A Relational Practice Approach to the Study of Social Networks

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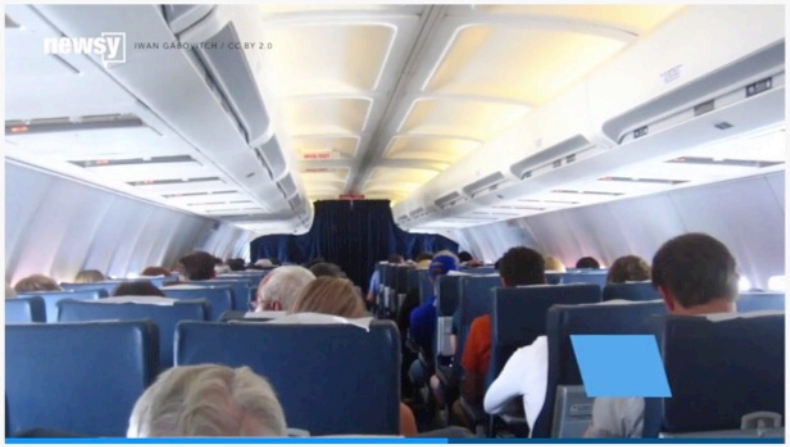
Professor suspected of being a terrorist because of a math equation

14837

646

510

Steph Solis, USA TODAY 12:31 p.m. EDT May 8, 2016



An economics professor at the University of Pennsylvania says his flight was delayed after his seatmate grew worried about his writing. Video provided by Newsy Newslook

Richmond Times-Dispatch

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TRANSIT-IVE PROPERTIES

Editorial: Math can be scary, but it's not terrorism

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Posted: Monday, May 9, 2016 10:30 pm

(WIKIMEDIA COMMONS)

When national-security experts talk about solving the terrorist equation, this probably isn't what they mean.

The other day Guido Menzio, a professor of economics at the University of Pennsylvania, was taking a flight between Philadelphia and Syracuse. The woman in the seat next to him tried to engage him in conversation, but he brushed her off. He was too busy working out a differential equation related to a price-setting model.

But the curious runes he was scribbling were all Greek to his seatmate. Or rather, perhaps all Arabic. She slipped a note to the flight crew, and the next thing Menzio knew, the plane had taxied back to the jetway and he was being

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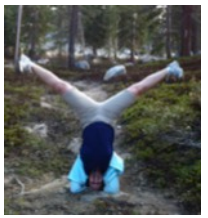

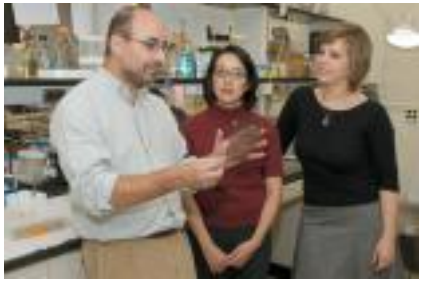

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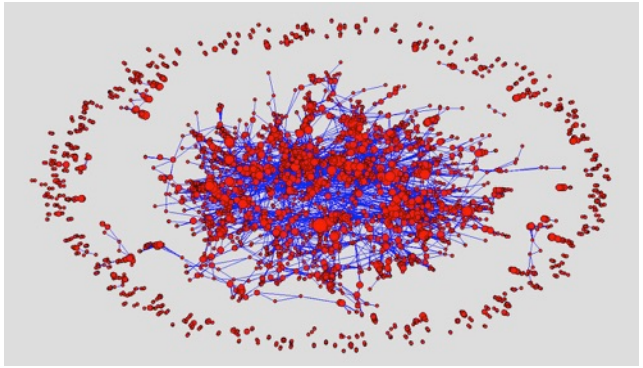
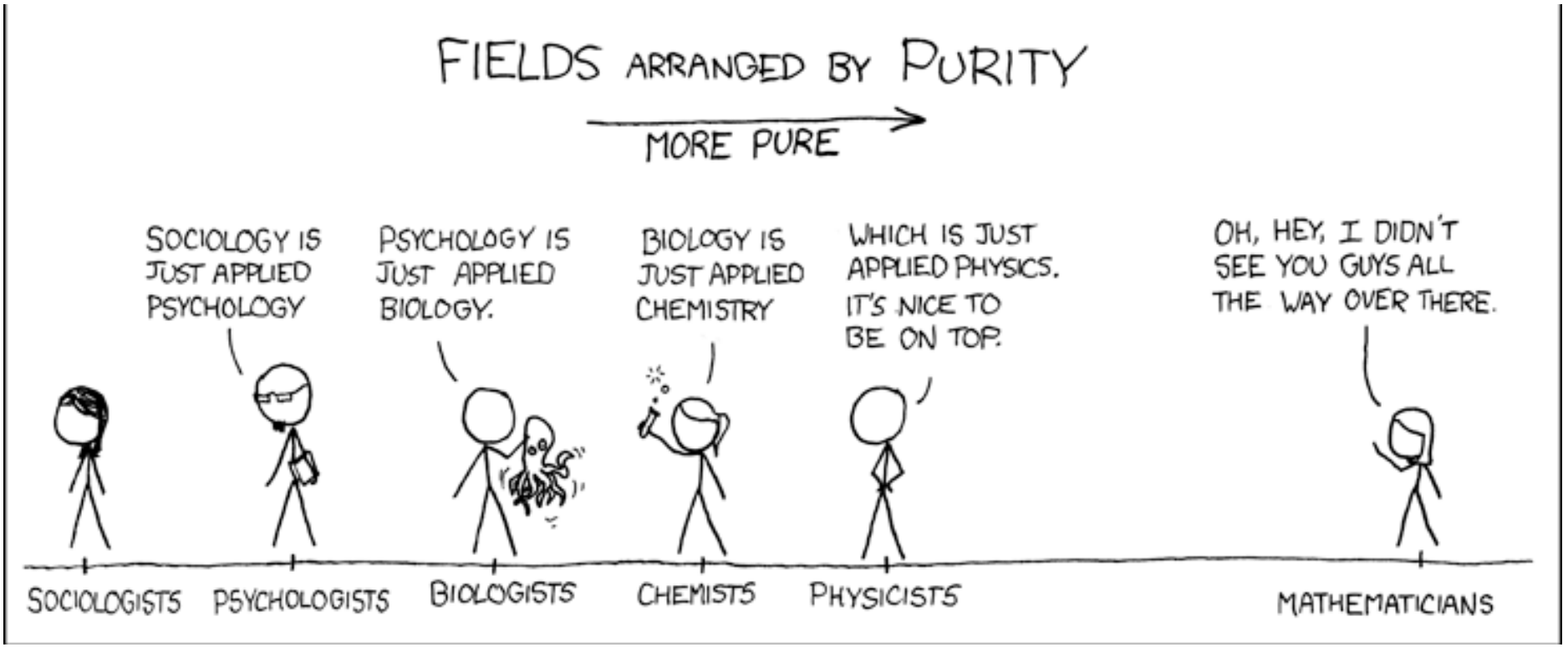


Organizational behavior / Sociology of work

- How do individuals search for and share knowledge to accomplish work?
- How are innovations diffused through knowledge networks within and across bureaucratic organizations?
- How is the changing nature of work affecting work practices?

