GRASP World ODD description

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This ODD complements the paper on GRASP world written for SSC 2018 Stockholm, to be submitted to the JASSS special issue on the conference. The corresponding code is in Netlogo 6.0.2. file 'GRASP world JASSS 20190416'. This file was created using the ODD + D reference model (Müller et al. 2013).

Overview

GRASP world is an agent-based model that investigates group longevity in a population in a foundational way, using theory on social relations and culture. The model is the first application of the GRASP meta-model for social agents, containing elements of Groups, Rituals, Affiliation, Status, and Power. It can be considered an exercise in artificial sociality: a culture-general, content-free base-line trust model from which to engage in more specific studies. Depending on cultural settings for individualism and power distance, as well as settings for xenophobia and for the increase of trust over group life, the GRASP world mod-el generates a variety of patters. Number of groups ranges from one to many, composition from random to segregated, and pattern genesis from rapid to many hundreds of time steps. This makes GRASP world an instrument that plausibly models some basic elements of social structure in different societies. An article about GRASP world in JASSS is forthcoming.

Design concepts

Theoretical and empirical background

The main basis for the sociality of the agents in GRASP world is Kemper's status-power theory of relations, as described in (Kemper 2011).

Differences between societies (that is, between model runs) can be articulated with sliders based on Hofstede's work on national cultures, as described in (Hofstede, Hofstede, & Minkov 2010).

This is a theory-driven generic model. It reproduces patterns that many observers recognize, but has no formal empirical basis other than the 'nomological network' (the set of empirical phenomena that can be explained by the theory) of the theories with which it was designed.

Individual decision making

In the beginning of each time step, any agent that is not in a group selects a random group to join. At each time step, agents pick a random other in their group and decide how much social status to confer on that other. The other does the same. Each agent compares how much status they received with how much they expected. If they received less than expected, they become unhappy. If they are unhappy they may pick a fight with the other, depending on culture and mutual status.

At the end of each tick, depending on their happiness, on the fraction of happy members of the group, on its social status relative to others in the group and on the agent's culture, an agent may decide to leave the group.

Learning

Agents do not learn.

Individual sensing

Agents sense the status conferral they gave and received within an interaction, the difference between the two, and form an emotional response to that difference. Beyond their dyadic status exchanges, they sense the current status of all other agents in their group.

Individual prediction

None

Interaction

See 'individual decision making'. The mutual conferral of status with one member of their group, possibly followed by a fight, is the key interaction. A fight is technically a mutual conferral of power. The winner gains status, the loser loses status.

Collectives

The agents assemble in groups that interact between their members and stay together as long as members do not individually decide to leave.

Heterogeneity

All agents are the same, except for their 'norm meme' and their social status. Norm meme is a linear parameter shown as the agent's shade. Social status changes each tick in function of winning or losing a fight.

Stochasticity

Initial agent status is stochastic. Stochastic agent decisions are: group to join, agent within my group to interact with. Other agent decisions are partly stochastic too: status conferral, decision to leave group.

Observation and emergence

During a run one can observe in the world

- How many groups there are
- How long they live
- Whether agents self-organise according to status or shade
- Whether status differentiation occurs
- ...and whether the above are correlated, e.g. because high-status agents form longer-lived groups.

Details

Implementation details

The model was written in Netlogo. The world is undifferentiated, and spatial distance has no meaning, but for a technical detail: there are patches that serve as 'meeting points' for the groups. This was the simplest way to avoid agents from different groups occupying overlapping areas.

Initialization

N Agents (max 40) are placed randomly in the world. Their social status is randomly distributed. In tick 1 they will form around N / 3 groups by chance.

Input

The model has no input, other than (potentially) the value of the random seed. This allows to reproduce specific runs.

Submodels

The main submodels are the mutual conferral of status and potential fight, and the decision to leave a group. Here are the details of both.

Conferral:

Both agents use the same reasoning.

1. set status-conferral (random-normal 0.5 status-conferral-stdev)
2. let norm-misunderstanding xenophobia-factor * (abs (my-shade - mate-shade))
3. set status-affront status-conferral - mate-status-conferral
4. set dyadic-trust (dyadic-trust-factor / 10) * time-know-each-other
5. let my-perceived-status-affront status-affront + norm-misunderstanding - dyadic-trust

Decision to fight depends on the parameter status-deficit-limit:

1. if my-perceived-status-affront > status-deficit-limit [fight]
2. fight: let my-power-conferral my-perceived-status-affront * status / 200
3. if my-power-conferral >= mate-power-conferral [win] else [lose]

Decision to leave:

1. agent retains emotion from conferral. It is happy except in two cases.
   if my-perceived-status-affront > status-deficit-limit [set my-emotion "angry"]
   if my-perceived-status-affront > 0.5 status-deficit-limit [set my-emotion "neutral"]
2. agent with highest status in group decides to leave if either
   a. angry and random 50 < individualism and count my-happy-group-members < (individualism / 75) * count my-group-members
   b. neutral and random 75 < individualism and count my-happy-group-members < (individualism / 125) * count my-group-members
   c. happy and random 100 < individualism and count my-happy-group-members < (individualism / 200) * count my-group-members
3. other agents decide to want to leave following same logic, but there is an additional constraint: leave if max-status-in-my-group - my-status <= (1 - power-distance / 100)

References

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