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Lecturer in Educational Change and Collaborative Improvement

University of Nottingham

Research Fellow: EQuaLLS Project
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University of Cambridge | CDH Cambridge Digital Humanities

PhD. University of Cambridge, Faculty of Education 2021
Cambridge Digital Humanities Lab: Methods Fellow 2022

Former Secondary Teacher, Minneapolis Public Schools (USA)
OPPORTUNITIES TO DIVE INTO SNA

- Conferences
  - Sunbelt 2022 Conference and Workshops: July 4-7, 12
  - 6th European Conference on Social Networks (EUSN) 2022 London: 12-16 September

- Summer School Circuit
  - Methods Summer School at the University of Manchester (delivered online!) Introduction to Social Network Analysis- 27 June - 1 July, 2022 (£360 Register HERE)
  - Essex Summer School in Social Science Data Analysis (hybrid delivery): 11 July - 22 July in Essex or Online

- Join the International Network for Social Network Analysis
- Start Reading: Social Networks
AGENDA

- Asking Different Questions about Social Phenomena
- Components of Modern SNA
  - Structural Intuition
  - Collecting Relational Data
  - Network Diagrams
  - Descriptive Network Statistics & Relational Modeling
- Empirical Research Example
  - Mixed Methods Social Network Analysis
  - Case Study: Supporting Teacher-led School Improvement
AGENDA

• **Asking Different Questions about Social Phenomena**

• Components of Modern SNA
  ○ Structural Intuition
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"This article builds on political socialization research to examine how family and peer ties are associated with participation in political violence, particularly volunteering to be a suicide bomber...I argue that socialization plays a crucial role in suicide bomber mobilization, especially through familial and peer networks."

"Network position (isolate, member, liaison), peer-group substance use, and their interaction were examined as predictors of cigarette, alcohol, and marijuana use in a sample of 163 urban sixth, seventh, and eighth graders...To what extent is the effect of peer substance use moderated by the individual's position in his or her friendship network?"

"The current study investigates informal social structure among prison inmates. Data come from the Prison Inmate Network Study (PINS), a project focused on a unit of a Pennsylvania medium security men’s prison. We focus on 205 inmates and their “get along with” network – an approximation of friendship in other settings. We find a weak subgroup structure dominated by two groups of “old heads” and characterized by moderate (non gang-based) race/ethnic clustering. Structurally, the network resembles adolescents in schools, suggesting that prison inmates are capable of successfully building peer associations."

"This article studies the importance of friendships and antipathies among the three concerned parties (sender, receiver, target) for negative gossip among adolescents...Results suggest that, at least among adolescents, negative gossip is not about bonding with potential allies but more about consensus-making between friends."

"Improving student achievement through teacher collaboration networks is a current focus of schools in many countries. Yet, empirical evidence on the relationship between teacher networks and student achievement and mechanisms that may explain this relationship is limited. This study examined the relationship between teacher networks and student achievement and the mediating role of teachers’ collective efficacy beliefs."

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Components of Modern SNA

- Structural Intuition
- Systematic Collection of Relational Data
- Network Diagrams
- Mathematical/Computational Modeling (and descriptive network statistics)

FUNDAMENTAL CONCEPTS IN SNA

Actor (node): social entity; discrete individuals or collective social units (comprised of many individuals).
- Student
- School
- Non-profit Company
- Nation State

Relational Tie (edge/link): establishes a linkage between a pair of actors.
- Evaluation of one person by another- friendship, liking, or respect.
- Transfers of material resources- lending, borrowing, bank transfer
- Association or Affiliation- jointly attending an event, members of a club
- Interaction- sending messages, talking on the phone, emailing
- Biological relationship- kinship, descent

ADOPTING A SOCIAL NETWORK PERSPECTIVE

- Actors and their actions are viewed as interdependent rather than independent, autonomous units.
- Relational ties (linkages) between actors are channels for transfer or "flow" of resources (either material or nonmaterial).
- Network models focusing on individuals view the network structural environment as providing opportunities for or constraints on individual action.
- Network models conceptualize structure (social, economic, political, and so forth) as lasting patterns of relations among actors.

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# How Do We Represent Relational Data?

## Node/Edge List

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<thead>
<tr>
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HOW DO WE REPRESENT RELATIONAL DATA?

ADJACENCY/SOCIO MATRIX

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HOW IS RELATIONAL DATA COLLECTED?

OBSERVATION
Manually observe individuals or objects.

