Resource Management:
INSTITUTIONS AND INSTITUTIONAL DESIGN

SOS3508

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A grammar of institutions
Why classify generic rules?
Classifying rules

NTNU, Trondheim
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Literature

Ostrom, Elinor 2005, *Understanding Institutional Diversity*, Princeton University Press, Princeton, Ch 5-7

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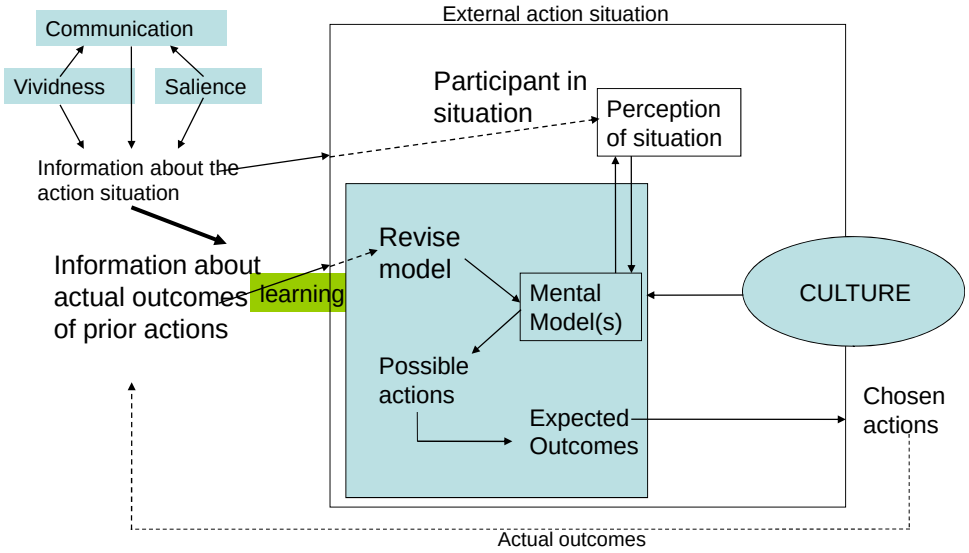
Impact of communication, vividness and salience



Adapted from Figure 4.2 from Ostrom 2005:108

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Institutional statements

- Shared strategies, norms, rules: what is the difference?
- Rules-in-force vs Rules-in-use
- Institutional statements as attributes of a community (norms, shared strategies)
- Institutional statements as rules
- Changing rules is often easier than changing the bio-physical world
- Two ways of expressing rules:
  - Generative rules: “Let there be an X” (e.g. creating positions)
  - Regulative rules: regulative rules will be the focus …

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The Syntax of a Grammar of Institutions

- ADICO
- A: attribute [default: all participants/ positions]
  - Any value of a participant level variable that distinguishes to whom the institutional statement applies
- D: deontic (déon= that which is binding or proper)
  - One of three modal verbs: may (or permitted), must (or obliged), must not (or forbidden)
- I: aim
  - Describes particular actions or outcomes of actions to which the AD is assigned
- C: conditions [default: everywhere and all the time]
  - Variables describing where and when the ADI applies
- O: or else
  - Consequences of not following the ADIC stipulations

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Shared strategies, Norms, Rules

There are 5 elements of ADICO

- **Shared strategies** contains 3 elements: AIC
- **Norms** contain 4 elements: ADIC
- **Rules** contain all 5 elements: ADICO

- All rules can be rewritten as [attributes] [deontic] [aim] [conditions] [or else]

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Attributes

- Defines how an institutional statement applies to all or to a subset of the participants/ positions in an action situation
- Default: if nothing is said all participants/ positions are included
- The attribute component maps the authority or prescription of an institutional statement to particular positions or to all positions
- This implies that there are other institutional statements assigning participants to positions
- There is always a default value of the attribute

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Deontic logic

- D (= the set of deontic operators) = (P, O, F)