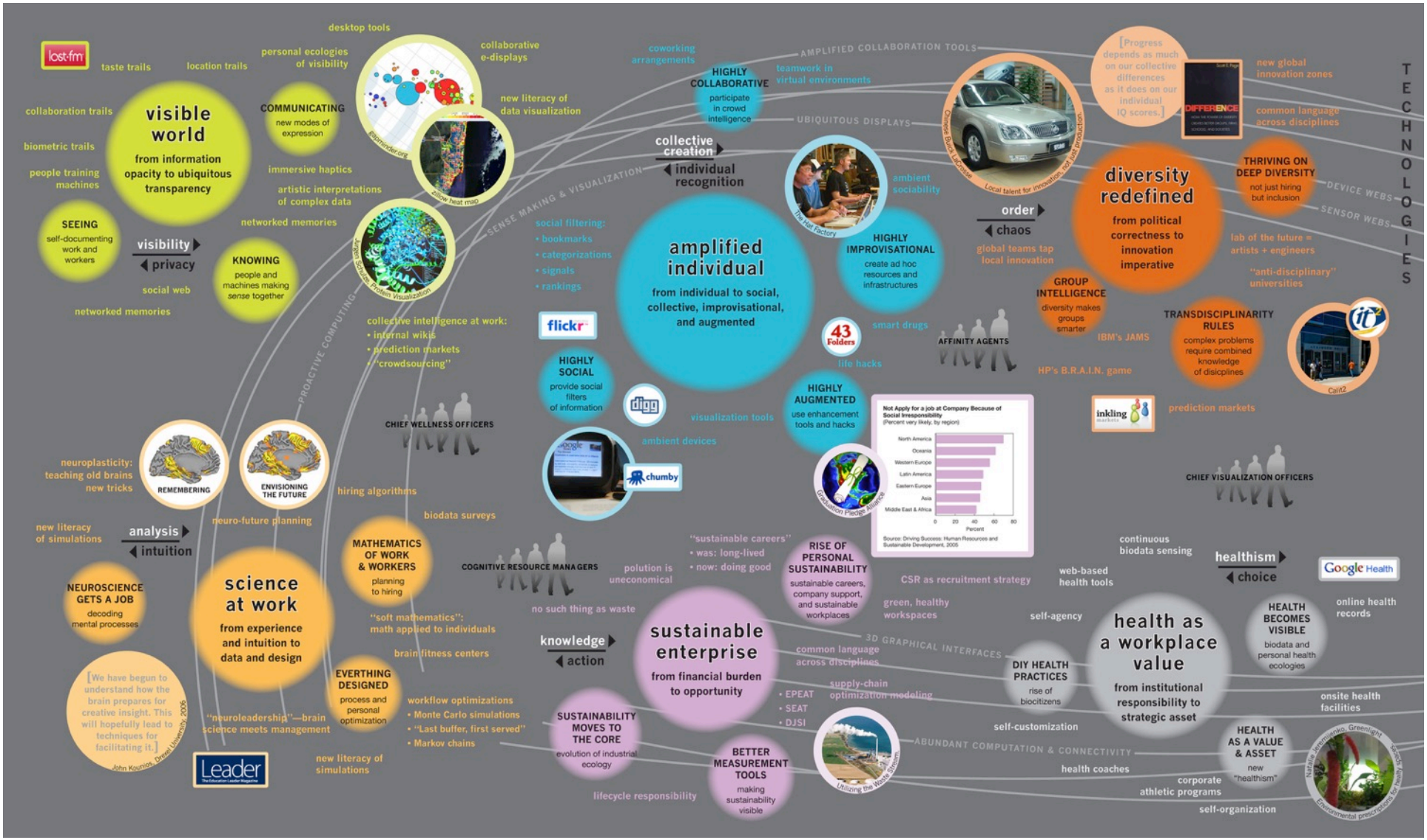


Source: xkcd.com

Research Overview

Topic	Setting	Findings	Papers
Conception and implementation of large-scale IT projects	Public officials in state government agencies	• It takes a network to build a network • Small and incremental is better than large	*Binz-Scharf 2003, 2008* *Binz-Scharf & Lazer 2007* *Vaast & Binz-Scharf 2008*
Informal knowledge sharing in highly controlled systems	DNA forensic scientists in government crime labs	• Informal networks arise to compensate for structural deficiencies	*Mergel, Binz-Scharf & Lazer 2008* *Binz-Scharf, Lazer & Mergel 2012* *Greenberg et al 2012*
Collaborative knowledge production in science	Research scientists in university science labs	• Databases have revolutionized science, but social factors remain strong • Relational skills	*Paik & Binz-Scharf 2012, 2014* *Binz-Scharf, Kalish & Paik 2015* *Binz-Scharf, Dunne & Paik 2016*

Future of Work



Source: Institute for the Future

Studying Organizational Networks

1,200 out of 11,000 papers published in 13 top organization studies journals since 2004 are on social networks (trend rising)*

Social network analysis (SNA) as a quantitative domain (Wasserman & Faust 1994)

- Focus on structure (Borgatti, Mehra, Brass, Labianca 2009)
- Massive data sets (Lazer, Pentland, Adamic, Aral, Barabasi, Brewer 2009)

What we know less about: content of ties, factors related to tie formation, maintenance, dissolution (Ahuja, Soda, Zaheer 2012; Ghosh & Rosenkopf 2015)

* Of these, 61 papers used some form of qualitative data, 11 were purely qualitative

