

Defining extremism in opinion models

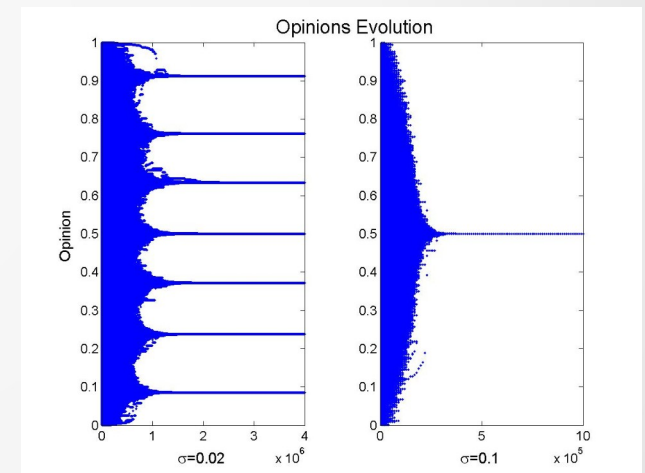
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ICTP – SAIFR: Workshop on Sociophysics: Social
Phenomena from a Physics Perspective



Traditional opinion models and extremism

- Discrete
 - Good for choices
 - Describes actions such as terrorism (do or not do is binary) very well
 - Typically, no strength of opinions
- Continuous
 - Opinion strength
 - Not so natural to talk about actions
 - Values at the end of range: always extremists?

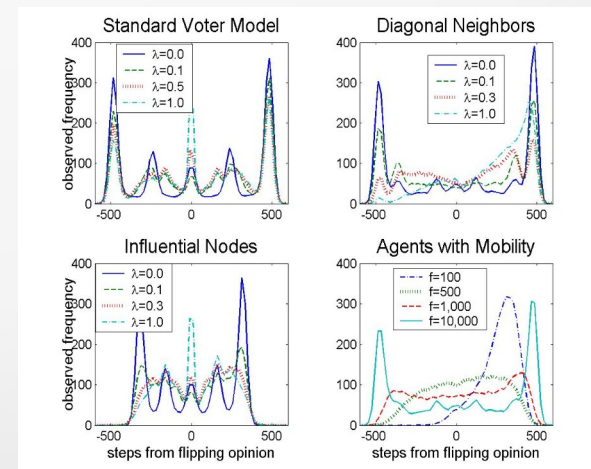
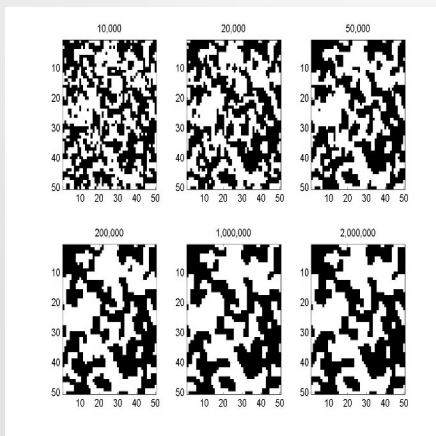


Opposing concepts

- Discrete models: inflexibles → inability to change opinions
- Continuous models: end of range → distant from the opinion of others, but can still change as well as anyone else.
 - It is possible to change definitions here to inability to learn, but they are conflicting.
- Both cases lack a direct link to actions

How to expand those definitions

- We need a framework with choices, strength of opinions, communication and action.
- First attempt:
 - Original CODA model: doi.org/10.1142/S0129183108012339
 - Probability as opinion strength
 - Observed choice: action with highest probability
 - Update rule based on observation: Bayesian inspired



Framework

doi.org/10.1063/1.4759605

- The issue: variable x
- Opinion about the issue: distribution $f(x)$
- Communication: Functional $A[f]$
- Agent internal model dependent on best choice x^* : $p(A|x^*)$
- Update rule from the internal model: Bayes (or something else)
- Interaction rules: networks, etc.

