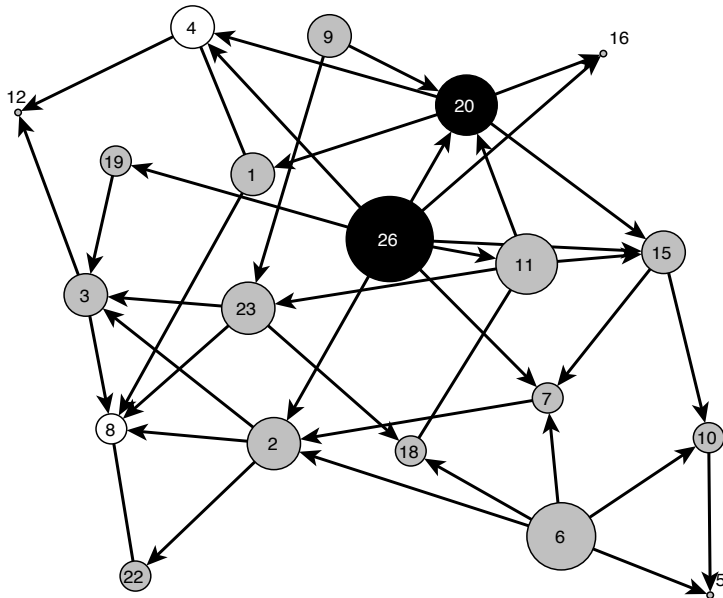


Social Network Analysis (SNA) Demonstration



Innovations in Collaborative
Modeling – Track 2

Jennifer Watling Neal
Department of Psychology
Michigan State University

SNA is not synonymous with:



Networking

SNA is not synonymous with:



The study of
online networks

But SNA can be used to study...



The effects of networking
on relationships

But SNA can be used to study...



The effects of networking
on relationships



The characteristics of
online networks

SNA is actually much broader...

“Social network analysis is neither a theory nor a methodology. Rather, it is a perspective or a paradigm” (Marin & Wellman, 2010)

- Focuses on characterizing systems by examining the pattern of relationships between a set of actors

SNA is actually much broader...

“Social network analysis is neither a theory nor a methodology. Rather, it is a perspective or a paradigm” (Marin & Wellman, 2010)

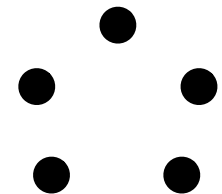
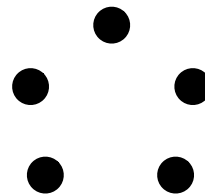
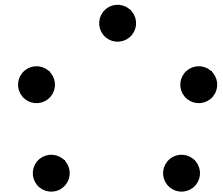
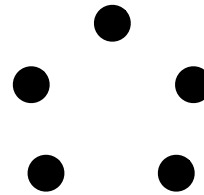
- Focuses on characterizing **systems** by examining the pattern of **relationships** between a set of **actors**

Actors

Referred to as **nodes** in SNA

Multiple levels of analysis

- People

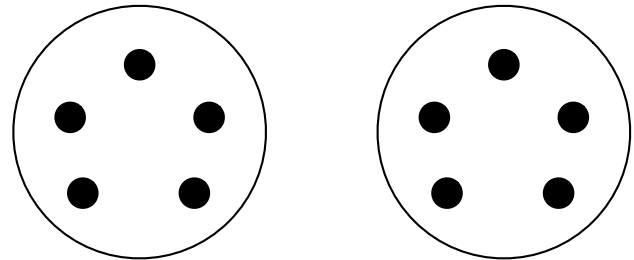


Actors

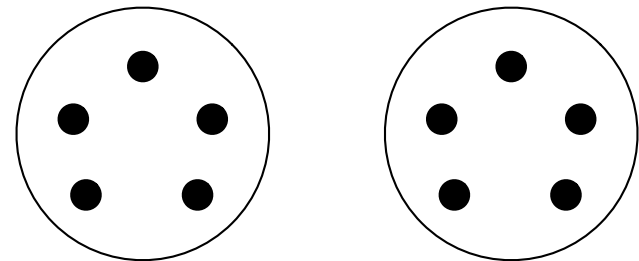
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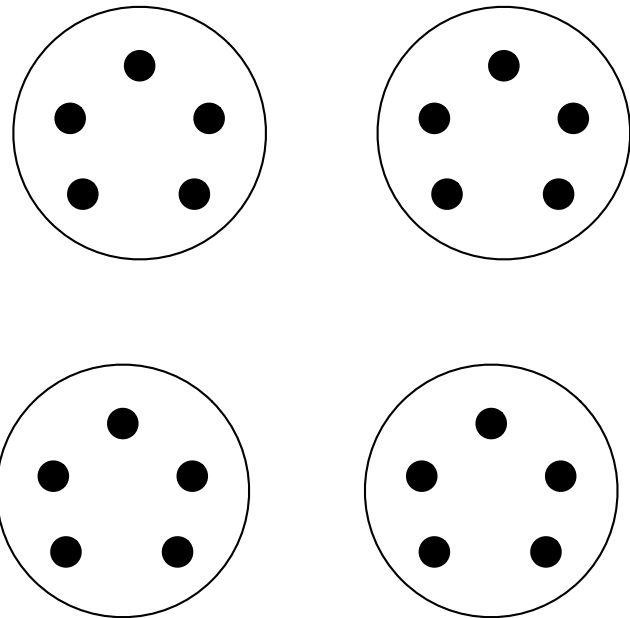
- Organizations



Systems

Setting where the actors reside

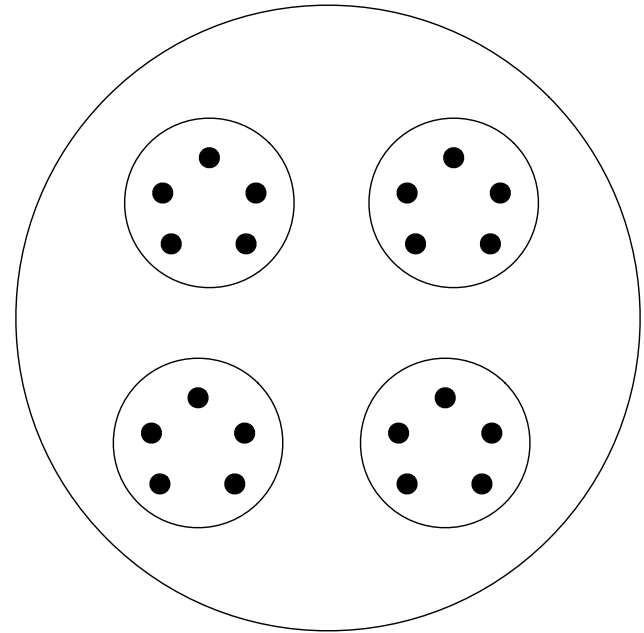
–Organizations, schools, classrooms



Systems

Setting where the actors reside

- Organizations, schools, classrooms
- Or larger systems like coalitions, communities

