

Norms, Groups and Social Simulation

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Agenda

- Norms
- Types of norms
- Social structures
- Agents that consider norms
- Implementation issues
- Conclusions

Norms for social simulation

1. Models **of norms** tend to be useful when they are simultaneously simple enough to fit a variety of behaviors and complex enough to fit behaviors that need the help of an explanatory model **of norms**

[Schelling, *micro motives and macro behavior*, pp.89]

2. Simple implementation of norms may be just a complex way of implementing constraints
3. Norms have many motivational and social aspects
 - Aspects of norms to be incorporated depend on social aspects and cognitive abilities of the agents in the simulation

Norms vs Constraints

Norms

- Can be **violated**
- Lead to efficiency
- **Motivate** behavior
- Can emerge
- Are related to social awareness
- Need a rich cognitive model to explore

Constraints

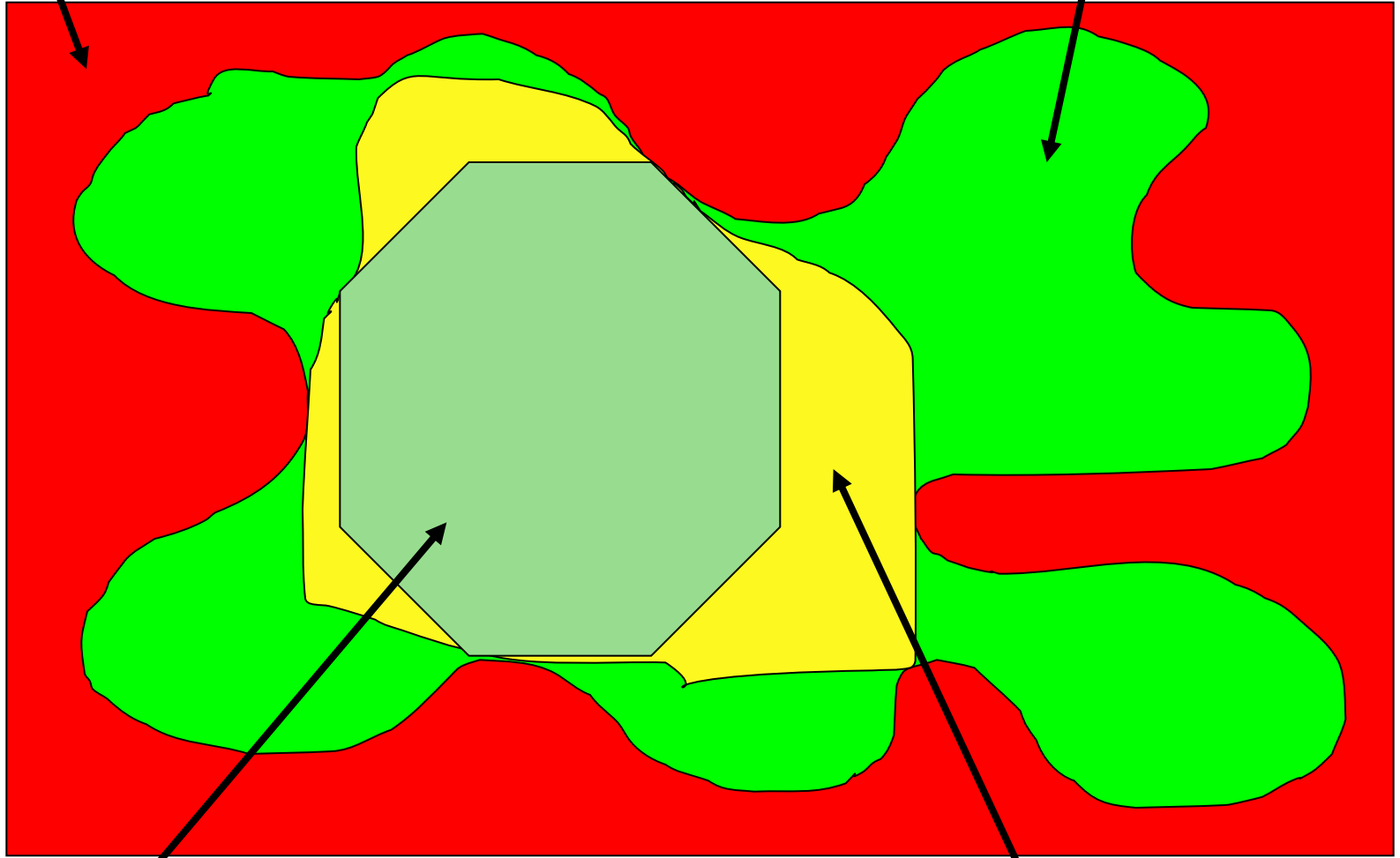
- Cannot be violated
- Lead to control
- Restrict behavior
- Are imposed
- Do not require social abilities
- Are simple to explore using standard techniques



