

Goal

This project aims to explore semiotic codes as the “deep structure” of culture in different context using statistical tools offered by dynamical system.

System

Culture has powerful influence on action even when individuals do not deeply internalize its meanings. Swidler uses “semiotic code” to characterize this self-referential system of meanings in which each element takes its meaning not from its inherent value or from external referent but from the meanings created by the code itself. For example, although many people don’t believe that presents on Mother’s Day is the only way to express children’s affection for mothers, they will follow the publicly promoted semiotic code that if you love your mother you will buy a gift for her on that day. This inconsistency is more prevalent in institutional context. For example, survey and interview studies find that Americans do not really believe that the country provides equal opportunity for all, but these beliefs appear over and over again even among the poor and disprivileged. In political context, especially in unstable situations, people may take on coherent ideologies, not because they deeply believe them but because they need some way to organize action when settled habit is no longer enough.

I want to capture this inconsistency by the difference between actions driven by internalized values and actions driven by strategic choice. Normally we don’t care about this difference much. The sociological theory of semiotic code provides an opportunity to explore in the internalization of the semiotic code actually matters in collective action result and when controversial events happen, does it make a difference.

We can consider social learning as an internalization process. The paper Stability and Diversity in collective action and I see that it has a model where agents update their pool of decision probability distribution each iteration by reinforcement. We can see this reinforcement as an internalization process. At the same time, based on the theory of semiotic code, we can also have agents that do not have the social learning process and only make strategic decisions based on the other agent’s last move. When they interact with an agent that had the action that follows the semiotic code, the same action that follows the semiotic code will lead to higher pay-off, otherwise, they will make decisions that follow their default probability distribution of a pool of decisions.

I then constructed an agent-based model as follow:

There’s two different type of agents: learners and strategists. Learners take an evolutionary approach. They decide on strategies (A/B) according to their beliefs B (if $B \in (0,0.5)$ then bias towards A; if $B \in [0.5,1)$ then bias towards B) and get pay-offs and then update their beliefs.

Strategists always decide on strategies (A/B) according to the other agent’s last move and never update their beliefs.

matrices:

For people with default value that bias towards strategy A (non-semiotic code), the payoff matrix is as follows:

	A	B
A	socialBenefit	-socialCost
B	-socialCost - internalCost + SemioticTopup	socialBenefit - internalCost + SemioticTopup

For people with default value that bias towards strategy B(semiotic code), the payoff matrix is as follows:

	A	B
A	socialBenefit - internalCost	-socialCost - internalCost
B	-socialCost + SemioticTopup	socialBenefit + SemioticTopup

For this model, I would expect that different ratio of the two populations will all converge to semiotic codes (B) but at a different rate. There are a few dimensions/questions I can answer using this model and dynamical methods: (1) the difference between the dynamics of decisions made by the two types of agents. (2) How do the converging rates differ? (3) Is there a flipping point for the proportion of agents which internalized the value that would change the converging rate dramatically? (4) When an event (might be political) happens and it changes the payoffs of the original semiotic code, how would it change the collective pattern in a society where individuals internalized the patterns and the society where individuals just make strategic moves?

Dynamic properties

I will investigate basin of attractor in the system.

Intrinsic computation properties

I will investigate the collective as a system and average the strategy output to calculate the causal states, statistical complexity, entropy rate. I will also calculate the b_{μ} and r_{μ} of learning agents and strategic agents.

Method

I will build an agent-based model using java (almost done) and simulate the model with a few set of parameters. I will then calculate the Intrinsic computation properties and dynamic properties.

Hypotheses

H1: We should observe a oscillation when the semiotic-code top-up benefit equals to 0, whereas the system will converge to strategy B (semiotic code) when the semiotic top-up benefit is positive.

H2: A system with more strategists will converge at a faster rate but less robust.

H3: Learners has a higher b_μ than strategists.

H4: Systems with more learners has fewer causal states than systems with more strategists.

Steps & Time

Simulation: 1 week

Data reconstruction: 1 week

Estimate properties from empirical data 1 week

write up report: 1-2 week

I will be able to finish the project within a month.