Relation to traditional models

- Bounded Confidence results equivalent to a continuous update rule with some distrust:
doi.org/10.1088/1742-5468/2009/02/P02017
- Discrete models recovered as a limit case of an extension where self-influence is considered by agents:
doi.org/10.1016/j.physa.2013.10.009

Also details

- Contrarians: doi.org/10.1142/S0219525910002773
- Inflexibles: doi.org/10.1103/PhysRevE.87.042807
- Trust: doi.org/10.1016/j.physleta.2013.07.007

Ways to implement extremism

doi.org/10.3389/fphy.2016.00007

- Even a simple model of two choices raises questions:

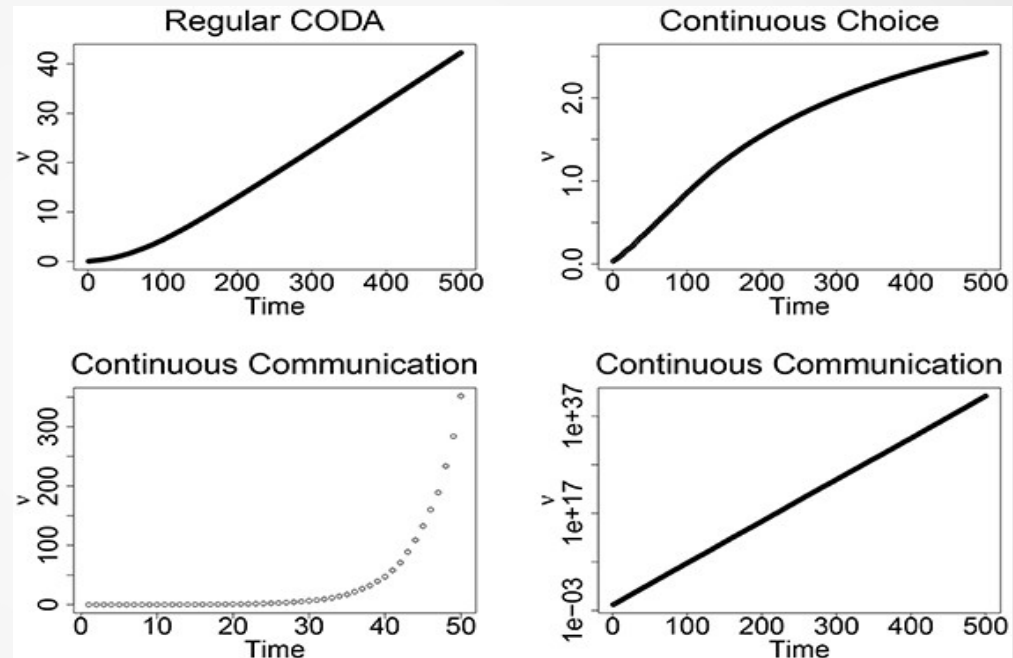
- Communication:

- Discrete
- Continuous

- Mental models:

- Wishers
- Mixers

- Probability of being right can be non-extreme even when effort to change is the same.



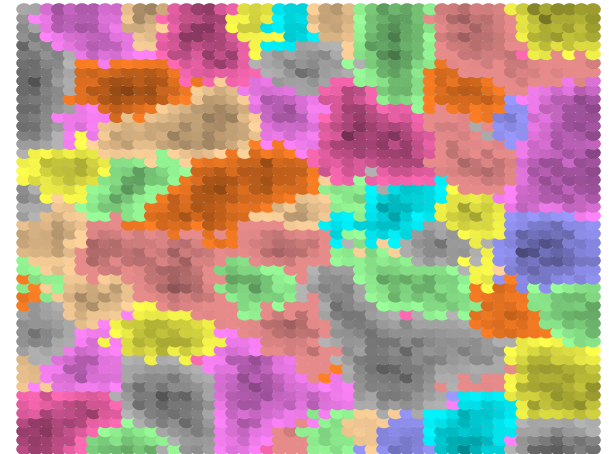
CODA-inspired Bounded Confidence lessons

- Over a continuous range, the limits of the range are naturally seen as extreme.
- If certainty (BC threshold) is updated, agents can grow very sure over time:
 - Become inflexibles, discrete version of extremism
- What represents extremism better?