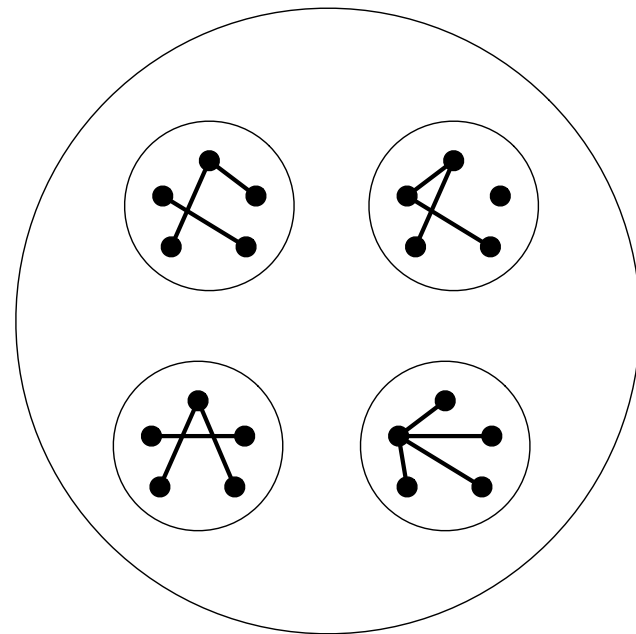


Relationships

Referred to as **edges** in SNA

Actors can be connected in many ways

- People by (a) friendship, (b) advice, (c) trust

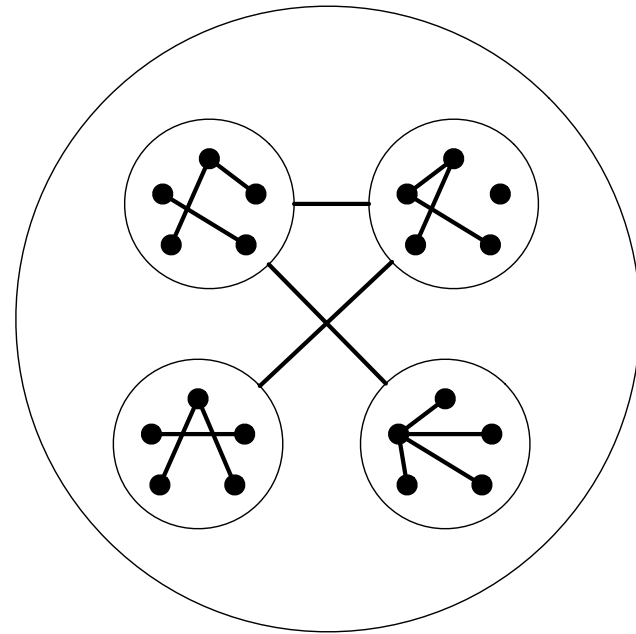


Relationships

Referred to as **edges** in SNA

Actors can be connected in many ways

- People by (a) friendship, (b) advice, (c) trust
- Organizations by (a) resource sharing, (b) info exchange, (c) referrals



General Principles (Wellman, 1988)

Relationships over attributes

Common to explain social phenomenon using analyses of attributes

Economic Disparities: Women earn less than men in the same profession.

But, attributes are proxies for structural relationships

General Principles (Wellman, 1988)

Relationships over attributes

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Economic Disparities: Women earn less than men in the same profession.

But, attributes are proxies for structural relationships

Network Explanation: Women go to different people for instrumental and expressive support in the workplace, limiting strong relationships that are important for promotions (Ibarra, 1992)

General Principles (Wellman, 1988)

Dyads exist in a larger relational context

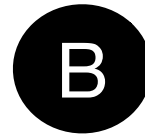
Focusing on dyads only misses important pieces of the relational structure that guide individual behavior

General Principles (Wellman, 1988)

Dyads exist in a larger relational context

Focusing on dyads only misses important pieces of the relational structure that guide individual behavior

Any pair of actors is a dyad



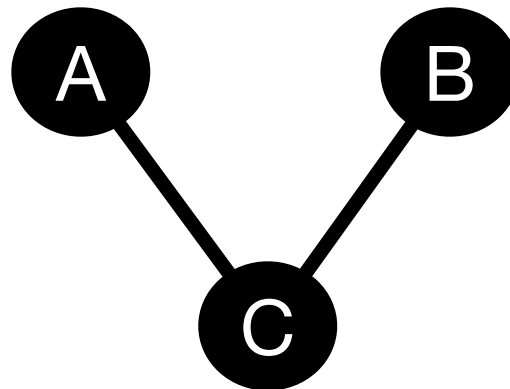
Actors A and B appear unrelated

General Principles (Wellman, 1988)

Dyads exist in a larger relational context

Focusing on dyads only misses important pieces of the relational structure that guide individual behavior

...but actually they have a mutual friend that connects them



General Principles (Wellman, 1988)

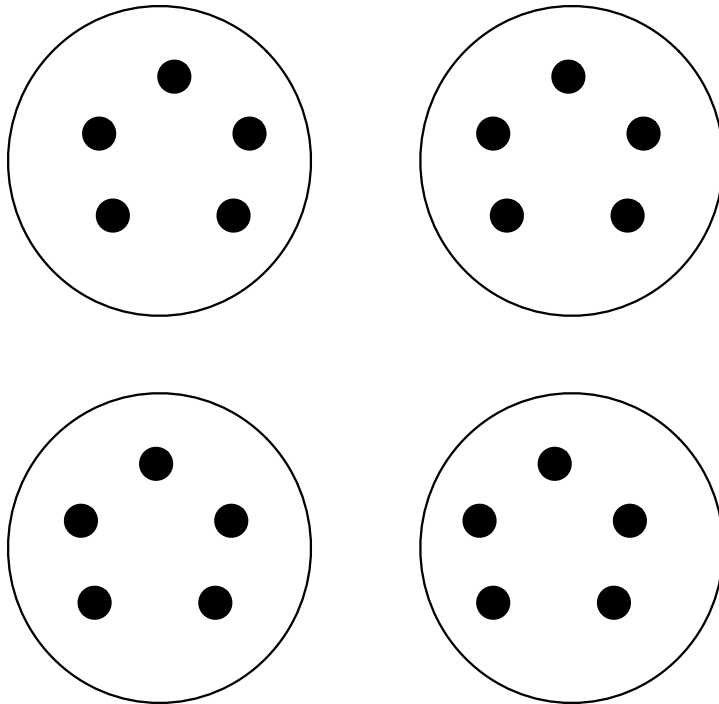
Networks, not groups

Focus is on relationships within and across groups rather than discrete group membership

