Dilemma situation described in the article, for which the payoff matrix is included below, how many years will Ms Red spend in jail if she does not confess, but Mr Blue does?

		Ms Red	
		Confess	Do not confess
Mr Blue	Confess	(2,2)	(3,0)
	Do not confess	(0,3)	(1,1)

2. Suppose the prosecutor, instead, makes a similar type of offer, but with different lengths to the jail sentences, as given by the following payoff matrix:

		Ms Red	
		Confess	Do not confess
Mr Blue	Confess	(19,19)	(20,0)
	Do not confess	(0,20)	(1,1)

   a) If both prisoners do not confess, what would be the total length of their jail sentences?

   b) Suppose that Ms Red decides to confess. What should Mr Blue decide to do in order to spend as little time in jail as possible? Confess or not?

   c) Suppose that Ms Red decides not to confess. What should Mr Blue decide to do in order to spend as little time in jail as possible? Confess or not?

The Prisoners' Dilemma: Comprehension Answers:

1. Ms Red would get 3 years in jail.

2. a) 2 years (each would get 1 year in jail)

   b) Confessing would lead to the shorter jail sentence (19 years rather than 20 years)

   c) Confessing would lead to the shorter jail sentence (0 years rather than 1 year)