- P (=permitted) [= tillate] (action a can be done if the actor wants)
- O (=obliged) [= påbode] (action a has to be done by the actor)
- F (=forbidden) [= forbode] (action a cannot be done by the actor)
  - Actor is defined by the attribute

- Deontic operators are logically interrelated. Symbols used are to be read:
  - ∩ = intersection: only elements from both sides are valid,
  - U = union: all elements from both sides are valid,
  - Ø = empty set)
  - ~ means negation , sometimes it is written ¬
  - See http://en.wikipedia.org/wiki/Table_of_mathematical_symbols

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Deontic operators (D)

- D = P ∪ O ∪ F
- F∩P = Ø
- O∩P = O
- F∩O = Ø
- If O then P

- Deontic operators relate to the physically possible (e.g. in actions, outcomes, communication channels, …)
- Deontic operators are interdefinable: based on
- [P][a] [= action a is permitted], then it follows
  - [F][a] = [~P][a] and [O][a] = [~P][~a]

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Permission rules affect actions situations

Permission rules affect opportunities and constrains in action situations

- Permission rules usually establish conditions where permission exist
- Permission rules may sometimes constitute an action (create a social reality) [citizen X may **vote** for candidates to the Parliament]
- If permission is defined as a right to act it implies that others have duties to recognize this right

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Rights and duties
The “Hohfeld-Commons” conception

Defining the relation (jural correlates)		**and it’s limit** (jural opposite)
OWNER	NON-OWNER	
claim-rights	duties	exposure
liberty	exposure	duties
powers/ authority	liability	disability/ no authority
immunity	disability/ no authority	liability

Ref.: Hohfeld, W. N. 1913. & .1917. *Yale Law Journal*
Commons, John R. 1932. Legal Foundation of Capitalism.

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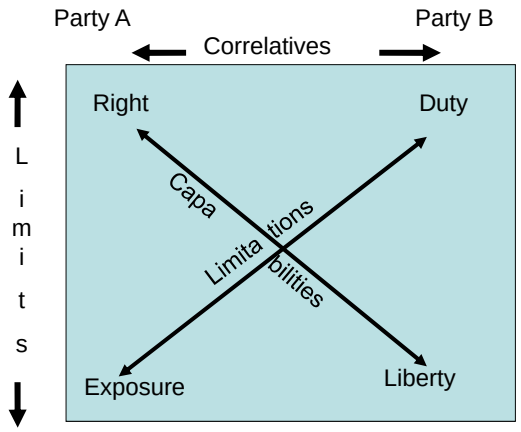
Authorised relationships: authority to act



Source: V.Ostrom and E.Ostrom 1999:46

- Rights depends on correlative duties.
- Rights have limits. Stepping over the limit the claimant is exposed.
- Duties have limits. Outside the limit the duty bearer has liberties.
- Liberties depend on correlative exposures.

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Deontic: limits and correlatives

- Correlatives –means reciprocity in relations
  - If something is permitted for actor A it implies that some actor that is not A (~A) has an obligation, or duty, to ~F (not forbid) this something for A
- Limits – of a right defines the area of decision making outside of which a claimant stands exposed. Non-claimants are at liberty to inspect and verify that the claimant is within the bounds of his or her rights. If that is verified they have the duty not to interfere with the exercise of the right. If the claimant is not within the bounds of his rights the non-claimant is at liberty to act on that information

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Deontics in formal game analysis

- Institutional statements including deontics imply that payoffs are seen as different from situations where there just is a shared understanding of the situation
- This is captured by adding a **delta parameter** representing the rewards or costs of obeying (o) or breaking (b) a prescription:

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Delta parameters added to payoffs I

- $\Delta = \delta^o + \delta^b$
- Δ = sum of all the delta parameters
- δ^o = the change in expected payoff from *obeying* a prescription
- δ^b = the change in expected payoff from *breaking* a prescription

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Delta parameters added to payoffs II