General Principles (Wellman, 1988)

Networks, not groups

Focus is on relationships within and across groups rather than discrete group membership

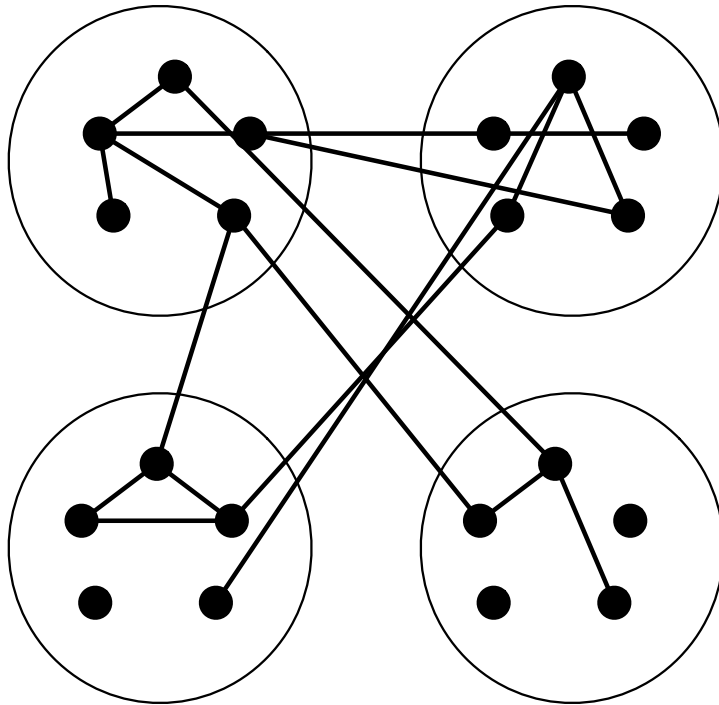


Most studies focus on discrete groups like service providers who work for the same organizations.....

General Principles (Wellman, 1988)

Networks, not groups

Focus is on relationships within and across groups rather than discrete group membership



...but important ties like service referrals may cut across groups

Data Collection – Bounding & Sample

Specify a population boundary

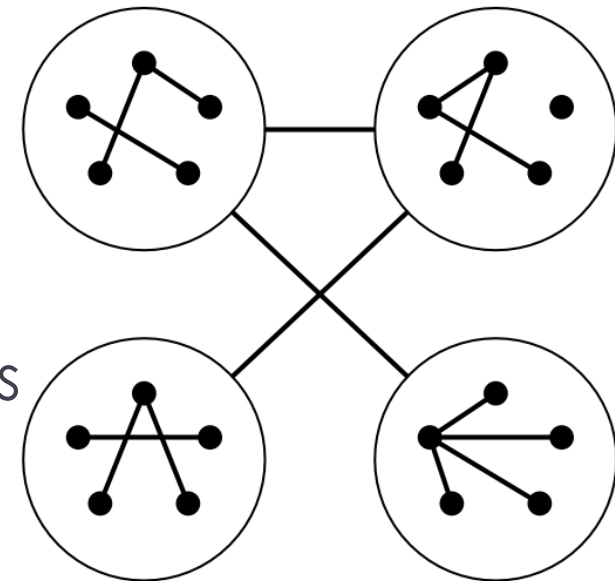
–Naturally Occurring

- A Classroom
- A geographic area

–Attribute

- Psychology professors
- Homeless Service Organizations

All actors in population
included in SNA



Data Collection – Relationships

Relationships can be measured in multiple scales:

- **Binary:** The relationship is present (1) or absent (0)
- **Ordinal:** The relationship is strong (2), weak (1), or absent (0)
- **Interval:** The relationship has a specific value (e.g., Number of emails between people)

Data Collection – Relationships

Relationships can be measured as:

Symmetric: Two actors are simply linked by a relationship (e.g., Jerry and Elaine are friends)

Jerry — Elaine

Directional: One actor sends or receives a relationship to/from another (e.g., Jerry reports to Elaine)

Jerry → Elaine

Data Collection – Methods (Marsden, 1990)

Questionnaires & Interviews

Most common sources of network data

- Actors' report of presence or absence of ties
- Informants used when actors are orgs

Format considerations (Wasserman & Faust, 1994)

- Roster vs. Free Recall
- Free vs. Fixed Choice
- Binary, Ratings, or Rankings

Data Collection – Methods (Marsden, 1990)

Questionnaires & Interviews

Please circle the names of all the people you hang out with often:

Aaron	Elaine	Isobel	Nancy	Sasha
Aimee	Emilio	Jerry	Norman	Tammy
Chris	Florence	Kramer	Omar	Terrence
Curly	George	Larry	Paul	Xavier
Darren	Harriet	Mabel	Robert	Zachary

Data Collection – Methods (Marsden, 1990)

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Data Collection – Methods (Provan et al., 2005)

Questionnaires & Interviews

Organizations/agencies	Types of links (Check <input type="checkbox"/> the box if you have this link)				Relationship quality
	Shared information	Shared resources	Referrals sent	Referrals received	(Please circle)
Agency A					1 2 3 4
Agency B					1 2 3 4
Agency C					1 2 3 4
etc.					1 2 3 4
					1 2 3 4
					1 2 3 4
Other organizations: (please list and respond as above)					
					1 2 3 4
					1 2 3 4

Data Collection – Methods (Provan et al., 2005)

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Agency B	✓				1 2 3 4
Agency C		✓	✓		1 2 3 4
etc.					1 2 3 4
					1 2 3 4
					1 2 3 4
Other organizations: (please list and respond as above)					
					1 2 3 4
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Data Collection – Methods (Marsden, 1990)

Observations

- Used in small settings where actors have face to face interactions
- Benefits
 - Measures actual interactions
 - Does not require verbal responses
- Drawbacks
 - Time & resource intensive
 - Not always feasible

Data Collection – Methods (Marsden, 1990)

Archival Records

- Network data are obtained from records
 - Newspapers
 - Board meeting minutes
 - Email logs
- Benefits
 - Low budget
 - Can be used to study historical networks
- Drawbacks
 - Measures are often indirect proxies

Data Collection – Ethics

Confidentiality: Network data cannot be anonymous.

