The network science of public policy diffusion

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What is policy diffusion?

- Study of **how policies spread** from one government unit to the next
- Units may be countries, states, cities
- These units are thought of as “the laboratories of democracy”

Underlying idea

- **Decision to adopt a policy:**

  Characteristics of the unit + Relative position of the unit wrt other units

- **Consistent finding:**
  Geographically closer units → more likely to adopt similar policies

- **Other variables which predict diffusion:**
  Demographic, economic, political similarity

Past Methods for Empirical Analysis

- **Event History Analysis (EHA):**
  - Models the time to event after ’exposure’
  - Models if diffusion occurs
  - Does *not* explicitly model the mechanisms which lead to diffusion

- **Dyadic EHA:**
  - A more relational approach
  - Outcome = does policy Δ in a unit bring it closer to the policy in other units?
  - Covariates = f(past adopter + potential adopters)

Drawbacks of EHA & its variants

- **Concentrate on single policies**
  - Few studies analyze persistent diffusion pathways
- **More difficult to model mechanisms**
  - Dyadic EHA conflates emulation with independent convergence (Boehmke, 2009)
- **Assumes observations are independent**

Network Perspectives & Methods

- **Explicitly models relative position of actors**
- **Eschews the assumption of independent observations**
- **The structure of the network can explain outcomes**
- **Has theoretical underpinnings in policy networks literature**

Network Approaches: Recent Contributions

- **Network statistics can be used to study diffusion mechanisms**
  - Reciprocity can be used to reveal competition b/w units
  - Centrality measures can be used to identify leaders in a network (Boehmke et al., 2020, Paterson et al. , 2014)

- **Can be used for inferential analysis**
  - Multiple policies can be analyzed in a single model
  - Reveal persistent diffusion patterns (Desmarais et al., 2015, Boehmke et al. 2017)

Future Directions - Theory

- **Draw from policy networks literature**

- Policy diffusion has focused on aggregate covariates
  - →Geographic closeness of units (Nicholson-Crotty and Carley, 2016)
  - →Partisan/Socioeconomic similarity b/w units (Volden, 2016)

- Policy networks lit. uses precise covariates
  - →co-membership of policy actors in organizations (Fuglister, 2012)
  - →transfer of managers across regions (Yi et al., 2018)

Future Directions – Methods

- **Utilize Multi Layer Networks**

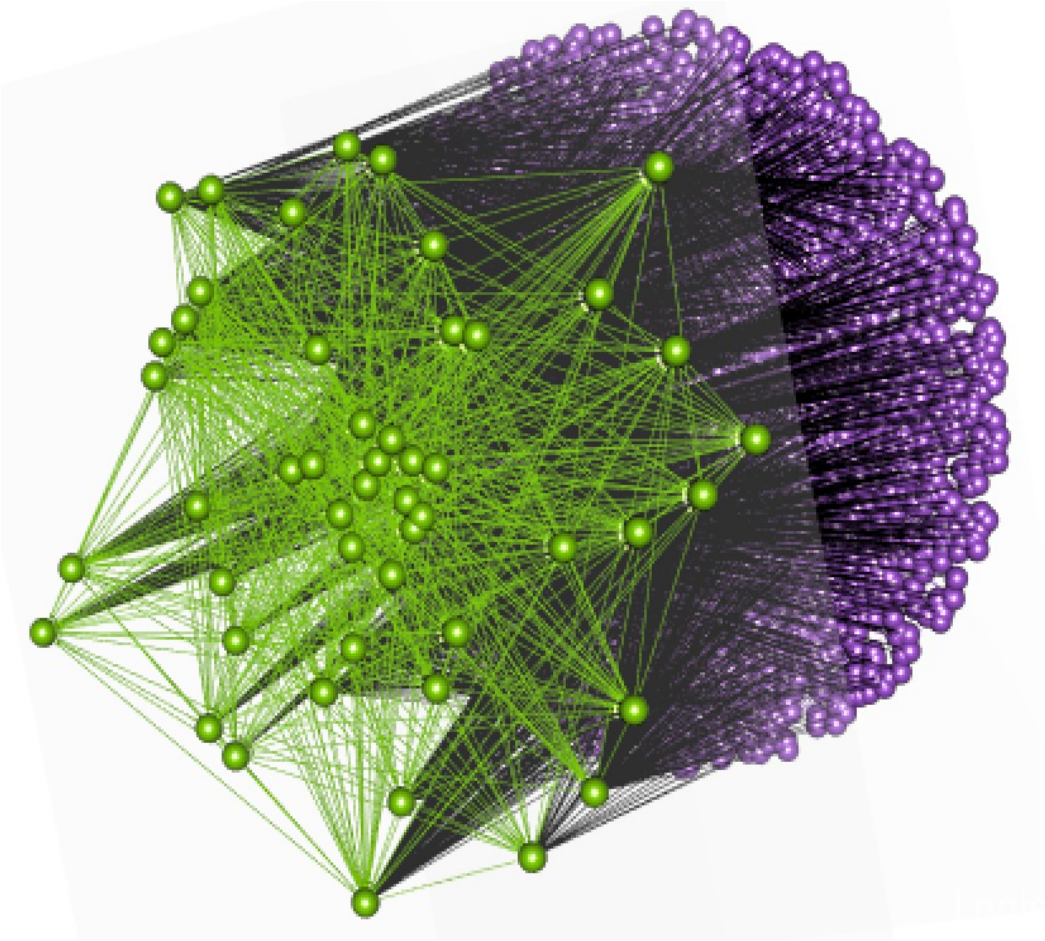
- Nodes can occupy different layers
  - Ex: state, policy, individual layer

- All ties may be endogenous
  - No assumptions about exogeneity → No “right” hand side
  - Not possible in EHA

- **Multilayer ERGM can model this complex system**

Example Multi Layer Network

- **2 Layers**: State, Legislator
- **Legislator layer:** $\text{legislator}_i \rightarrow \text{legislator}_j$ via Twitter's retweets network
- **Ties b/w the 2 layers**: $\text{legislator}_i \rightarrow \text{state}_j$
- **State layer:** $state_i \rightarrow state_j$ via latent diffusion network



Conclusion

- Networks can enhance theoretical & methodological development in diffusion studies
- Literature from policy network can help us explore fine grained variables which may impact policy diffusion
- Data proliferation + multilayer network methods can help us model the complex process of diffusion closer to reality