- The changes in payoff can further usefully be divided into externally and internally generated payoffs, indexed by e and i (ref.: Coleman 1987)
- $\delta^o = \delta^{oe} + \delta^{oi}$
- $\delta^b = \delta^{be} + \delta^{bi}$
  - Internal forces affecting the size of the delta
    - If breaking the norm: shame, guilt;
    - If obeying the norm: pride, warm glow
  - External forces affecting the size of the delta
    - If breaking the norm : fine, exclusion, ostracism, physical punishment;
    - If obeying the norm : pride, warm glow

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A/M, CONDITIONS, OR ELSE

- The A/M part of an institutional statement specifies the actions or outcomes to which the action is directed (process, formula, state of the world, outcome). It must be physically possible, more than one outcome must be possible and both action and inaction must be allowed.
- CONDITIONS defines when and where the institutional statement applies. **Default** is everywhere and all the time.
- OR ELSE specifies what happens in case of non-compliance

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Rules defined by “OR ELSE”

1. **Requires a sanction** that is decided in a collective choice situation, often sanctions are graduated depending on some conditions
2. Must be backed by another rule or norm that changes the DEONTIC assigned to some A/M for at least one actor if individuals fail to follow the rule: This is the **sanctioning prescription**
3. This SP requires a norm or rule that affects the constraints and opportunities facing an actor or actors to take the responsibility to monitor the conformance of others to the prescription: the **monitoring prescription**

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Using the grammar in game-theoretic analysis I

- In game theory the games without norms or rules uses a concept of strategy conforming to AIC [attribute][*a*i*m*][conditions]
- To analyse games with norms or rules delta parameters need to be included
- Including players doing enforcing requires a delta parameter assigned to the action “not sanctioning”
- Using enforcement players also requires a monitoring rule and a monitoring player

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Using the grammar in game-theoretic analysis II

- Costly sanctioning/ monitoring may require that
  - Monitors/ sanctioners face the possibility of being subject to sanctions
  - There is a large and salient pressure to monitor/ sanction (large external deltas)
  - Monitors/ sanctioners hold strong moral commitment (large internal deltas)
  - Payments to monitors/ sanctioners create prudent awards high enough to offset costs
- When an “OR ELSE” clause is backed by norms, the monitoring and enforcement rests solely on normative delta parameters and payment schemes for monitors and sanctioners

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Collective action problems

- Two person prisoner dilemma

Statements about rules are on the form [A][D][I][C][O]

1. Base game: No institutional statements
2. Shared strategies game: AIC Statements:
   a. [All players] [] [Cooperate] [first round] []
   b. [All players] [] [Cooperate] [if all C in previous round] []
   c. [All players] [] [Defect] [all rounds after a D] []
3. Norms game: ADIC statement:
   a. [P1 and P2] [must] [Cooperate] [always] []
4. Rules game: ADICO statements:
   a. [P1 and P2] [must] [Cooperate] [always] [f(= fine)]
   b. ADIC statements:
      1. [P3] [must] [monitor] [always] []
      2. [P4] [must] [impose f on defector] [when P3 reports a D] []

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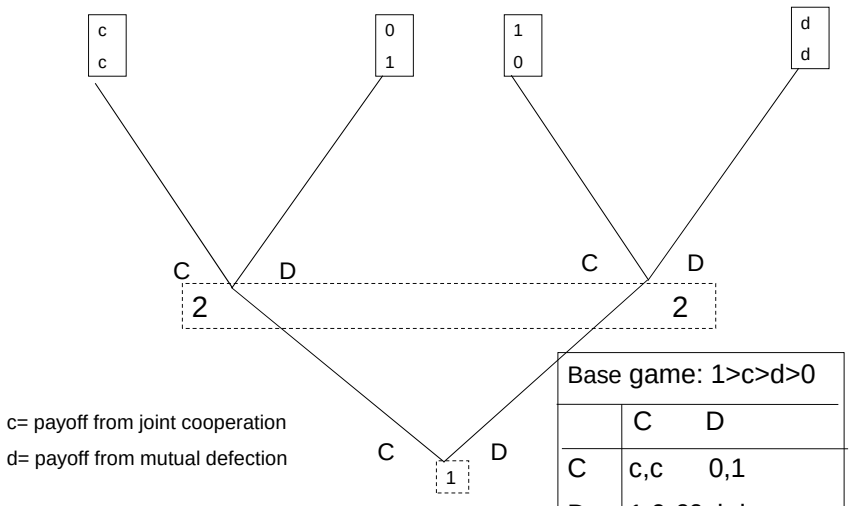
Base game payoff



