Lecture #4  
4 October 2018  
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# Introduction

# Discussion

## Real-life examples that differ in problem structure terms used from last class

# Problem Structures: thinking about Incentives in Game Theory terms

## These follow Stein and Krasner readings.

## Games Notation:

### CELLS contain 2 Payoffs, i.e., value of the outcome to that player, with payoffs potentially different for each player - right hand number = Col’s payoff; left hand = Row’s payoff

### Columns and rows contain Strategies of one player

### Rs-s = payoff to “Row” of outcome when Row plays S and Col also plays S

### Cns-s = payoff to “Col” of outcome when Row plays not-S but Col plays S

### Higher numbers are “better”

### Games are simplified as two players but can usually have multiple players

|  |  |  |
| --- | --- | --- |
|  | C(ol) plays Strategy S | C(ol) plays Strategy of not-S |
| R(ow) plays Strategy S | Cs-s  Rs-s | Cs-ns  Rs-ns |
| R(ow) plays: Strategy of not-S | Cns-s  Rns-s | Cns-ss  Rns-ns |

## **Harmony** - no conflict situation where independent decisions lead to outcomes preferred by all parties. Preferences are independent or mutually beneficial. No institution needed because no conflict

|  |  |  |
| --- | --- | --- |
|  | Allow education of foreigners in your universities | Do not allow education of foreigners in your universities |
| Allow education of foreigners in your universities | 4  4 | 2  3 |
| Do not allow education of foreigners in your universities | 3  2 | 1  1 |

## **Deadlock** -- those interested can see end of lecture notes.

## **Positive externalities plagued by incapacity** – hard because incentives on one side to remedy may not be sufficient to generate solution to the problem because of incapacity.

### Problem is one of incapacity not incentives

### All states better off if cooperate to address problem but some states don’t have capacity

### States that have capacity must have enough interest to pay for others - capable have to “foot the bill”

### Examples: health care, particularly AIDS – all have incentives to prevent but nobody wants to pay.

|  |  |  |
| --- | --- | --- |
| Incapable state ==>  Capable state | Contribute to AIDS prevention | Don’t contribute to AIDS prevention |
| Contribute to AIDS prevention | not possible because state is incapable | 3  2 |
| Don’t contribute to AIDS prevention | not possible because state is incapable | 1  1 |

## **Upstream/downstream problem**

### Upstream states receive no direct benefits from cooperation and probably incurs costs to cooperate. Willing to cooperate only if receive sidepayments that outweigh these costs

### Very strong incentives for upstream states to renege on their commitments after agreement is reached - problems of obsolescing bargains

### Example: French reduction of pollution of the Rhine river, Canadian control of dams on the Columbia; nuclear weapons programs of weak (as “upstream”) states

|  |  |  |
| --- | --- | --- |
| Upstream state ==> Downstream state --vvv-- | Contribute to pollution reduction | Don’t contribute to pollution reduction |
| Contribute to pollution reduction | 1  4 | 3  2 |
| Don’t contribute to pollution reduction | 1  3 | 3  1 |

## **Suasion**-- those interested can see end of lecture notes.

## **Coordination** – easy because all states have incentives to agree and once states agree on how to cooperate, there are no incentives to defect. Example: English as common language for airline pilots and air traffic controllers; international ship navigation rules (sail on the right side of a sea-lane); assignment of domain names to avoid conflicts

### Two possible equilibriums, one of which benefits one side and one of which benefits the other but where both prefer cooperation to non-cooperation

### Examples: satellite slots, navigation rights, language for air traffic controllers, URLs for websites

### Stein calls this: “dilemma of common aversion and divergent interests”; Krasner: “Battle of Sexes”

### Krasner points out that resolution differs depending whether power is symmetric or asymmetric.

|  |  |  |
| --- | --- | --- |
|  | Train pilots in Row Language | Train pilots in Col Language |
| Train pilots in Row Language | 3  4 | 2  2 |
| Train pilots in Col Language | 1  1 | 4  3 |

## **Collaboration (Prisoners’ Dilemma)** – hard because although all states have incentives to agree, even after states agree on how to cooperate, there are still strong incentives to defect. Standard Prisoners’ Dilemma (PD) or Tragedy of the Commons.

