

Disobedience as a Mechanism of Change

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12th IEEE SASO, 3-7 Sep 2018, Trento Italy

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Introduction

*We propose that the social concept of **disobedience** can be used as a mechanism for **adaptive and exploratory learning** in norm-governed multi-agent systems.*

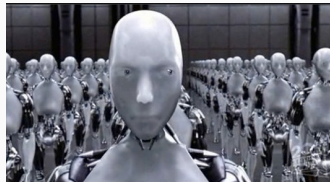
Disobedience in Society

- **Disobedience** has been used historically as a form of resistance and call for change in unfair regimes.
- Among the factors that motivate widespread disobedience are:
 - **The iron law of oligarchy** - the tendency for a small group to emerge and run complex organisations for its own benefit, rather than the collective interest
 - **Principled violation of policy** - law enforcement relaxation, with selective common-sense non-application of sanctions



Figure 1: Suffragette's in UK

- Can these notions be applied to **norm-governed MAS**?
- How to deal with systems with **disfunctional norms**?
- Can disobedience be a form of **collective learning**, enabling the construction of adaptive systems?



Base Premises and Operationalisation

- **Base Premises**
 - **P1** - A norm is in place
 - **P2** - Compliance is an individual decision
 - **P3** - Existence of monitoring and sanctioning mechanisms

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- **Disobedience Premises**

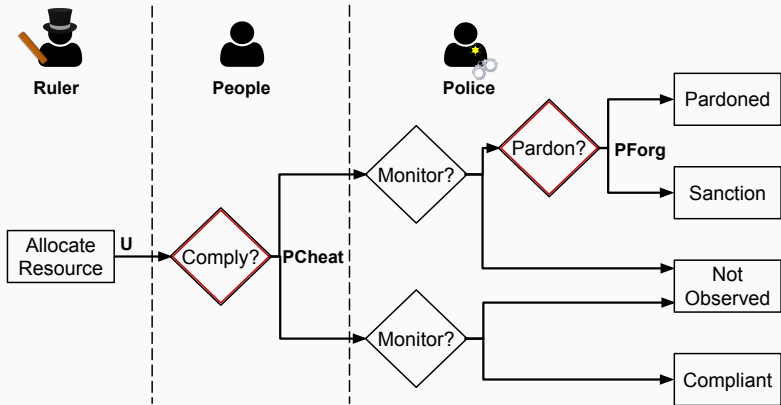
- P4 - Fairness decays over time (corruption)
- P5 - Possibility of pardon by law enforcers

- **Base Premises**
 - P1 - A norm is in place
 - P2 - Compliance is an individual decision
 - P3 - Existence of monitoring and sanctioning mechanisms
- **Disobedience Premises**
 - P4 - Fairness decays over time (corruption)
 - P5 - Possibility of pardon by law enforcers
- **Transformation Premises**
 - P6 - Prescribed ruler destitution



- Resource allocation scenario
- Players and its roles:
 - **Rulers** - Resource allocation policy
 - **People** - Appropriation of resource
 - **Police** - Check if appropriation = allocation

Disobedience levels



Rulers:

U - Corruption of allocation policy

$$U = f(time)$$

Police:

P_{forg} - Probability of sanction pardon as function of perceived fairness

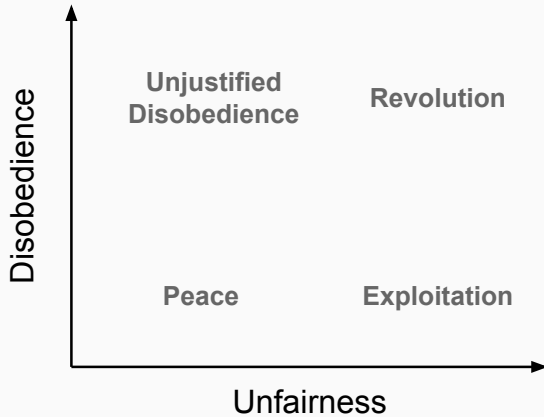
$$P_{forg} = f(fairness) \quad fairness \sim Gini(Satisf)$$

People:

