SOCIAL SIMULATIONS AND SOCIAL REALITY

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Outline

- Social Reality
- Norms
- Values
- Social Practices
- Conclusions
Social reality

1. Creating social reality
2. Social landscape
3. Social “laws”
4. Interdependencies between social and functional/physical
5. Social practices
Why creating social reality?

- hunger
- tired
- ask food
- eat
- sleep
Why creating social reality?

NOT THAT SIMPLE

hunger
tired
ask for
eat
deep
Why creating social reality?

Reality

percept

percept

percept

Social filters

Social rules

percept

percept

percept

percept

percept

percept

percept

percept

percept

percept

percept

percept

percept

percept
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 virtual agents

Social structures are an important aspect in human behavior

→

Social structures should be represented in virtual agent models

→

Norms play an important role in defining social structures

→

Norms should be used in virtual agents models

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

→

Social structures are very important for virtual agents
Social Reality and Physical Reality

Big friend $\rightarrow$ greet with hug
Social Reality and Physical Reality

Greeting at work

Portugal → standard greeting

The Netherlands → good friends

Israel → inappropriate
Social deliberation

- Deliberation
  - Functional
    - Interdependencies
  - Social
  - Perceive/act
  - Perceive/act
Creating Social Reality

objectivation

externalization

internalization
Externalization

1. Create **patterns** of behavior
   - The patterns are based on context and individuals
   - They can change when individuals change or context changes

2. Actions are performed as “social actions”
   - Agents have “we” intentions
Objectivation

1. Name the patterns as objects in their own right
   • Here social reality is created!
   • The social structure now has an existence independent of the persons
   • The social structure can be transmitted easy, be discussed, etc.

2. The social structures are legitimimized
   • Legitimization can be different from the reason the structure is created.
   • E.g.
   • **Justification:** coffee time is at 10:30 because it breaks the morning (9-12) nicely in two parts.
   • **Reason:** coffee time is at 10:30 because then the last person gets into work and we can have coffee together
(Social) reality persists with legitimation
Internalization

1. The social structure is used as a part of reality that has to be taken into account when deciding upon actions

2. Beliefs, norms, etc. become part of individual mental attitudes
Cause and Effect

1. Due to the cyclic nature of the influence between individual and social reality it is not clear what is the cause and what is the effect of certain phenomena.

E.g. In the playground soccer is the most popular activity because it can satisfy the largest set of motivations (achievement, power and affiliation). Boys are physically a bit bigger than girls and thus better at playing soccer. Because the boys achieve more at soccer they tend to play more soccer (and might even get better). Mostly boys play the most popular activity (soccer). Boys are the most popular children, because they can play the most popular activity best. Boys are better than girls.
Cause and Effect

It is easy to draw wrong conclusions, based on limited observations.

But how far back does one have to go to get to the “real” origins of some 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
• Social Practices
• …
Modeling Social laws

No laws of nature but things like NORMS

Example:

You cannot drive more than 100km/hr

BUT NORMS CAN BE VIOLATED!
How does Social Reality work?

1. When do we follow norms and when do we violate them?

2. How do norms arise?

3. Which norms are stable? How are they maintained?

4. Norms have many motivational and social aspects → Which aspects and how do we model them?
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 committed to the agreed course of action
• If George Clooney drinks Nespresso I also have to drink Nespresso
Socially regulated  Policy regulated
## MAS vs. ABM

<table>
<thead>
<tr>
<th>MAS</th>
<th>ABM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complex cognition</td>
<td>Relatively simple cognition</td>
</tr>
<tr>
<td>Theoretically sound</td>
<td>Ad-hoc (not unjustified)</td>
</tr>
<tr>
<td>Computationally expensive</td>
<td>Computationally inexpensive</td>
</tr>
<tr>
<td>Difficult to scale</td>
<td>Easy to scale</td>
</tr>
</tbody>
</table>
Example (I)

- Goal

\[
\text{goal1} = \{\text{money} > \text{min\_debt}\} \\
\text{goal3} = \{\text{money} = \text{max\_money}\}
\]