### There are costs to both (or all) players of cooperating and the value of cooperating depends on all others contributing, so it makes little sense to contribute if nobody else does (since the goal won’t be accomplished, but it also makes little sense to contribute if everybody else does (since the goal will be accomplished even if you don’t contribute and you can save the cost of compliance)

### Both (or all) sides in the problem prefer mutual cooperation to mutual cheating but both prefer even more their own unilateral cheating

### Game assumes symmetry in the positions of the actors - both are assumed as polluters, which may not always be the case

### Examples: arms races, trade wars, OPEC price setting, many environmental problems particularly overharvest of a resource (e.g., fish, fur seals)

### Known as Tragedy of the Commons in environmental issues

|  |  |  |
| --- | --- | --- |
|  | Stop polluting | Continue polluting |
| Stop polluting | 3  3 | 4  1 |
| Continue polluting | 1  4 | 2  2 |

## **Assurance problems** -- those interested can see end of lecture notes.

## Capacity, knowledge and norms problems are not well-suited for placing in game theoretic terms but doesn’t mean they aren’t important. Just can’t fit them readily into these sorts of intellectual matrices.

# Questions 7 and 8

## Inherent transparency and ability to be clandestine

### Before any institution at all, does each actor know what other actor is doing?

### Security: nuclear weapons development vs. testing or war games

### Trade:

#### Tariffs and quotas CANNOT be undertaken without other side knowing about it.

#### Subsidies and NTBs CAN be undertaken without other side knowing.

#### Language of pilots/air traffic control or side of sea lanes driving in is always known

### Human rights

#### Civil/political rights violations (e.g., torture, disappearances) are done clandestinely

#### Economic/social rights violations (e.g., housing/food provision) much more transparent

## Response incentives: if there is a violation, do those harmed have sufficient incentives to respond or, instead, to tolerate it?

### Problems vary considerably in how much states are willing to tolerate violation. ONE violation of non-proliferation treaty creates major problems but frequent violations of tariff agreements do not cause agreement to fail. Human rights and environment cooperation can be violated and not be noticed.

### Weak incentives to respond to HR and environmental violations but strong for trade and VERY strong for weaponry

### Notice that in weapons agreements the “response” is implicit ending of agreement.

### Costs of not responding:

#### How much harm is inflicted on each actor? Is it a public harm or a targeted harm? Compare global environmental pollution or nuclear weapons development (harm everyone) vs. tariff increases (harm only countries on which tariff is imposed).

#### How much do victims care about the harm? Security threats are of greater concern than HR or environment threats

### Cost of responding:

#### Can those who want to respond to a violation target the response? Trade yes, security no.

#### Are sanctions likely to work and, if so, do the benefits to the sanctioner of them working exceed the costs to the sanctioner of imposing them

# Conclusion

## How to think systematically about different incentive structures

## Next class will develop other parts of problem structure

Other games -- for those who are interested.

## **Deadlock** – most basic and unrepentant form of conflict. No middle ground. Interests are diametrically opposed. Zero sum conflicts.

### Both sides have an unambiguously preferred strategy which involves harming the other side.

### Although both sides preferred OUTCOME (the cell) is the other side stopping from engaging in the conflict while they continue (i.e., kill them without being killed in exchange), if they can’t have that, they prefer continuing the conflict over halting it

### Although Deadlock can become another game over time, and then may be subject to cooperation, so long as preferences are truly Deadlock preferences, there is no resolution

### Examples: ancient hatreds, ethnic violence, conflicts over values (e.g., whaling?)

|  |  |  |
| --- | --- | --- |
|  | Stop engaging in conflict | Continue engaging in conflict |
| Stop engaging in conflict | 2  2 | 4  1 |
| Continue engaging in conflict | 1  4 | 3  3 |

## **Suasion problems** – really hard because some states have no incentives to agree and even if they do agree, they still have incentives and ability to defect.

### Both strong and weak states benefit from cooperation but strong state is willing to provide all of the benefits without help but prefers that weaker states contribute

### Weaker states have “a strong incentive to free-ride, knowing that public goods… will nevertheless be provided” [Martin, 1992 #1964].

### Example: burden sharing of security in Europe during Cold War (or burden sharing for Iraq war)

|  |  |  |
| --- | --- | --- |
| Weak state ==> Strong state --vvv-- | Contribute to defense or pollution reduction | Don’t contribute to defense or pollution reduction |
| Contribute to defense or pollution reduction | 3  4 | 4  3 |
| Don’t contribute to defense or pollution reduction | 2  2 | 1  1 |

## **Assurance problems** - All states want to collaborate and believe they will be better off if they do, but they lack perfect information and so may fail to coordinate their behavior by accident and because of excessive lack of trust.

### Problem is one of imperfect information, not one of incentives

### War games and pre-announcing them. Each country wants to make sure that other state knows it is only doing a war game and not actually attacking.

|  |  |  |
| --- | --- | --- |
|  | Announce war game | Don’t announce war game |
| Announce war game | 4  4 | 3  1 |
| Don’t announce war game | 1  3 | 2  2 |