Our last class
PAD637 Evaluation

Instructor: Jeongyoon Lee (Yoonie Lee)
Course Section Number: 6104
Ansell & Gash (2008)

Figure 1
A Model of Collaborative Governance
Provan & Milward (1995)

Figure 1. A preliminary model of network effectiveness.

- **NETWORK STRUCTURE**
  - Centralized integration
  - Direct, nonfragmented external control

- **NETWORK CONTEXT**
  - System stability
  - High resource munificence

- **NETWORK EFFECTIVENESS**
Network Effectiveness

Antecedents

Network variables

Network itself

Consequences

Today’s Reading Focus
Process over outcomes

• A great deal of the early work was descriptive in nature
• Focused on describing processes
  ▫ Dr. Rethemeyer’s management work falls in this area – e.g., Who has political access and why? How is the Internet affecting political processes?
• For some purposes a systematic description is diagnostic and definitive
• For others, we want to tie structure to outcomes
Reading papers

- Key concepts in Haunschild (1993), Ibarra and Andrews (1993), Marsden & Friedkin (1994) ...
  - Reference group
  - Comparison group
  - Imitation
  - Mimetic processes
  - Behavior contagion
  - Social influence
  - Social selection
How could we tie structure to outcome?

- There are five primary models
  - Main effects models
  - Interactive models
  - Contextual effects models
  - Spatial autocorrelation models
  - Stochastic models

- Spatial autocorrelation models draw us closer to GIS approaches to analysis
- We will look at all five
Main effects models

• Standard dependent variable – independent variable models
• Early studies focused on well-being (either perceived or actual)
• Found that density was a key indicator
  ▫ Density → Wellbeing
  ▫ Density → Happiness
  ▫ Multiple mechanisms proposed for this relationship
Main effects: Structure or content?

- These models primarily focus on structure
- However, may also be about the content of ties
  - Content could be measured as different relations in a network
  - May require detailed knowledge
Main effects: Terrorist lethality

- Asal-Rethemeyer paper in JOP
  - There are several factors that help to drive terrorist organization’s lethality
  - One of those factors is their ability to tap resources from other groups (RDT)
  - Hypothesis: The more ties one has, the more lethal the group will be
  - Use a degree centrality measure, but have also studied Bonacich power measure
  - Model: Negative binomial
Interactive/indirect effects

- Maybe the network effect is not direct
- Could be that network characteristics moderate the effects of other independents
  - E.g., Stress $\rightarrow$ Density $\rightarrow$ Well-being
  - Use interactives or path modeling/structural equations (i.e., LISREL, AMOS, etc.)
Contextual effects models

- Models that use group measures to specify “context”
  - Used in education to some extent
- Modeling steps
  - First step: An equivalence partition
  - Second step: A group-level summary measure
    - E.g., Average income within group
    - E.g., Average parental income within group
  - Third step: Regression model
    - $y_i = \beta_0 + \beta_1 x_{1i} + \beta_3 \bar{x}_j + \varepsilon_i$
    - The x-bar term is the group average (weighted)
    - E.g., Educational achievement, given the characteristics of the students “peer group” — as identified by their sociometric data
  - Nested nature, similar to the “hierarchical models”
Spatial autocorrelation models

• Defining the nature of MDS coordinates
  ▫ Considering similarity/proximity of independent variables
  ▫ Regress on the MDS coordinates as DVs, using attributes as independent variables

• Problem: The members of a network dataset are not a random sample in most cases, so the independent assumption fails

• Problem: What to do with isolates?
Spatial autocorrelation models

- If the cases/observations are not independent, must account for dependence
- So, Borrowing basic premise of spatial analysis
  - “Everything is related to everything else, but near things are more related than distant things.” - Waldo Tobler (1970)
- The approach in spatial stats is to develop a weighting matrix – W matrix
- Various approaches
  - Nearest neighbor – dependence is only nearest neighbor
  - Boundary contiguity – those that touch at a boundary are dependent
  - Distance = use the inverse of the distance to measure dependence
Spatial autocorrelation models

- In social network analysis, one can weight by...
  - Sociomatrix itself
  - Euclidean distance matrix
  - Structural equivalence
  - MDS distances

- Goal: To determine how much any two observations are related to one another with respect to the DV
  - \((y_i - \bar{y})(y_j - \bar{y})\) - correlation of related instances of the DV
  - The \(W\) matrix provides some way to account for this dependence
Spatial autocorrelation models

- The Friedkin solution: A recursive model

\[ y_i = \beta_0 + \beta_1 X + \rho wy + \varepsilon_i \]

- Idea: That the outcome variable \( y \) depends on the outcome variables of all others, as attenuated by the \( W \) matrix; the other covariates are in \( X \)
- The degree of influence from the network of alters depends on what measure is used in the \( W \) matrix
- The Ibarra & Andrews piece uses this method
  - Table 4 and 5: the impact of proximity (Rho) on dependent VARs

- This approach seems underutilized in network studies
Other approaches

- In some cases, you cannot make any useful inference from a single case/network
- Need to compare networks
- Problem: Cost/time of multiple network data collections
- Solution: Collect case-comparison data and use informal methods
- E.g.,: Milward & Provan
Statistical approaches

- The most highly developed is Snijders approach to longitudinal data
  - The network affects the behavior...
  - And the behavior affects the network
  - The newest version of SIENA allows one to model these effects simultaneously
  - The key assumption is that the network changes due to a Markov process
    - The network and the behavior take on fixed states
    - There is a transition matrix that describes possible states
P* model (coevolution-model)

• Method: Co-evolution of behavior (academic achievement) and networks (social integration)

Let’s think about friendship networks and smoking behaviors

Other approaches
(Out of today’s topic); but, we’ve learned QAP (Quadratic Assignment Procedure)

• The basic idea of QAP is:
  ◦ To identify systematic connections between different relations

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Relation 2

Correlation

Causality
QAP methods
Wrap up: Network Analysis and your research paper

- Think about how you can comprehensively use these analyses to answer your research questions.
Wrap up: Network Analysis and your research paper

Antecedents

Network variables

Network itself

Consequences

PAD 637 techniques: Think about how to use this diagnostic X-ray machine for your research!!!
Enter Pathways of Social Network Analysis

Network Data and Data collection

Centrality/Centralization

Cohesive subgroups/ Core-periphery str.

Visualization

Block modeling/ Positional Analysis

Social capital/Ego-network

Statistical approach to Network analysis

Wrap up/ Network Effects

Thank you, PAD 637ers!
# PAD 637 Final Paper

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<tr>
<th>Name</th>
<th>Interests (Jan, 2013)</th>
<th>Final Paper (May, 2013)</th>
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Good Luck!