A model for M choices

doi.org/10.1140/epjb/e2019-100298-3

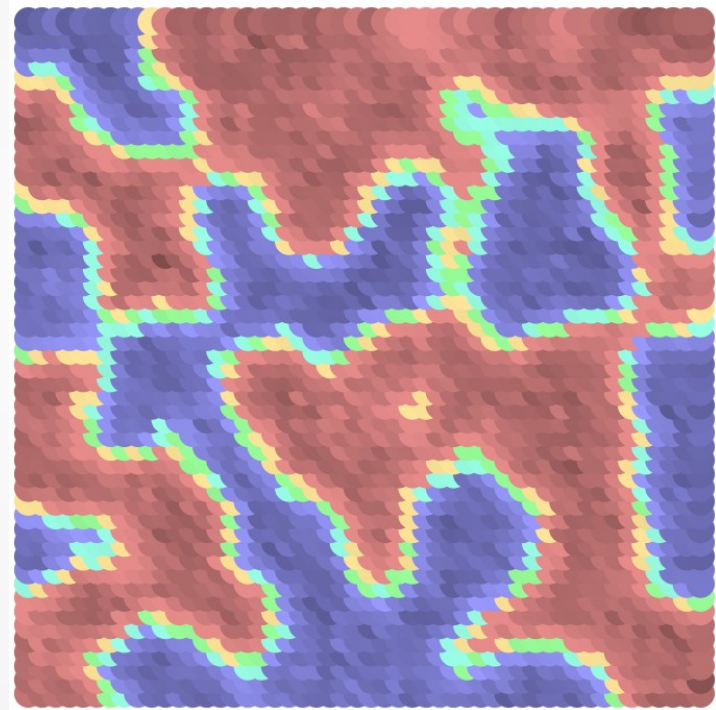
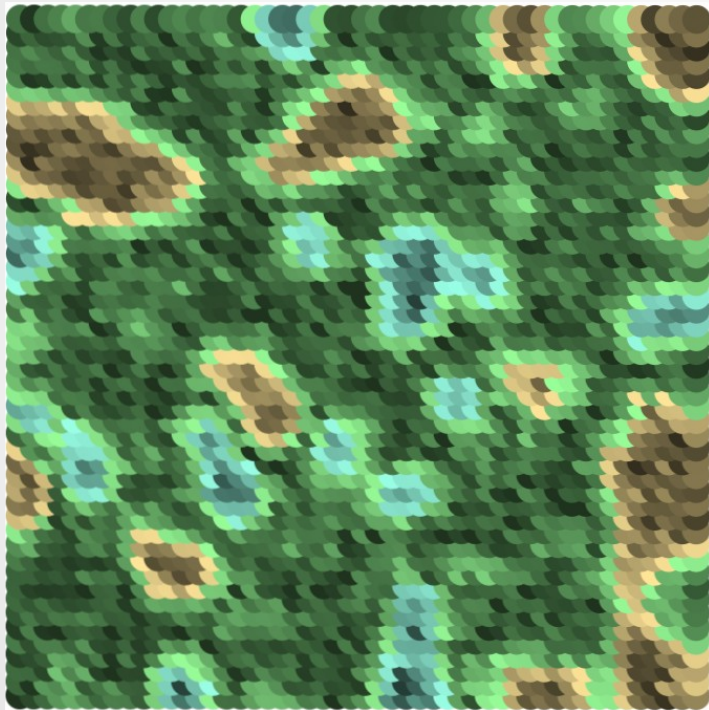
- Extending CODA for M choices
 - Each choice might be independent:
 - Formation of domains
 - Local reinforcement
 - Extremism is strength of opinion
 - Choices can also be aligned over a political axis.



M choices over a one-dimensional issue

arXiv:2004.14548

- For example, suppose agents choose over the options: extreme left, left, centre, right, and extreme right.
- Outcomes depend on the mental model of the agents:
 - When agents assume that, if center is better, extreme positions should be much less probable, a strong tendency to central positions is observed.
 - When extremism is believed to be not so rare, agents tend to the extremes of the political spectrum.



Discussion

- In every case, agents do become quite certain about their choice: extreme centrists happen when we see large clusters that prefer the central position.
- Who are the actual extremists? Those at the end of the political range? Those who are too sure to change their minds?
- All those models lack one important feature, central in real world relevant problems: agents just choose and debate. Do we need to distinguish choice and action in our models?



Thank you