

Using Social Network Analysis to Study the Diffusion of IT

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Why use social network analysis (SNA) to study IT diffusion?

- Social Network Analysis
 - views the organization as an interconnected group of actors with formal, informal, structural, and social ties
 - accounts for social influences on communication and IT use
 - compliments other methods well

What is SNA?

- Social network analysis examines the set of relationships among a set of actors.
 - Assumption: Actors have a set of interdependent relationships embedded in a social or organizational system which influence behavior

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SNA Core Principles

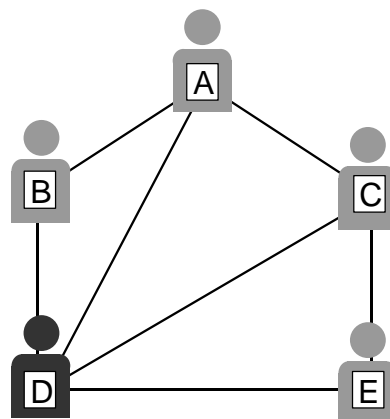
- Actors and their actions are interdependent
- Relational ties (links) are channels for the transfer of resources
- Network models focusing on individuals view the network environment as shaping individual action
- Network models conceptualize structure as lasting patterns of relations among actors

(Wasserman & Faust 1994)

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SNA Fundamental Concepts

- Actor
- Relational ties
- Groups
- Unit of analysis



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Diffusion and SNA

- Relational Diffusion Networks
 - Direct contact between actors influences the spread of an innovation
- Structural Diffusion Networks
 - Structural characteristics of the social system influence the rate and character of the diffusion
- Network Threshold Models
 - Combines relational and structural models

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Relational Network Models

- Opinion leadership
- Group membership
- Personal and network density
- Personal network exposure
- Cohesion

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Structural Network Models

- Type of Ties
- Centrality
- Structural Equivalence

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Type of Ties

Weak

- Infrequent contact
- Key source of information
- Foster flexibility and effective decision making
- Promote efficiency

Strong

- Frequent contact
- Highly reciprocal
- Facilitate coordination and stable relationships

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Centrality

- Measure properties of “actor location” in social network
 - Actor centrality and network centralization
- Centrality measures
 - Degree
 - Indegree and Outdegree
 - Betweenness
 - Closeness

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Network Threshold Model

- Adoption decision based on immediate peers rather than entire social system
 - Personal network exposure
 - Structural network thresholds

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Social Network Data

- Social network data are relational data consisting of at least one structural variable measured on a set of actors
- Two types of variables
 - Structural variables measure a type of relation between a pair of actors
 - Compositional variables measure actor attributes

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Data Measurement Issues

- Unit of observation (actor, dyad, subgroup)
- Modeling unit
- Quantification of relations

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Network Boundaries & Sampling

“A representative sample of [*actors*], does not, in itself, give a useful sample of *relations* (Alba, 1982: 44)”

- Boundary setting approaches
 - Natural boundaries
 - Frequency of interaction
 - Intensity of ties
 - Realist vs. Nominalist
 - Snowball sampling
 - Random nets

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Collecting Social Network Data

- Relational data sources
 - Questionnaires
 - Roster vs. recall (e.g. Krackhardt and Stern 1988)
 - Free vs. fixed choice (e.g. Coleman, Katz, Menzel 1957)
 - Ratings vs. complete rankings (e.g. Carley and Wendt 1988)
 - Interviews
 - Participant observation
 - Archival documents
 - Other methods
 - Experiments
 - Cognitive social structure (perceptions)
 - Diaries
 - Small world

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Structuring Social Network Data

- Show ties between actors
- Show strength of ties
- Show direction of ties
- Importance of diagonal

| | A | B | C | D | E |
|--------|---|---|---|---|---|
| A | - | 2 | 2 | 1 | 0 |
| B | 2 | - | 3 | 2 | 1 |
| From C | 2 | 3 | - | 2 | 2 |
| D | 1 | 2 | 2 | - | 0 |
| E | 0 | 1 | 2 | 0 | - |

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SNA Software

- UCINET
- STRUCTURE
- Krackplot

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SNA and IT Diffusion Studies

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