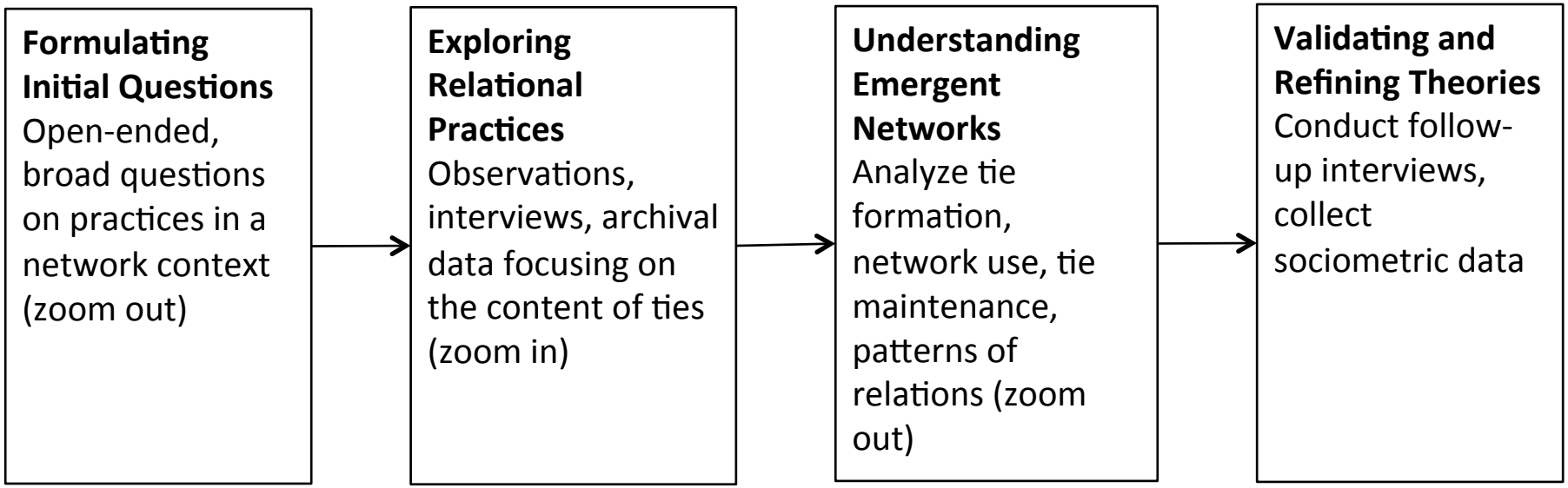
Focus on Practices

Practice is "what is actually done in the doing of work" (Orr 1996:439)

Structures are produced and reproduced as people adopt, adapt, improvise them (Orlikowski 2002)

Networks are something that people *do*, rather than have

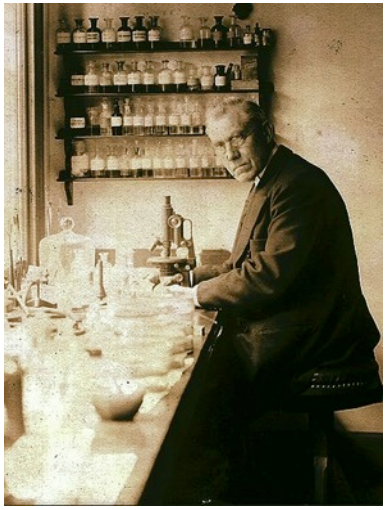
Relational Practice Approach



Binz-Scharf, M.C. (2015). A practice approach to the study of social networks. In: Handbook of Qualitative Organizational Research: Innovative Pathways and Methods. Kimberly D. Elsbach and Roderick M. Kramer, eds. New York: Taylor & Francis, pp. 186-194.

An illustration of the relational practice approach

From little science…



…to Big Science

"Collaboration is no longer an option, it's a necessity"

Source: "Sunset of the Solo Scientist", WSJ, Feb 5, 2011

Current Trends in Science

- Co-authored papers more common, team size increasing (Wuchty, Jones and Uzzi 2007)
- Scientific teams span international borders (Olson, Zimmermann and Bos 2008) and institutions (Jones, Wuchty and Uzzi 2008)
- Virtual technologies facilitate knowledge sharing across time and space (Finholt and Olson 1997; Walsh and Roselle 1999)
- In the near future: Open collaboration – "Era of Networked Science" (Nielsen 2012)

Democratization of Science

The Challenge

Scientific knowledge production is a collective and social process (Cole 1992; Hacking 1999; Jasanoff 2004; Lynch 1993, Pickering 1992)

Open Science

- Data availability
- Data accessibility
- Drive to understand systems

Sociology

- Organizational boundaries
  - Institutions, schools, departments, labs…
- Socially constructed boundaries
  - Hierarchies, status
  - Trust

Methods

Ethnographic case studies

- Observation of three US labs over 8 months; 50 lab visits total
- Attendance/observation of biennial meeting
- Grounded theory

Social network analysis

- Conference programs of biennial meeting (1996-2012)
- 1,985 papers, 4,971 unique authors
- Coded papers, co-authors, affiliation/location, role (first/last author, chair)
- MRQAP on subset: authors who attended >1; n=219
  - Looked up h-indices, institutional ranking

Let’s zoom in!

