Issues and Methods in Researching Social Networks

Tools, Trends, and Applications to Language Learning Research

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History of Social Network Research

- Appearance of "social network" in abstracts in the social sciences went from nearly zero in 1965 to over 2,500 in 2005 (Knoke & Yang, 2008).

- With the growth of social media (Facebook, Twitter, etc.), frequency has risen even more.

- Google Scholar search yielded 1,080,000 total mentions on 3 April, 2013 and 18,800 results for the years 2012 and 2013.

History of Social Network Research

- Radcliffe-Brown (1930's-1970's)
  - Anthropology
  - Social structure
  - Web of social life
  - Interweaving
  - Interlocking
  - Textile metaphors
  - *Social groupings, social structure, web of social units, etc.*
  - Kinship and marriage

History of Social Network Research

- Barnes (1954)
  - Anthropologist
  - First to use the term "social network"
  - Investigated connections between people living in a Norwegian island parish and the results of their collective efforts
  - Barnes envisioned networks as a series of points connected by lines

History of Social Network Research

- Elizabeth Bott (1957)
- Book Titled: *Family and social network : roles, norms, and external relationships in ordinary urban families.*
- Investigated social networks and the roles of husbands and wives in marriage.

History of Social Network Research

- Gestalt theorists—flow of information, object perception, etc. (Köhler, 1925; Lewin, Mareno, Heider, & other German scholars)
- Harvard group looking at the importance of social relationships in factories
- British group looking at conflict in African tribal societies and in rural towns in Britain
- Abortionists and their networking (Lee, 1969)
- MIT researchers and personal psychological development (Lewin, 1951)

Definition of Social Networks

- "a specific set of linkages among a defined set of persons, with the additional property that the characteristics of these linkages as a whole may be used to interpret the social behavior of the persons involved." (J. Clyde Mitchell, 1969, cited in K&Y, 2008, p. 9).

Social Network

- "A social network is a social structure made up of a set of actors (such as individuals or organizations) and a complex set of the dyadic ties between these actors. The social network perspective provides a clear way of analyzing the structure of whole social entities. The study of these structures uses social network analysis to identify local and global patterns, locate influential entities, and examine network dynamics." Facebook

Work on Language Variation by Milroy and Other

- Milroy's definition
- Integration into speech community reinforces norms.
- The greater the affinity, the more they sounded
- Milroy's methods (sample graph, etc.)

- "a fundamental postulate of social network analysis is that individuals create personal communities which provide them with a meaningful framework for solving the problems of their day to day existence." (de Bot and Stoessel, 2002, p. 2).

Why are Social Networks Important?

- Language use and change
- Flow of information and ideas
- Resource access and exchange
- Social capital
- Attitudes, beliefs, perceptions, and actions
- Mental and physical health
- Academic literacy (Ferenz, 2005)

Methods of Data Collection

- Questionnaires (Survey)
- Interviews (Survey)
- Observations
- Texts

Methods of Data Collection

- Egocentric (aka personal network)
- Dyadic
- Triadic
- Complete Network

Methods of Data Collection

- Fixed List Selection
- Expanding Selection
- Name Generator

Tools

- General Social Survey (Burt, 1984, 1985; Fischer, 1982) and similar tools
  - "Important matters surveys"
- Indianapolis-St. Louis Study (Huckfeldt & Sprague, 1985; 2000)
  - "Political matters survey"
- Interview Questions

Sample Survey Question

- ISL: "Now let's shift our attention to another area. From time to time, people discuss [important matters/government, elections and politics with other people]11 with other people. Looking back over the last few months, I'd like to know the people you talked with about matters that are important to you. These people might or might not be relatives. Can you think of anyone?"
- CNES-US: "Now let's shift our attention to another area. From time to time, most people discuss important matters with other people. Looking back over the last six months, I'd like to know the people you talked with about matters that are important to you. Can you think of anyone?"
- GSS: "From time to time, most people discuss important matters with other people. Looking back over the last six months, who are the people with whom you discussed matters important to you? Just tell me their first names or initials."