c= payoff from joint cooperation

d= payoff from mutual defection

Base game: 1>c>d>0		
	C	D
C	c,c	0,1
D	1,0	d,d

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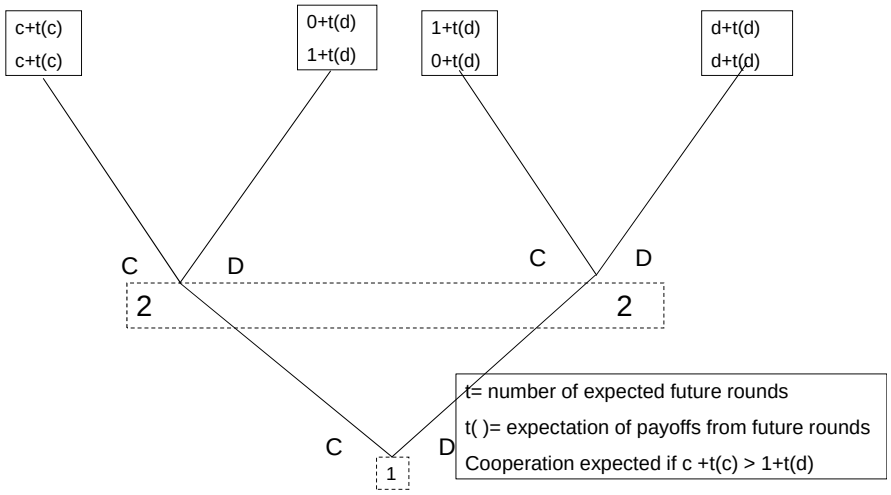
Shared strategies payoff



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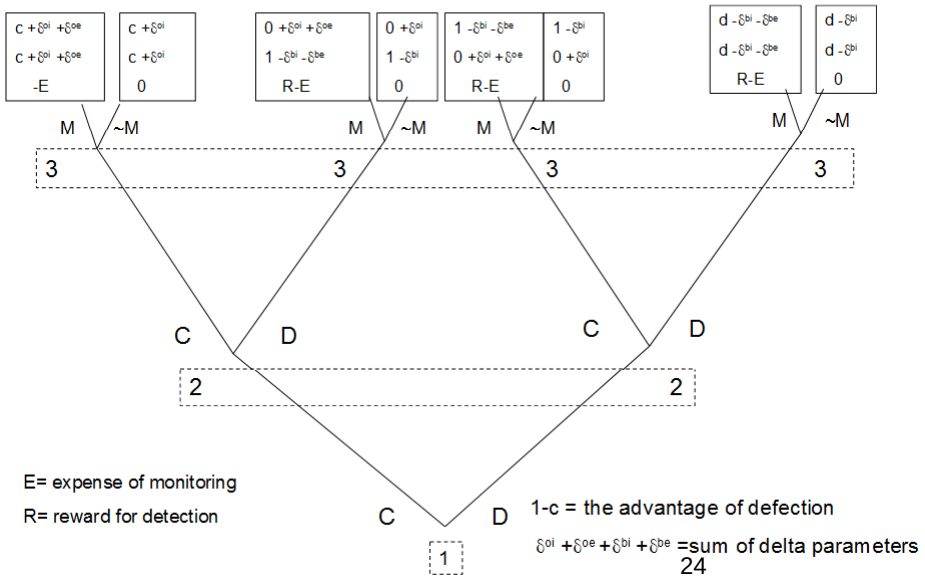
Game with a norm and monitoring