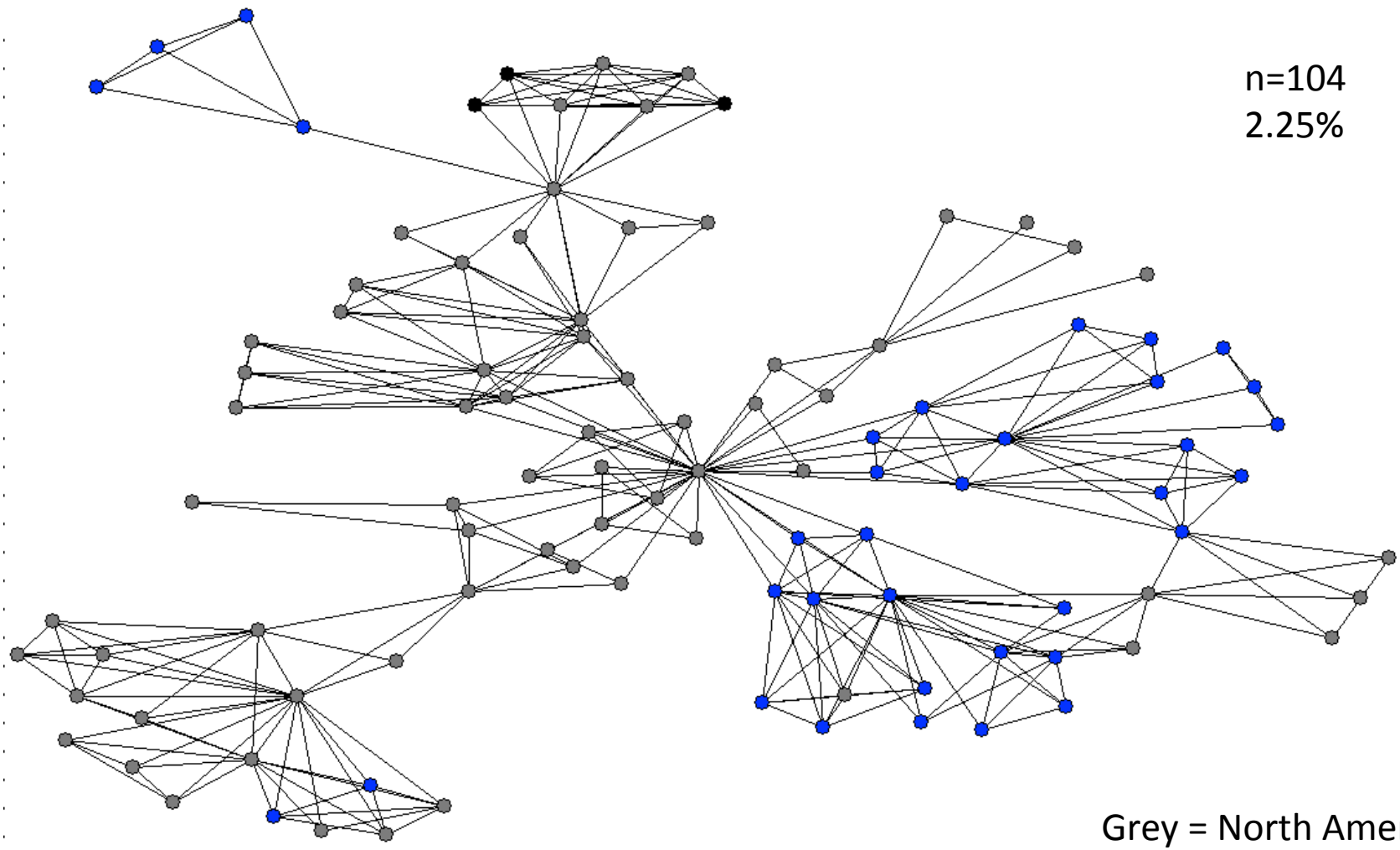
The Way We Work Now

…Based on an ethnography of scientists working in academic labs, we find five categories of relational practices at work: **helping, mentoring, apprenticing, co-creating, and coordinating**. We theorize how these **practices shape scientists' networks** throughout their career stages around [**technical** and **relational**] **skills**, foci, and objects. […] Our agentic view of network emergence adds to existing understandings of the changing nature of work by emphasizing the **increasingly entrepreneurial role** of knowledge workers in negotiating access to the knowledge they need to accomplish their work. Future research needs to integrate small and big data studies to zoom in and out between relational practices and network structure.

Binz-Scharf, M.C., Danielle D. Dunne, and Leslie Paik (2016). The way we work now: Toward a relational practice theory of network emergence. *Under review*

Zooming waaaaay out….

