Resource Management:
INSTITUTIONS AND INSTITUTIONAL DESIGN

SOS3508

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Introduction

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Problems in the world

- War
- Injustice
- Poverty
- Illness / Public Health
- Democracy/ Governance
- Environmental degradation
- Climate change

Why?
What can be done?

First task

- To understand why a solution to some core problems in the world require more than good will and impeccable moral rectitude
- In this class I will argue that the problems called social dilemmas are of this kind
- So, what is a social dilemma?

Defining social dilemmas

- A social dilemma is a situation where the private return to an optimal strategy based on the assumption that all follow their optimal strategy without regard to what others do, is less than a share from the joint product of a cooperative strategy.
- But if you are the only one following the optimal individual strategy your return is substantially larger than a share of the joint product of a cooperative strategy.

Second task

- Understand why some societies avoid many serious problems of the social dilemma type
- In class I will argue that the key factor are social institutions
- So, what is an institution?

Elements of institutions

- Institutions comprise
  - A substantive area of operation
  - A system of legitimate rules
  - A group of enforcers (persons) with legitimate interest in the interpretation and application of the rules
  - A group of actors pursuing their goals within the substantive area constrained by the system of rules
- An institution is in principle of relevance for all members of the social system

Third task

- Understand why societies have difficulty improving their institutions
- In this class I will argue that at the core of this problem lies the self serving interests of those who profit from the current institutional structure.
- This is also called “path dependence”

Expectations

- I have now explained what I expect to spend time on in this class
- What did you expect to learn coming here?

Structure of class

- Lectures and seminar
  - No meetings 5 and 12 November
  - Last time 19 November
- Seminar discussions including one presentation from Elster Ch 18-26
  - Scheduled for 22-29 October
- Writing
  - Book review of Diamond or Reinert
    - Deadline 20 October
  - Term paper - topic based on class readings
    - Deadline 23 November

Required reading

- Elster, Jon. 2007. *Explaining Social Behaviour: More Nuts and Bolts for the Social Sciences*. Cambridge: Cambridge University Press.
- Henrich, Joseph, and Natalie Henrich. 2007. *Why Humans Cooperate A Cultural and Evolutionary Explanation*. Oxford: Oxford University Press.
- North, Douglass C. 2005. *Understanding the Process of Economic Change.* Princeton: Princeton University Press.
- Ostrom, Elinor. 2005. *Understanding Institutional Diversity.* Princeton: Princeton University Press.
- Rothstein, Bo. 2005. *Social Traps and the Problem of Trust*. Cambridge: Cambridge University Press.

Advice on reading (1350 pages)

1. Henrich & Henrich Ch 10, Ostrom Ch 1-4
2. Elster Ch 1-14, Rothstein Ch 1-3
3. Elster Ch 18-26, Rothstein Ch 4-9
4. Henrich & Henrich Ch 1-3, Elster Ch 15-17
5. Henrich & Henrich Ch 4-9
6. Ostrom Ch 5-9
7. North Ch 1-13

Literature

Ostrom, Elinor 2005, *Understanding Institutional Diversity*, Princeton University Press, Princeton, Ch 1-4

- Understanding the Diversity of Structured Human Interactions
- Zooming in and Linking Action Situations
- Studying Action Situations in the Lab
- Animating Institutional Analysis

What are institutions?

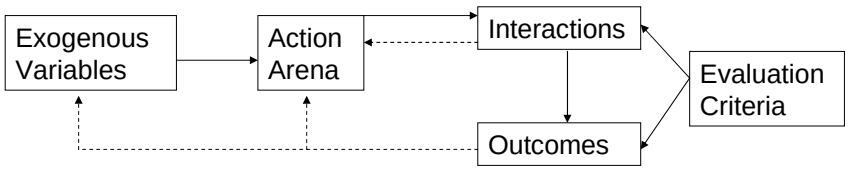
- Institutions are the prescriptions that humans use to organise all forms of repetitive and structured interactions, including those within families, neighbourhoods, markets, firms, sports leagues, churches, private associations, and governments at all scales
  - Great diversity of institutions
  - Great diversity of scientific approaches
  - IAD (institutional analysis and development) framework

Holons

- The term holon may be applied to any stable sub-whole in an organism or social hierarchy, which displays rule-governed behaviour and/ or structural Gestalt constancy
  - Environment
  - System
  - Sub-system