Admissable states and constraints

Violation states

Admissable states

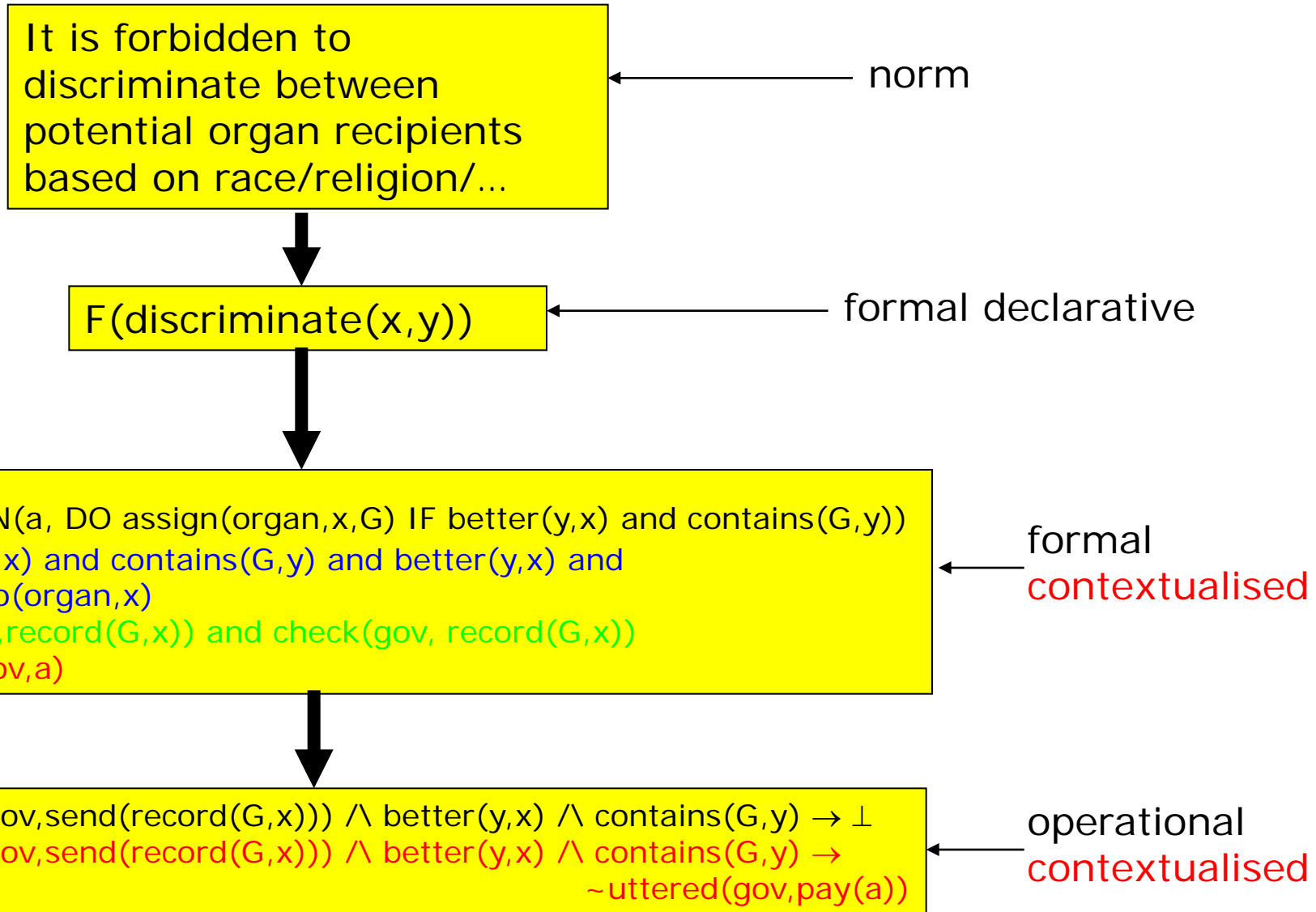


Allowed states

Known admissible states

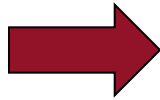


From abstract norm to implementation



Norms and social structures

1. We need criteria on when to violate a norm
2. These criteria need to be structured (to ensure consistent behavior)
3. We need to define the context (of normative behavior) in order to interpret the norm

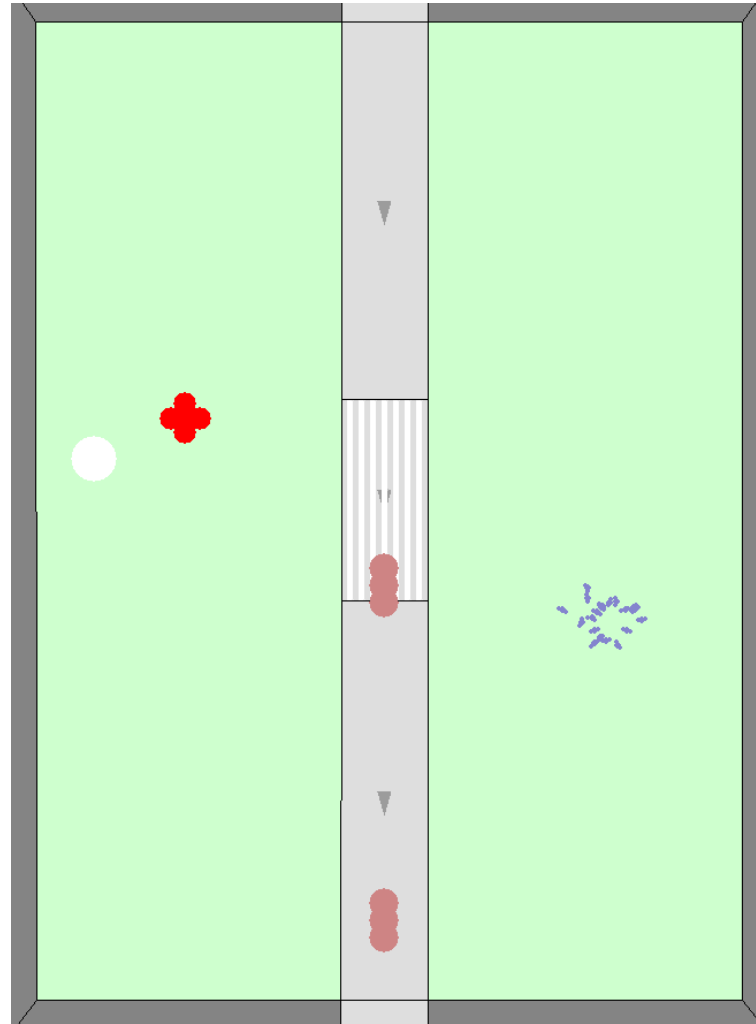


Simulations with norms need social structures like groups and organizations

EMERGING AND IMPOSED NORMS



Emerging norms (EMIL traffic video)



Norms can emerge

- From repeated consistent behavior of many agents patterns of behavior can arise that become norms:
 - E.g. Many people drive 110 in the highway. It slowly becomes the norm to drive this fast.
 - Prerequisite: the pattern should be individually beneficial or becoming beneficial when a small group of agents follows the pattern.
 - Prisoners dilemma shows that some wanted social optimum is not individual rational and the norm for this behavior will not emerge.

Violating and changing emerged norms

- When will an agent violate an emerged norm?
 - Only if the situation forces the violation to be more preferred than adherence to the norm
- What happens if an agent violates an emerged norm?
 - No direct punishment
- What happens if many agents violate the norm?
 - Only happens if the situation in which the norm emerged changed and adherence to the norm is no longer beneficial
 - Norm changes “automatically”



Imposed norms



How behavior influences Norms

1. Imposed Norms are influenced by behavior:
 1. Massive violation of a norm leads to lower priority for upholding the norm
 2. Massive obedience of a norm reinforces the importance of the norm

How do these feedback loops work?

