

NOW IT'S TIME FOR:

NETWORK ANALYSIS

**WHY NETWORKS? WE
ALREADY TAKE SO MANY \$#
%^*NG METHODS CLASSES.**

I KNOW.

BUT

**MOST OF THE STATS YOU LEARN
OPERATE ON THE ASSUMPTION
OF INDEPENDENCE**

**SOCIAL SCIENCE = RELIANCE
ON METHODOLOGICAL
INDIVIDUALISM**

ANYTIME CONNECTIONS ARE FOSTERED

- ▶ Between people
- ▶ Among groups
- ▶ Through tools (like texts, practices, strategies)

Networks Result

PEOPLE ARE EMBEDDED IN NETWORKS

- ▶ either through their social connections
- ▶ as part of their membership/role in an organization
- ▶ or through their material/embodied/day-to-day interactions

- ▶ But our current approach to investigating learning and change divorces people from their networks

**NETWORK DATA MAKES
YOUR STUDY BETTER**

BY:

- ▶ adding context to your qualitative description of environments and community
- ▶ providing the opportunity to connect individual explanatory variables to meso-level factors
- ▶ identifying the relationship between the structure of a social context and the agency of an individual to make decisions within that context

HERE IS A REALLY
GOOD EXAMPLE

PEER COLLABORATION IS NECESSARY FOR SUCCESS IN PHYSICS

- ▶ Group composition is significantly related to women's performance in STEM courses (e.g. Dasgupta, Scircle, & Hunsinger, 2015; McCullough, 2002; Stout, Dasgupta, Hunsinger, McManus, 2011)
- ▶ Physics curriculum = disciplinary "logic of collaboration" (Nespor, 1994, p. 40).
- ▶ Students with lower levels of overlap between their social and academic world have a harder time persisting in Physics (Nespor, 1994; Forsman, Linder, Moll, Fraser, & Andersen, 2014; Forsman, Moll, and Linder, 2014)

POTENTIAL PROBLEM WITH PEER SELECTION

- ▶ Women and Students of Color are substantially underrepresented in undergraduate Physics
- ▶ Prior research suggests that students are most likely to choose peers who resemble them
- ▶ This potentially leaves Women and SOC at a disadvantage for engaging in collaboration

