

Prisoner's Dilemma

The Prisoner's Dilemma problem is a classic problem in game theory that attempts to explain agreement and dissension among two parties. Here is a description of the game taken from Wikipedia:

Two men are arrested, but the police do not possess enough information for a conviction. Following the separation of the two men, the police offer both a similar deal- if one testifies against his partner (defects / betrays), and the other remains silent (cooperates / assists), the betrayer goes free and the co-operator receives the full one-year sentence. If both remain silent, both are sentenced to only one month in jail for a minor charge. If each 'rats out' the other, each receives a three-month sentence. Each prisoner must choose to either betray or remain silent; the decision of each is kept quiet. What should they do?

If the two convicts are cooperating, then the clear choice is to both remain silent. That way, each serves only the minimum one month sentence instead of one person receiving a full year or both receiving three months. However, if both convicts distrust the other, then it turns out that the optimal decision to be made by both is to rat the other convict out. To see this, let's examine the *payoff matrix* that describes the time each prisoner gets based on the decisions they make.

	A is silent	A rats out B
B is silent	A and B get 1 month	A goes free; B gets 1 year
B rats out A	A gets 1 year; B goes free	A and B get 3 months

From this we can see that, for example, if prisoner A decides to be silent, then he will either 1 month or 1 year of team. On the other hand, if prisoner A rats out B, then he'll get either serve no time or 3 months. Clearly if A does not trust B, then ratting him out is the best idea.

The traditional prisoner's dilemma consists of only a single opportunity for the prisoners to be silent or rat out their partner. Academics have also considered the *iterated* prisoner's dilemma in which the prisoners make several such decisions in a row, potentially changing their strategies based on previous rounds.

Of course, this is slightly unrealistic, so instead we phrase the iterated prisoner's dilemma game in terms of another game called A Peace War Game

Peace War Games

The peace and war game is similar to the prisoner's dilemma except that instead of prisoners we have neighbouring countries. And instead of either staying silent or ratting, declare peace or war against the opposing country, scoring a number of points based on who declares peace or war. The game continues for a number of years and the winner is the country with the most points.

The pay-off matrix for the peace and war game is as follows:

	A declares peace	A declares war
B declares peace	A and B get 3 points	A gets 5 points; B gets no points
B declares war	A gets no points; B gets 5 points	A and B get 1 point

TASK: Using the matrix provided to you, you need to negotiate with each other person in the seminar group on whether you are going to declare peace or war with them... of course, what you actually decide to do is up to you! You can tell someone you are going to be declare peace but actually declare war – if they declare peace with you then you will get all of the points and they will get none. However, if they declare war as well you will only get one point apiece.

The winner (because you go to war with the intention to win) will be the person who accumulates the most points from the decisions made with all other participants.

Peace War Game Grid

You are country _____

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

Put a cross through the box above of whatever your country letter is (no need to negotiate with yourself!).

You must negotiate with all other countries verbally about whether you are going to declare war or peace with them – your strategy may depend upon what they say to you as well – this is a negotiation.

However... privately you should enter into the box what you intend to do – just because you have told someone you are going to declare peace on them does not mean that you have to behave in that way – this is about winning! Your goal is to score the most points that you can, and so sometimes it may be more beneficial to declare war, at other times peace, depending upon what others are going to do to you (or what you think they might do to you!). Use the matrix to understand how to maximise the number of points that you get. Make sure other people can't see your grid and enter W for war or P for peace into each box after your negotiations.

For example, if you are country A and you are negotiating with country C you might tell each other that you are both going to declare peace. If you both do declare peace then you get three points each... not bad. But if you declare war and they declare peace... they might glare at you but you will get five points and they will get none – and remember, this isn't about being nice, it is ultimately about winning! However, be warned – if you both lie to each other and say you will declare peace and then both actually declare war – just one point each – better than the zero points for declaring peace when your opponent goes war, but nowhere near as good as the three points you would get for both declaring peace.