

**Master in International Cooperation and Development
(MIC&D)**

***Thinking strategically:
Conflict and Cooperation***

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Fourth lecture:
Which solution? The hierarchy

Which solution? The hierarchy

Deliberation

Unplanned order

Planned order

Ontology

Spontaneous
order

Market
(state of nature)

Contract
(constitution)

Contingent
order

Community
(tradition)

Hierarchy
(state)

- Deliberation: Do people forge a solution?
- Ontology: Are only individuals involved?

Which solution? The hierarchy

- Hierarchy: planned and contingent order
- CA comes about because **someone** has sufficient power to bring it about
- *Leviathan as the “only” way (?)*: we should create a **central authority** that monitors players’ actions and that will apply a sanction against the defector(s) (or against those who do not cooperate)
- Note that the very same players could have an interest to delegate power to such central authority to reach an outcome otherwise unattainable (Hobbes’ lesson...)

Our usual PD

		Player B	
		Cooperate	Defect
Player A	Cooperate	$3, 3$	$1, 4$
	Defect	$4, 1$	$2, 2$

New payoffs given the presence of the Leviathan: a penalty p to whom does not cooperate

Situation	Player A	Player B
Player A defects, Player B cooperates	$4-p$	1
Player A defects, Player B defects	$2-p$	$2-p$
Player A cooperates, Player B cooperates	3	3
Player A cooperates, Player B defects	1	$4-p$

A PD with the Leviathan

		Player B	
		Cooperate	Defect
Player A	Cooperate	3,3	1,4- p
	Defect	4- p ,1	2- p ,2- p

Which solution? The hierarchy

- Is the presence of the Leviathan enough to produce always a cooperative outcome?

It depends...

A PD with the Leviathan

		Player B	
		Cooperate	Defect
Player A	Cooperate	3,3	1,4- p
	Defect	4- p ,1	2- p ,2- p

If the Leviathan chooses a punishment (p) enough large, the players will cooperate. How much should be p ?

A PD with the Leviathan

		Player B	
		Cooperate	Defect
Player A	Cooperate	3,3	1,4- p
	Defect	4- p ,1	2- p ,2- p

p should be larger than 1. **Why?** Players prefer not to defect when:

$$3 > 4-p \text{ and } 1 > 2-p.$$

This happens iff $p > 1$.

Which solution? The hierarchy

- Problem solved? Not necessarily...
- Some (relevant) problems:
- **FIRST:** the optimal equilibrium achieved by following the advice to centralize control is based on assumptions concerning monitoring capabilities and sanctioning reliability. **Without** valid and reliable information a central agency could make several errors
- Let's suppose now that the Leviathan is able to discover a non-cooperative behavior with probability "x". As a consequence, with probability "1-x" a free-rider is not discovered...
- This is a quite PLAUSIBLE assumption...how many crimes remain unsolved?

Which solution? The hierarchy

- In this situation, if player A defects and player B cooperates, then with probability “x” player A will expect to receive $(4-p)$, while with probability “ $(1-x)$ ” to receive (4) . As a consequence her **expected utility** is equal to: $(4-p)*x+4*(1-x)$
- Similarly, if both players defect, the expected utility of A (or B) is equal to: $(2-p)*x+2*(1-x)$

PD, Collective Goods and the Leviathan

		Player B	
		Cooperate	Defect
Player A	Cooperate	3,3	$1, (4-p)*x+4*(1-x),$
	Defect	$(4-p)*x+4*(1-x), 1$	$(2-p)*x+2*(1-x),$ $(2-p)*x+2*(1-x)$

How much should be **now** p to produce a NE where everyone cooperates?

PD, Collective Goods and the Leviathan

		Player B	
		Cooperate	Defect
Player A	Cooperate	3,3	1, $(4-p)*x+4*(1-x)$,
	Defect	$(4-p)*x+4*(1-x)$,1	$(2-p)*x+2*(1-x)$, $(2-p)*x+2*(1-x)$

It should be higher than $1/x$. As a consequence, if “x” is low, p must increase (a great deal), and viceversa

Which solution? The hierarchy

- Note that the Leviathan could also decide to **reward** rather than to punish players to produce a cooperative NE
- We call “**selective incentives**” those incentives given to single players according to their own behavior, regardless of what other players are doing
- Selective incentives can be or **negative** (punishment, as just saw) and/or **positive** (rewards)
- As a result, “selective incentives” are exactly as *private goods*: excludable and rival
- Let’s call “ b ” the reward given to those players that play cooperation (for example, the free journal that the Italian Society of Political Science sends me when I pay the annual fee)
- The game, and all its conclusions, remains the same as in the previous case

A PD with the Leviathan

		Player B	
		Cooperate	Defect
Player A	Cooperate	$3+b, 3+b$	$1+b, 4$
	Defect	$4, 1+b$	$2, 2$

If the Leviathan chooses a reward (b) enough large, the players will cooperate. How much should be b ?

A PD with the Leviathan

		Player B	
		Cooperate	Defect
Player A	Cooperate	$3+b, 3+b$	$1+b, 4$
	Defect	$4, 1+b$	$2, 2$

b should be larger than 1. Why? Players prefer not to defect when:

$$3+b > 4 \text{ and } 1+b > 2.$$

This happens iff $b > 1$.

Which solution? The hierarchy

- Problem solved? Not necessarily...
- Some (relevant) problems:
- **SECOND:** little consideration is given to the cost of creating and maintaining such an external central agency
- Why should a Leviathan make us a favour to act as our police guard?
- Usually there is an *exchange relationship* between the players and the Leviathan. The Leviathan always wants something back for his job...

PD, Collective Goods and the Leviathan

		Player B	
		Cooperate	Defect
Player A	Cooperate	$3-t, 3-t$	$1-t, 4-p-t$
	Defect	$4-p-t, 1-t$	$2-p-t, 2-p-t$

We can think about t as the taxes to pay for the services of the Leviathan. Therefore, **now** the presence of the Leviathan is always the favoured situation from the point of view of the players? Once again it depends...

Without the Leviathan			With the Leviathan		
	C	NC		C	NC
C	(3,3)	(1,4)	C	(3-t,3-t)	(1-t,4-p-t)
NC	(4,1)	(2,2)	NC	(4-p-t,1-t)	(2-p-t,2-p-t)



The NE in each game

Only when Leviathan's costs are not huge ($3-t > 2$, or $1 > t$) and when the punishment is enough large ($p > 1$ or $p > 1/x$ under uncertain conditions), the life of the players would be better with him rather than without him

Which solution? The hierarchy

- Evaluation of the Hierarchy solution:

- It is **incomplete**: it is true that the presence of the Leviathan, under given circumstances, could solve the Cooperator's Dilemma...

- Which conditions?

1. $p > 1/x$ (punishment must be enough large)

2. $t < 1$ (Leviathan cost must be enough small)

- *However...*

- ▶ ...who controls the controller?

- ▶ Controlling the controller is **once again a collective good**, given that everyone within a group enjoys that (i.e., having a well-behaved Leviathan)...

- ▶ Therefore, the Cooperator's Dilemma has moved simply a step behind...