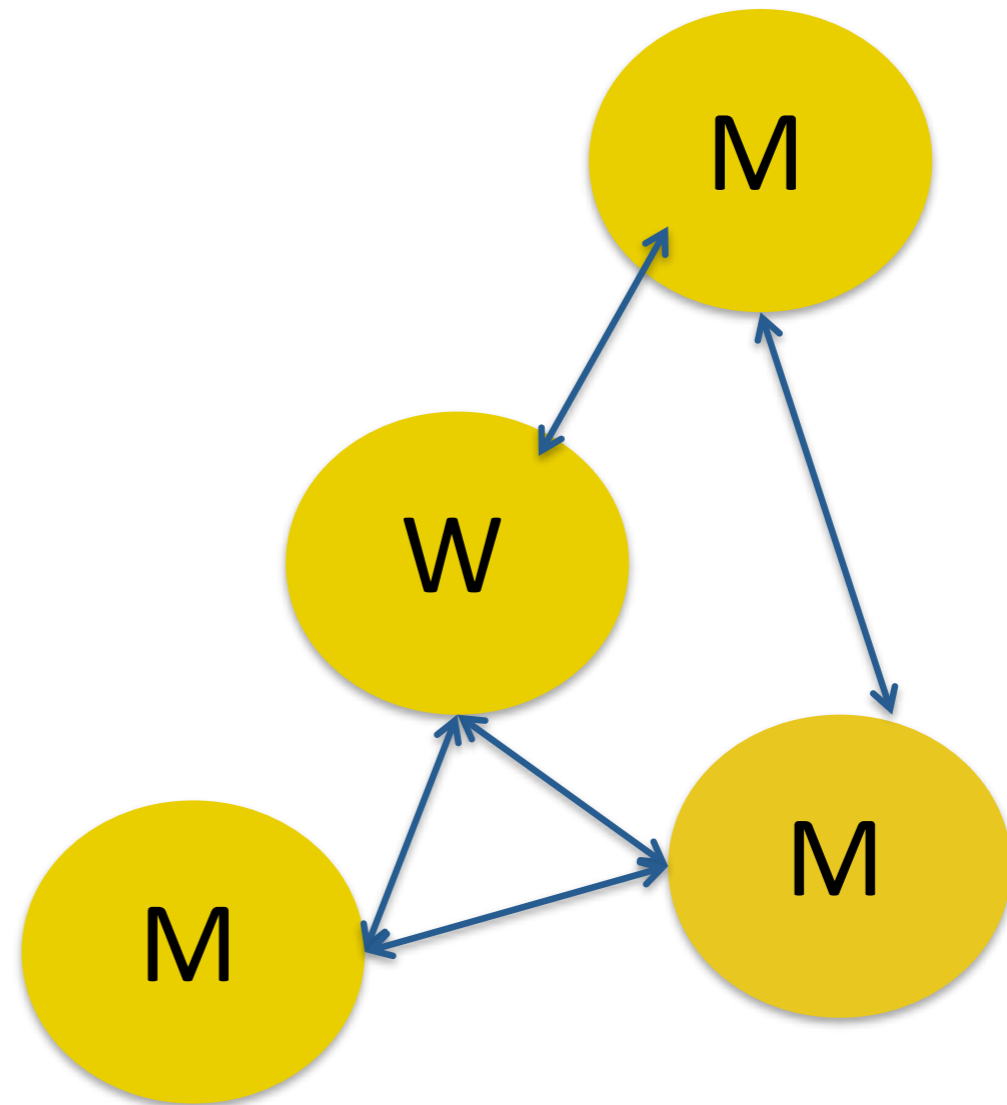


Men in Physics (top) and Women in Physics (bottom) Google Image Search



THE PUSH AND PULL OF PEER INSTRUCTION

- *Pull*: Everyone participated in some collaborative partnerships during interactive instruction, even if they reported they were a loner
- *Push*: During observations three types of groups formed:
 - Men only (3 groups)
 - Women only (1 group)
 - Mixed groups with one woman and three-five men (9 groups)
- One student remarked that gravity was “pushing the genders apart” as part of a debrief activity on gravitational forces



Example Project Cluster from the network

BY MAPPING THE SOCIAL NETWORK

- ▶ I observed gendered sorting
- ▶ Was able to identify instructional practices that fostered & deterred diverse sorting
- ▶ Could investigate the relationship between diverse sorting behaviors and academic success (although I haven't....I should of....That's a really good idea...like a logistic regression where there's a covariate for diverse or homogenous collaborative group....).

I'm sold. But how do I do it?

I'm so glad you asked.



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1	0	0
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1	-	1
1	1	-
1	0	0

**MATRICES ARE
THE BASIS OF ALL
NETWORK
ANALYSIS**

Table with 26 columns and 30 rows. Columns are labeled with names and initials (e.g., Fosselt, Jr, Jaquette, O, Kim, J, Kleinman, M, Samuels, E, Bowman, Na Harris, NF, Gumport, PJ, Lattuca, Lr, Carter, Df, Ro, Hk, Alcott, B, Magolda, Mit Perez, RJ, Shim, W, King, Pm, Hyman, Jm, Dynarski, Sm Hemelt, Sw, Terezini, Pt, Me). The cells contain binary values (0 or 1).

ADJACENCY MATRIX

Faculty



Peter Riley Bahr
Associate Professor
734.647.1832
prbahr@umich.edu

Michael N. Bastado
Professor, Director,
Center for the Study of
Higher and
Postsecondary
Education
734.615.3349
bastado@umich.edu
Room: 2117 C

Philip J. Bowman
Professor
734.647.8394
pbowman@umich.edu
Room: 2117 G

John Burkhardt
Clinical Professor,
Director, the National
Center for Institutional
Diversity (NCID)
734.615.6962
jburkum@umich.edu
Room: 3520

Kim S. Cameron
Professor, School of
Education; William
Russell Kelley Professor
of Management and
Organizations; Stephen
M. Ross School of
Business
734.615.5247
cameronk@umich.edu

Stephen L. Desjardins
Professor, School of
Education; Professor,
Ford School of Public
Policy
734.647.1964
sdesj@umich.edu



Susan Dynanski
Professor, School of
Education; Professor of
Public Policy, Gerald R.
Ford School of Public
Policy; Professor,
Department of
Economics, College of
Literature, Science, and
the Arts
734.615.5113
dynanski@umich.edu
Room: 5152 West Hall