In repeated layers: multilevel complex systems

Holon: The action arena

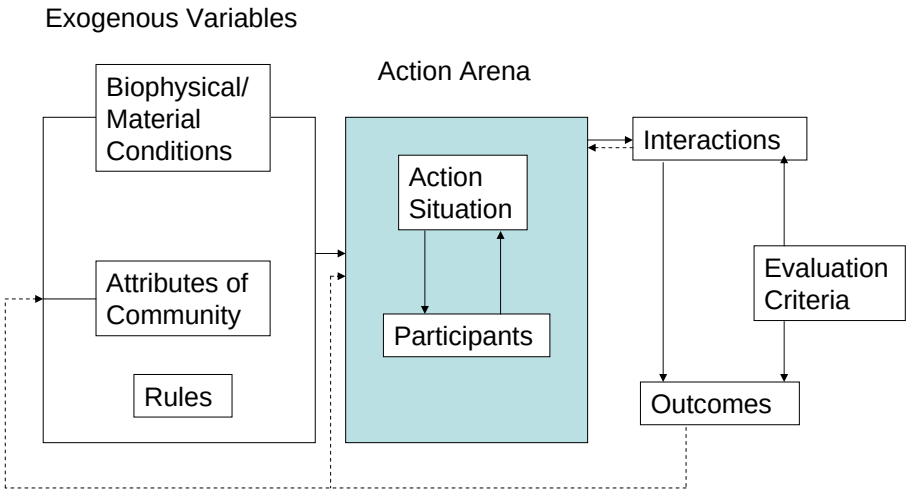


The action arena will be the focal unit for our discussion

Examples of evaluation criteria:

- **Positive utility of outcome**
- **Outcome seen as unfair or inappropriate**
- **Other feasible procedures will give more utility**
- **Procedures used seen as unfair**

The environment of action situations



The action arena

The action situation:

- Positions
- Potential outcomes
- Available actions and action-outcomes linkages
- Control over outcomes
- Information generated in the situation
- Cost-benefit attached to actions and outcomes

The participant (individual or corporate unit)

- Preferences
- Status/ command of resources
- Individual attributes
  - Age, sex, education, culture, etc
- # participants in the situation

Rules I

- Rules, written or unwritten, may be used about
  1. Regulations (prescriptions, prohibitions, permissions)
  2. Instructions/ recipes/ strategies
  3. Precepts/ advice for moral behaviour (norms)
  4. Principles/ laws of nature
- Regulations provide the participants with a shared understanding of what actions/ outcomes are prescribed/ prohibited or permitted

Rules II

- Rules are the result of explicit or implicit efforts to create order and predictability among humans by
- Creating positions who are required, permitted or forbidden to take classes of
- Actions in relation to outcomes that are required, permitted or forbidden, or face the likelihood of being
- Monitored and sanctioned in a predictable fashion

Rules III

- Origin of rules
  - Self-organised groups
  - Externally imposed rules
  - Evolution (from problem solving to designed rules)
- Working rules
  - Rules justifies actions
- Predictability of rules
  - Depends on shared meanings since rules are not self-formulating, self-determining, or self-enforcing
  - System of enforcement
  - System of creation

Biophysical and material conditions

Attributes of goods produced, distributed or consumed
- Excludability of outcomes
  - Free riders
- Divisibility of outcomes (subtractability)
- Transferability of utility

Classification of goods (bads), entities that people want to obtain (or avoid)

- **Subtractability**
  - Intrinsic
  - Technology dependent
  - Depletable or reproducible
- **Excludability**
  - Intrinsic
  - Technology
  - Political choice

		Sub tract ability	
		Low	High
Ex clud ability	Low	Public	?
	High	?	Private

Community and culture

COMMUNITY
- Size and composition of population
- Values in the local culture
- Common knowledge and understanding of various action situations
- Degree of homogeneity of preferences