Need to observe the adherence to the norms

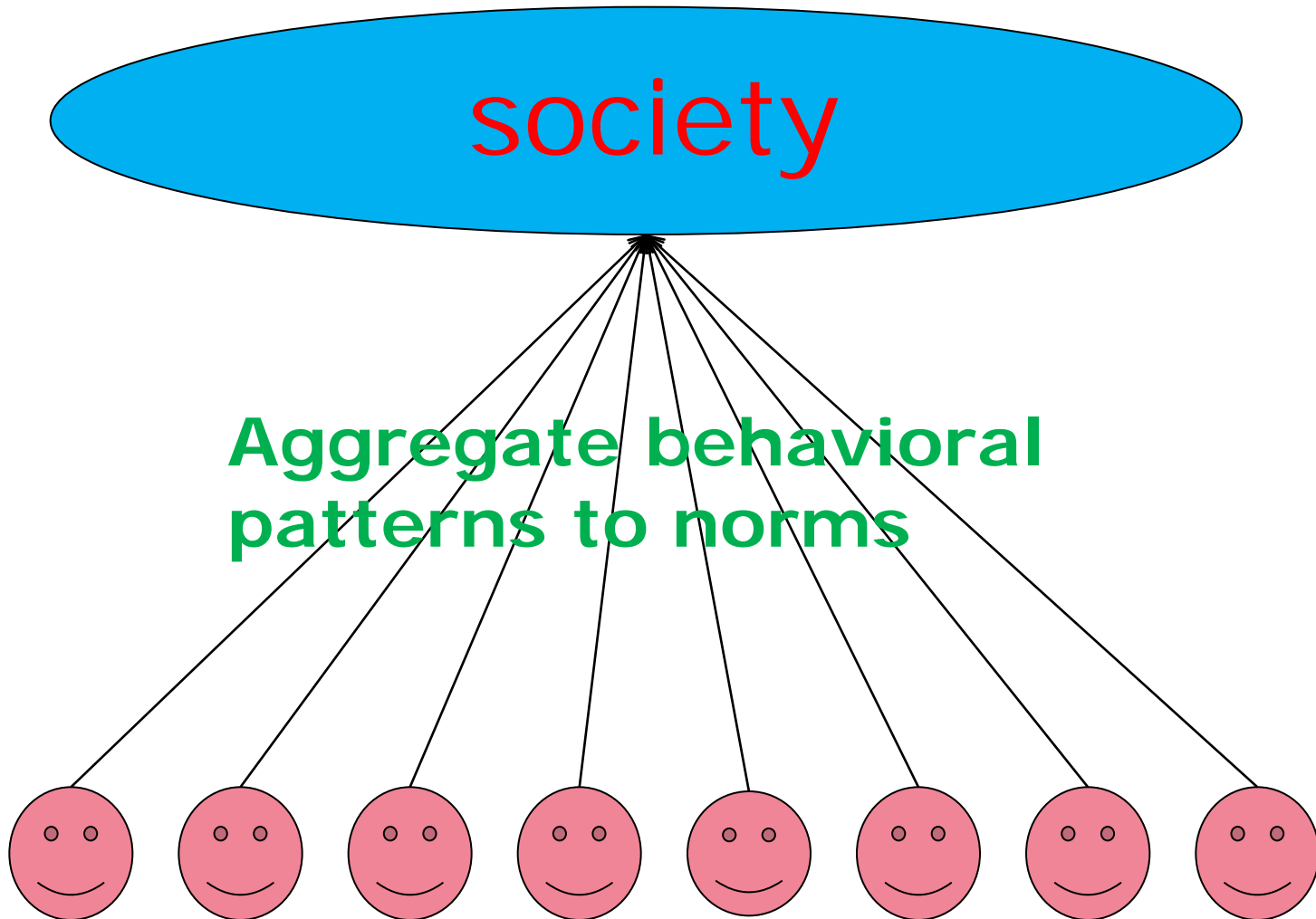
Norms should be a motivational factor

Some preference ordering should be available

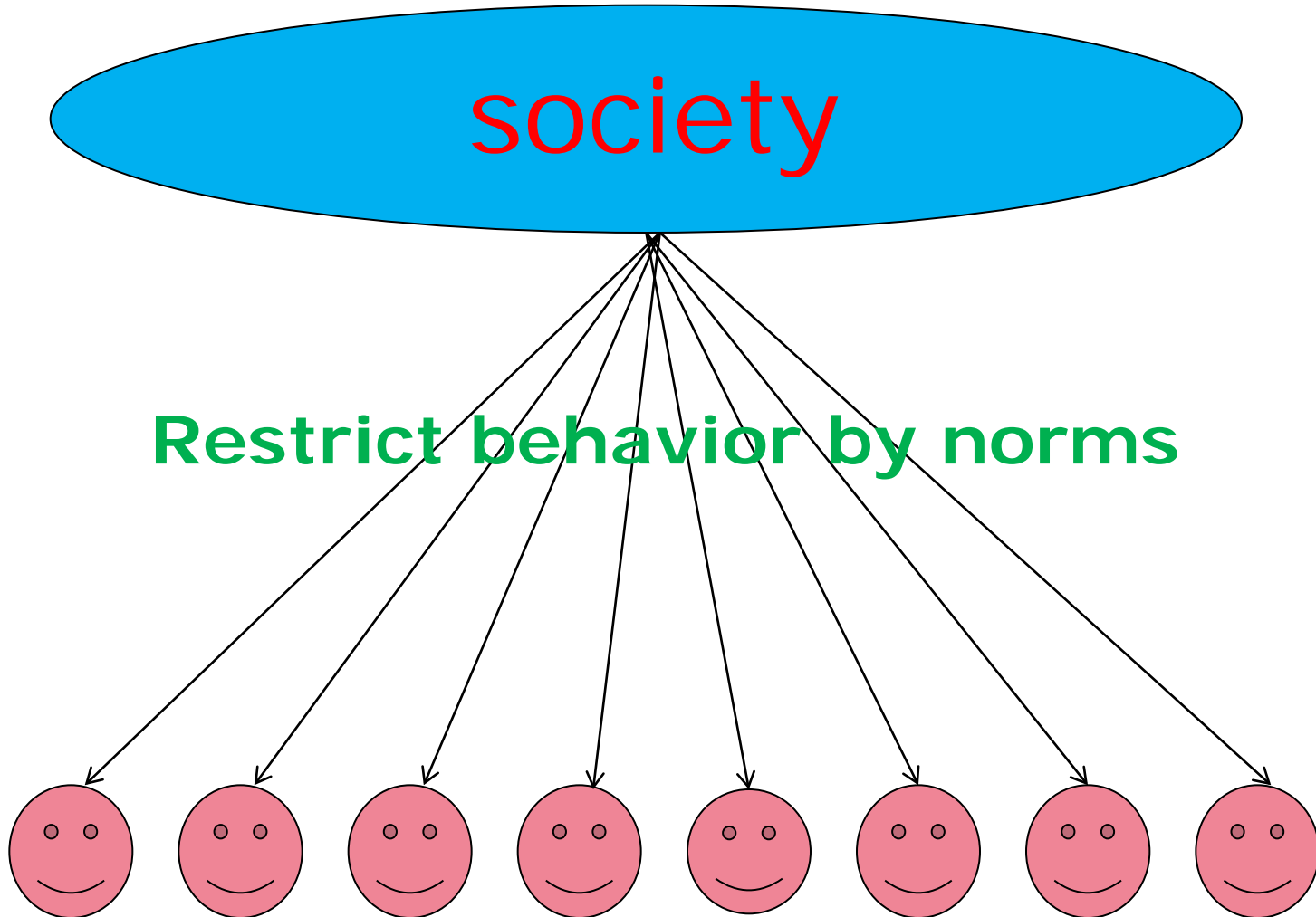
2. Imposed norms do not change through this mechanism! This needs explicit action on changing the norm.



