

PRISONERS' DILEMMA

Background

- The prisoners' dilemma shows why individuals might not cooperate, even when it is in their mutual interest to do so.
- We will use Hobbes state of nature to motivate our discussion of the prisoners' dilemma.
 - Hobbes state of nature is a war of all against all, where no one lays down their arms in fear that others will kill them.
 - Hobbes thinks a covenant (or social contract for peace) could end the killing if it were enforced. But without enforcement, no one will unilaterally abide by the covenant.
 - The two person prisoners' dilemma help us see why.



Background

- Definitions

- **Action** – something an individual can chose.
 - Ex: Fight or Abide.
- **Outcome** – that which results from a combination of actions.
 - Ex: peace; Max rules, Rambo rules, war of all against all.
- **Payoff** – a numerical valuation of an individual's preferences (also called utility).
 - Note, larger numbers indicate more preferred outcomes.

Note, payoffs left of the comma are for Rambo (row player), payoffs right are for Max (column player).

Mad Max

		Abide	Fight
Rambo	Abide	peace	Max rules
	Fight	Rambo rules	war

State of Nature

<u>Actions</u>		<u>Outcomes</u>	<u>Payoffs</u>	
<u>Rambo</u>	<u>Max</u>		<u>Rambo</u>	<u>Max</u>
Abide	Abide	peace, covenant		
Fight	Fight	state of nature		
Fight	Abide	Rambo pillage, Max dead		
Abide	Fight	Max pillage, Rambo dead		

State of Nature

<u>Actions</u>		<u>Outcomes</u>	<u>Payoffs</u>	
<u>Rambo</u>	<u>Max</u>		<u>Rambo</u>	<u>Max</u>
Abide	Abide	peace, covenant	3	3
Fight	Fight	state of nature	2	2
Fight	Abide	Rambo pillage, Max dead	4	1
Abide	Fight	Max pillage, Rambo dead	1	4

Mad Max

		Abide	Fight
Rambo	Abide	↓ 3,3	↓ 1,4
	Fight	↓ 4,1	↓ 2,2

Better for Rambo to fight no matter what Max does.

State of Nature

<u>Actions</u>		<u>Outcomes</u>	<u>Payoffs</u>	
<u>Rambo</u>	<u>Max</u>		<u>Rambo</u>	<u>Max</u>
Abide	Abide	peace, covenant	3	3
Fight	Fight	state of nature	2	2
Fight	Abide	Rambo pillage, Max dead	4	1
Abide	Fight	Max pillage, Rambo dead	1	4

Mad Max

		Abide	Fight
Rambo	Abide	3,3	1,4
	Fight	4,1	2,2

Better for Max to fight no matter what Rambo does.

State of Nature

<u>Actions</u>		<u>Outcomes</u>	<u>Payoffs</u>	
<u>Rambo</u>	<u>Max</u>		<u>Rambo</u>	<u>Max</u>
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Fight	Fight	state of nature	2	2
Fight	Abide	Rambo pillage, Max dead	4	1
Abide	Fight	Max pillage, Rambo dead	1	4

Need a volunteer

Mad Max

		Abide	Fight
Rambo	Abide	3,3	1,4
	Fight	4,1	2,2

The prediction is they both will continue fighting, even though there is mutual gain (a Pareto improvement) from abiding.

State of Nature

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Abide	Abide	peace, covenant	3	3
Fight	Fight	state of nature	2	2
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Mad Max

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Important note: if Max *abides*, does Rambo effectively get to determine the choice between two outcomes through his actions? Which ones?

State of Nature

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note: similar thing is true if Rambo *fights*.

		Mad Max	
		Abide	Fight
Rambo	Abide	3,3	1,4
	Fight	4,1	2,2

Important note: if Rambo *abides*, does Max effectively get to determine the choice between two outcomes through his actions? Which ones?

Summary

- Prisoners' Dilemmas are interesting in-and-of themselves because they illustrate a conflict between individual rationality and mutual advantage.
 - But they may be a bit of a tangent.
- For us, they will help us understand Sen's Liberal Paradox
 - Keep an eye on which actions each player gets to choose and which outcomes they effectively control by their actions.
 - Note: not all examples of Sen's Liberal Paradox are prisoner dilemmas.
 - Not all prisoner's dilemmas are examples of Sen's Liberal paradox.