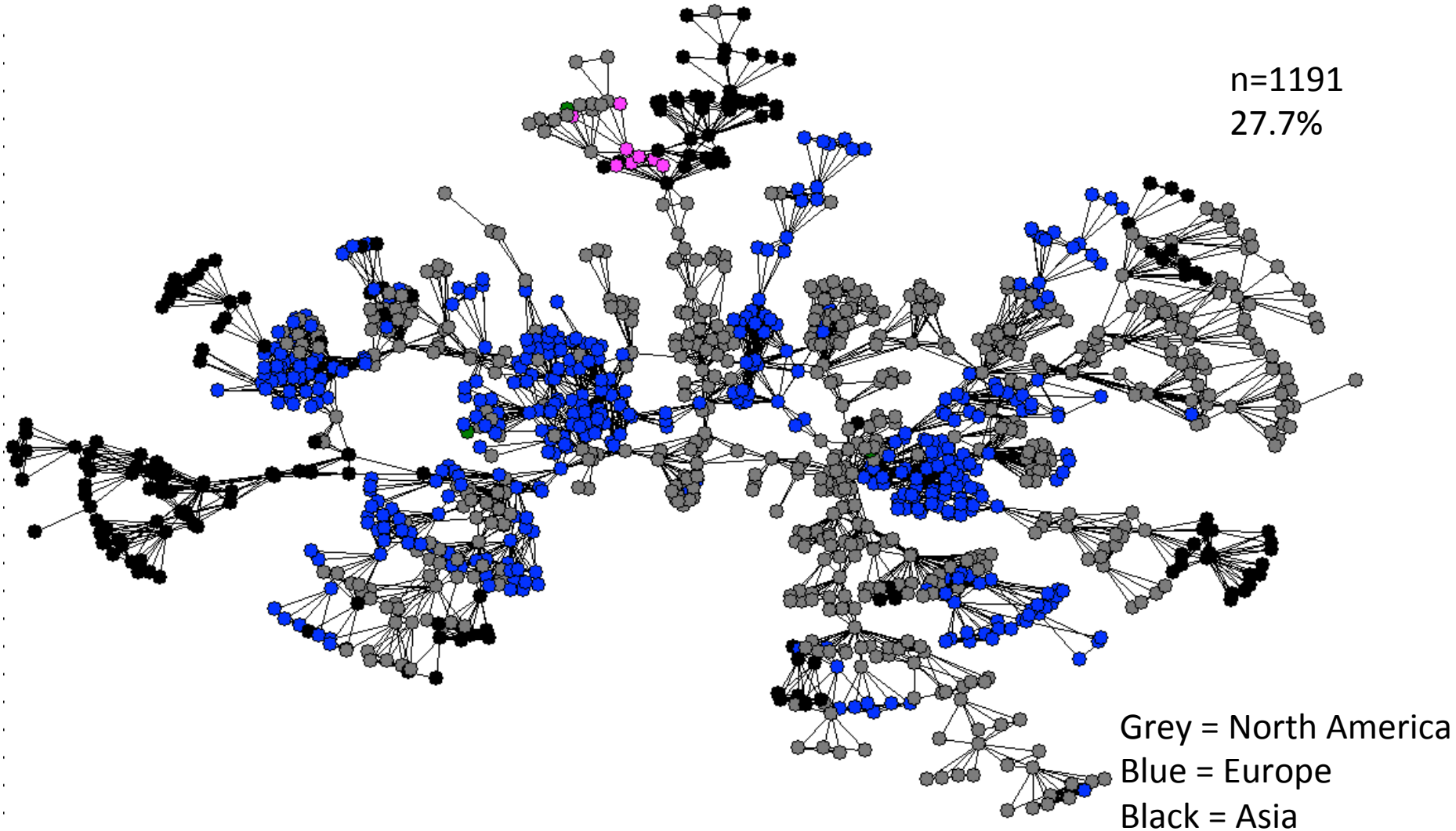
Largest Component by 2000



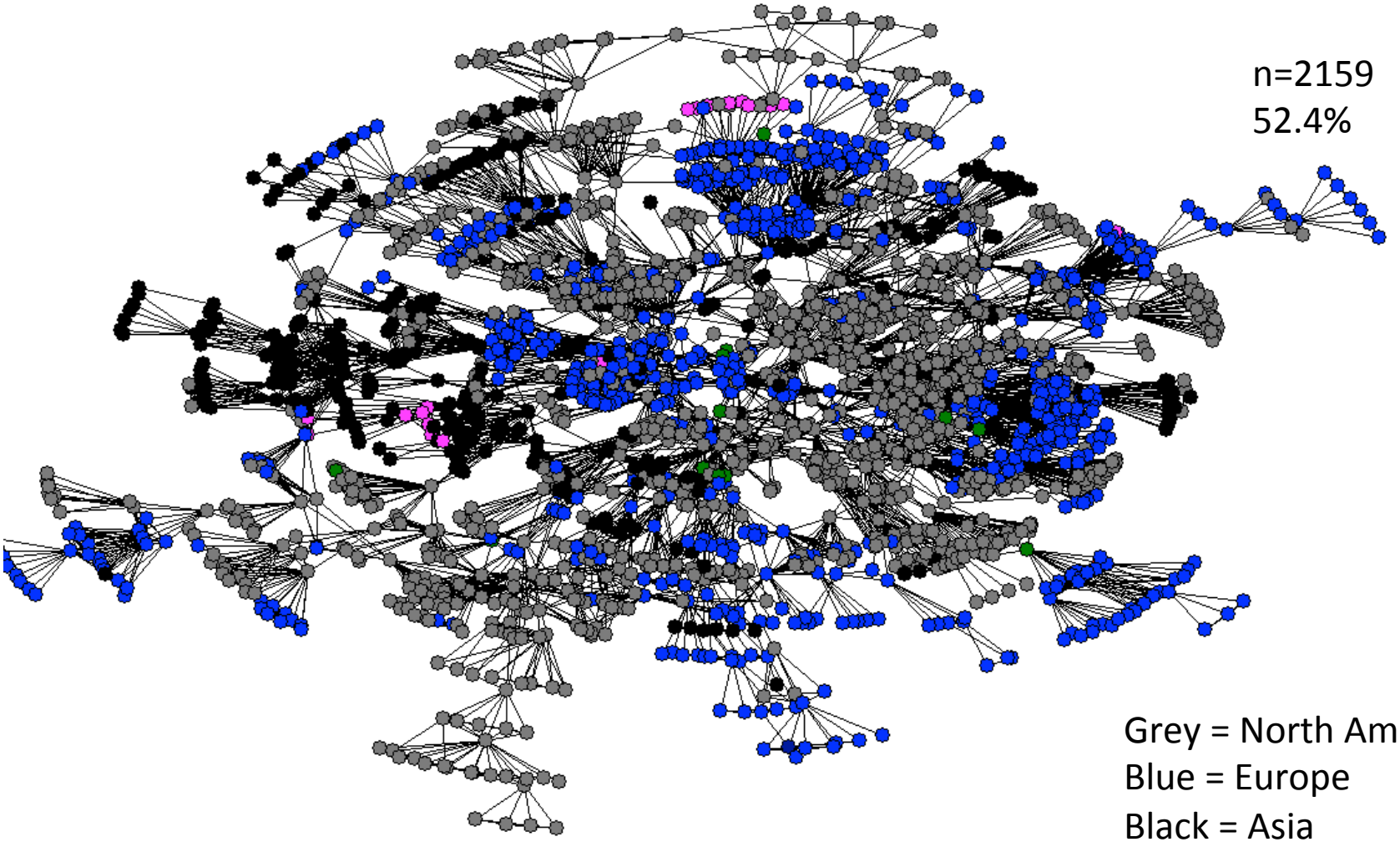
n=104
2.25%

Grey = North America
Blue = Europe
Black = Asia

Largest Component by 2004

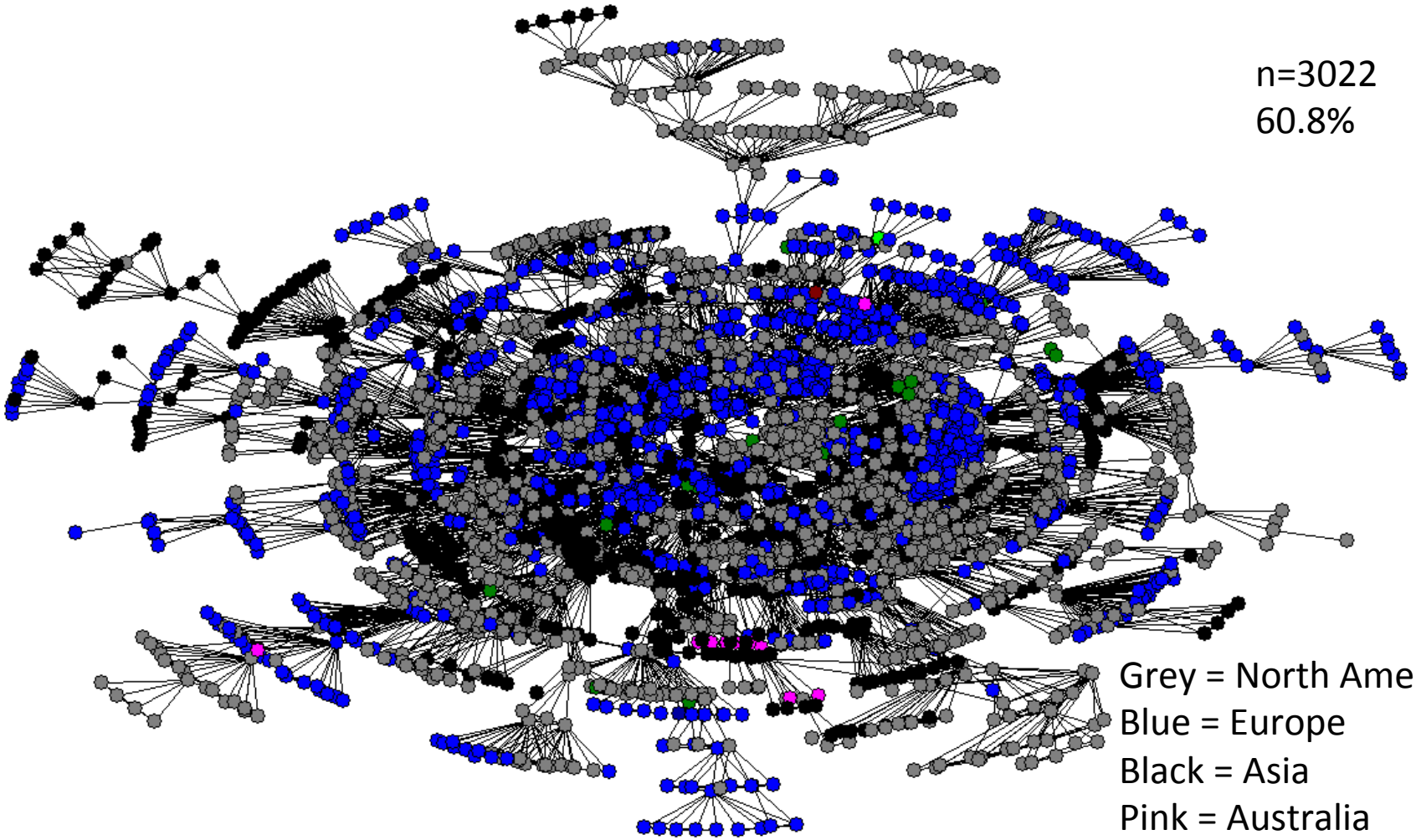


Largest Component by 2008