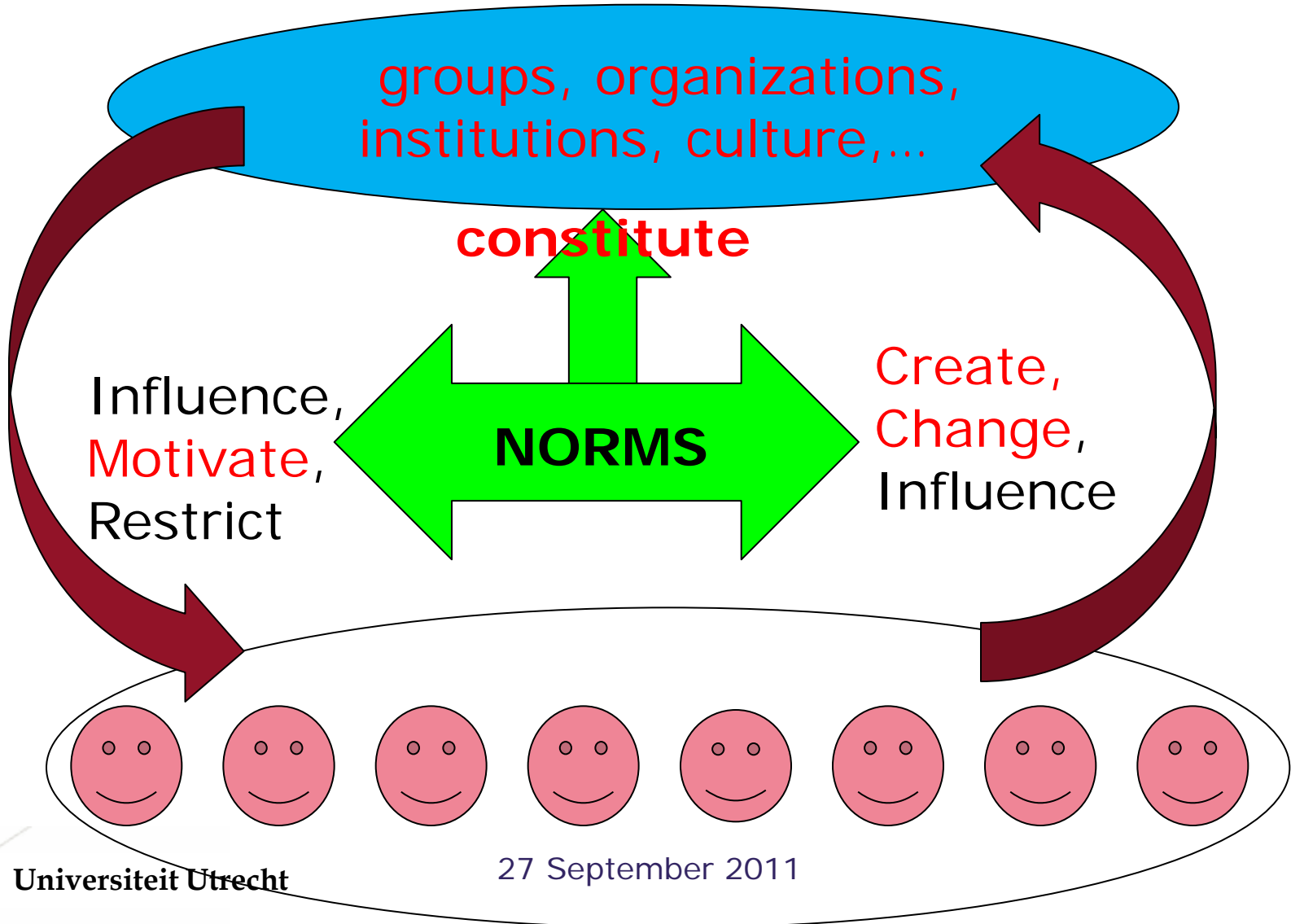
Emerging norms



Imposed norms



Norms, agents and social structures



SOCIAL STRUCTURES



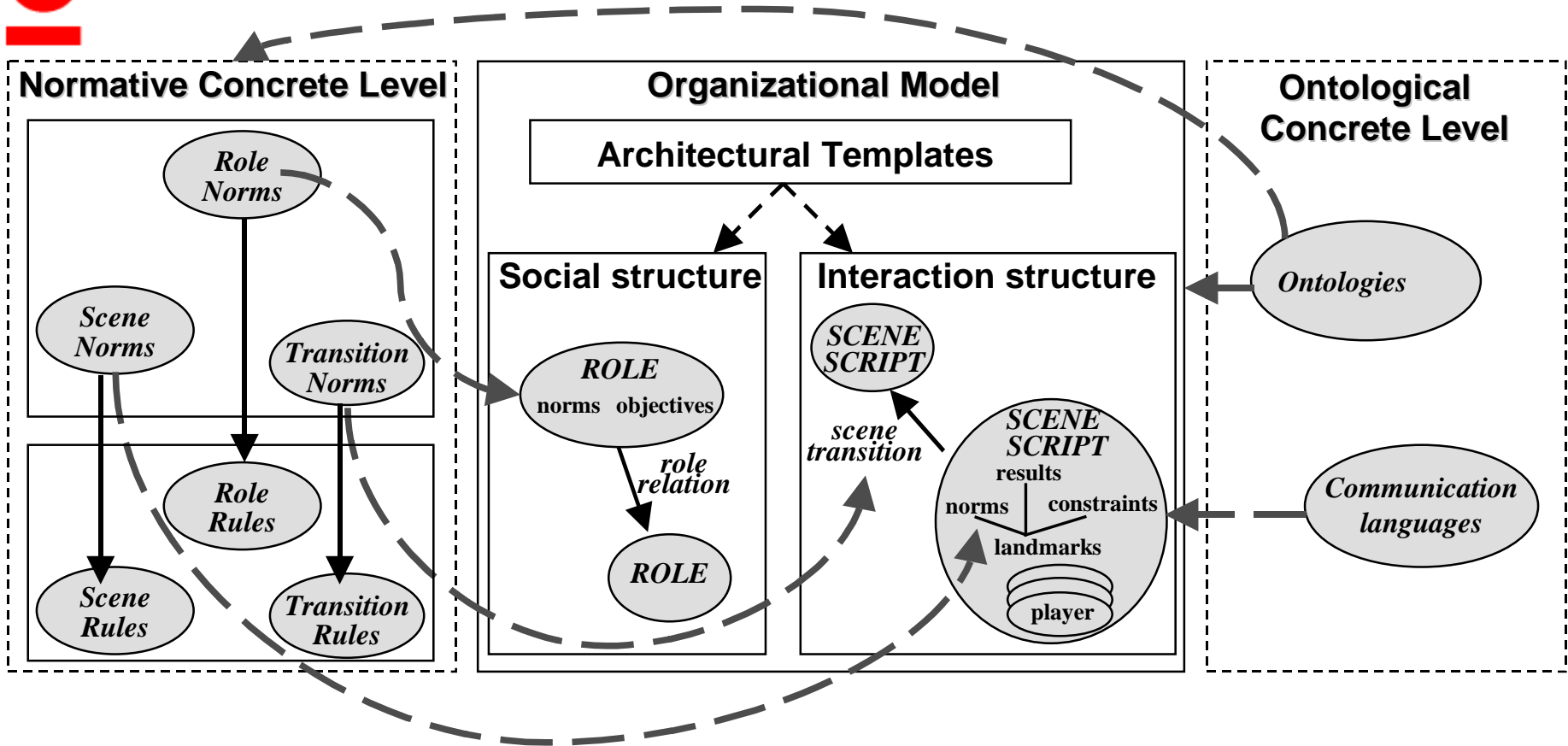
Social structures

- Formal social structures:
 - Institutions, Organizations, Nations,...
- Informal social structures:
 - Teams, Groups, Families, Friends,...

Social structures are described in terms of:

- Roles
- Relations and interaction (patterns)
- Norms
- Values
- Culture
- ...

Example Organizational Model (based on OperA)