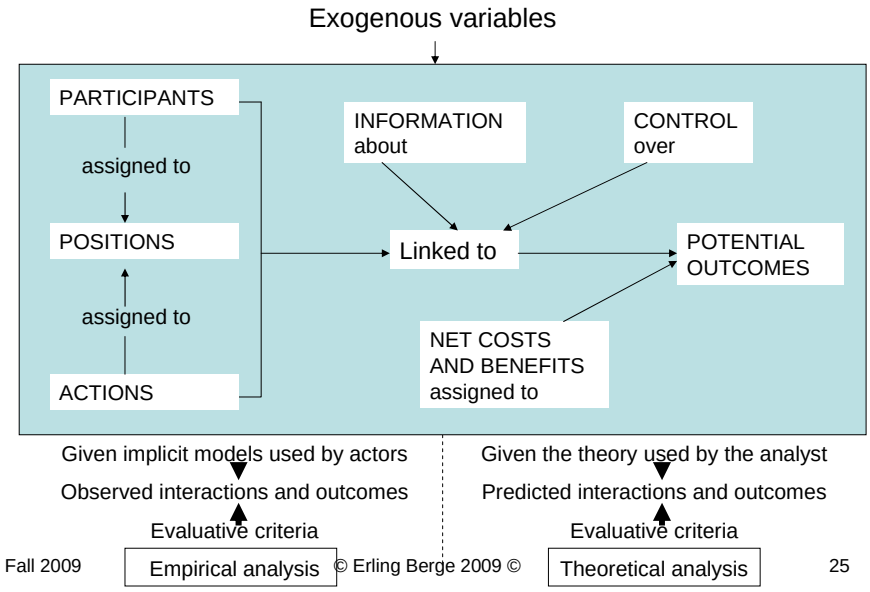
CULTURE
- Affects costs of interaction
- Reputation, trust, etc

LANGUAGE

Action situations

- Two or more individuals facing a set of actions that jointly produce outcomes can be analysed by studying
  - Participants
  - Positions
  - Potential outcomes
  - Available actions and action-outcomes linkages
  - Control over outcomes
  - Information generated in the situation
  - Cost-benefit attached to actions and outcomes
- They can be evaluated empirically by observation of interactions and outcomes (use of implicit models)
- They can be evaluated theoretically by predicting interactions and outcomes (use of theory)

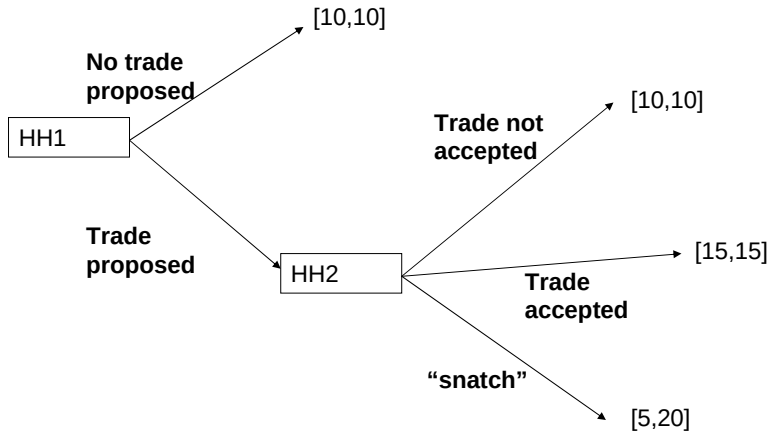
The internal structure of action situations



The "snatch" game

- "state-of-nature" = no rules apply, no common understanding or norms
- Household 1 (HH1) produce 10 bags of potatoes
- Household 2 (HH2) produce 10 chickens
- Both HH1 and HH2 prefer to eat chicken and potatoes
- In the "state-of-nature" they have a social dilemma:
  - That is a situation where the private return to an optimal strategy based on the assumption that all follow their optimal strategy without regard to what others do is greater than a share from the joint product of a cooperative strategy

The “snatch” game: illustration of action situation



The working parts I

- **Participants**
  - Numbers, individuals or teams
    - A team require collective action, members intend a joint product or have a common purpose
  - Groups, aggregates of individuals or teams
    - If there is variable strength of interest we may get frequency dependent behaviour
  - Attributes: sex, age, education, ...
- **Positions authorise actions**
  - Roles, participants may have more than one
  - Roles allows, prescribes of prohibit actions
  - Participants may or may not choose entry or exit from positions

The working parts II

- **Potential outcomes**
  - Status quo outcome
  - Biophysical outcomes, external payoffs, internal valuations may have to be assessed separately
  - The opportunity of a situation: range of value in outcomes
- Available actions and action-outcomes linkages
  - Actions: actors choose one from the set of possible actions. The choice of no action is an option
  - Action-outcome linkages: action(s) will "produce" the outcome to some degree (transformation function), control variables
  - Certainty, link is known
  - Risk, probability distribution of outcomes are known
  - Uncertainty, the relation between action and outcome is indeterminate (interdependent actions, number of possible outcomes too large)
  - Uncertainty, risk and certainty are structural characteristics of the situation (not dependent on information)