Sample Survey Questions

- ISL, CNES-US: "When you talk with [discussant's name], do you discuss political matters: often, sometimes, rarely, or never?"
- GSS: "About how often do you talk to [discussant's name] about *political* matters: almost daily, at least weekly, at least monthly, at least yearly, less than yearly, or never?"

Sample Survey Questions

- GSS: "Here is a list of some of the ways in which people are connected to each other. Some people can be connected to you in more than one way. For example, a man could be your brother and he may belong to your church and be your lawyer. For each name, please tell all the ways that person is connected to you."

Sample Survey Questions

- ISL: "Would you say [discussant's name] is a close friend, a friend, or just someone that you regularly come into contact with?"
- CNES-US: "Is [discussant's name] a friend of yours: yes or no?" "Would you say [discussant's name] is a close friend: yes or no?"
- GSS: "Which of these people do you feel especially close to?"

Child Classroom Relationships

- Class _____   School _____   Date _____

- My code _____   boy   or   girl

- *Use the code numbers on your class list to answer each question.*

- 1. The three children in my class who I MOST like to play with: _____   _____   _____

- 2. The three children in my class who I LEAST like to play with: _____   _____   _____

- http://www.sussex.ac.uk/Users/robinb/socio2.html

Social Network Tools in SA Research

- Study Abroad Social Interaction Questionnaire (Dewey et. al., 2012)
- Social Networking Questionnaire (McManus & Tracy-Ventura, 2012)

Study Abroad Social Interaction Questionnaire (Dewey et. al., 2012)

- In the blanks below, please write, from memory, the names of friends or acquaintances who you regularly spoke with in the target language (the language spoken in the country where you studied abroad). You may also write the names of native speakers of the target language with whom you also spoke in English who fit the following description:
- • You at least occasionally spoke your target language to them.
- • You know them well enough to have spent at least some time socializing with them.

  To help you think about individuals you could name, think about people you met at school, at clubs or formal organizations, in the community, through internships, etc. Think also of people you lived with, as well as people you were introduced to through friends or others.

Study Abroad Social Interaction Questionnaire (Dewey et. al., 2012)

For each of the people in your list, please indicate the level of your friendship, ranging from mere acquaintance to very close friend/confidant.

Note that in terms of communication, level of friendship ranges from engaging in occasional friendly exchanges (low on the scale) to sharing one's deepest feelings or asking for advice regarding personal challenges (high on the scale). Refer to the diagram below to help interpret the range.

Acquaintance			Friend			Very Close Friend/Confidant	
1	2	3	4	5	6	7	8

Study Abroad Social Interaction Questionnaire (Dewey et. al., 2012)

On average how many hours did you spend with this person per week?

What percentage of that time did you spend doing activities in the target language? (reading, writing, speaking, listening to music, watching movies or TV, etc.)

What percentage of that time did you spend doing activities in English. (speaking, doing homework, writing, listening to music, watching movies or TV, etc.)

Social Networking Questionnaire (McManus & Tracy-Ventura, 2012)

- In this section, we will ask you to list and then describe the people you have been in active contact with over the past month at **work**. For those of you doing Erasmus, the university becomes your work context. List as many people as necessary. Remember, these should be people who you interact with regularly.
  - Follow-up questions on the nature of the relationship
  - Similar questions on free time, home time, and online social activities

Interview Questions

- Who would care for your home if you were out of town?
- With whom have you spoken about a decision at work?
- Who has helped you with a household task in the past several months?
- Who have you recently engaged in social activities with (movie, dinner, etc.)?
- Who have you discussed some common spare-time interests with?
- With whom have you recently discussed personal worries?
- Who would you seek advice from on a personal decision?

- (Fischer, 1982)

Interview Questions

- From whom could you or would you borrow a large sum of money if needed?
- With whom have you recently discussed a personal concern or worry?
- Who (over fifteen years old) lives in the same household with you?
  - 12.8 people on average listed
  - Follow-up demongraphic questions asked (age, how they met, gender, economic information, etc.)