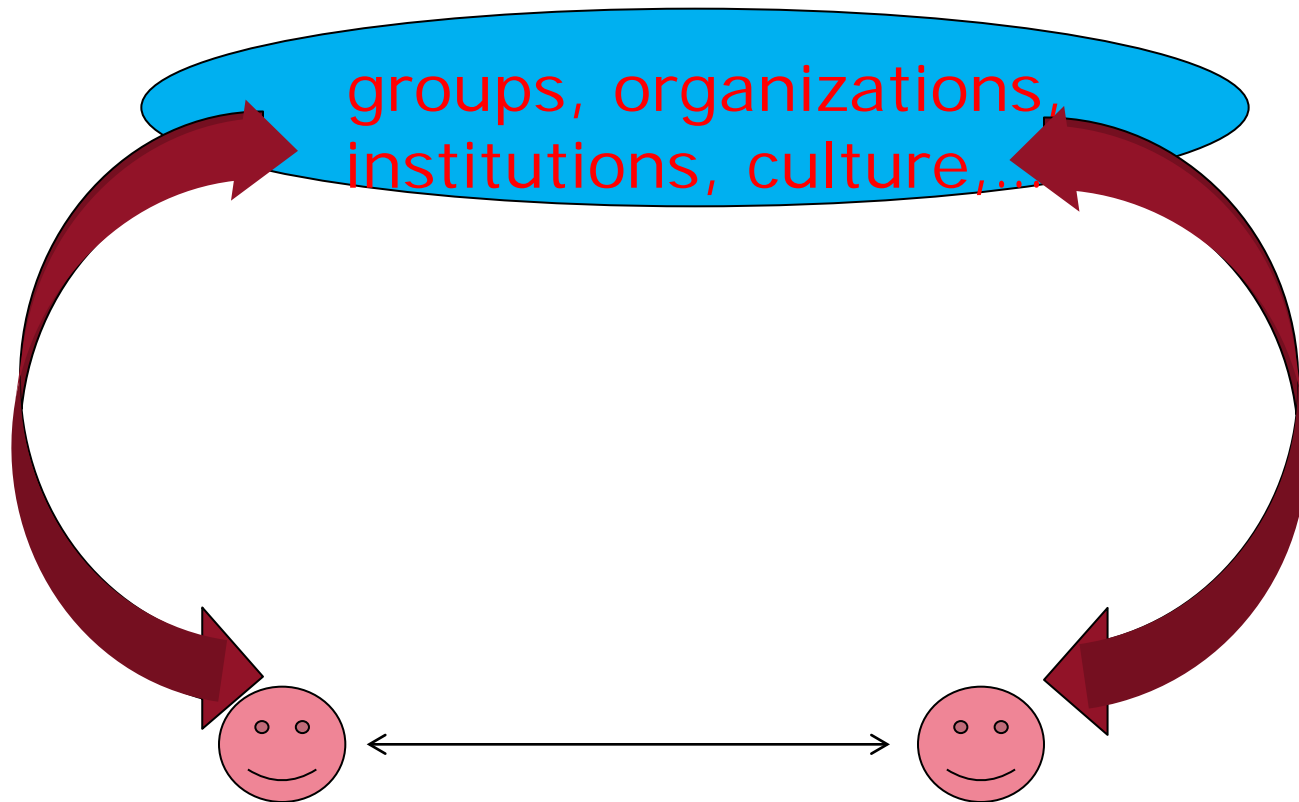
Social structures and norms

- The **accountant** of a company has to make sure the accounts of the company are correct
- The **head of the department** can **order** an **employee** to perform a task
- A “**green**” company has rules that force its employees to **use public transport** for business trips
- **Academics** do not wear suits
- In a **collectivistic** team all members are committed to the agreed course of action
- If George Clooney drinks Nespresso I also have to drink Nespresso

