

Polarization and Tipping Points

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Overview

- Extensive pre-existing academic literature about polarization
- Exploratory paper about existence of polarization tipping points
 - Meant to be abstract and theoretical, needs empirical follow-up studies
- Theoretical model, not based on any particular governing body (although somewhat resembles US congress)
 - Eliminates assumptions about individual institutions, potentially makes it more generalizable
 - Also makes it less applicable to real-world circumstances

Significance

- Why are we unable to put aside partisan divisions in the face of a common threat?
 - The COVID-19 pandemic caused greater polarization
 - Similar “shock” events such as the Great Depression and World War II led to more unity
- Why do members of political parties align so strongly on seemingly unrelated issues?
 - Example: guns, reproductive rights, mask wearing

Model

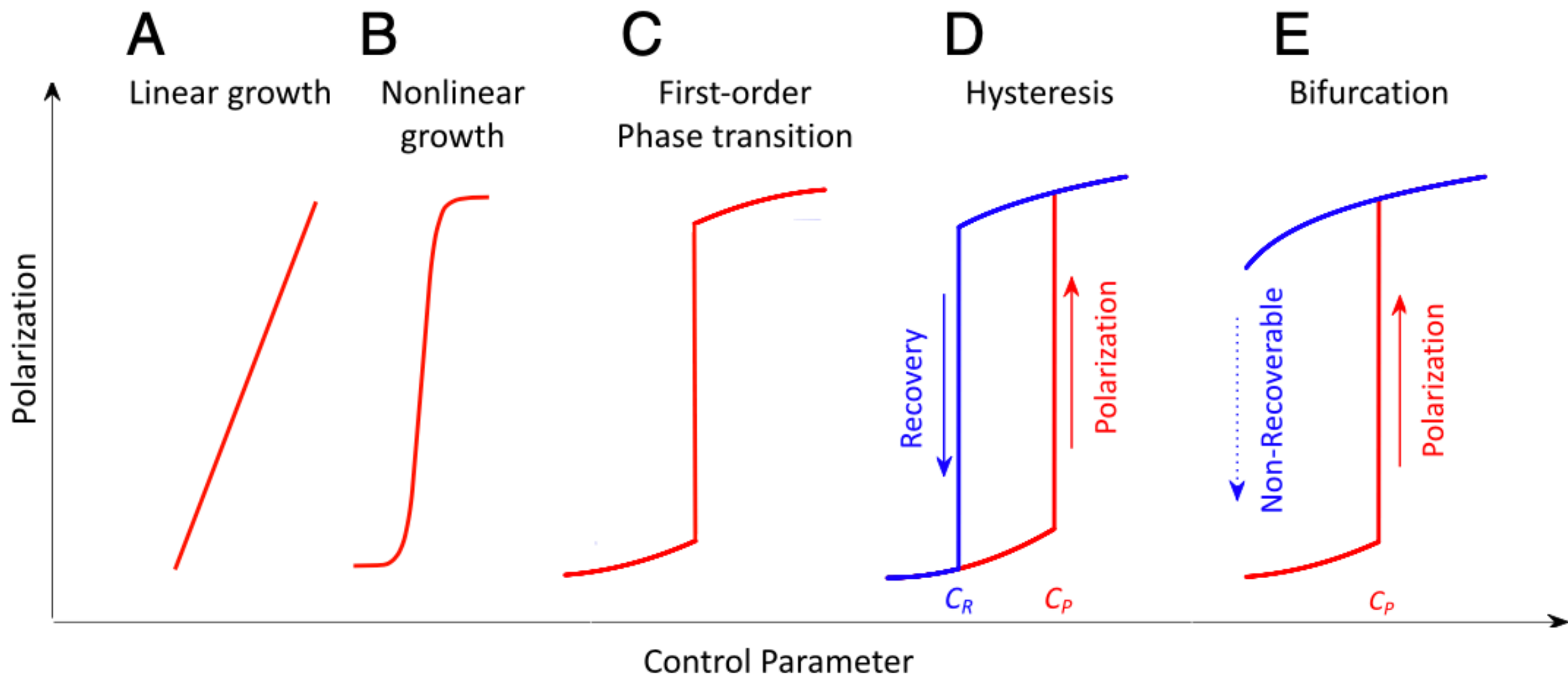
- Each node is assigned a position between +1 and -1 on each of 10 issues plus a party affiliation
 - At least 10 issues ensures that polarization arises out of cross-cutting cleavages, more than 10 issues diminishes importance of each issue
 - Negative influence is very important
 - Uses two-party system for simplicity, but model robust for multi-party systems
- Shocks introduced by adding an 11th issue all members initially strongly agree upon
 - Example: a global pandemic, large-scale war, etc
- Population of models, not a model of a population
- Polarization measured by the Rice Index: $\frac{| \text{yes} - \text{no} |}{\text{yes} + \text{no}}$