Grey = North America
Blue = Europe
Black = Asia
Pink = Australia
Green = South America

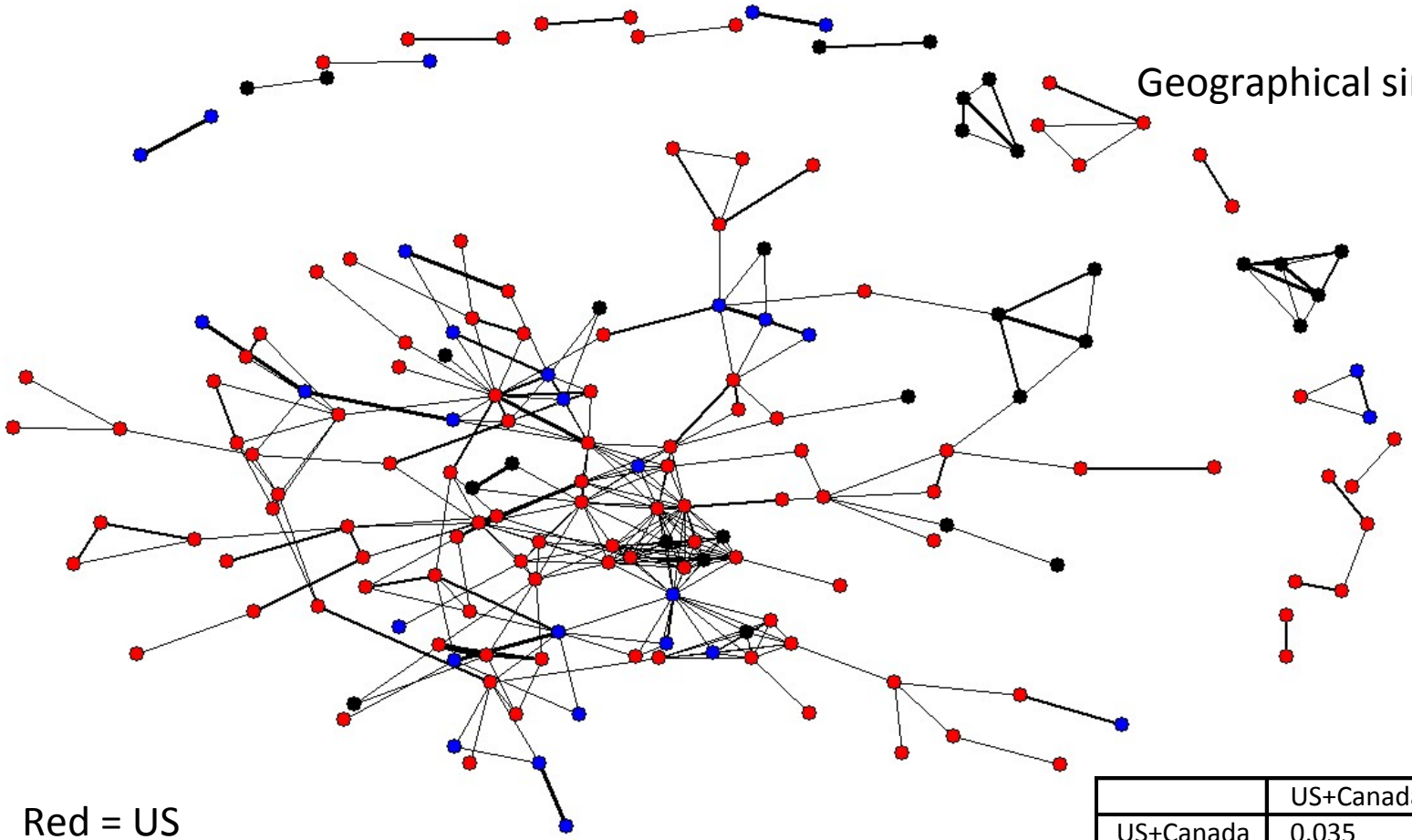
Largest Component by 2012



n=3022
60.8%

Grey = North America
Blue = Europe
Black = Asia
Pink = Australia
Green = South America
Light green = Other