The working parts III

- Control over outcomes
  - Power = control * opportunity
- Information generated in the situation
  - Complete
    - Perfect: all actions known to all participants
    - Imperfect: the complete situation but not the decisions of other participants
- Incomplete "Who knows what at what juncture"
  - Opportunistic behaviour: deceitful behaviour to improve ones own outcome to the detriment of others
  - Asymmetric information problems
    - Principal — agent problems
    - Moral hazard — whenever risk is to be shared

The working parts IV

- Cost-benefit attached to actions and outcomes
  - Material costs from choosing particular actions
  - Internal valuations of particular actions
  - Material rewards from particular outcomes
  - Internal valuations of particular outcomes
  - Material or internal valuations of the action path chosen
  - Internal valuations: shame, regret, joy, guilt
  - Decisions based on net value (utility)
- Number of repetitions of action situation
  - One time, finite number of times, indefinite repetition
  - Tit-for-tat in symmetric social dilemmas
  - Heuristics for asymmetric social dilemmas

Linking Action Arenas

- Sequential linkages of arenas
  - Facilitates building of reputation for reciprocity
- Simultaneous arenas
- Organisational links, (appears as trees or lattices) long complex chains where output from one arena is input to another
- Competitive links
  - Adaptations to other participants
  - Market interactions (rule governed competition)
- Levels of action arenas: rules at deeper levels are part of the structure of action arenas at a given level
  - Operational — interpreting rules
  - Collective-choice — making rules
  - Constitutional choice — making rules about rules making
  - Meta constitutional choice — procedures for making rules about rules making

Levels of analysis

Environmental characteristics that directly affects the situation

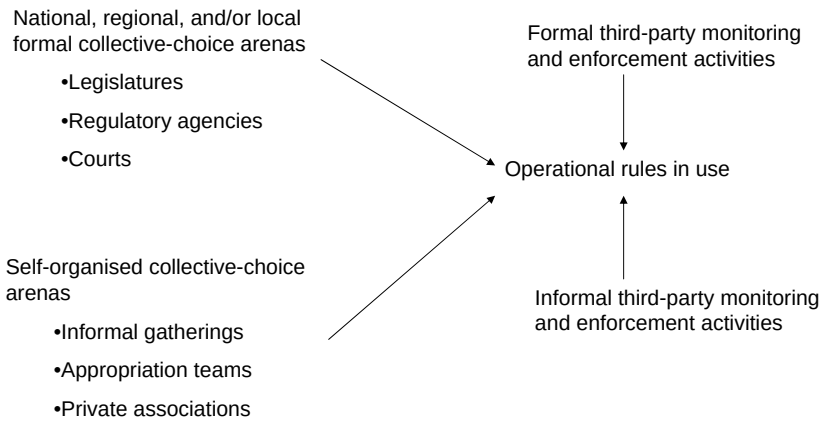
For level 1-3:
- RULES IN USE
- BIOPHYSICAL WORLD
- COMMUNITY

For level 4:
- BIOPHYSICAL WORLD
- COMMUNITY

Individual actions taken that directly affects state variables in the world or the situation:

1. OPERATIONAL SITUATION
   - Provision, production, distribution, appropriation, assignment, consumption
2. COLLECTIVE CHOICE SITUATION
   - Prescribing, invoking, monitoring, applying, enforcing
3. CONSTITUTIONAL CHOICE SITUATION
   - Prescribing, invoking, monitoring, applying, enforcing
4. METACONSTITUTIONAL CHOICE SITUATION (no rules in use)
   - Prescribing, invoking, monitoring, applying, enforcing

Formal and informal collective-choice arenas



Level shifting strategies

- Contemplating changes in the rules defining permitted, prohibited and proscribed actions in operational situations
- The cost (including transaction costs) of actually changing the rules varies dramatically from arena to arena
  - Costly formal requirements may lead to informal de facto changes at the operational level

Predicting and evaluating outcomes

- Predicting
  - Only very simple situations allow strong predictions
  - Interdependent decisions, linked arenas, communication, learning, changes in strategy: all make it difficult to predict
- Evaluating
  - Economic efficiency, benefits from reallocation of resources
  - Equity, matching ability and requirements, equality of outcomes
  - Adaptability, resilience (from ecosystem), and robustness (from engineering)
  - Accountability
  - Conformance to general morality
  - Needs for trade-offs

Additional readings

- Instead of reading again the same book, read another one with a similar content. Sometimes one needs to read a the precursor to get a perspective on the lates work:
  - To understand North 2005 read North 1990
  - To understand Ostrom 2005 read Ostrom 1990