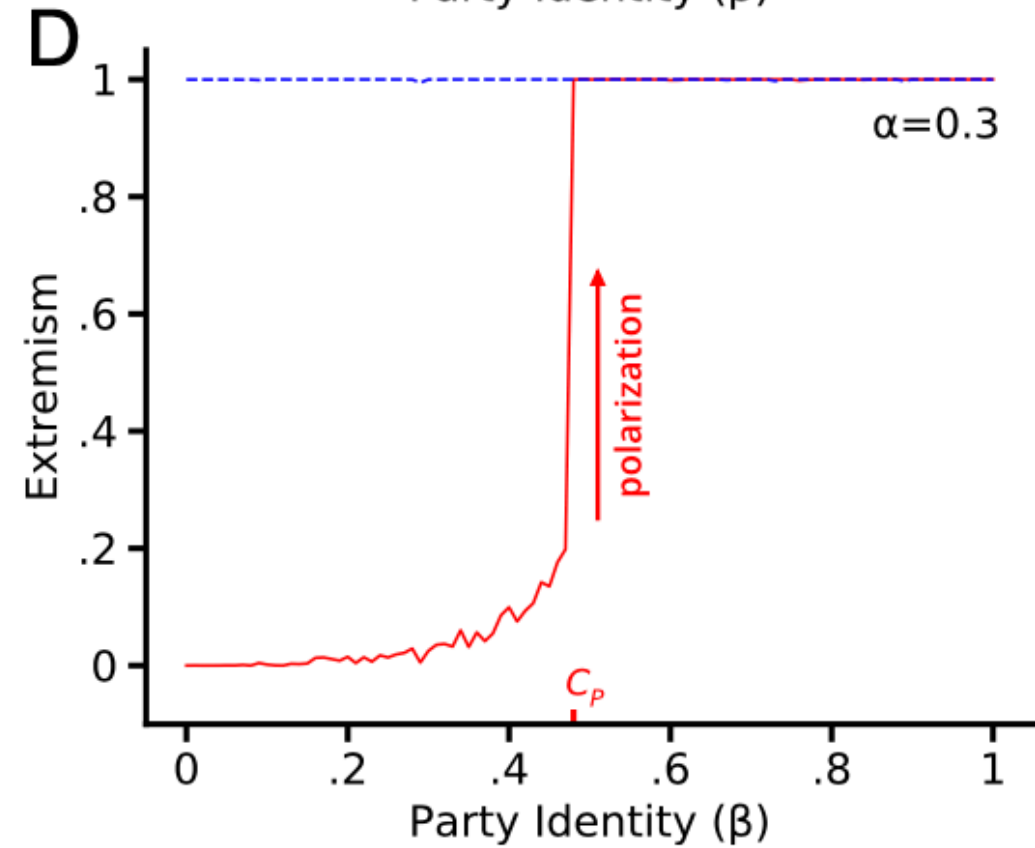