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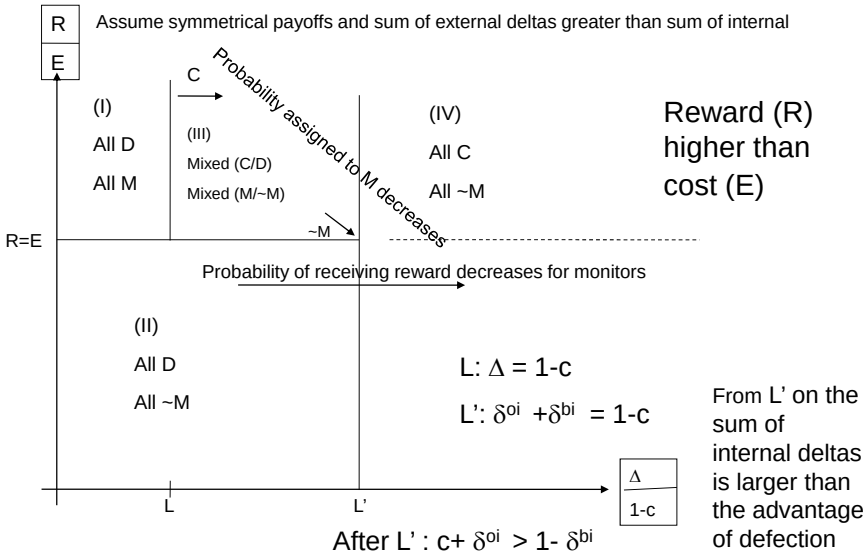
Equilibrium diagram in game with norm and monitoring



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Rules changing a PD base game

Predictions of cooperation must be based on

- Changes in payoffs due to at least one delta parameter
- Addition of institutionally assigned consequences for breaking a rule: e.g.
  - Rule: [Players 1&2] [must] [cooperate] [always] [OR ELSE f]
- The possibility of detection
- At least one player has the authority to monitor:
  - Norm: [Players 3] [must] [monitor] [always] [ ]
- At least one player has authority to impose the fine [OR ELSE f]:
  - Norm: [Players 4] [must] [impose f on a player] [when player 3 reports that player has defected] [ ]
- The base game payoffs

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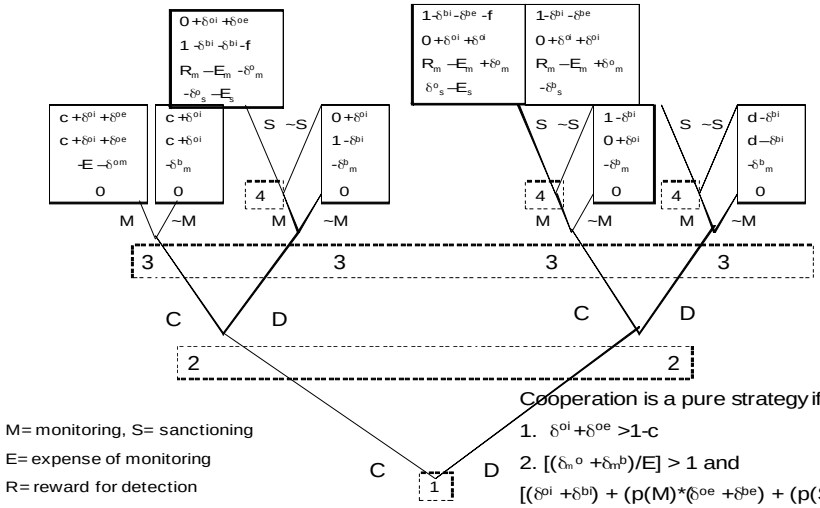
Game with a rule; monitoring and sanctioning norms



M= monitoring, S= sanctioning
E= expense of monitoring
R= reward for detection

Cooperation is a pure strategy iff
1. $\delta^{oi}+\delta^{oe}>1-c$
2. $[(\delta_m{}^o+\delta_m{}^b)/E]>1$ and
$[(\delta^{oi}+\delta^{bi})+(p(M)*(\delta^{oe}+\delta^{be})+(p(S)*f))>1-c]$