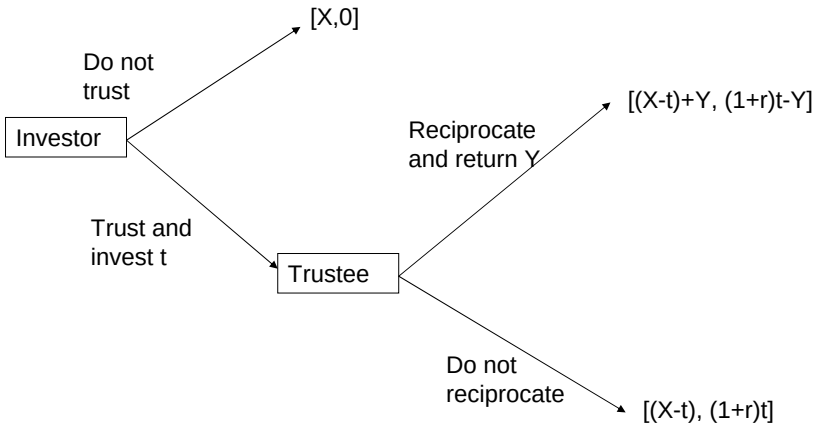
Experimental studies of action situations

- Using social dilemma games to illustrate action situations
  - Showing that small changes in the action situation can produce big differences in outcomes
  - Illustrate how experimental results challenge the presumption that all use the same internal rationality to make decisions
  - Will use the trust game (similar to the snatch game) and
  - The commons dilemma game

The trust game: the baseline

- Participants: two subjects
- Positions: investor and trustee
- Actions:
  - Investor has X. Can choose between
    - Keeping X
    - Giving t to the trustee and keeping X-t
    - Give all X to the trustee (t=X)
  - Trustee can subsequently choose how much to return to investor (Y)
- Outcomes: size of funds resulting from actions
- Action-outcome linkages: rate of return on investment = (1+r)
- Information: all possibilities are known, assurance of anonymity both to players and experimenter
- Potential payoffs (possibilities) [(X-t)+Y] and [(1+r)t-Y]; t>0
  - Often r=2

The trust game: illustration of decisions and outcomes



The trust game: Malawi 2007

- Participants: 30 subjects (15 pairs) in 18 villages
- Positions: investor and trustee
- Actions:
  - Trustee has 80. Investor has 80. Investor can choose between
    - Keeping 80
    - Giving t to the trustee and keeping 80-t
    - Give all 80 to the trustee (t=80)
  - Trustee can subsequently choose how much to return to investor (Y)
- Outcomes: size of funds resulting from actions
- Action-outcome linkages: rate of return on investment = 3
- Information: all possibilities are known, assurance of anonymity both to players and experimenter
- Potential payoffs (possibilities) [(80-t)+Y] and [3*t-Y]; t>0

The trust game: variations

- Positions changing to worker-employer
- Participants from different cultures
- Number of repeated plays: building reputation?
- Information:
  - Investor stipulates minimum returns
  - Investor may apply or refrain from applying costly punishment tied to minimum returns. Applying punishment was found to reduce reciprocity.
  - Highest return when punishment was possible but not used: **external sanctions crowd out reciprocity**
- Small changes in conditions create large differences in outcomes (relative positions, information and sanctions available)
- Results challenge the self-interested actor model: high level of trust in situations where none should have been

Prisoners dilemmas, Public goods, Common pool resources

Definition
- T>H
- H>L
- L>S

- T= temptation
- S= succer

Social dilemmas	Cooperate	Defect
Cooperate	H ; H	S ; T
Defect	T ; S	L ; L

Common-pool resources

- A common-pool resource is a natural or man-made resource from which it is difficult or very costly to exclude or limit users once the resource is provided by nature or produced by humans and removal of a resource unit makes that unit unavailable for others
  - Unregulated access leads to overuse and possibly destruction
  - Lack of exclusion leads to free-riders in provision

Basics of a commons dilemma I

- Participants: n symmetric subjects without any outside relations with each other
- Positions: appropriator
- Actions: each is endowed with e (=effort, or endowment) units (e.g. working hours) and have to decide on how much to spend on appropriation and how much on earning income from an external source (w = wage rate)
- Outcomes: actions affect the number of resource units that can be appropriated or the returns for working outside
- Action-outcome linkages: 1) wage*work hours 2) the resource function (F) is concave and depends on the total effort allocated to appropriation ($\Sigma_i x_i$): $F(\Sigma_i x_i)$