Patricia M. King
Professor, SOE
Ombudsperson
734.615.6740
peking@umich.edu

Lisa R. Lattuca
Professor
734.647.1979
lrlatt@umich.edu
Room: 2117 D

Janet H. Lawrence
Professor
734.647.1977
jlaw@umich.edu

Brian P. McCall
Professor, School of
Education; Professor,
Department of
Economics, College of
Literature, Science, and
the Arts
734.647.8366
bpccall@umich.edu

Betty J. Overton-Adkins
Clinical Professor,
Director, National Forum
on Higher Education for
the Public Good
734.936.6995
boverton@umich.edu



Julie Renee Posselt
Assistant Professor
734.764.8423
jposselt@umich.edu

Awilda Rodriguez
Assistant Professor
734.647.2150
awilda@umich.edu

Edward St. John
Algo D. Henderson
Collaborative Professor
734.647.2013
edstjohn@umich.edu
Room: 2117

I did this in like 20 minutes so I didn't include research faculty or Awilda or Jan because their last names are too common for a quick search. Also, at some point Sue started using a middle initial so she's in here twice. LISTEN- it's an example. It's not research

HOW CONNECTED ARE OUR FACULTY?

BASIC NETWORK DESCRIPTIVES

Authors in the dataset

Tie is not sent

of connections between authors in the data

Percentage of observed connections

out of all total possible connections

Network attributes:

vertices = 205

directed = FALSE

hyper = FALSE

loops = FALSE

multiple = FALSE

bipartite = 102

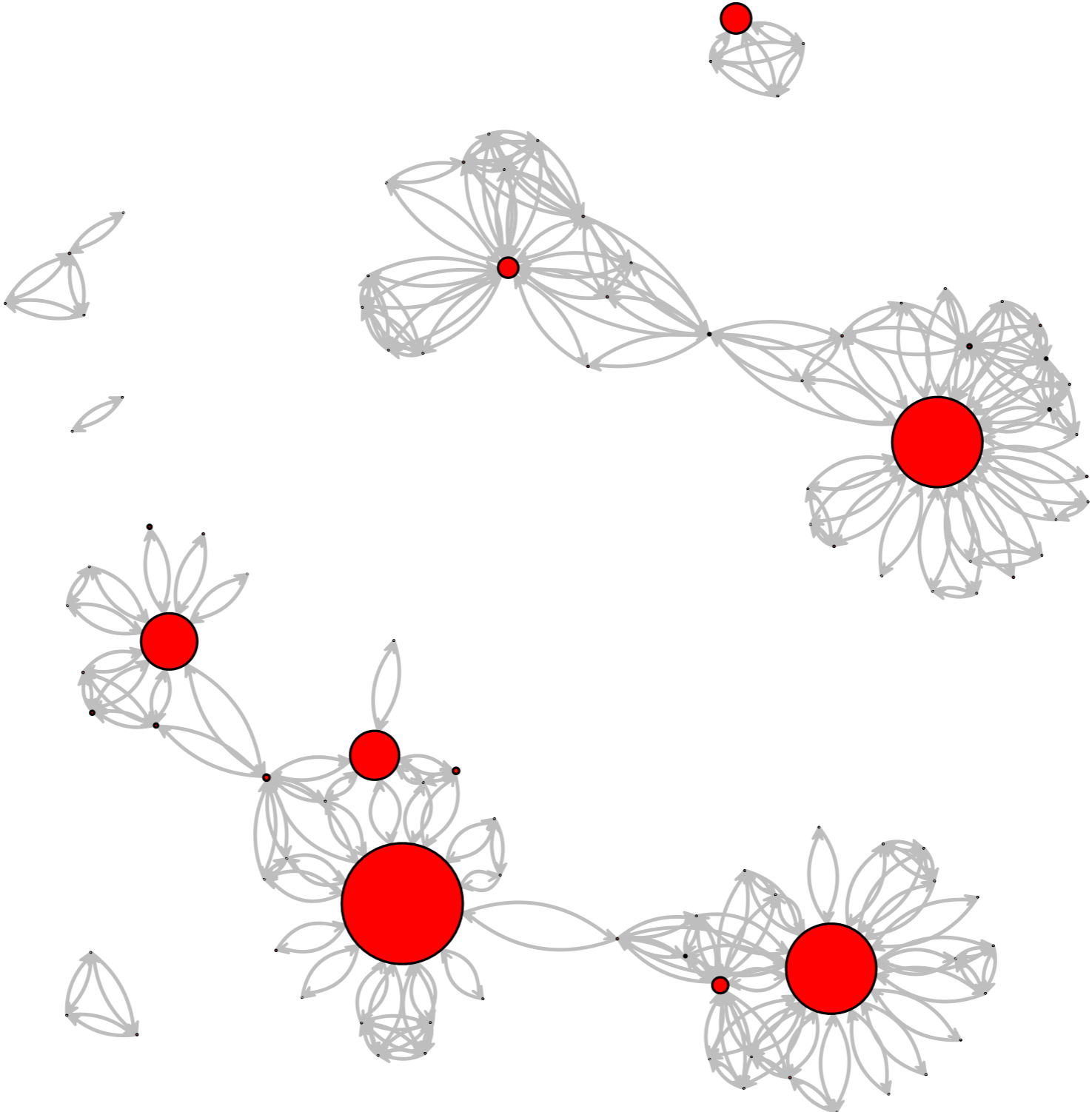
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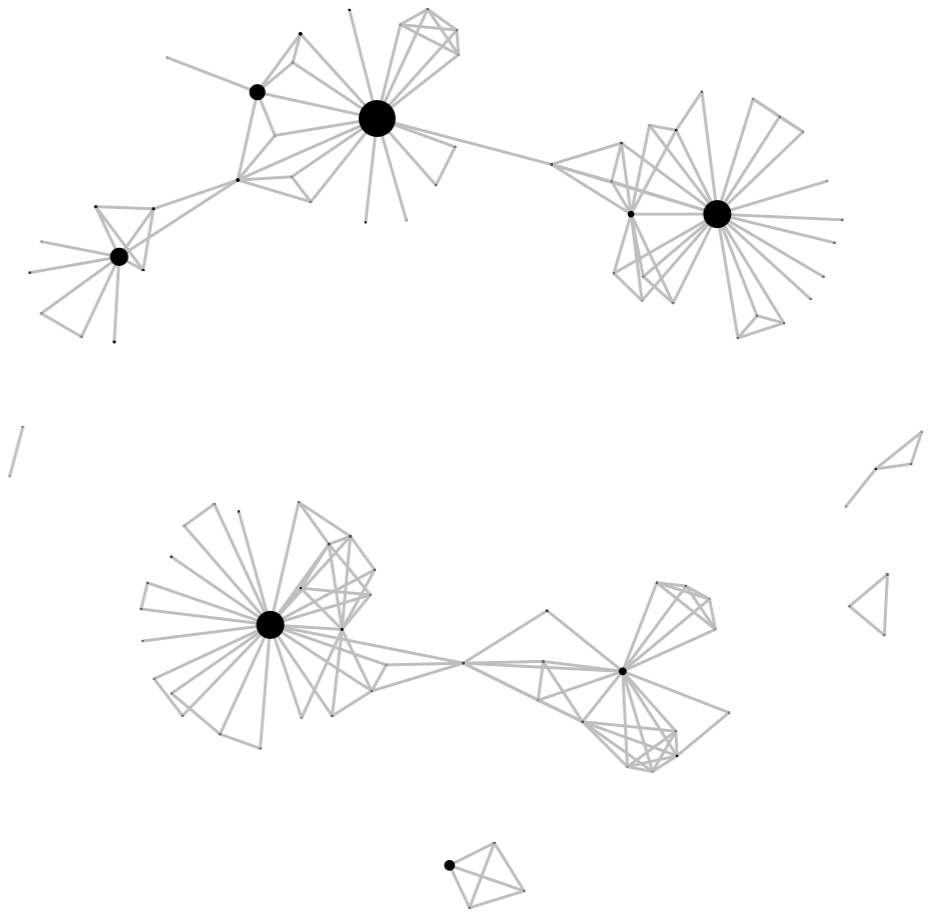
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non-missing edges = 486