- Limit access to identifiable data
- Destroy identifiers as soon as possible

Secondary Participation: Non-respondents can still be named by others.

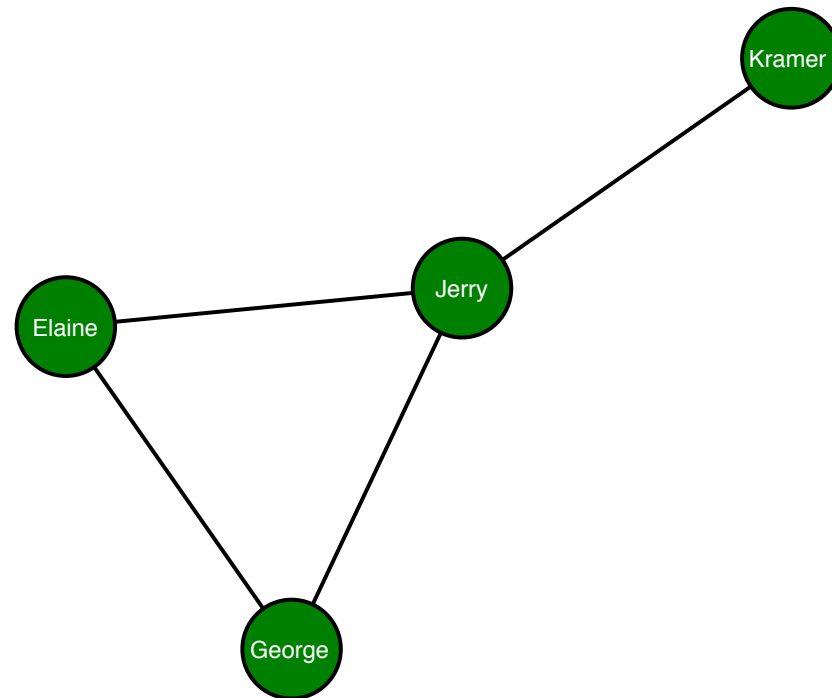
Providing Feedback: Easy to compromise confidentiality and feedback can be misused.

Representing Network Data

Matrix

	Jerry	Elaine	George	Kramer
Jerry	--	1	1	1
Elaine	1	--	1	0
George	1	1	--	0
Kramer	1	0	0	--

Sociogram



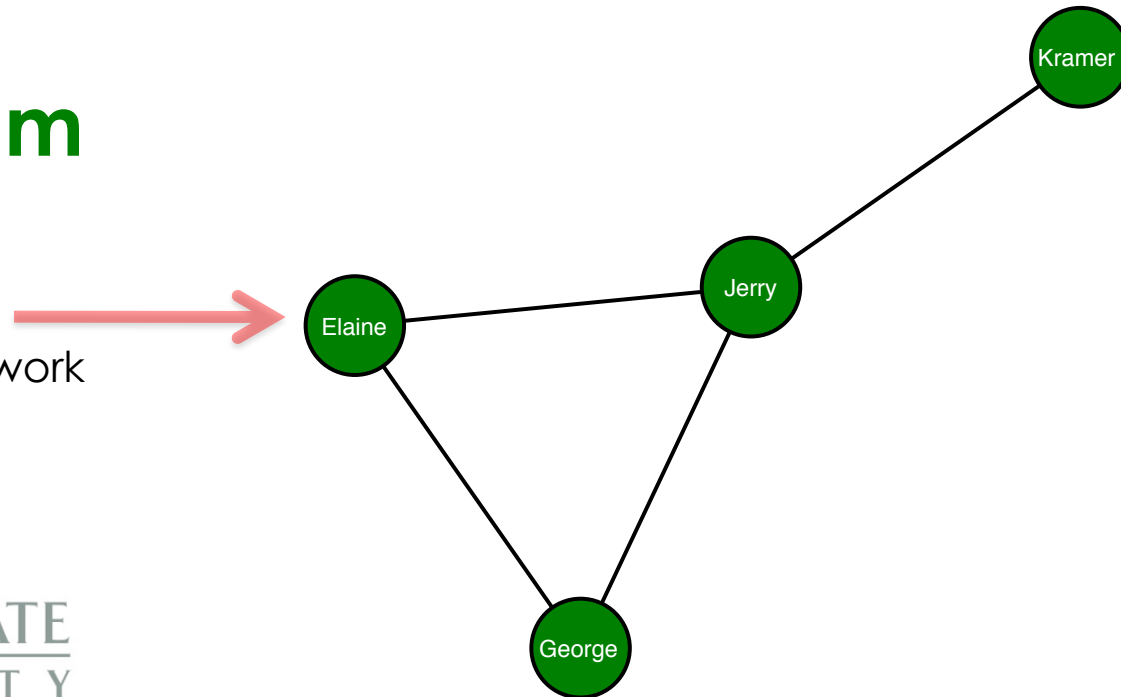
Representing Network Data

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Jerry	--	1	1	1
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Kramer	1	0	0	--