Basics of a commons dilemma II

- Information: participants know that they are all alike (symmetric) and they know the function linking aggregate effort to individual payoff
  - Information about outcomes are available after each round of allocation
  - No communication is allowed
- Potential payoff with n players
  - Payoff for individual i : $w*e$ if $x_i = 0$
  - It is $w*(e - x_i) + r*(\Sigma_i x_i)$ if $x_i > 0$ and $r<1<r*n$

Behaviour in a basic commons dilemma

- Comparing two games with 10 or 25 tokens endowment
- Overuse of the resource is usually the case
- 25 token experiments do considerably worse than 10 token
- Observes an unpredicted pulsing pattern (increasing investment until declining returns, then reducing it)
- No theoretically satisfactory explanation exist
- Some subjects say they use CPR return over or below 0.05 as guide to investment in the next round (w=0.05)
- Results replicated by agent based simulation
- Social psychology suggests cognitive processes are important to outcomes
- Subjects use heuristics in complex problems

Variations on a basic commons dilemma I

that should not affect outcomes but does

1. Allowing face-to-face communication before each session of investment
2. Allowing costly sanctions increase compliance
3. Allowing subjects to covenant to determine investment levels and adopt sanctioning

- Communication improves outcomes where there is heterogeneity of endowments
  - If subjects are kept out of the communication much less compliance is observed for all

Variations on a basic commons dilemma II

- Voluntary sanctions is chosen even if it is costly to the person proposing it, sanctioning and fines wipe out gains from better performance
- Crafting rules to solve commons dilemmas is costly (second order dilemma) but do occur frequently. Those who covenant do considerably better than those who do not
- Electronic communication do not do as well as face-to-face
- Experiments using real farmers replicate findings
- Experiments based on heterogeneous preferences giving incentives to inspect and punish deviations from covenants explained by a heterogeneous, linear other-regarding model

Animating institutional analysis

- Starting with the full-information, rational behaviour focusing on material outcomes in open, competitive, posted price markets
- Adding complications
  - **Information processes**
  - **Valuation mechanisms used by individuals (preferences)**
  - **Selection processes used by individuals (choice of actions)**

Open competitive processes

- Repetitive situations where complete information and adequate models of the situation can be assumed
  - Explaining learning has proved very difficult
- Assumptions for a rational egoist
  1. Individuals possess as much information about the structure of a situation as is contained in the situation
  2. Internal valuations of outcomes are complete and consistent based on a monotonous mapping of external payoff
  3. Individuals choose actions to maximise expected net benefits based on what resources they have and the actions others are expected to take

Challenges

- It has been shown that it is the structure of the situation that produces efficient choices, not the internal calculations of individuals
- Social dilemmas evoke positive or negative internal valuations not conforming to assumption 2 above
- Imperfect information is rampant, including
  - Asymmetric information,
  - Risk and uncertainty
  - Repetitions and constancy of participants

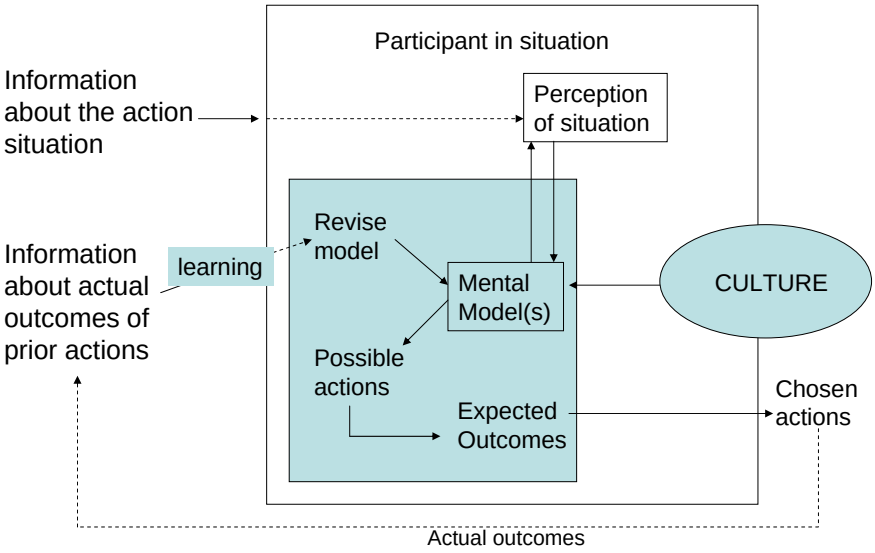
Extending rational choice

- Modelling how participants acquire, process, represent, and use information
- Modelling how participants value actions and outcomes
- Modelling the processes participants use (maximizing, satisficing or using diverse heuristics) to select particular actions or strategic chains of actions in light of their resources