Geographic Regions

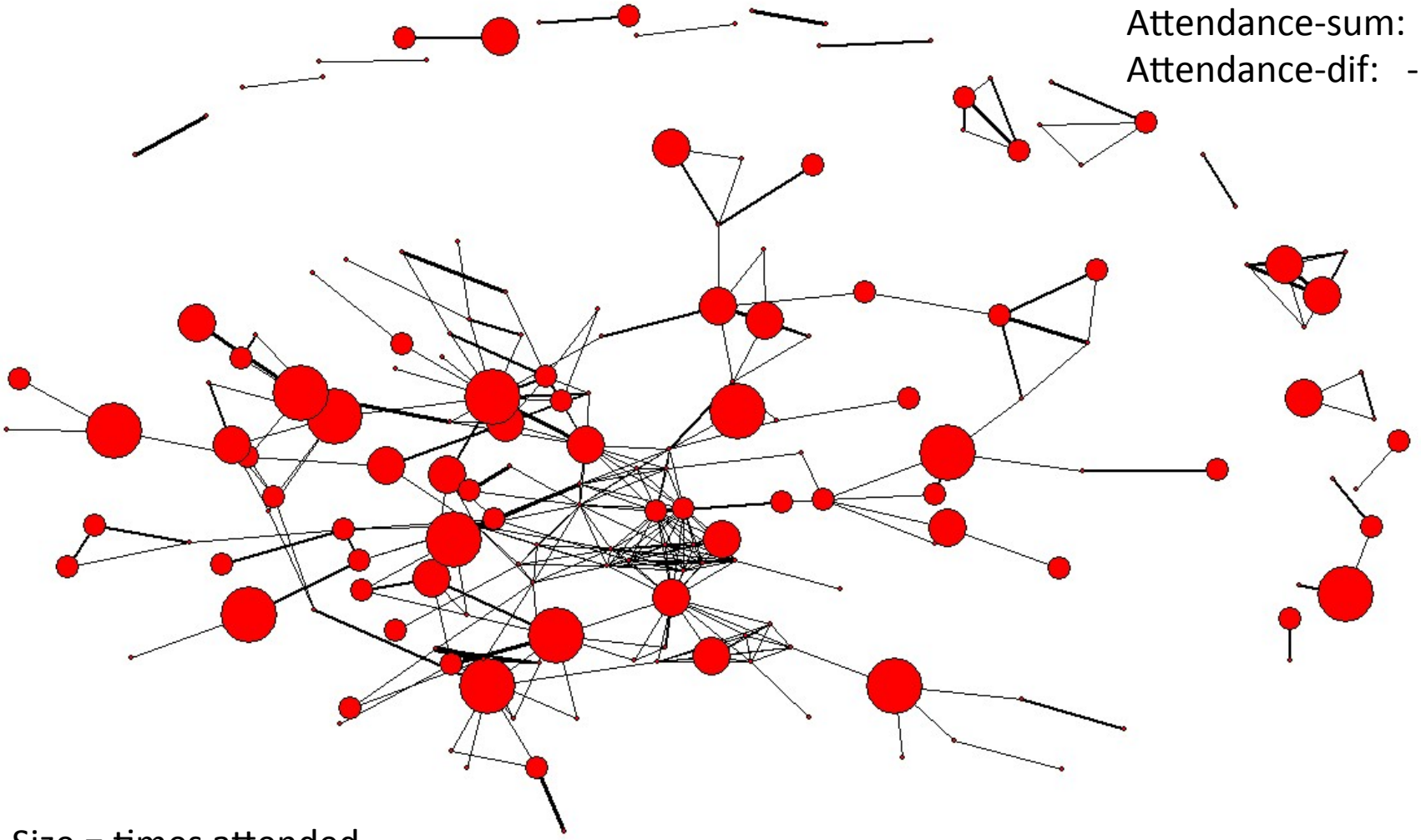


Geographical similarity: .06**

Red = US
Blue = Europe
Black = Asia

	US+Canada	Europe	Asia
US+Canada	0.035		
Europe	0.013	0.081	
Asia	0.009	0.006	0.135