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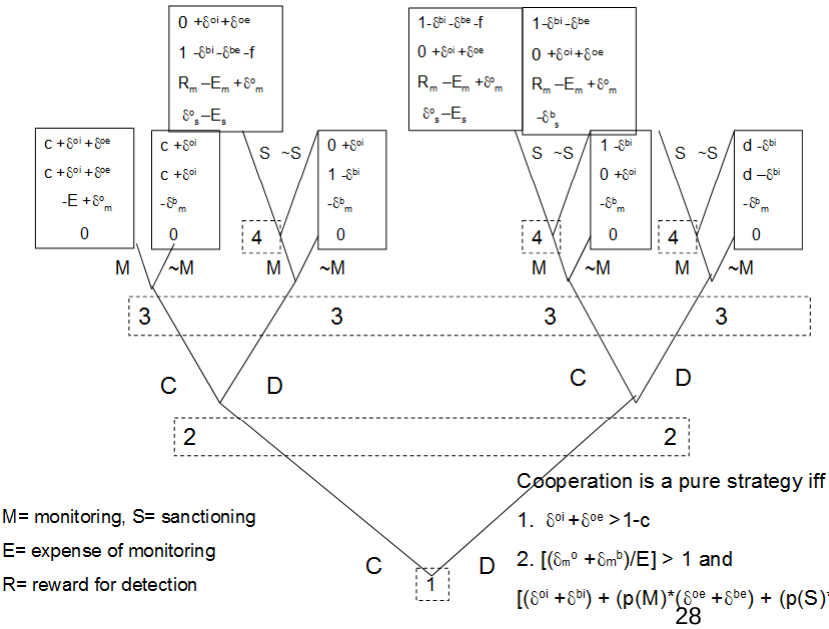
Game with a rule, monitoring and sanctioning norms



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$[(\delta^{oi}+\delta^{bi})+(p(M)*(\delta^{oe}+\delta^{be})+(p(S)*f))>1-c]$

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Using the grammar I

Disentangling formal laws, informal institutions and ordered behaviour: ADICO and delta parameters

- Is there a shared understanding?
- If there is an “OR ELSE” clause, what about monitoring and sanctioning?

< p167 note a printing error: b^e should be δ^{be} >

- Legitimacy and compliance (legitimacy linked to internal δ)
  - How are internal deltas and “OR ELSE” related?
  - Are there limits to formal rules?

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Using the grammar II

- Basic normative assumptions
  - Sign, size and interpretation of deltas
    - Warm glow, honour, duty, social sanctions, moral duty, reputation, fairness, ---
  - Types of players and numbers conforming reflected in deltas
    - Zealot, egoist, everyday Kantian, elite, or mass participant,
  - Creation and maintenance of deltas
    - Are Δ resources that deteriorate or increase by use? Impact of external agents?

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Using the grammar III

- Freedom and constraint (Ulysses and the Sirens)
  - Rules define rights and duties
- Institutional configurations (systems of rules, norms, etc.)
  - Rules are nested and linked
- Field studies:
  - Listen for normative discourse (prudence or obligation)
    - From what is “best” to what is “proper” signify a shift from strategy to norm
  - The “know and use” condition for formal/ written prescriptions
  - Precision of institutional statements and scale of problem

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Next steps

- Delta parameters arise from commitments to the norms and rules of a community
- They do not incorporate concern for the welfare of other community members
- How can this be incorporated?
- How does this way of analysing institutions relate to a theory of knowledge and a theory of action?

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Why classify generic rules? I

- Solve babbling equilibrium problems: clarify meaning
  - Case: North clarifying the difference between organisation and institution
- Needs of policy analysts in reforms
  - Syntax and semantics of rules, or
  - How to write rules achieving a purpose
- Moving beyond slogan words in descriptions
  - What do we mean when we say privatization or centralization?