Information processing and mental models

- Due to individual limits on cognitive capacity in pursuing goals, analysts may have to assume bounded rationality rather than full information
- Mental models develop and change from
  - Feedback from the world
  - Shared culture/ belief system
  - ---
- See next slide

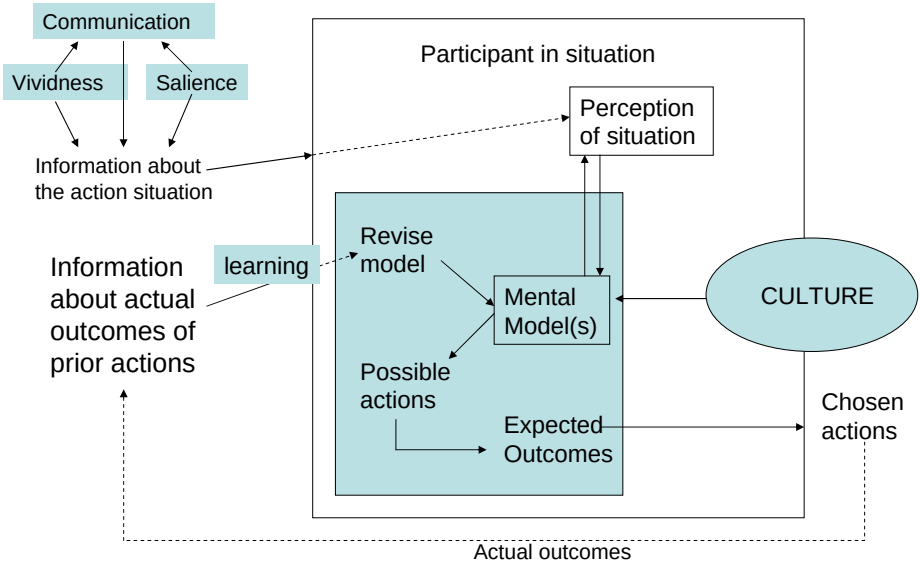
Information, action-outcome linkages, internal mental models



Differences in mental models

- Number of participants large
- Situation is complex
- Situation change frequently or participation is infrequent
- Externally induced need for increased performance
- Information is costly
- Information processing capabilities limited
- Errors of perception
- Errors in understanding a complex structure
- Errors in prediction
- Each participant may choose among several models of
- the situation
  - What determines the choice? Paying attention is costly.
  - See next slide

Impact of communication, vividness and salience



Change in mental models

- Disproportionate information processors (information and decision making do not link directly to output)
- Adaptive strategies and information do not match
- The inner cognitive and emotional architecture of the brain is "showing through" in responding to information
- Change in human institutions tends to be conservative but is subject to occasional large punctuations: "punctuated equilibrium"
- Internal models tend to be stable, until some event triggers a large change
- Rules and routines may help to structure a situation so as to increase the likelihood that individuals will share a mental model of the situation

Valuation processes

- Why trust and reciprocity?
- Why other-regarding preferences and norms backed by emotions (pride, guilt, shame, anger)?
- Why the consistent differences in response to the same conditions?
- Special neural/ emotional reactions to cooperative behaviour is documented

The dark side of trust

- The dark side of reciprocity, trust, and emotional actions: envy, vengeance, and desire to dominate
- Intrinsic motivations are increased if subjects feel self esteem and self determination is enhanced
  - External interventions crowd out intrinsic motivations if they are perceived as controlling
  - Extrinsic interventions crowd in intrinsic motivations if they are perceived as supportive
- People must be expected to differ in the ways they value trust, reciprocity, the welfare of others, equity, etc.