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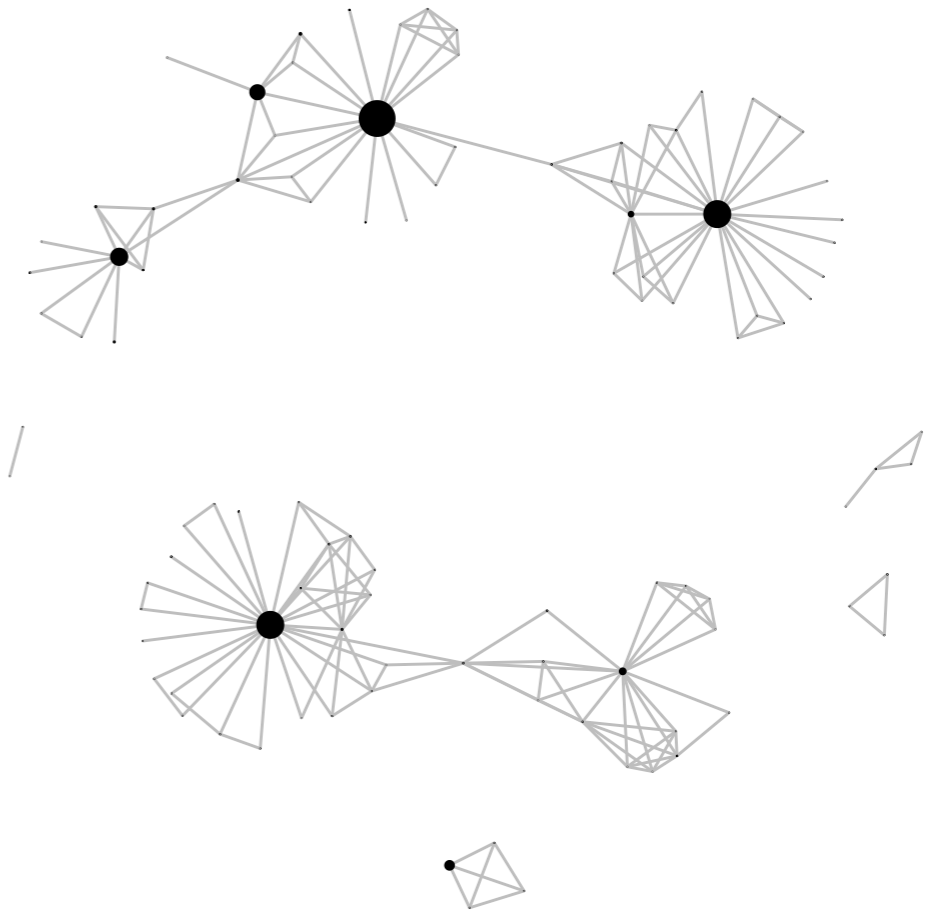
CSHPE NETWORK