Sociogram

Each circle is an actor in the network



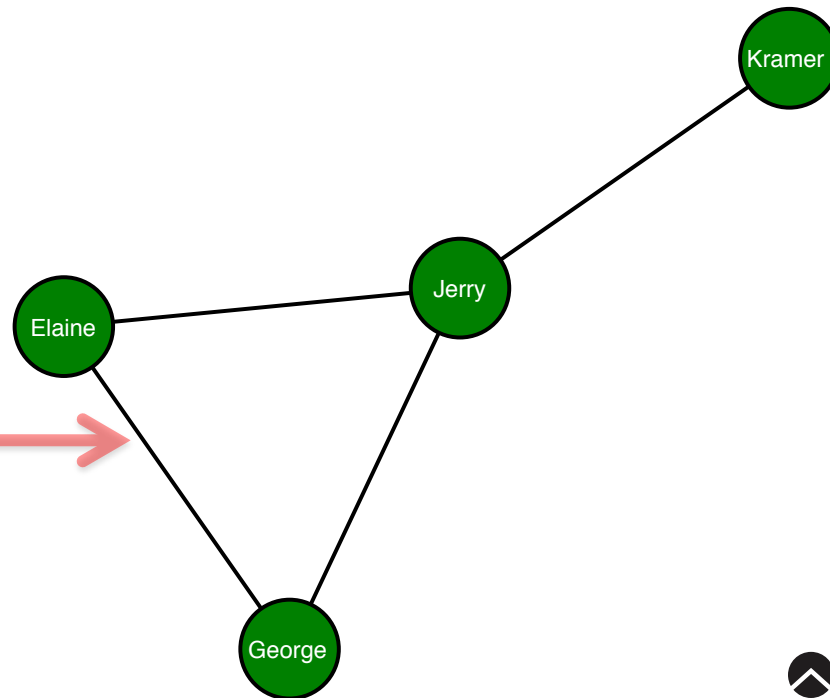
Representing Network Data

Matrix

	Jerry	Elaine	George	Kramer
Jerry	--	1	1	1
Elaine	1	--	1	0
George	1	1	--	0
Kramer	1	0	0	--

Sociogram

Each line represents
a relationship
between two actors



SNA Demonstration (Kornbluh & Neal, in press)

Promoting Academic Success Project (PAS)

– Intervention Goals

- To increase academic achievement among minority boys



SNA Demonstration (Kornbluh & Neal, in press)

Promoting Academic Success Project (PAS)

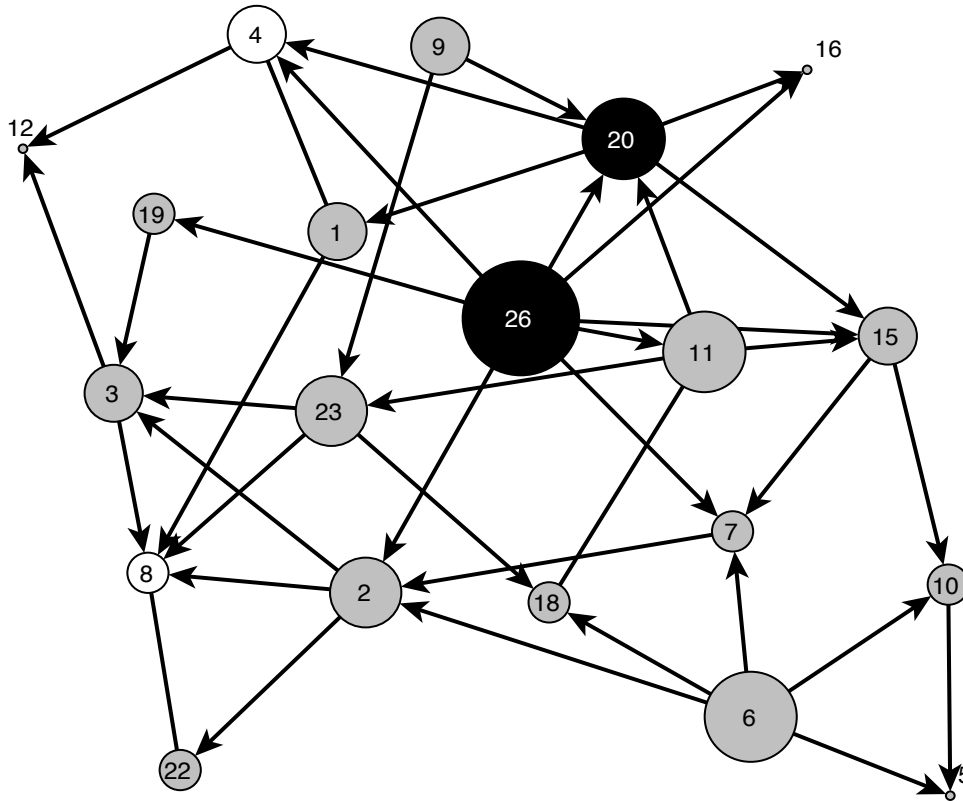
– Intervention Goals

- To increase academic achievement among minority boys
- “Lead teachers” selected by principals to encourage attendance at PD sessions and intervention use

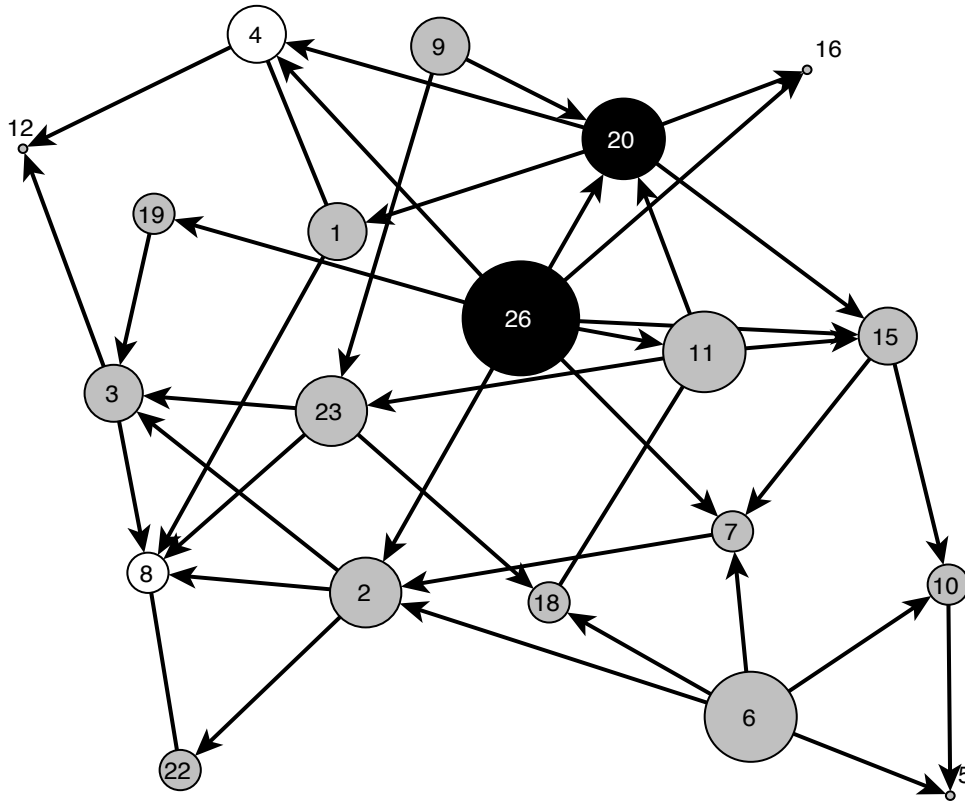


SNA Demonstration

(Kornbluh & Neal, in press)