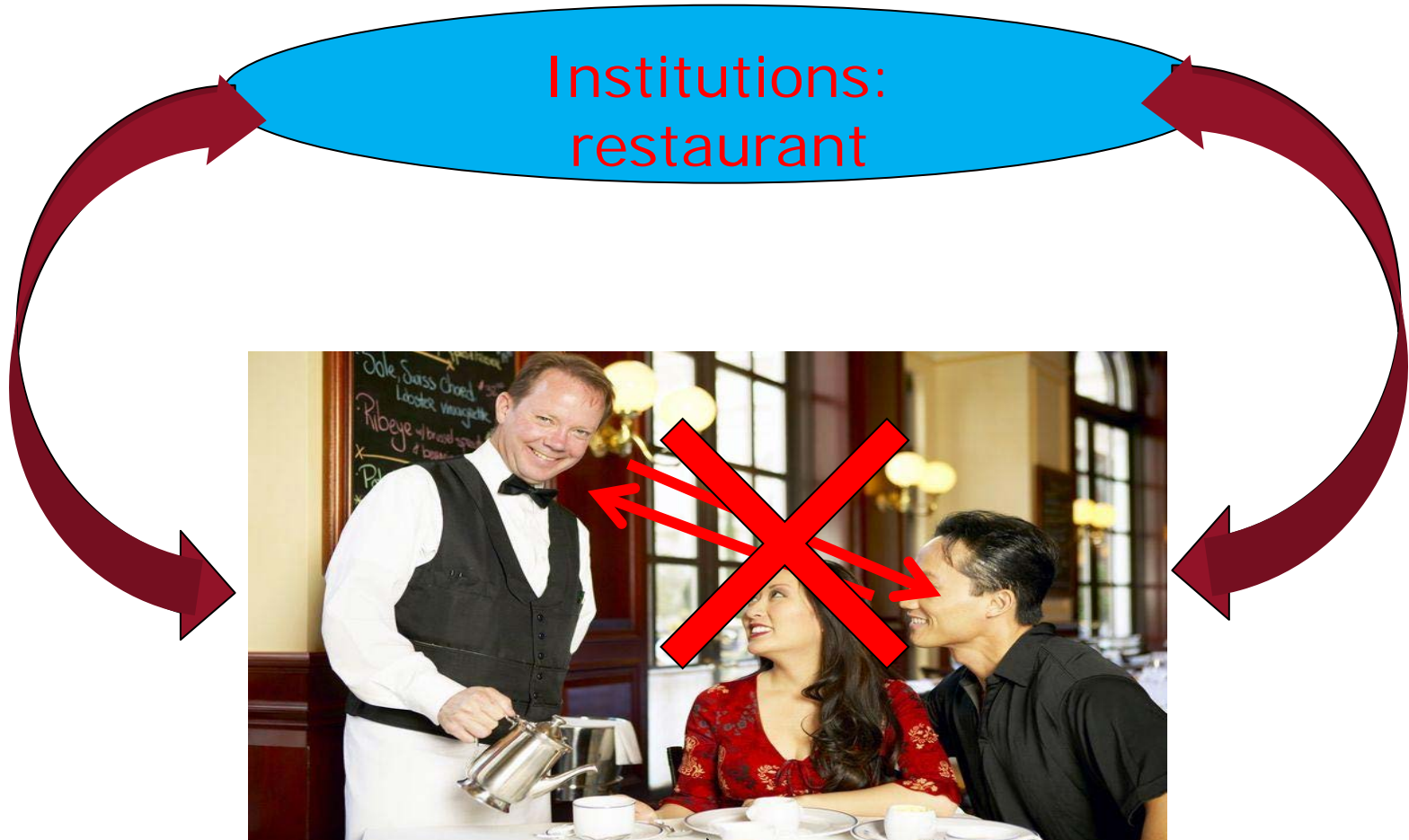


Social structures regulate behavior

- Persons influence each other **through** social structures, **using** social structures and **because of** social structures