- (Fischer, 1982)

Typical Size

- AMERICANS
  - 3 close friends (decreasing in the U.S.)
  - 18.5 friends when the list is greatly expanded
- CHINESE
  - Roughly from 2 to 5 or more—increasing and moving away from kin and toward matropolitan circles
- OUR SURVEYS (Study Abroad Participants)
  - 11.4 (including NNS)
  - 9.4 (NS only)

Ways of Analyzing and Diagramming Results

- Sociograms (graphs)
- Mathematical Tools
  - Large Data Sets

Diagramming and Conceptualizing Networks

- Networks are sets of nodes connected by edges.

"Network" ≡ "Graph"
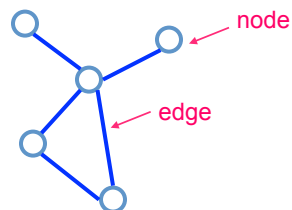
node

edge

points	lines	
vertices	edges, arcs	math
nodes	links	computer science
sites	bonds	physics
actors	ties, relations	sociology

Nodes

- Node network properties
  - from immediate connections
    - indegree
      how many directed edges (arcs) are incident on a node

      indegree=3

    - outdegree
      how many directed edges (arcs) originate at a node

      outdegree=2

    - degree (in or out)
      number of edges incident on a node

      degree=5

  - from the entire graph
    - centrality (betweenness, closeness)

Connected components

- Strongly connected components
  - Each node within the component can be reached from every other node in the component by following directed links

    - Strongly connected components
      - B C D E
      - A
      - G H
      - F
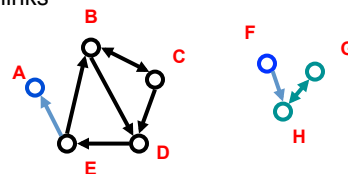
- Weakly connected components: every node can be reached from every other node by following links in either direction

  - Weakly connected components
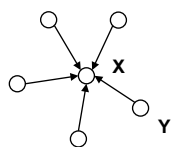   - A B C D E
    - G H F
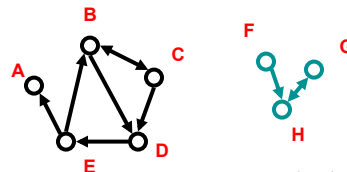
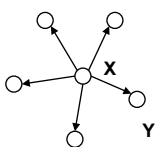- In undirected networks one talks simply about 'connected components'

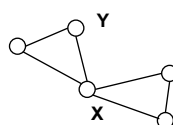**different notions of centrality**

In each of the following networks, X has higher centrality than Y according to a particular measure
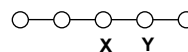
indegree   outdegree   betweenness   closeness

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Ways of Labeling Results

- **Size**
- **Intensity**
- Degree
- **Dispersion**
- **Durability**
- Reciprocity
- **Density**

Ways of Labeling Results

- Centrality
- Adjacency
- Uniplex
- **Multiplex**
- First-Order
- **Second-Order**
- Betweenness
- **Bridging**
- **Bonding**
- Cluster
- Leaders

Alternatives (User friendly)

- Pajek
  - http://vlado.fmf.uni-lj.si/pub/networks/pajek/ very extensive functionality via drop-down menus
  - free
  - Windows-only
  - A bit more complex

Alternatives (User friendly)

- UCINet
  - extensive, sociology-focused functionality
  - Windows-only
  - costs $$
  - Considered by some to be complex

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Alternatives (User-friendly)

- NodeXL http://nodexl.codeplex.com/
  - SNA integrated into Excel
  - Windows-only
  - free
  - beta

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Alternatives (Python)

- NetworkX
  - extensive functionality
  - scales to large networks by taking advantage of existing C, Fortran libraries for large matrix computations
  - open source
  - http://networkx.lanl.gov/

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Alternatives (Specialized)

- sna package for R
  - extensive, statistics-heavy functionality
  - http://cran.r-project.org/web/packages/sna/index.html

- SoNIA - Social Network Image Animator
  - http://www.stanford.edu/group/sonia/
  - specialized for longitudinal analysis of networks

Gephi

- Download from:
  - http://gephi.org/
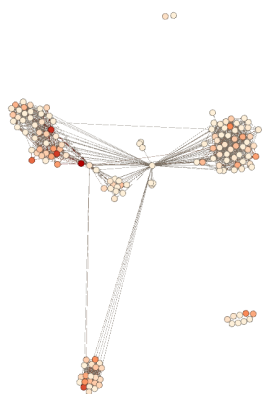 - Download facebook networks using Netvizz
    - Search for Netvizz on Facebook
    - Step 2 is easiest
    - Click where it says "Click here"