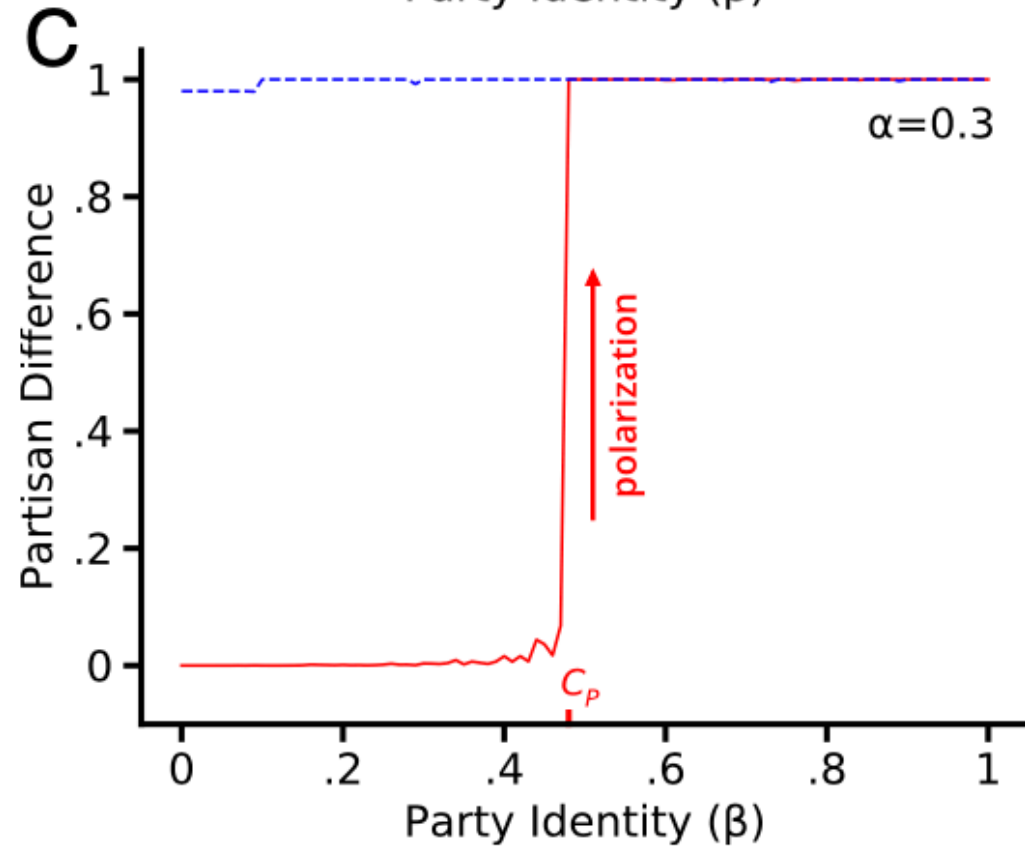
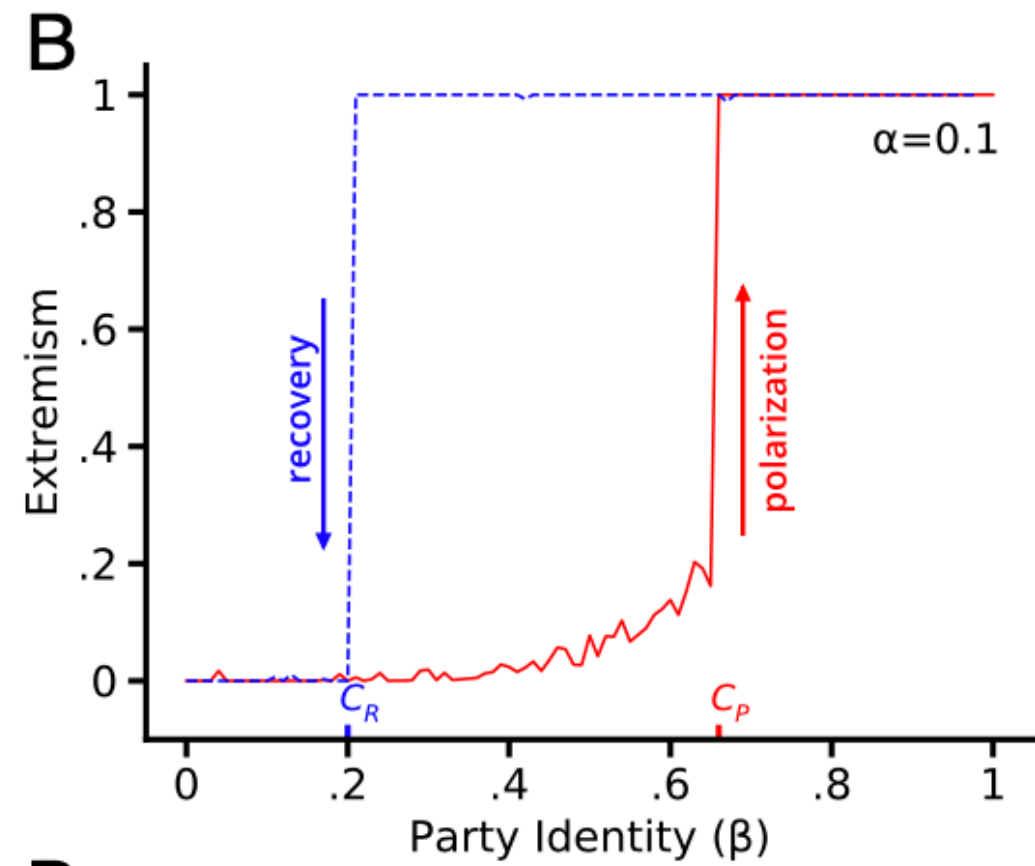
