**Modeling Social Systems with Matlab, Project Proposal**

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***Modeling trust in non-zero sum games to predict negotiation outcomes on international level.***

Introduction:

Trust on intergovernmental level is crucial for emergence of cooperation if no authority is present to enforce the contract or agreement.

To understand the decision processes and why negotiations about contracts are successful or a failure one needs to understand not only rational implications that are considered by game theory, but also emotional influences on rational decisions. One of these emotional influences is trust, which will be modeled and compared to the most used and accepted models of game theoretical decision making. Furthermore I will in a later stage compare the model to reality, by analyzing international contracts between countries or alliances that are assumed to have high trust for each other and countries that have low trust for each other. This secondary Policy Analysis aims to see if the emotional reaction of trust as modeled by me does have an effect on international negotiations.

Model Assumptions:

* Non-zero sum game, meaning that the gain of one is not always based on the expense of another
* Rationality is assumed for trust=0, meaning that parties tend to fall into Nash equilibrium if no trust has been established.
* Cooperation emerges when trust allows for disruption of the original Nash equilibrium
* First interaction, trust is believed to be 0 and Nash equilibrium will be assumed.

Model requirements:

* Trust buildup is slower than trust loss
* Buildup and loss of trust are both dependent on the magnitude of payoff and loss/ betrayal
* Trust of n+1 is dependent on Trust of n
* Trust not only dependent on own payoff but also on the payoff of the counter party

Model:

**If:** SUM{Player2Payoff}<0 and SUM{Player1Payoff}>0

**Then**:

Trust[n+1]=SUM{Trust[n]}/n^(SUM{Player1Payoff[n]}/SUM{Player2Payoff[n]}\*(-1))

**If:**

SUM{Player1Payoff}/SUM{Player2Payoff}<0 || SUM{Player2Payoff}>0 and SUM{Player1Payoff}<0

**Then:**

Trust[n+1]=(SUM{Trust[n]}/n^(0-{SUM{Player1Payoff[n]}/SUM{Player2Payoff[n]}}^2)

**If:**

SUM{Player1Payoff}/SUM{Player2Payoff}>0

**Then:**

Trust[n+1]=(SUM{Trust[n]}/n)^(SUM{Player1Payoff[n]}/SUM{Player2Payoff[n]})

All Values apart from Nash equilibrium upadated from game theory grid with:

Value x (1+Trust)

Project Outline:

Until 23.10.17: Project Proposal and Trust function modeling

Until 15.11.17: Implementation of Trust function in Matlab

Until 30.11.17: Comparison to other approaches

Until: 31.12.17: Policy Analysis