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Why Classify Rules? II

- Coping with the diversity of rules
  - Diversity needs trial-and-error approaches to rule change
  - Reversion levels, default rules, lack-of-agreement rules determining outcomes of negotiations
- Rules as information/ transformation/ transmission mechanisms have errors in reproduction
  - Rules repeated across a diversity of rule configurations work better
- Universality of rules structure in action situations

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Classifying rules

- The horizontal approach (at operational choice level):
  - Using the direct A/M for classification (main focus here)
- Also the vertical approach (collective and constitutional choice levels):
  - J. R. Commons: authorised vs. authoritative relationships
  - Levels of authoritative relations (operational, collective choice, constitutional choice)
- The ADICO formula for a regulatory rule suggests that classifying by the AIM might be most useful
  - "[ATTRIBUTES of participants] who are [OBLIGED, FORBIDDEN, OR PERMITTED] to [ACT in a certain way or AFFECT an outcome)] under specified [CONDITION], [OR ELSE]"

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Elements of action situations

Participants and ***actions*** are assigned to ***positions***

Outcomes are linked to actions

Information is available about ***action-outcomes linkages***

Control is exercised over action-outcome linkages

Costs and benefits are assigned to action-outcome linkages

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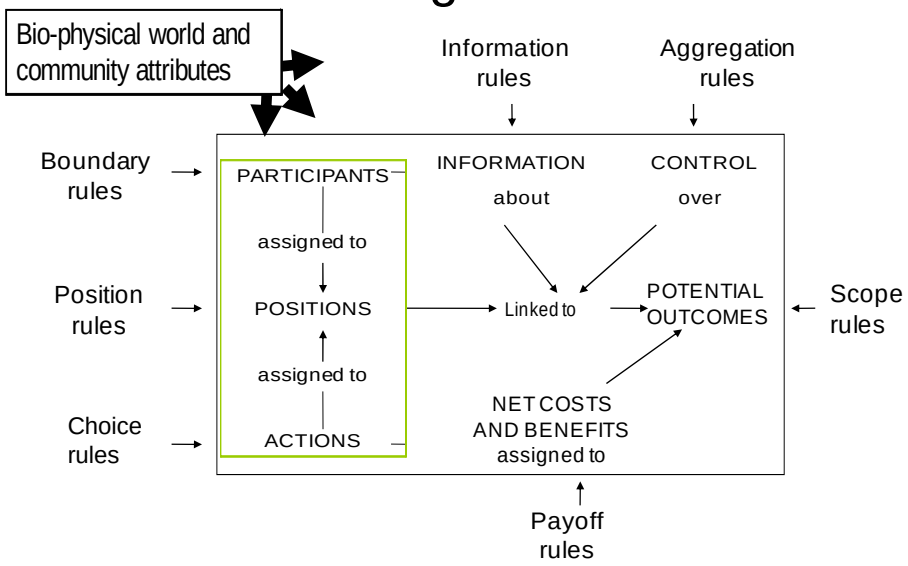
Rules affecting action situations



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The AIM component of each type of rule

Type of rule	Basic AIM verb	Regulated component of the action situation
Position	Be	Positions
Boundary	Enter or leave	Participants
Choice	Do	Actions
Aggregation	Jointly affect	Control
Information	Send or receive	Information
Payoff	Pay or receive	Costs/Benefits
Scope	Occur	Outcomes

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Types of rules (1)

- Position rules
  - Creates positions to which participants are assigned and where sets of actions are authorised
  - Number of participants: limits?
- Boundary rules
  - Specify who may or must enter positions, the process of determining eligibility, and how to leave
  - Rules related to multiple positions (e.g. soccer team)
  - Succession rules
  - Exit rules

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Types of rules (2)

- Choice rules (of actions)
  - Says what a participant in a particular position must, must not or may do under specified conditions
  - Actions (AIM) relating to Position, Boundary, Aggregation, Information, Payoff, or Scope rules are not included in choice rules
  - Choice rules create power that may be distributed equally or unequally

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Types of rules (3)