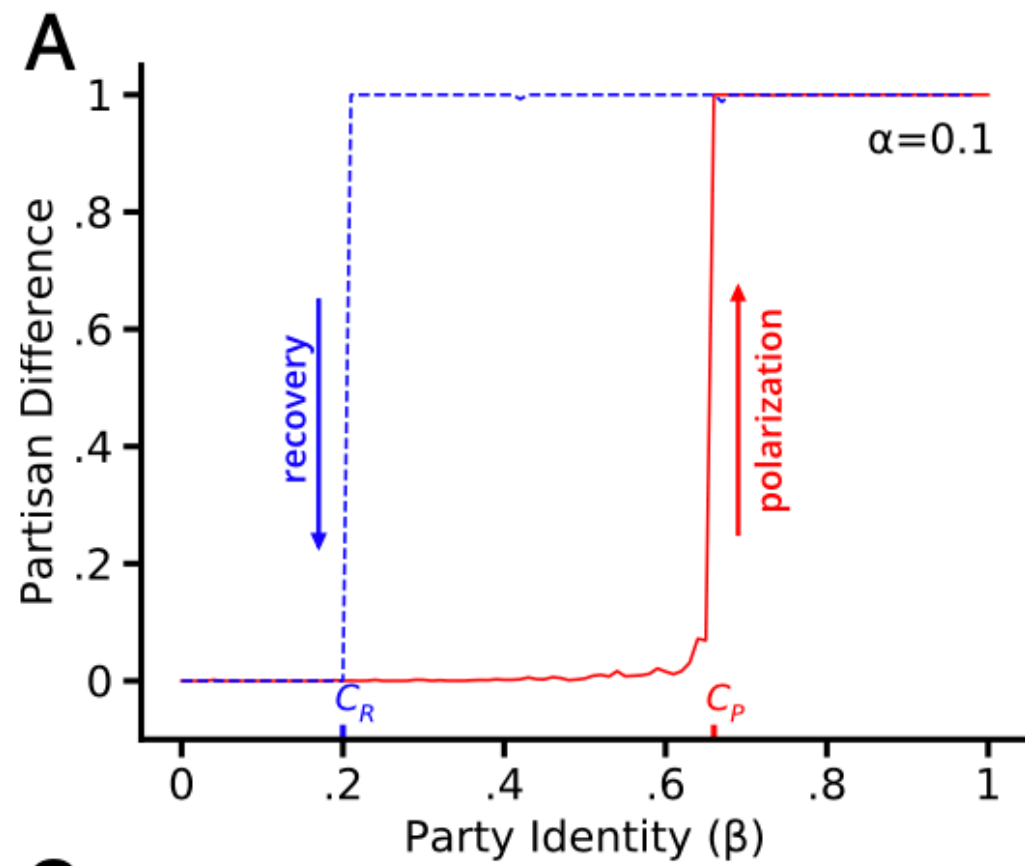
Simulation