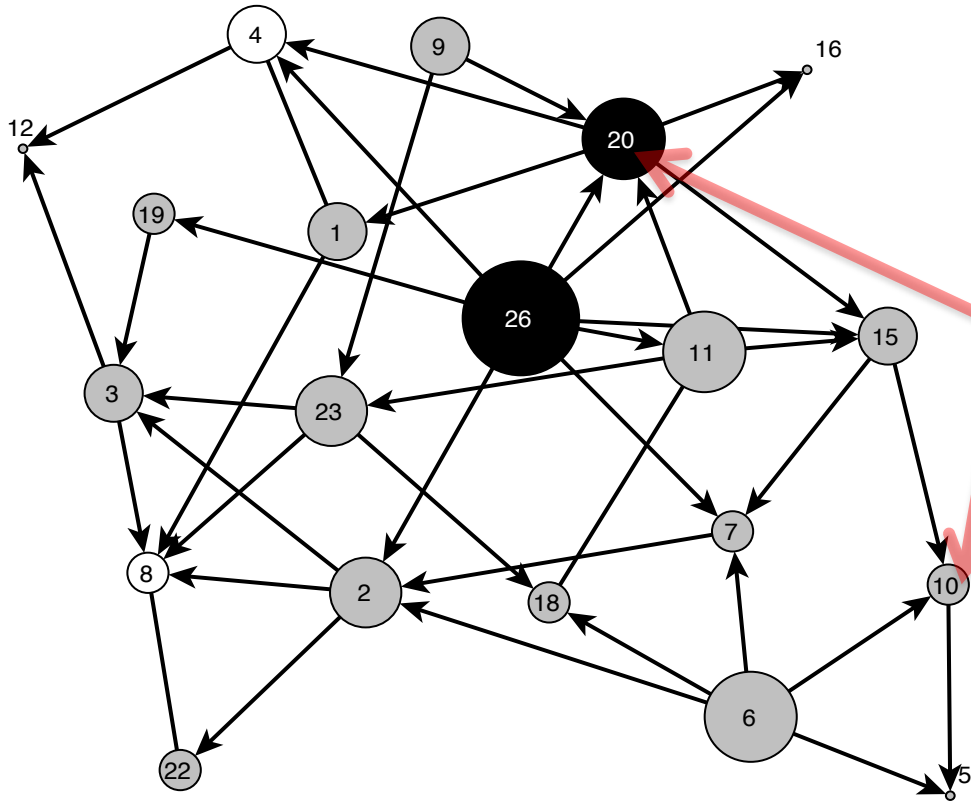
SNA Demonstration (Kornbluh & Neal, in press)



System

- An elementary school implementing PAS

SNA Demonstration (Kornbluh & Neal, in press)



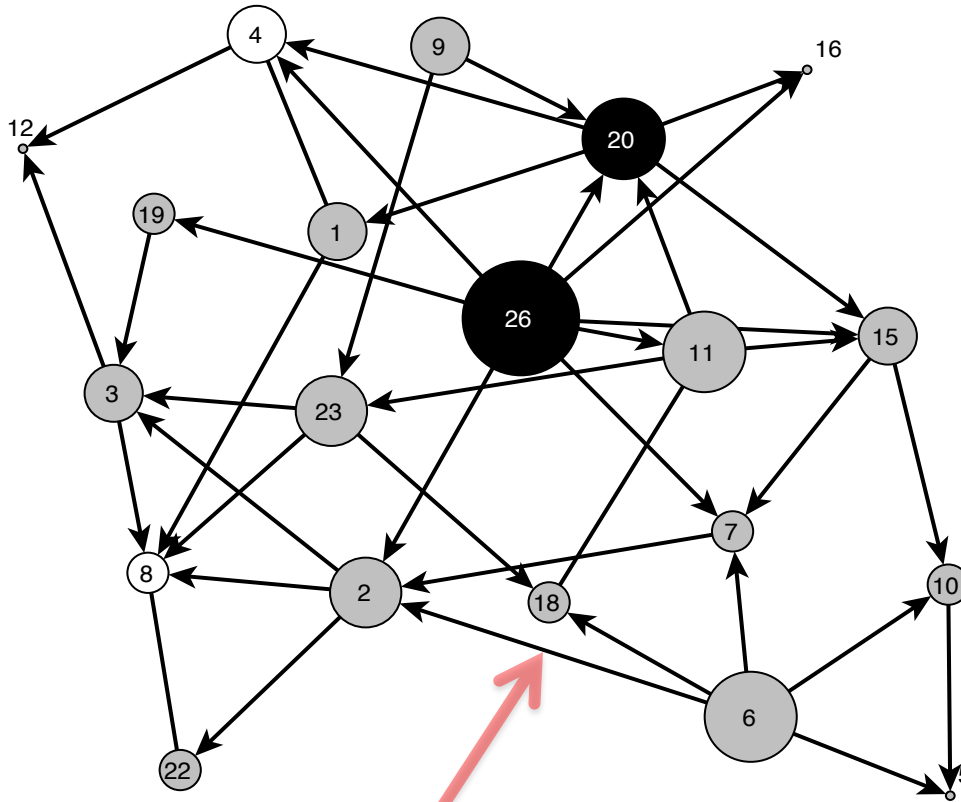
System

- An elementary school implementing PAS

Actors

- All regular and special ed teachers

SNA Demonstration (Kornbluh & Neal, in press)



Behavior management advice

System

- An elementary school implementing PAS

Actors

- All regular and special ed teachers

Relationships

- Advice on (a) family involvement, (b) behavior management, (c) instruction, & (d) promoting positive relationships.

SNA Demonstration (Kornbluh & Neal, in press)

Data Collection

– 10 to 15 minute structured interviews

4a. Please name the teachers in your school from whom you might seek advice around **managing the behavior of minority boys**. [PROBE: Is there anyone else?]