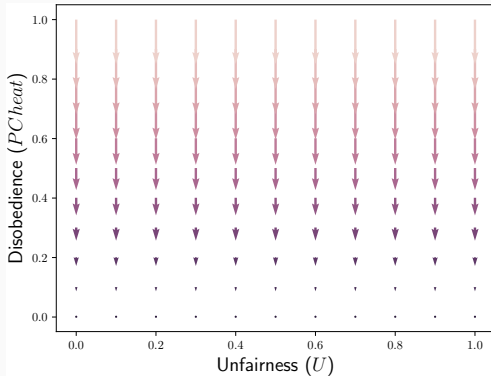
P_{Cheat} - Decision of compliance as reaction of system's feedback

$$P_{Cheat} = f(fairness_i) \quad \left\{ \begin{array}{ll} \uparrow & \text{if sanctioned} \wedge \neg \text{fair} \\ \downarrow & \text{if sanctioned} \wedge \text{fair} \\ = & \text{if forgiven} \\ \uparrow & \text{if not caught} \\ \downarrow & \text{if compliant} \end{array} \right.$$

Experimental Results

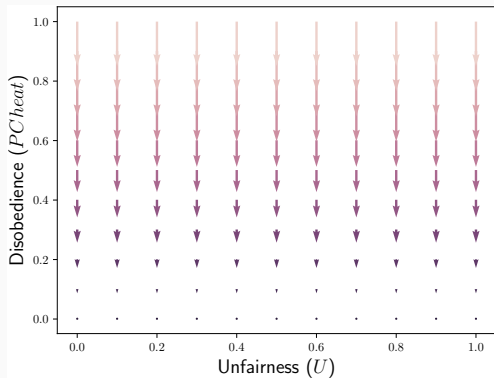


Base Game

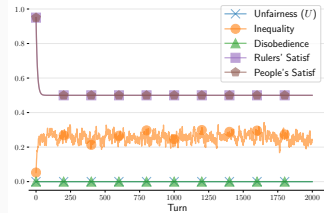


Without pardoning or reformation, People stay at the mercy of rulers, not having another rational choice than to obey, no matter how unfair is the current policy.

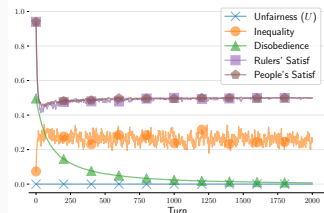
Base Game



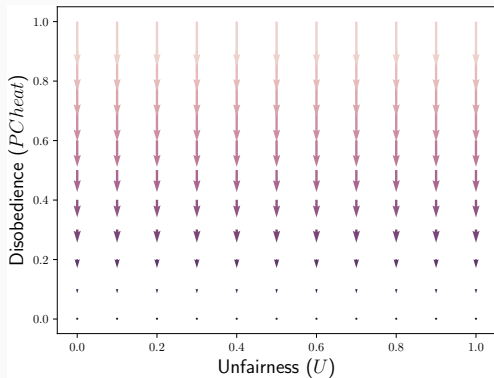
Peace:



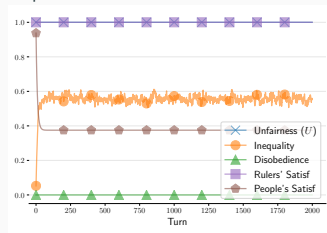
Unjustified Disobedience:



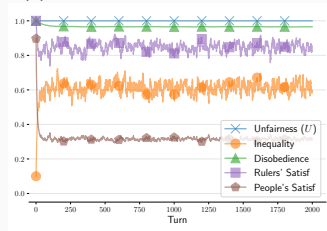
Base Game



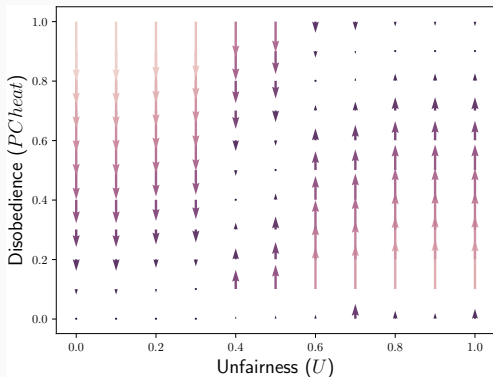
Exploitation:



Oppression:



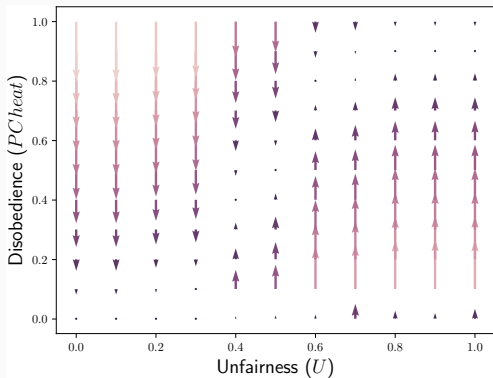
First Extension - Pardoning



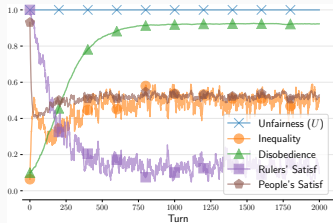
Obedience is conditioned to unfairness level: if fair, agents obey; if unfair, tendency to non-compliance

