

Long-term Dynamics of Institutions

An empirically tested model

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Summary

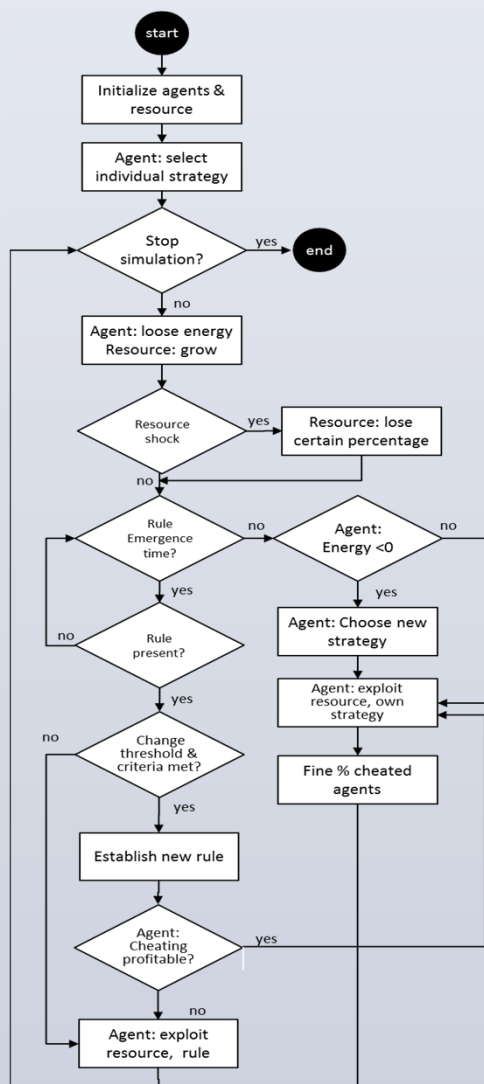
Institutions are key to avoid the “tragedy” of the commons where a shared resource is at risk of depletion due to the collective action problem underlying its management (Ostrom 1990). Therefore, **understanding institutional forms** and how they emerge and evolve over time is of crucial importance.

This research used **ABM** to study the **dynamics of institutions**. Since commons have been studied as iconic situations where individual interests are at odds with collective ones, we use this setting to study the emergence of institutions and their dynamics. **Our goal is to see how institutions, i.e., rules that govern the commons, change across the life span of a common resource.**

Theoretical Basis

The agent-based model consists of **one common resource** and a set of agents who follow their own individual strategy of how much to take from the resource and how often. Agents **create new strategies** and sometimes **copy their neighbours**. An **institution, i.e., a rule** is defined through a **voting mechanism** at a given time in the simulation. After the introduction of the institution, the agents must **comply** with it. Some agents choose to **cheat** and therefore, run the risk of being **sanctioned**. The **institution changes** throughout time when agents are not satisfied with the existing one.

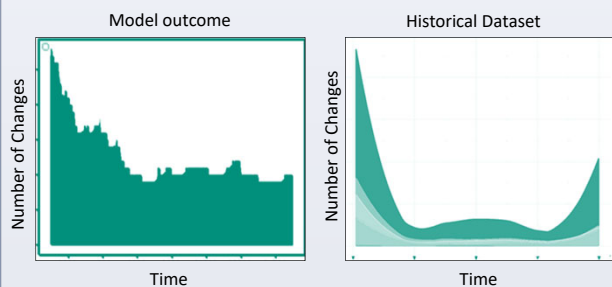
Model



Results

We compare the patterns of institutional change that is observed in our model, to a unique **historical dataset of commons** in order to find commonalities. The historical dataset includes 10 commons from the Netherlands. The earliest record of these commons comes from 1300 and the latest recorded rule change is 1904. On average commons lasted for 245 years in the dataset and had on average 210 rule changes during that time.

Frequency of institutional change



In both dataset, at the birth of the commons (time = 0), there are frequent changes in the institution, followed by a period of stability.

Types of institutional change

- First Mentioning: the institution is introduced for the first time.
- Repetition: the mentioned institution is the same as the previous one (unchanged).
- Adjustment: the mentioned institution is an updated version of the previous one.

Finding: In both datasets, adjustments are more common, followed by repetition, followed by first mentioning.

Conclusions

Our agent-based model does not make any use of real-world data. Therefore, it is interesting to see how this theoretical model corresponds to reality. We see that in both sets of data (generated, historical), institutions change rapidly at the beginning followed by a period of stability. In the historical dataset there is also rapid change at the end of the commons' lifetime, but our model does not produce that because unlike for the historical dataset the agents are not aware of the environmental conditions (including economic and legal) that are putting the commons at risk. The types of change also have similarities; institutions are adjusted to new forms more often than being repeated without any change, or being created from scratch, suggesting continuous disequilibrium with small changes rather than radical ones.

Work in progress

- Calibrate the model using more institutional patterns
- Explain the common emerging patterns using micro behaviours in the model
- Adding power relations and agent heterogeneity to the model.

Acknowledgements

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