- Norm

\[
\mathcal{N}_{\text{fishing}} = [G = \{\text{money} = \text{current\_debt} \times \text{repayment\_rate}\}, \\
C = \{\text{boat} = \text{small\_boat}\}]
\]
Example (II)

• Policy

\[ P_{\text{fishing}} = [Ca = \{(\text{fishing\_action}, \{\text{remaining\_quota} > 0\})\}, \]
\[ Ce = \{(\text{fishing\_action}, \text{remaining\_quota} -= \text{fished\_quota})\}, \]
\[ G = \{\text{money} = \text{quota\_depletion\_rate} \times \text{initial\_quota} \times \text{fish\_value}\}, \]
\[ P = \{(\text{fishing\_action}, \{\text{remaining\_quota} = 0\})\] \]
Example (III)

- **Action**

  \[
  \text{fishing\_action} = \begin{cases} 
    C_{ph} = \{\text{boat} \neq \text{null}, \text{days\_at\_sea} > 0\}, \\
    E_{ph} = \{\text{money} = \text{days\_at\_sea} \times \text{efficiency} \times \text{catch\_value}\}
  \end{cases}
  \]

- **With norm**

  \[
  \text{fishing\_action} = \begin{cases} 
    C_{ph} = \{\text{boat} \neq \text{null}, \text{days\_at\_sea} > 0\}, \\
    G = \{\text{money} = \text{current\_debt} \times \text{repayment\_rate}\}
  \end{cases}
  \]

- **With policy**

  \[
  \text{fishing\_action} = \begin{cases} 
    C_{ph} = \{\text{boat} \neq \text{null}, \text{days\_at\_sea} > 0\}, \\
    G = \{\text{money} = \text{quota\_depletion\_rate} \times \text{initial\_quota} \times \text{fish\_value}\}, \\
    C_{p} = \{\text{remaining\_quota} > 0\}, \\
    E_{p} = \{\text{remaining\_quota} -= \text{fished\_quota}\}
  \end{cases}
  \]
Norm deliberation

```python
deform each (norm in Norms):
    if (norm.isActive):
        if (norm.isInternalized):
            comply with norm
        else:
            foreach (goal in Goals):
                checkCompatibility (norm, goal)
                if (norm is compatible with goal):
                    comply with norm
                else:
                    costOfCompliance = calculateCostOfCompliance
                    costOfNonCompliance = calculateCostOfNonCompliance
                    if (costOfCompliance <= costOfNonCompliance):
                        comply with norm
```

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Values

- Self-Direction
- Universalism
- Stimulation
- Benevolence
- Hedonism
- Tradition
- Achievement
- Conformity
- Power
- Security
Schwartz value system
What is more profitable to me, investing in fishery or buying a bigger house?

How much should I donate to public good?

Power-oriented

Universalist
Goal

Plans

Actions

Values
Value framework implementation

\[ V_i = i^{th} \text{ value in the circle} \]

\[ \tau(V_i) = \text{importance of } i^{th} \text{ value} \]
Value framework

Condition 1: $\forall i, j \in 1..10 : 0 \leq |\tau(V_i) - \tau(V_j)| \leq m_{i,j}$, where:

$$m_{i,j} = \begin{cases} 
|i - j| \ast c & \text{if } |i - j| \leq 5 \\
(10 - |i - j|) \ast c & \text{if } |i - j| > 5
\end{cases}$$
Value framework

Condition 2:

\[
\begin{align*}
\tau(V_i) &> 50 & \text{if } \tau(V_j) = 0 \\
100 - \frac{c}{2} &\leq \tau(V_i) + \tau(V_j) \leq 100 + \frac{c}{2} & \text{if } \tau(V_j) \neq 0 \& \tau(V_i) \neq 0
\end{align*}
\]

where \( j = (5 + i) \% 10. \)
Water tank model

\[ \lambda_i = \text{fluid level } V_i, \text{ how much the value is satisfied} \]

\[ \rho_i = \text{threshold, when a value gets salient} \]
Value based selection

\[ \rho = -\left( \frac{\lambda - \tau(V_i)}{\tau(V_i)} \right) \times 100 \]

\[ \operatorname{arg\,min}_{V_i \in \text{Values}} \rho(V_i) = \{ V_i | V_i \in \text{Values}, \forall V_j \in \text{Values} : \rho(V_j) > \rho(V_i) \} \]
Connecting values to actions