Police validates justified norms disobedience, pardoning transgressions

First Extension - Pardoning

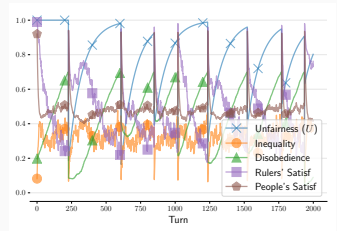
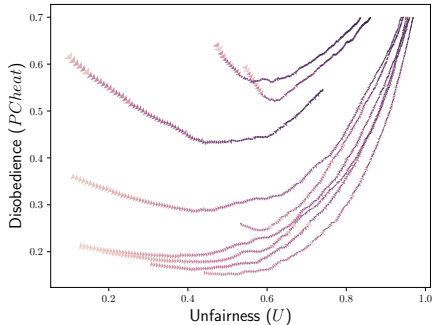


Revolution:



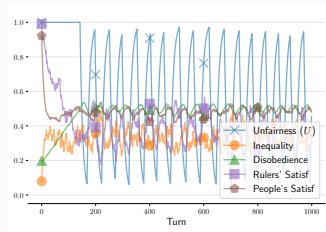
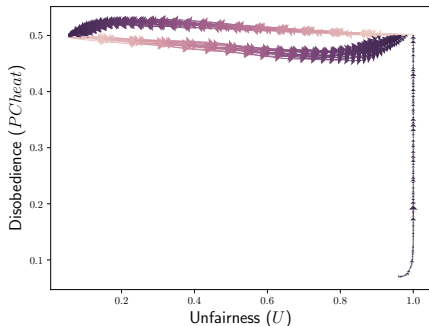
- Lost of governability implies in **ruler change**
- If Non-Compliance $\geq \mathcal{T} \rightarrow$ Reformation
- Set of non Rulers become the new Rulers, individual satisfaction is randomly restarted
- 3 possible equilibria...

Equilibrium 1 - Reformation Cycles



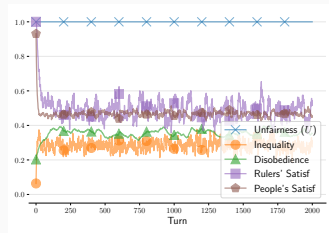
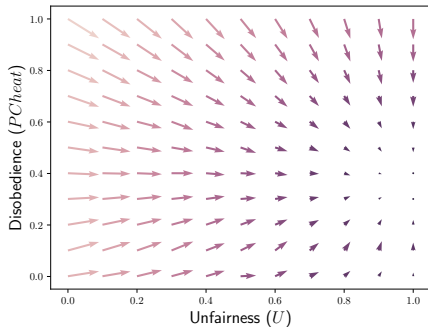
- Perpetual cycle of power change
- Alternation of power and higher overall satisfaction.
- Points out the need for post-revolution reconstruction.

Equilibrium 2 - Popular control



Knowing the Reformation Threshold \mathcal{T} , unfairness is manipulated so Rulers please People with just enough resources so their disobedience remains in controlled levels.

Equilibrium 3 - Pragmatic revolution



People disobey just enough to guarantee that satisfaction (and resource) is the same for all agents.

Conclusion

- **Disobedience** as tool for adaptive learning in norm-governed MAS
 - Standard norm-governed systems guarantees agents' **obedience**, but not **governance fairness**, allowing exploitation and oppression of agents
 - The introduction of **pardoning mechanisms** changes the system's dynamic equilibrium by justifying **disobedience** as a revolutionary behaviour for justice restoration
 - The introduction of formal **reformation mechanisms** changes the equilibrium once more, giving supplementary power to non-Rulers and enabling **cycles of change**
- Open questions / Future work:
 - Could we have defined subjective terms such as *fairness*, *obedience*, *unjustified*, *revolution* in different ways?
 - What would happen if agents had limited or subjective knowledge of events happening in the network? How interpersonal factors such as *social influence*, *trust* and *misinformation* would affect the system?
 - How to escape from simple system reformation and move towards post-revolution reconstruction?

- National Council for Scientific and Technological Development (CNPq), Brazil;
- Diverse collaborators.



Thank you!