Sample Gephi Network (Michael)
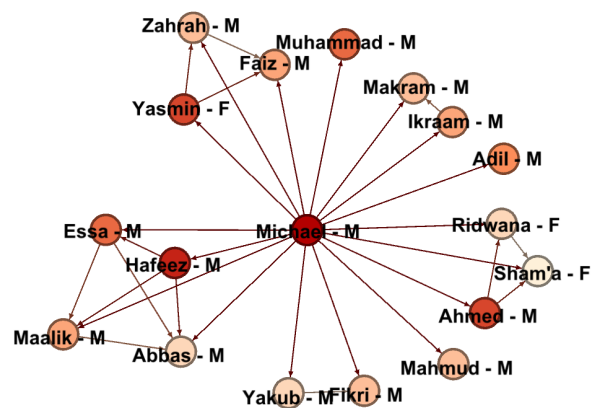
Sample Gephi Network (Dan's Facebook)

David

- Mexican married to Mexican living in US
- FACEBOOK NETWORK
  - Family in Mexico
  - Family in the U.S.
  - Colleague at work in U.S. and his connections
  - **Church friend and his friends**
  - Church friends in general
  - High school friends (Spanish NS)
  - **Single high school friend (Spanish NS but connected with many English speakers in US)**

Some Key Findings

- Age leads to more connections (edges)
- Nodes (people) prefer to attach to nodes with more edges (connections).
  - Matthew Effect
  - Rich get richer
  - Cumulative advantage

Predictors of Proficiency
(Self-Perceived—Japanese)

- Predictors of Self-Perceived Gains
  - Pre-departure proficiency (self-perceived)
  - **Dispersion** (number of social groups)
  - Time spent in Japan
  - Time speaking Japanese
  - **Durability** (average time with native speaker friends)
    - » Dewey, Bown, & Eggett, 2012

Predictors of Proficiency
(Self-Perceived—Arabic)

- Predictors of Arabic proficiency gains
  - **Intensity** (closeness to NS friends)
  - English proficiency of NS friends
  - **Time spent speaking with people not in one's host family**
    - » Dewey, Belnap, Hillstrom, 2012

Predictors of Language Use
(Multiple Programs and Languages)

- Predictors of L2 use abroad
  - Program
  - Age
  - Pre-departure L2 proficiency
  - **Number of NS friends**
  - Gender
  - Personality
    - » Dewey, Bown, Baker, Martinsen, & Gold, 2012

Predictors of Proficiency
(OPI Data)

- Predictors of L2 proficiency gain
  - Pre-program proficiency
  - Social network variables
- See presentation later this week

Possible Questions to Answer

- How does a NNS get help when needed while abroad?
- What resources do they have access to?
- Which NNS and NS are other NNS working with?
- Who does a NNS communicate with on Facebook?
- What happens in local communities in terms of NNS social networks?
- What kind of social/psychological support do learners get from their networks?
- What language varieties are learners exposed to? Larger networks/more diverse networks yield more varieties?

Possible Questions to Answer

- What kind of academic support do they get while abroad?
- What sorts of ties lead to the greatest and most intense language use? What sorts of ties involve higher levels of L2 use?
- What roles do learners play? What organizations do they get involved in? Do they play multiple roles?
- Are ties directed or nondirected/nondirectional? What do the NS get out of the relationship? Do they consider the student a friend?
- What types of relationships do they develop and what are the implications of these relationships? Kin, transactional, communication, instructional, instrumental, etc. Do they share boundaries with people? Feelings and beliefs? Are there distinct power relations?
- What are the benefits of close ties vs. extensive or larger networks?

Quantitative and Qualitative

- "A second, yet very important insight is, however, that all five researchers in this volume also included qualitative aspects in their investigation, and most would agree that the quantitative aspect cannot be evaluated sufficiently on its own without also including a qualitative component." (deBot and Stoessel, 2002, p. 5).

IDEAS FROM PARTICIPANTS

- How can we use these ideas and tools in our research?

Thank You!

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