- Value trees

```
Universalism
  /    
Unity with nature    Social justice
  |      |
  Captain  Fisher  Care for the weak
  |        |
  Elderly Caretaker
```
Job selection-value trees

- Power
  - Authority
  - Wealth
  - Captain
  - Teacher
  - Factory boss
  - Mayor
  - Fisher
  - Factory worker
  - Elderly Caretaker
  - Unemployed

- Tradition
  - Respect for tradition
  - Be part of the community
  - Elderly Caretaker
  - Unemployed

- Universalism
  - Unity with nature
    - Captain
    - Fisher
    - Elderly Caretaker
  - Social justice
    - Care for the weak
    - Mayor
    - Factory boss
    - Teacher

- Self-direction
  - Independent
    - Not bound to village jobs
    - Work outside village
Values and Norms

Achievement

Self direction

Universalism

Maximize catch

Stop when quota reached

Plan A

Plan B

Plan C

V

F

F
Conclusions

• Incorporate values through a value tree
• Changing definitions and interpretations of values leads to different outcomes of a simulation
• Norms can be used to shortcut reasoning about values
• Full normative reasoning about norms and values is not scalable for social simulations
• Simple but explicit incorporation of both concepts IN the simulation gives interesting results

• New simulation platforms needed in order to make user interaction on values, norms, etc possible
The BIG picture

Social practices

norms
organizations
...

Social practices
Motivation: Sociality in CONTEXT
Motivation: CONTEXT recognition
Social Practices

• **Materials:**
  • Physical elements that are part of a practice

• **Meaning:**
  • Understandings, beliefs, emotions, social interpretations that are part of a practice

• **Competence:**
  • Skills and knowledge needed for a practice
<table>
<thead>
<tr>
<th>Abstract Social Practice</th>
<th>Combat Fire</th>
<th>Going to work</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Context</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resources</td>
<td>inflammable objects, water, barriers...</td>
<td>Vehicles, money, ...</td>
</tr>
<tr>
<td>Places</td>
<td>locations of fire, actors and resources,...</td>
<td>Stations, roads,...</td>
</tr>
<tr>
<td>Actors</td>
<td>Victims, bystanders, colleagues,...</td>
<td>Drivers, co-passengers, ...</td>
</tr>
<tr>
<td><strong>Social Context</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social interpretation</td>
<td>Dangerous places, safe places, rescue equipment</td>
<td>Bus driver, train driver...</td>
</tr>
<tr>
<td>Roles</td>
<td>police, medics, ...</td>
<td></td>
</tr>
<tr>
<td>Norms</td>
<td>own safety; public safety</td>
<td></td>
</tr>
<tr>
<td><strong>Activities</strong></td>
<td>Identify type of fire; Extinguish fire; Removal victims; Clear area; ensure own/team safety; ...</td>
<td>Choose transport type; buy ticket; drive car; ...</td>
</tr>
<tr>
<td><strong>Plan patterns</strong></td>
<td><img src="image" alt="Diagram" /></td>
<td></td>
</tr>
<tr>
<td><strong>Meaning</strong></td>
<td>braveness, leadership, ...</td>
<td>Environmental conscientiousness, comfort, social status, ...</td>
</tr>
<tr>
<td><strong>Competences</strong></td>
<td>• Fire combat knowledge and skills</td>
<td>• driving skills,</td>
</tr>
<tr>
<td></td>
<td>• Coordination skills</td>
<td>• cycling skills,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• knowledge of public transport routes</td>
</tr>
</tbody>
</table>