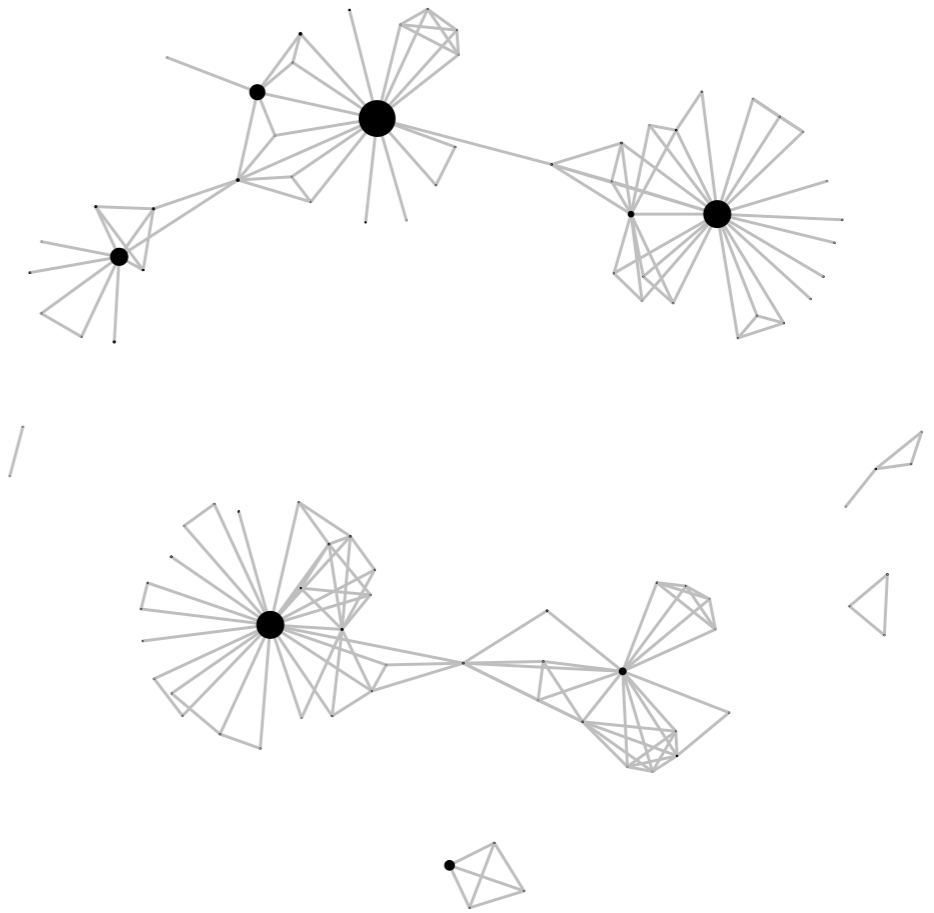
WE COULD NOW INVESTIGATE

HOW IDEAS DIFFUSE



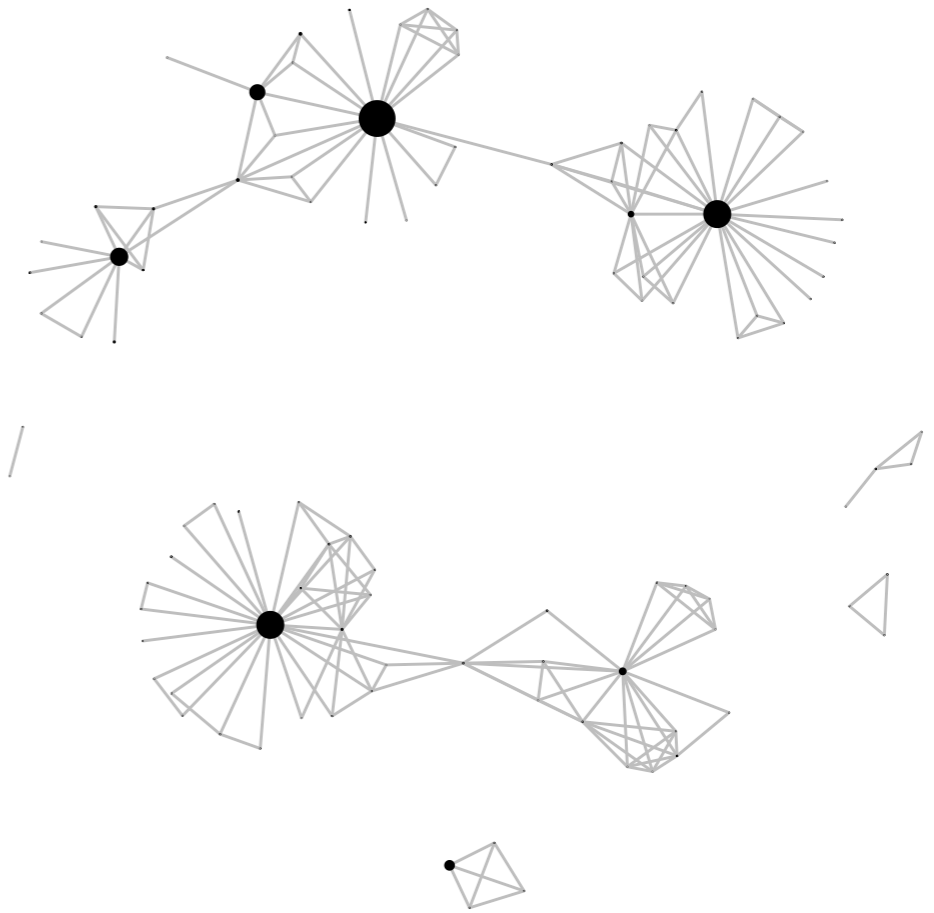
WE COULD NOW INVESTIGATE

HOW COLLABORATIONS FORM



WE COULD NOW INVESTIGATE

WHO IS MENTORING STUDENTS



WE COULD NOW INVESTIGATE

**THE ROLE OF INSTITUTIONAL TIES
IN RESEARCH COLLABORATIONS**

Let's Make An

ADJACENCY MATRIX