Name

Grade

SNA Demonstration (Kornbluh & Neal, in press)

Questions that SNA can help answer:

- What are the implications of teachers' existing advice networks for the spread of PAS strategies?
- Are the lead teachers optimally situated in the network to be able to spread PAS strategies?

SNA Demonstration (Kornbluh & Neal, in press)

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SNA Demonstration (Kornbluh & Neal, in press)

Multiplexity

- Do actors share multiple types of ties?
- **In this study:** Do teachers tend to go to the same peers for different types of advice?

SNA Demonstration (Kornbluh & Neal, in press)

Multiplexity

Advice Relationship	1.	2.	3.	4.
1. Instruction	—			
2. Family	.33	—		
3. Positive Relationships	.42	.33	—	
4. Behavior	.39	.32	.39	—

Teachers tend to get advice from different people depending on the type of information they are seeking

Only 32% of relationships present in the behavior management network were also present in the involving families network



SNA Demonstration (Kornbluh & Neal, in press)

Multiplexity

Advice Relationship	1.	2.	3.	4.
1. Instruction	—			
2. Family	.33	—		
3. Positive Relationships	.42	.33	—	
4. Behavior	.39	.32	.39	—

Implication: May need “specialized” lead teachers based on content of advice

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SNA Demonstration (Kornbluh & Neal, in press)

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SNA Demonstration (Kornbluh & Neal, in press)

Centrality

- How many relationships does an actor have in a network?
- For directed networks:
 - Indegree-How many ties does an actor receive?
 - Outdegree-How many ties does an actor send?
- Normed as a percentage of all possible ties in the network

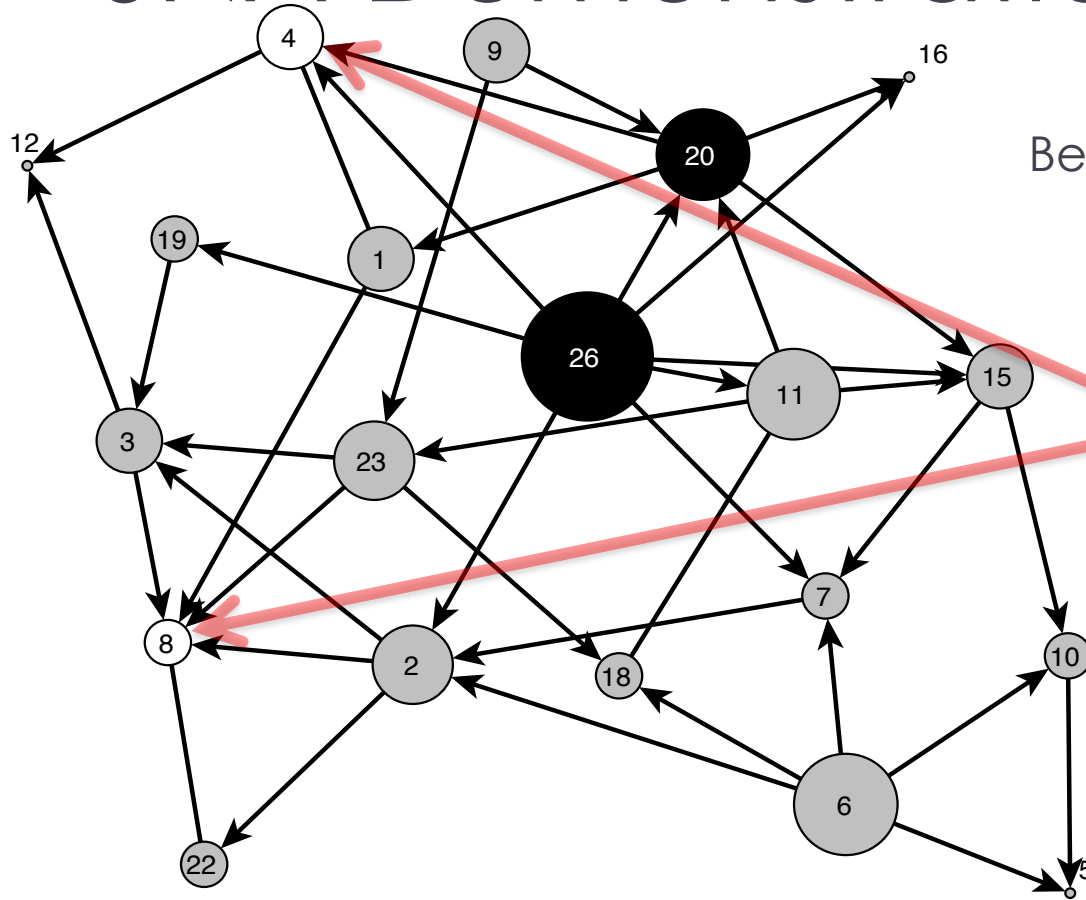
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SNA Demonstration