- Initial party affiliation and position on each of the 10 issues is randomly distributed
 - At time $t=0$, parties have uniform ideological distribution
- At each timestep, a node is selected and its position is updated based upon a randomly-selected neighbor's position
 - Moves towards neighbor with probability as function of their previous distance and the tolerance of disagreement, α .
- Four global parameters:
 - α — tolerance of disagreement
 - β — importance of party identity
 - γ — strength of shock (weight associated with 11th issue)
 - σ — level of extremism at which shock occurs

Results

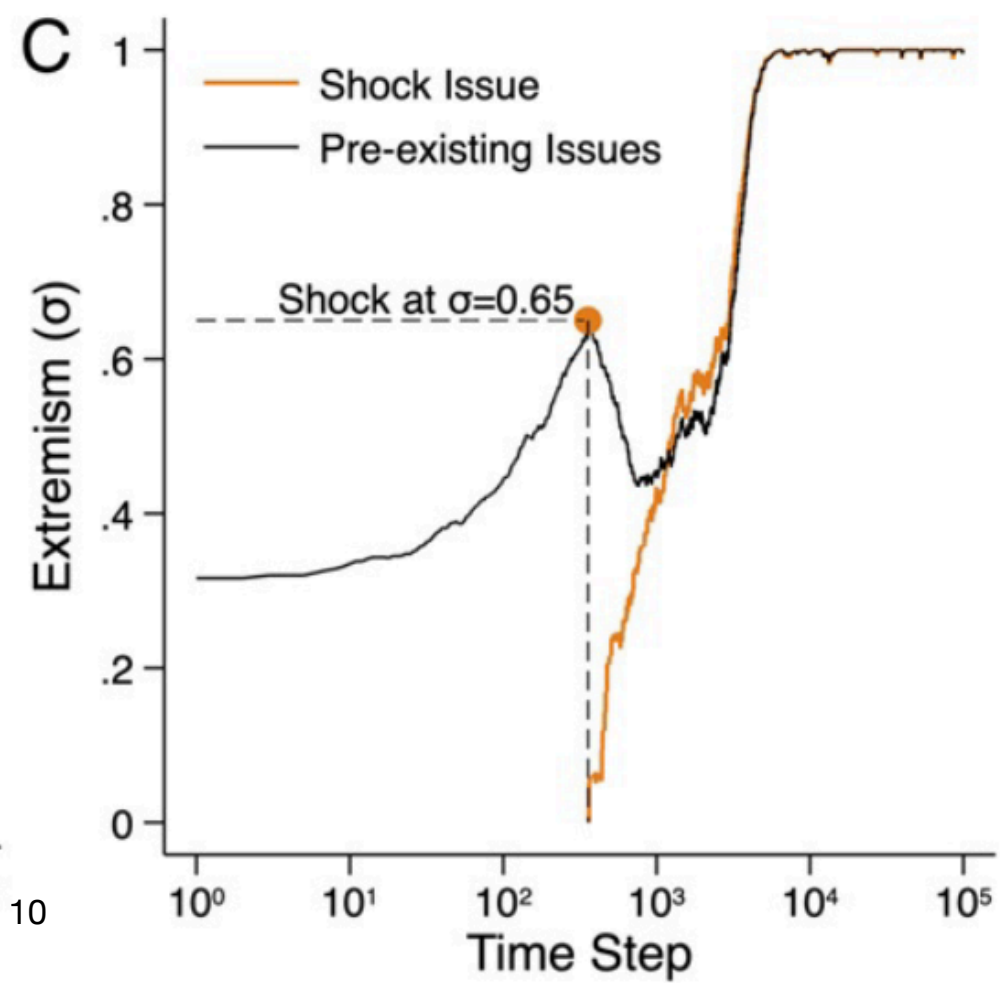
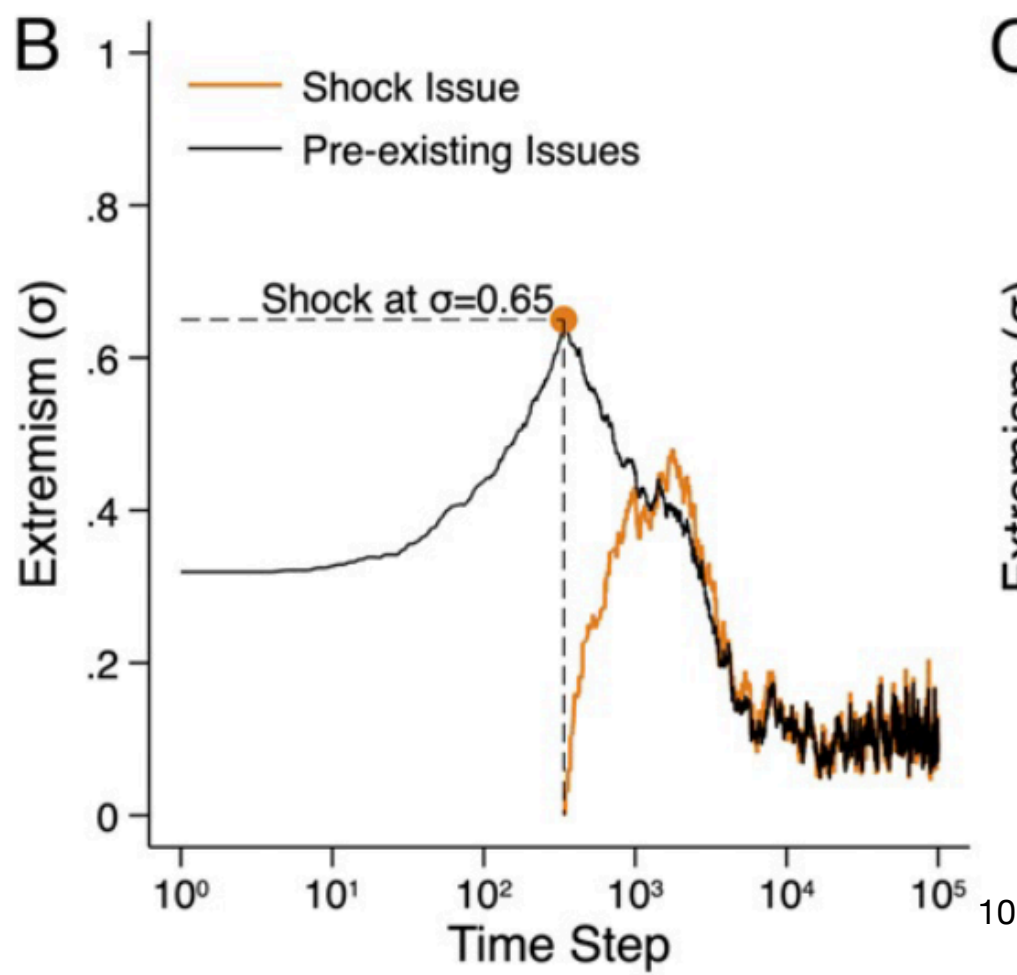
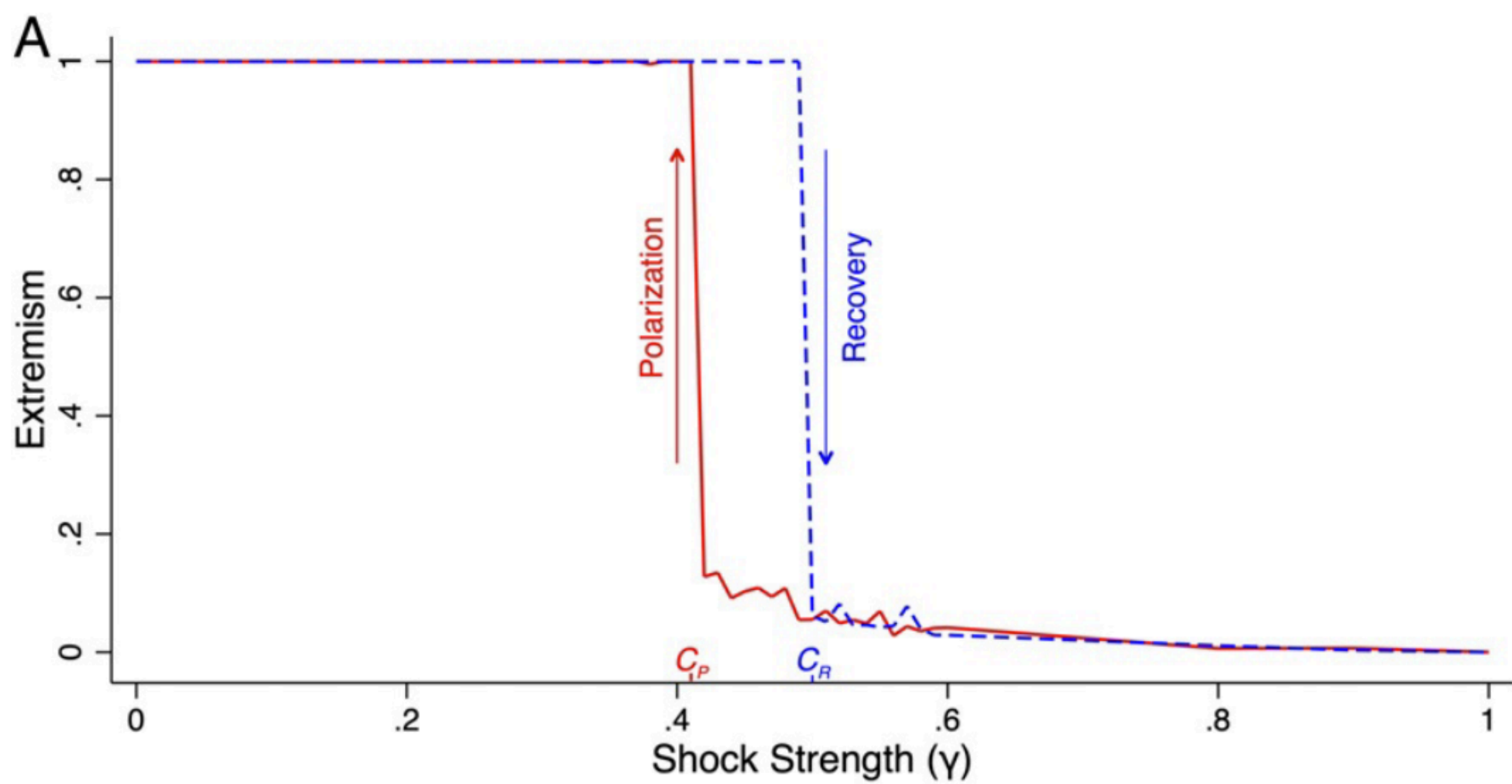
- It is possible for polarization to increase more rapidly than the network can react
 - Leads to irreversible polarization