Social structures regulate behavior



Get me some coffee, please

Social structures regulate behavior



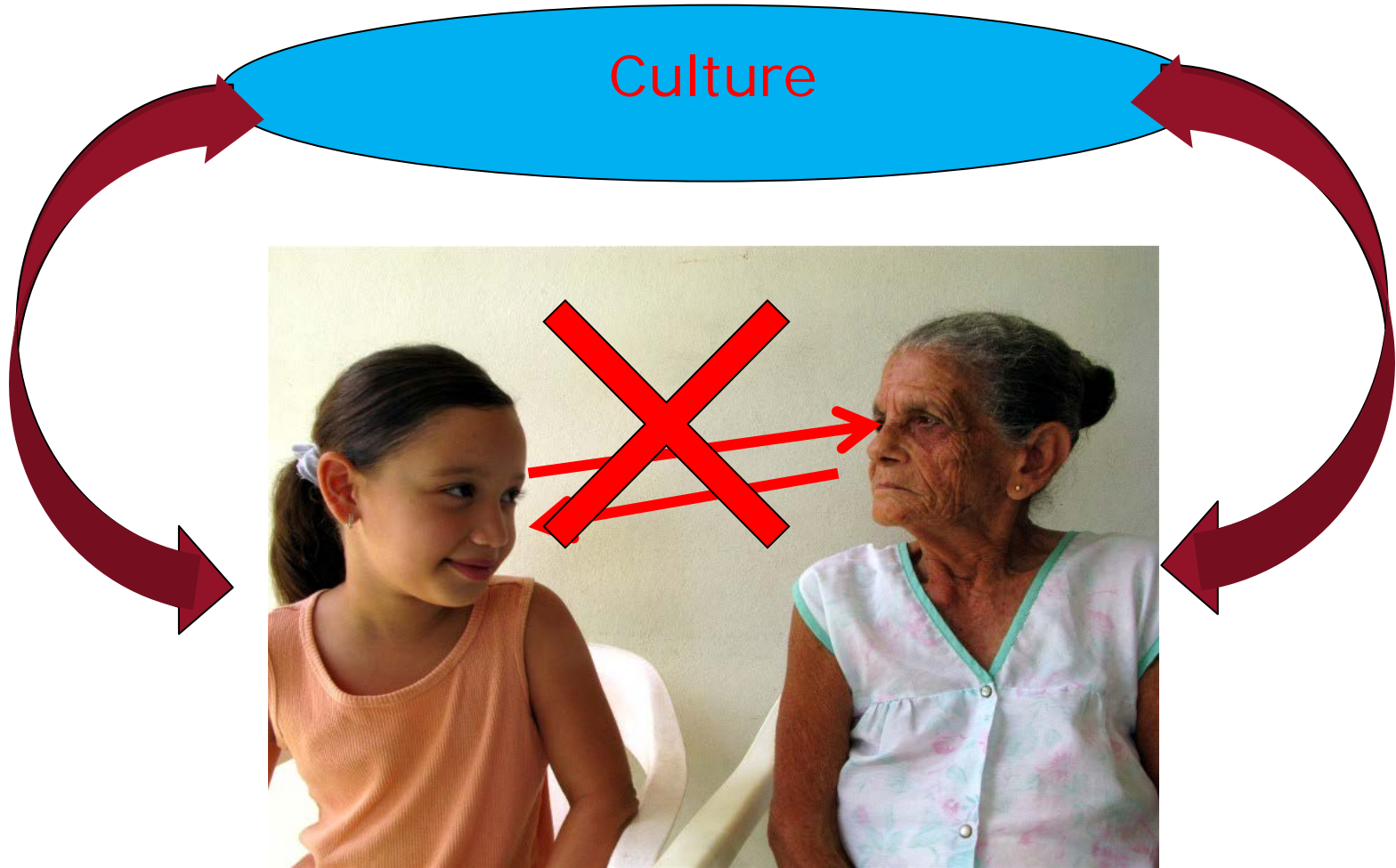
Social structures regulate behavior

Group of friends



Get me some coffee, please

Social structures regulate behavior



Get me some coffee, please

Social structures motivate behavior

- Identity and perception of identity is (partially) determined by **group membership**
- People are member of many formal and informal groups (social structures)
- These memberships all influence the behavior:
 - Role in a group
 - Relations to members of a different group
 - Aspiring a certain role or position in a group
 - ...
- Often these influences are all expressed in terms of norms
- **Social structures are needed to model the relations, priorities and preferences between norms**



Social structures and information exchange

- Social structures determine with **whom** we communicate
- Social structures determine **when** we communicate
- Social structures determine **how the communication is interpreted**

E.g.

- Tell a colleague about possible fraud at work
- Tell the boss about possible fraud at the university
- Tell the tv about possible fraud at university

Cf. Social network analysis



Social structures and social simulation

Social structures are an important aspect in human behavior



Social structures should be represented in social simulation models



Norms play an important role in defining social structures



Norms should be used in social simulation models

Norms can only be understood and modeled in the context of social structures



Social structures are very important for social simulation

NORMS AND AGENT BEHAVIOR



Norms and compliance

• New policy: raise the VAT on water usage for private citizens from 4% to 19%.

1. Model as Constraint.

- Everyone pays more tax.
- Prices go up.
- Leads to reduction of water use.
- Government gets (possibly) more income.
- ...

2. Model as Norm.

- People violate the norm (when friends, neighbours, family does)
- Water is bought illegally from industrial users without paying sales tax
- Government gets less income
- Alternative water circuit emerges
- ...



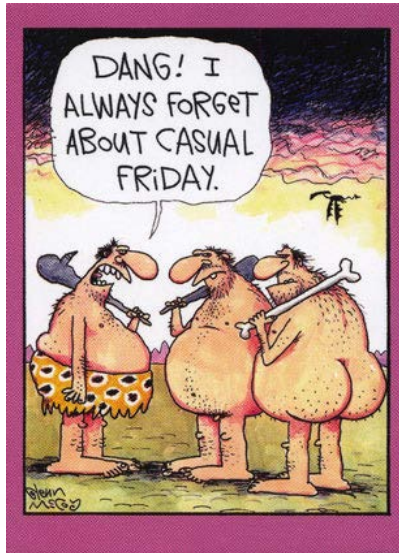
Violating norms

1. Norm conflicts with personal goal/desire
e.g. Tell all about norms vs. end
presentation in time
2. Context dictates violating behavior
e.g. Killing in self defence
3. Norm is violated but values upheld
e.g. Shout to your boss that there is a fire

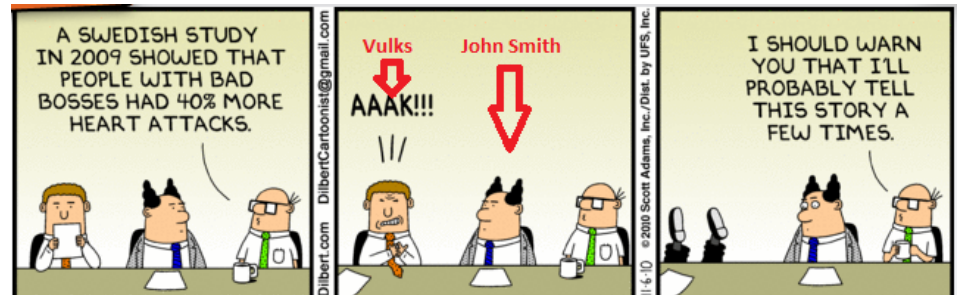
Violating norms

1. Norm violation as **social signal**:

1. The norm is a group norm and I do not belong to the group
2. The norm is a group norm and I am so important in the group that I can afford to violate the norm
3. I want to change the value priorities of which this norm is an instantiation



4. The norm is expressing a group structure that I want to change



How norms influence behaviour

1. **Predict:** People can hose their garden at night and thus the water use will be up at that time
2. **Adopt1:** Water shortage is a serious problem. I will adopt this norm.
3. **Adopt2:** All my neighbors adopt the norm thus it should be a good norm and I should adopt it
4. **Goal generation:** If I want to avoid hosing my garden. I will create a rock garden.
5. **Plan generation1:** I will walk my dog now before everyone is turning on their sprinklers
6. **Plan generation2:** I organize the neighborhood to restrict water use
7. **Violation:** It has been raining cats and dogs for 3 weeks until last weekend, I can water the garden this weekend again.
8. **Reaction:** The neighbor has been sprinkling his garden every day this week. I will report him to the water authorities or else there is no water left.