SURVEY
Ask respondents about their social ties.

INTERVIEWS
Ask people about their relationships with others

ARCHIVAL RECORDS/
DOCUMENT ANALYSIS
Historical evidence of a social ties.
RELATIONAL QUESTIONS IN SURVEYS

“Please select the administrators to whom you go to for advice related to implementation of the literacy reform effort . . . and at what frequency?”

For each network question, respondents were asked to quantitatively assess their relationships with other administrators (school and central office) on a 5-point interaction scale ranging from 1 (no interaction) to 5 (1 to 2 times a week).

"The data set used in this article consists of 6556 Twitter users whose tweets contained the “5Gcoronavirus” keyword or the #5GCoronavirus hashtag, or were replied to or mentioned in these tweets from Friday, March 27, 2020, at 19:44 to Saturday, April 4, 2020, at 10:38 UTC. Users were included in the data set if they sent a tweet during the time the data was retrieved or were mentioned or replied to in these tweets. This specific keyword and hashtag were selected, as this was the most popular and briefly became a trending topic on Twitter within the United Kingdom in early April."

THE IMPORTANCE OF ACCURATE DATA

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ROOSEVELT TO ASK
HUGE 4% BOND ISSUE
TO EASE FARM DEBT

Special Message to Congress
Today Will Propose Wide
Mortgage Refinancing.

2 TO 3 BILLION REQUIRED

Enabling Measure Drafted for
Rider to Expedite Agri-
cultural Relief Bill.

SENTIMENT IS FAVORABLE

Bonds Would Be Exchanged for
Farm Mortgages and Also
Sold to the Public.

MICHIGAN VOTES
TODAY ON REPEAL

Wets Are Hopeful of Victory
in the First State to Ballot
on Ratification.

DRY CONCEDES WISCONSIN

Referendum Tuesday Will Be
‘at Large,’ Making Milwaukee’s
Vote a Deciding Factor.

GERMANS FEARFUL
UNDER NAZI REGIME

American Just Returned Says
No One Dares to Utter an
Opinion Critical of It.

MASSES DON’T HATE JEWS

Many Christians Are Reported to
Be Suffering Just as Much for
Political Convictions.

EMOTIONS MAPPED
BY NEW GEOGRAPHY

Charts Seek to Portray the
Psychological Currents of
Human Relationships.

FIRST STUDIES EXHIBITED

Colored Lines Show Likes and
Dislikes of Individuals
and of Groups.

MANY MISFITS REVEALED

Dr. J. L. Morenci Calculates There
Are 10 to 15 Million Isolated
Individuals in Nation.

A new science, named psychologi-
cal geography, which aims to chart
the emotional currents, cross-cur-
cents and under-currents of human
relationships in a community, was
introduced here yesterday at the
scientific exhibit of the Medical
Society of the State of New York,
which opens its 127th annual meet-
ing here today at the Waldorf-
Astoria.
Classroom Observation

Jacob Moreno
HOW IS RELATIONAL DATA VISUALIZED?

**Basic Building Blocks**

Nodes (actors or vertices) are used to represent people.

Edges (ties) connect nodes to represent the existence of a social tie.

**Basic Structural Configurations**
TYPES OF DYADS (CENSUS)

\[ D_{ij} = (0,0) \quad \text{Null Dyad} \]

\[ D_{ij} = (1,0) \quad \text{Asymmetric Dyad} \]

\[ D_{ij} = (0,1) \quad \text{Asymmetric Dyad} \]

\[ D_{ij} = (1,1) \quad \text{Mutual Dyad} \]

TYPES OF TRIADS (CENSUS)

Naming Convention (M-A-N)

- Number of Mutual dyads in the triad
- Number of Asymmetric dyads in the triad
- Number of Null dyads in the triad
- $D$- down, $U$- up, $T$- transitive, $C$- cyclic

HOW IS RELATIONAL DATA VISUALIZED?

Static
(network/igraph)

Interactive
(visNetwork)

Dynamic!
(ndtv)
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ADVANCES IN MATHEMATICAL MODELING:

BASIC DESCRIPTIVE NETWORK STATISTICS

Describing Networks

- Summarizing Key Features
- Density
- Degree
Summarizing Key Features

Basic Descriptors:
- Directed?
- Named?
- Weighted?
- $N = 11; E = 10$
Degree (node attribute): inward, outward, or total number of edges for each node.
Weight (edge attribute): measure of tie/edge strength.