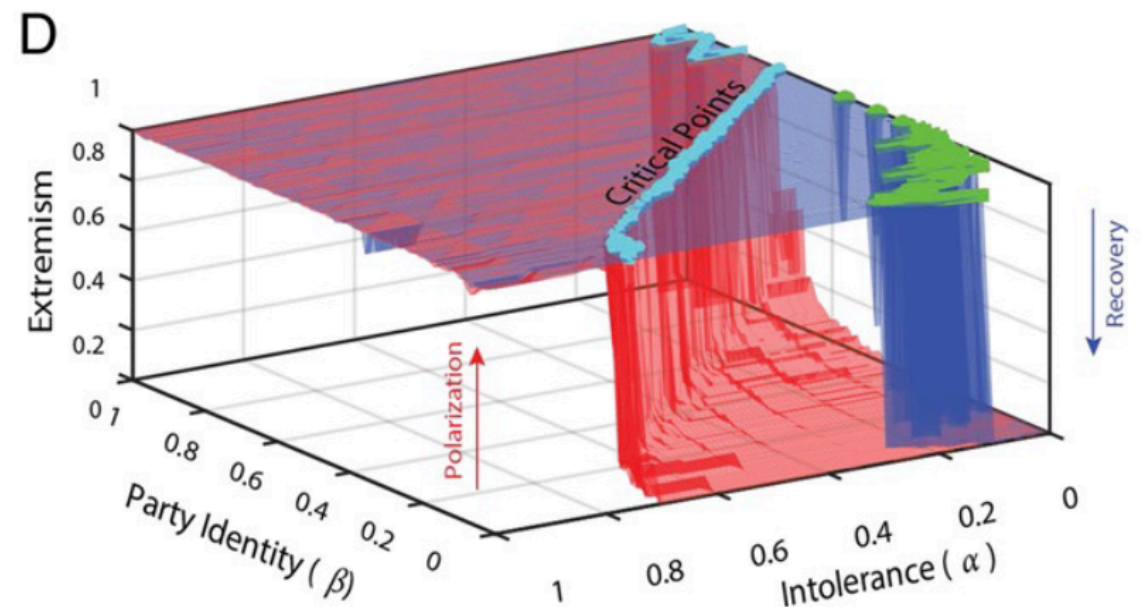
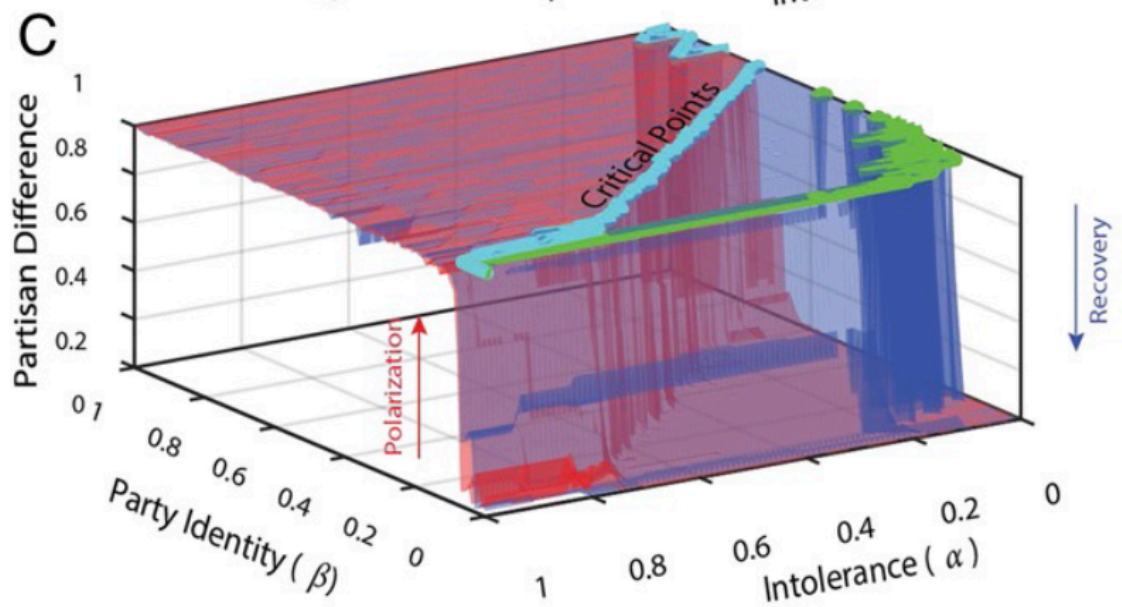
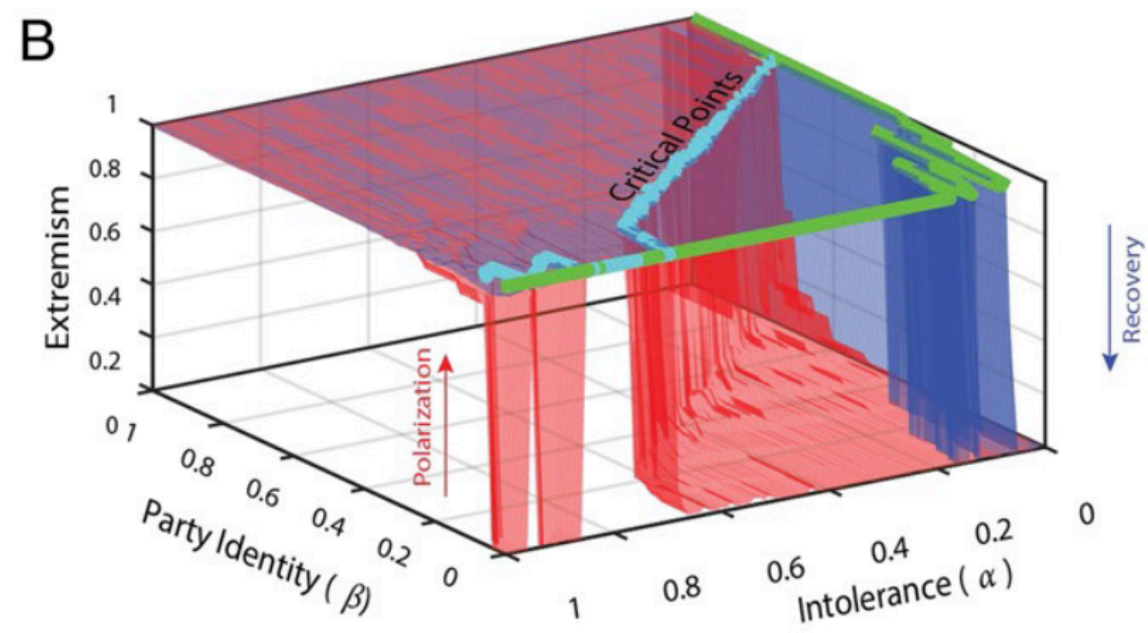
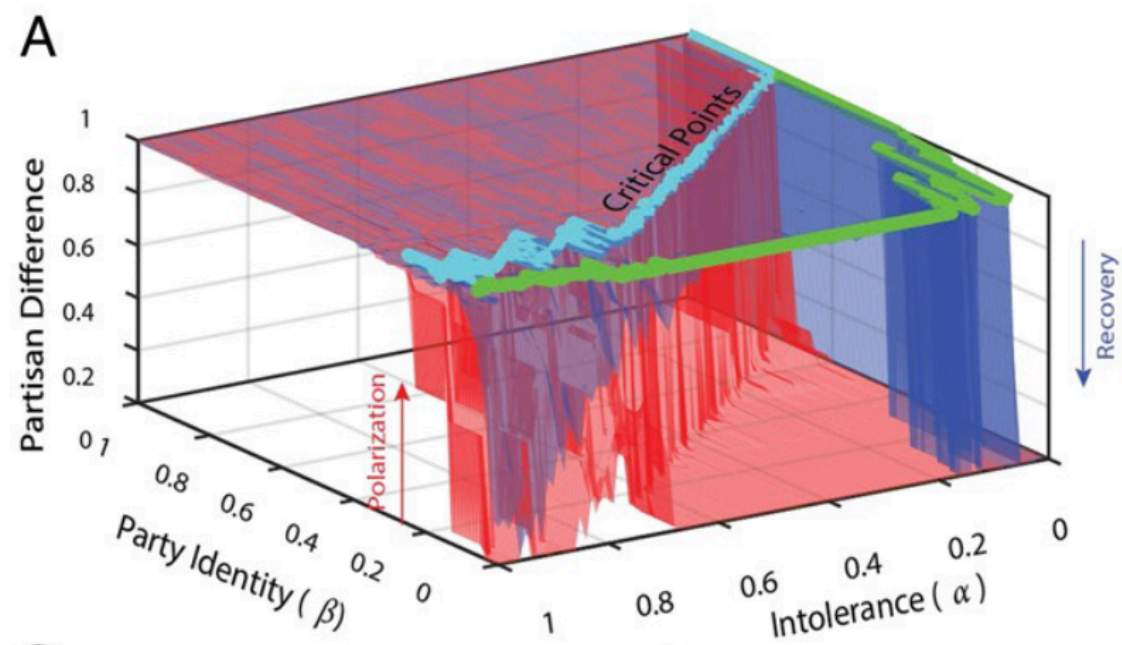
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- Shocks in critical region can go either way
- Shocks outside critical region almost exclusively tend towards the extremes
- Stronger party identity and higher intolerance correspond to increasingly difficult reversal



Future Work

- Empirical follow-up studies
- What effect does network topology have on tipping dynamics?
 - How much does the topology of the network have to change to achieve recovery?
- Do these tipping dynamics also apply to other polarization models?

Questions?