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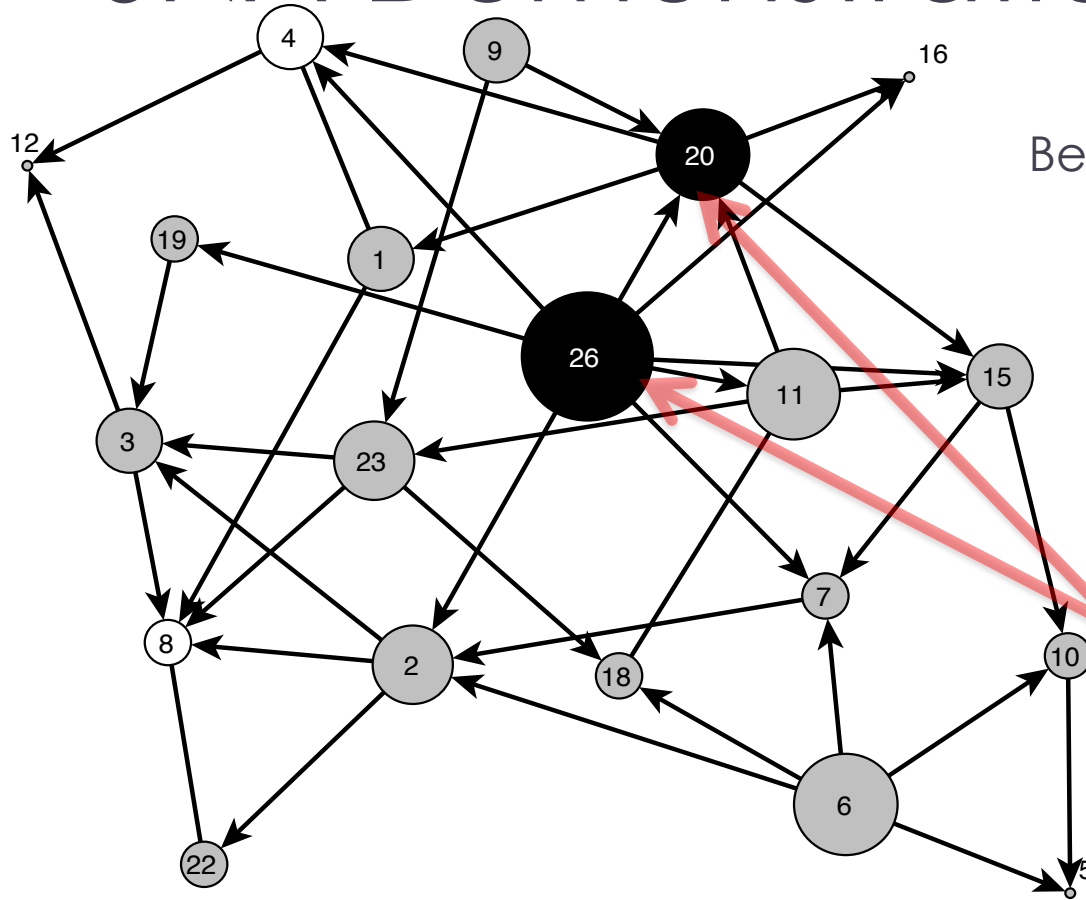


Behavior Management Advice

Lead teachers 4 & 8:
Gave advice to 10.53% of
peers & 5.26% of peers

SNA Demonstration

(Kornbluh & Neal, in press)



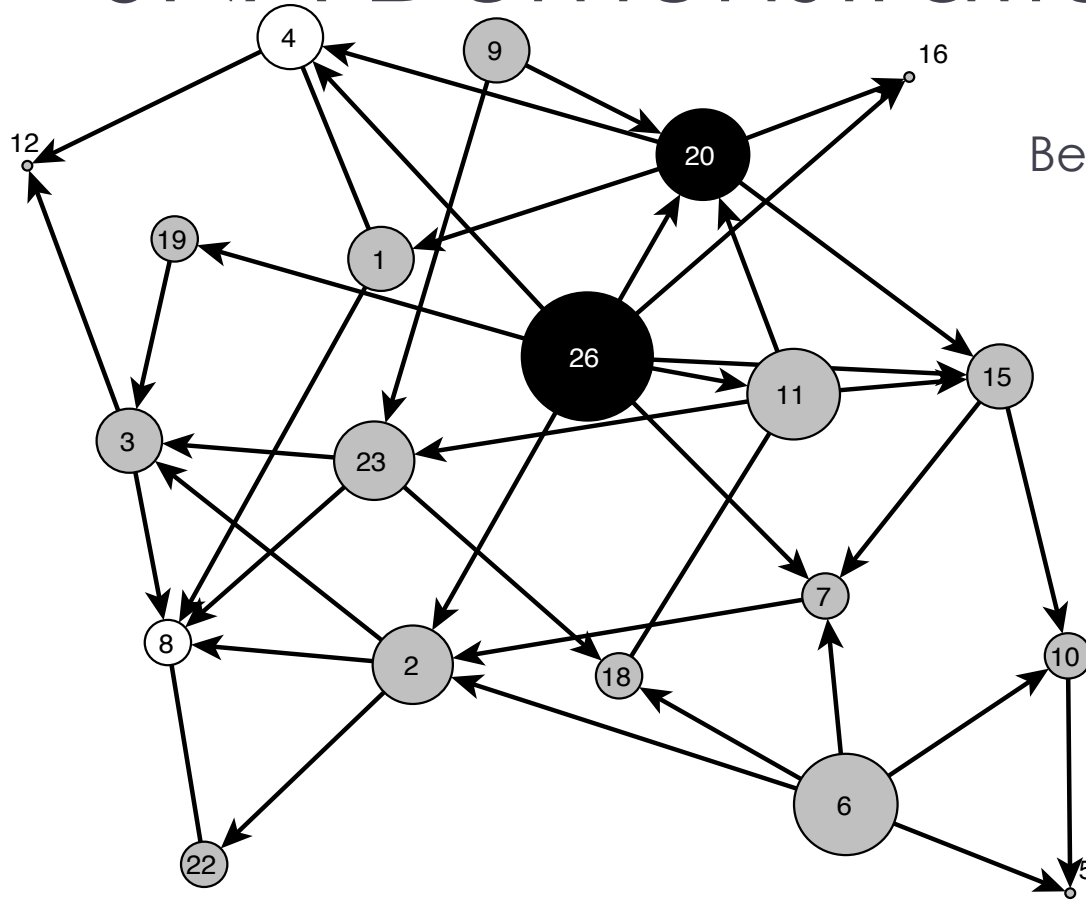
Behavior Management Advice

Lead teachers 4 & 8:
Gave advice to 10.53% of
peers & 5.26% of peers

Alternate teachers
20 & 26 gave
advice to 21.05%
and 42.11% of their
colleagues

SNA Demonstration

(Kornbluh & Neal, in press)



Behavior Management Advice

Bottom Line:
The principal's
selected lead
teachers may not
be the ideal lead
teachers for
spreading info
about PAS

SNA Demonstration (Kornbluh & Neal, in press)

SNA can provide a “birds eye” view of social systems

- This view eludes individual community members or leaders
- Can be used an alternative method for identifying leaders/key informants in a setting
- Can help identify how relational structure might facilitate or hinder communication

Exercise

Think of a social network that you might be interested in exploring in your own work.

Who are the actors?

- Are they people or organizations?
- How would you set the boundaries of your network?

What relationships would you explore?

- What scale of measurement is most appropriate?
- Are the relationships symmetric or directional?

How would you collect the data?

Questions?

Jennifer Watling Neal

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Analysis for the SNA demo is described in:

- Kornbluh, M. & Neal, J.W. (in press). Social network analysis. In L.A. Jason & D.S. Glenwick (Eds.), *Handbook of Methodological Approaches to Community-Based Research*. New York: Oxford University Press.