- Aggregation rules when joint decisions are required
  - Non-symmetric aggregation rules (expert/ dictator, oligarchy, weighted votes)
  - Symmetric aggregation rules (unanimity, majority, anyone)
  - Lack of agreement rules - also called default condition - (e.g. continue as before, no one receives any outcome, assign state variables at random, external decision maker) **Type of no agreement rule heavily affects outcomes in experiments**

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Types of rules (4)

- Information rules
  - Channels of information flows (required, prohibited, permitted)
  - Frequency and accuracy of information
  - Subject of communication
  - Official language
- Payoff rules
  - Paying or receiving something of potential value

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Types of rules (5)

- Scope rules (define the set of outcome variables that must, must not or may be affected by actions taken within the situation, including their permitted rang of variation)
  - Rules with AIMs tied to positions, boundaries, information, payoffs or aggregation are not counted as scope or choice rules
  - Rules with action AIMs are choice rules,
  - Rules with outcome AIMs are scope rules
  - In the real world choice rules are more used and studied than scope rules

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The default condition when no rules exist: The Hobbesian "state of nature" (the "snatch" game)

Default Position Condition	**One position exist.**
Default Boundary Condition	**Anyone can hold this position.**
Default Choice Condition	**Each player can take any physically possible action (this requires default aggregation).**
Default Aggregation Condition	**Players act independently. Physical relationships present in the situation determine the aggregation of individual moves into outcomes.**
Default Information Condition	**Each player can communicate any information via any channel available to the player.**
Default Payoff Condition	**Any player can retain any outcome that the player can physically obtain and defend.**
Default Scope Condition	**Each player can affect any state of the world that is physically possible.**

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Rules defining property rights for exchange of agricultural commodities in the Snatch game

Position Rules	**There exist two positions:** • **an eligible exchange participant and (2) a judge**
Boundary Rules	• **All farmer households are permitted to become exchange participants or else those refusing their entry may be punished** • **The judge must be elected on the basis of merit and integrity by the households in the community or else the other rules will not be in effect.**
Choice Rules	• **All exchange participants are permitted to offer to exchange goods they own for goods owned by others or else those forbidding the exchange must be punished** • **If a household's goods are snatched, the household can report to a judge or else those preventing the report may be punished** • **If a judge finds that a household has snatched goods illegally, the judge must ensure that the illegal household returns the goods and forfeits its own commodities or else the judge will be sanctioned.**
Aggregation Rules	**All parties to an exchange must agree before a legal exchange can occur or else the exchange does not occur.**

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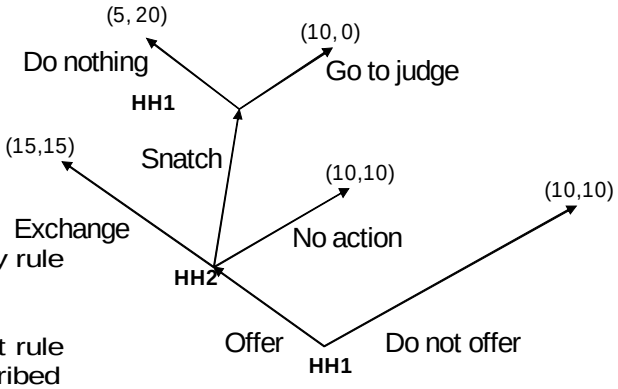
Transforming the snatch game



1. In the absence of any rule directly affecting an element of an action situation, the relevant rule in place can be described by a default rule.
2. **When all rules are in their default, the attributes of the physical world generate all aspects of the structure of the action situation. This is the Hobbesian "state of nature".**
3. **Rules operate together with the attributes of a physical world to create a structure**

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The vertical dimension of rules

- Authorised relationships occur by using
- Operational rules created by
- Collective choice rules crafted by
- Constitutional rules accepted by all
- Collective choice and constitutional choice create authoritative relations
- **Policy implications**
- Changing rule configurations to achieve agreed upon policy objectives is no simple task

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