The selection process

- Heuristics studied
  - Measured reaction (subjects seemed to follow this)
  - Grim trigger (after discussions this was rejected)
- Inherent problems of inference in studies of "black boxes" by observing external behaviour

Heuristics tested

- Eight heuristics tested with variable time constraints, based on cue-values
  - LEX the lexicographic strategy ("take the best")
  - LEX-semi (small differences are not ranked)
  - EBA elimination by aspects
  - Features highest no of good features
  - ADD highest sum of cue values
  - LEX-ADD LEX-semi used to select two alternatives, ADD to choose one
  - PROS highest no of "pros" (as in pro&contra)
  - WADD weighted ADD
- LEX do very well compared to an optimised regression approach

Variety and complexity

- The diversity of assumptions must be consistent with deeper more general patterns of human behaviour
- Need to understand how specific situations trigger internal models for selecting actions and valuing outcomes
- Humans are fallible and learning
  - With complex motivations including narrow self-interest, norms of proper behaviour and other-regarding preferences
- Institutions matter!

Collective action and social dilemmas

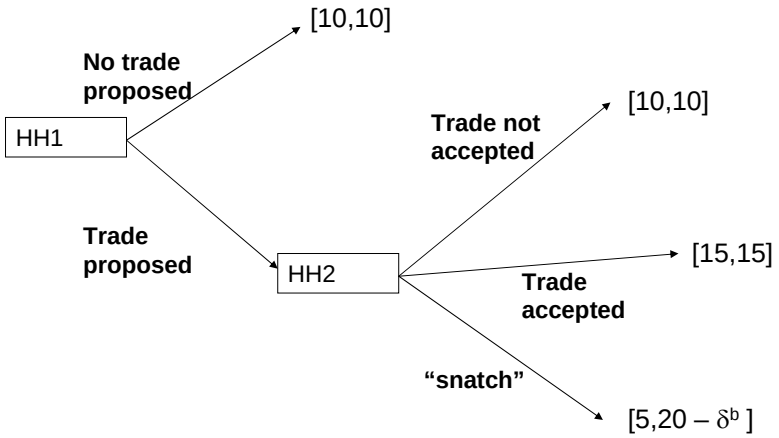
- Also outside the market there are highly competitive situations where rational choice theory applies (voting, legislative decisions)
- Engagement in collective action to overcome social dilemmas is not among these
- Behaviour in social dilemmas needs much better explanations
  - Evolution of norms for trust, other-regarding preferences
  - Rules regulating norms: e.g. backing good or counteracting bad reciprocity

Norms

- Norms in formal theory is currently problematic but not inherently impossible
- Norms are individual beliefs about permitted, prohibited or possible actions or outcomes in particular situations
- Snatch game with norms
  1. Utility of HH2: $U_2 = \pi_2 - \delta^b$
  2. π_2 = payoff obtained by HH2
  3. δ^b = decrease in the value of π_2 due to breaking of norms
- This means that not only presence of norms but also strength matters to behaviour

The "snatch" game with norms

Is δ^b >5 or <5 ?



Heterogeneity

- Heterogeneity of norms
  - Individual variations
  - Situational variations
- Strength of norms
  - Socialization
  - Type of community
  - Institutional backing or counteracting
- Saints, conditional cooperators, sociopaths
  - Cooperators need to be able to find each others
  - Spatial and/ or institutional clustering
- Institutions matter!

Evolution of norms I

- Model: individuals inherit strategies, individuals with more successful strategies have a higher rate of reproduction and increase in frequency in the next generation
  - Good at face recognition
  - Good at detecting cheating
  - Keep internal accounts of goodwill and threats
  - Deontic reasoning (permitted, prohibited or proscribed) looks for cheating and violations
  - Reasoning about what is true or false looks for confirmation
  - Good at learning language

Evolution of norms II

- Language represents a new way of inheriting strategies: "genetic change ceases to be the main basis of change: history begins" (Maynard Smith and Harper 2003:140)
  - Good at learning norms and rules
  - Cultural and situational variations
- Norm of reciprocity is often (always?) present
  - Reward cooperation
  - Punish defectors and those who do not punish defectors

Indirect evolutionary approach to adaptation through experience

- Model: players receive objective payoffs but make decisions based on the transformation of these material rewards into their own intrinsic values. Over a generation the intrinsic values are adjusted in the direction of the objective payoff
- With full information or knowledge of past history of the players rational egoists will not survive in an indefinitely played game
- With no information and many players rational egoists will dominate
- Known probabilities of trustworthy players or a “noisy” signal (better than random) of trustworthiness (e.g. from face-to-face communication) may help conditional cooperators to survive in substantial proportions

More on informal institutions …

- The nature of informal institutions:
- Probably the most important aspects of institutions are in peoples heads and exist only because we believe them to be real
- Searle, John R. 1995, *The Construction of Social Reality*, The Free Press, New York