Issues in implementing norms in agents and simulations

- Knowing that something is a norm
- Enforcement through regimentation or handle violations
- Know what is “expected”
- Within agents the following issues play a role:
 - Prediction
 - Adoption and applicability
 - Motivation: what “should” I do
 - Constraining behaviour
 - Monitor behaviour of others for norm compliance
 - React to violations
 - Repair norm violations
 - Promote a norm
 - Plan actions in order to make others comply to a norm
 - ...?

Adding norms to agents

A software engineering perspective

Can we add norms to agents by adding some **normative module**?

If so, how is this module connected to the other agent components?

If not, is there a standard way of adding norms to the agents?

Implementing norms: step I

Represent the norm:

1. Abstract representation ($F(\text{smoke}(x), \text{public_place})$)
 - a) Generally usable
 - b) Needs reasoning with counts-as to make concrete

2. Concrete representation

($\text{In}(x, \text{restaurant})$ or...or $\text{In}(x, \text{shop})$ then $\text{smoke}(x) \rightarrow \text{Violation and pay}(x, \text{fine})$)

 - a) Easy to reason about
 - b) Not able to handle "new" context

Choice: ?

Implementing norms: step II

Include norm in belief base of the agent:

Now the agent can check the norm explicitly
whenever it has to make a decision

DONE! The norms are
“implemented”

The rest is
“up to the agent”



Prediction

(Implicit) coordination

Norm: the language at ESSA is English

Predict: everyone will understand English

Consequence: prepare slides in English

Prediction

Norm: when you buy a product you have to pay for it

Predict: people pay when you agree they buy your product

Consequence: give them the product and wait for payment (trust the norm!)



Do agents plan based on predictions?

Adaptation and applicability

Decision criteria needed for adopting a norm.

Norm: **Presenters keep to the presentation time**

Criteria:

1. if @ESSA then adopt
2. if chair of session is friend and then adopt
3. if norm does not conflict with my goals then adopt

Applicable: Need to know my "role"

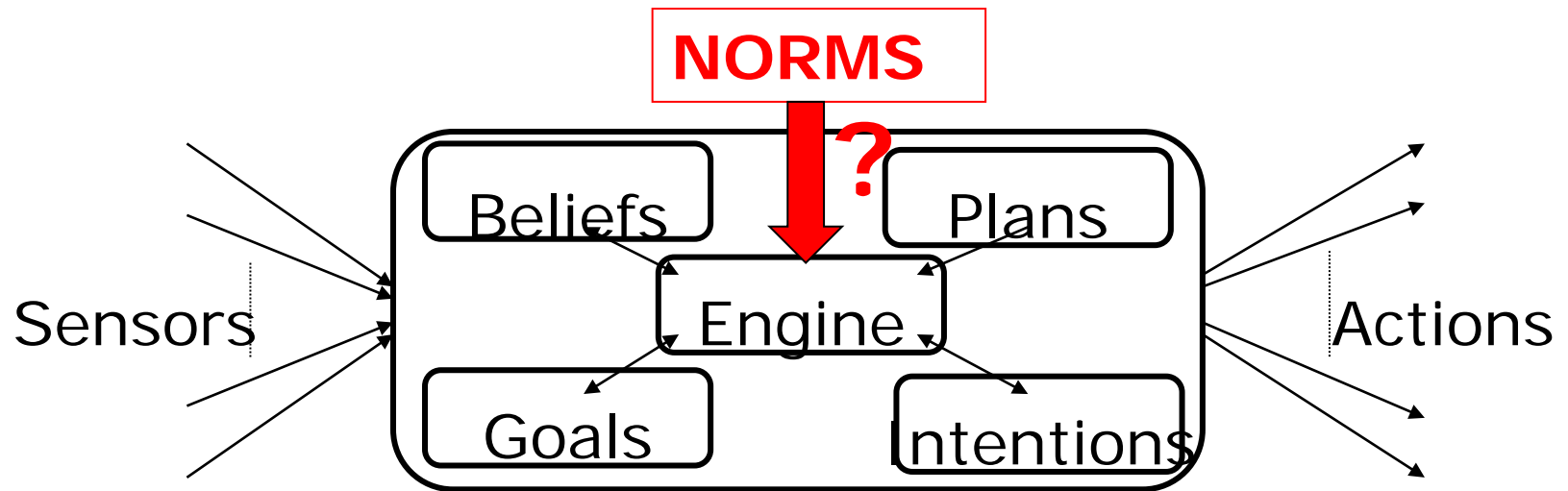
Is an **invited speaker** a **presenter**?



Norms influence goals and plans

When and where does an agent check for norm compliance?

a) Deliberation cycle → changes agent design!



b) As precondition to goals and plans → changes all plans and goal rules!

Norm violation

1. Decide WHEN to violate a norm
 - simple criteria → do we need a norm?
 - Complex criteria → efficiency, design
2. Decide HOW to violate a norm
 - Take into account monitoring
 - Avoid sanction
 - Exploit expectations of other agents
3. Reason about the consequences



Norm monitoring

How to monitor violations (what states can be checked)

When to monitor for violations (how often)

Who should react and how should be reacted on violations?

What happens if punishment is not given?

What is the reaction of an agent when it gets punished?

E.g. learning aspect.



Conclusions

1. **Norms** and **social structures** are interdependent → model both or neither in a social simulation
2. Norms form connections between **individual** and **social** attitudes → Aspects of norms to be modeled depend on goal of simulation
3. Simple implementation of norms may be just a complex way of implementing constraints
4. It becomes interesting when norms become separate mental objects, however this requires agents with an extended architecture that take norms into account in the deliberation
5. Reasoning about norms important to contextualize them and reason about violations
6. Balance between complexity and usefulness,
7. Theory on social structures and norms needed to make **informed** decisions