Conference Attendance

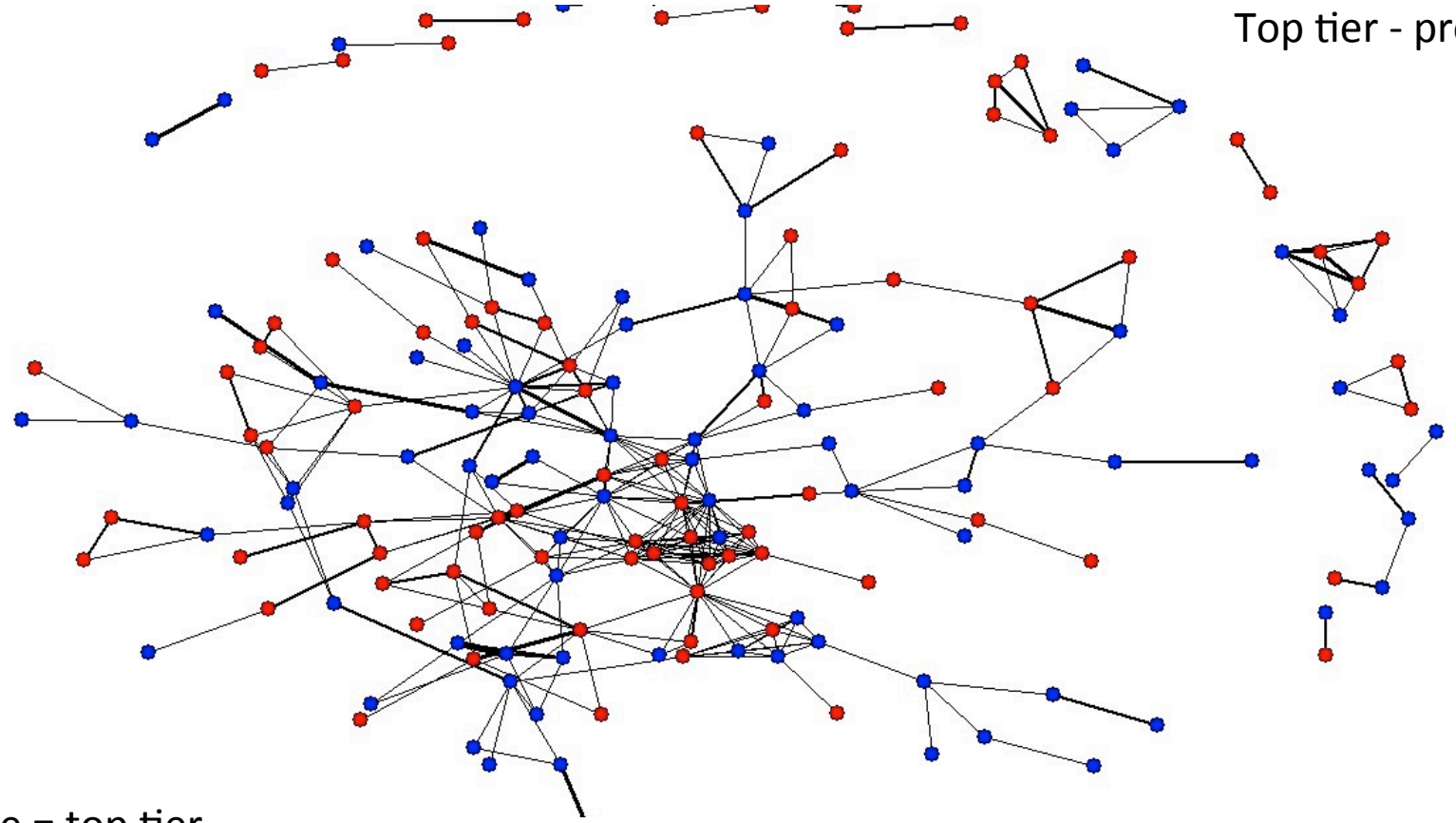


Size = times attended

Networking

“For years now… probably 10 years, I see him in meetings, he invited me to give a seminar [at his university]… I would meet him and we would just chat and hang out, and we worked on, sort of, similar things. And then about… a year ago … we were in a meeting and I said, I’ve got half a story on this, and he goes, I’ve got half a story on the same thing. I said come on, let’s try and put it together, and see where it goes, and we did, and it was great..”

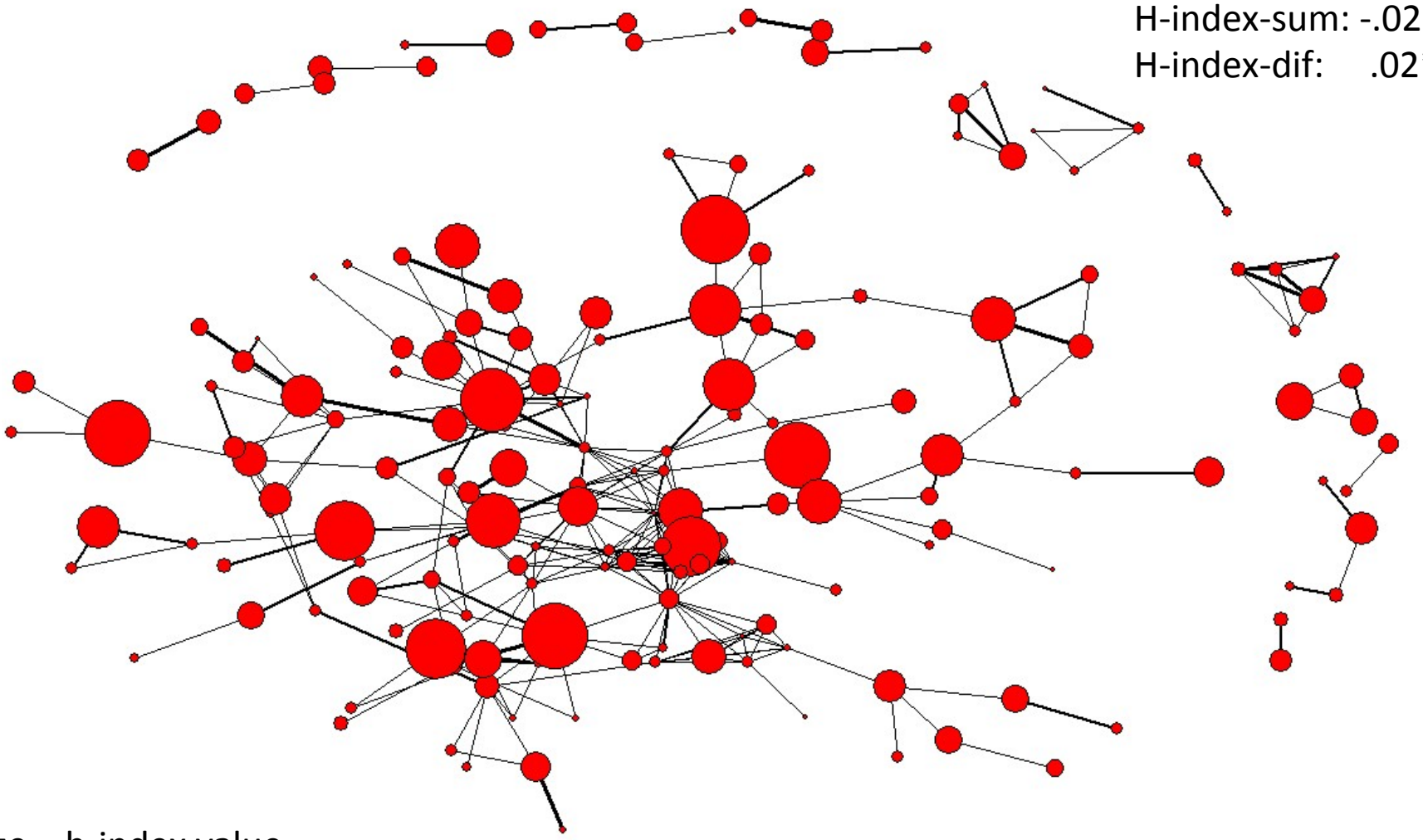
Institutional Ranking



Top tier - product: .01

Blue = top tier
Red = other

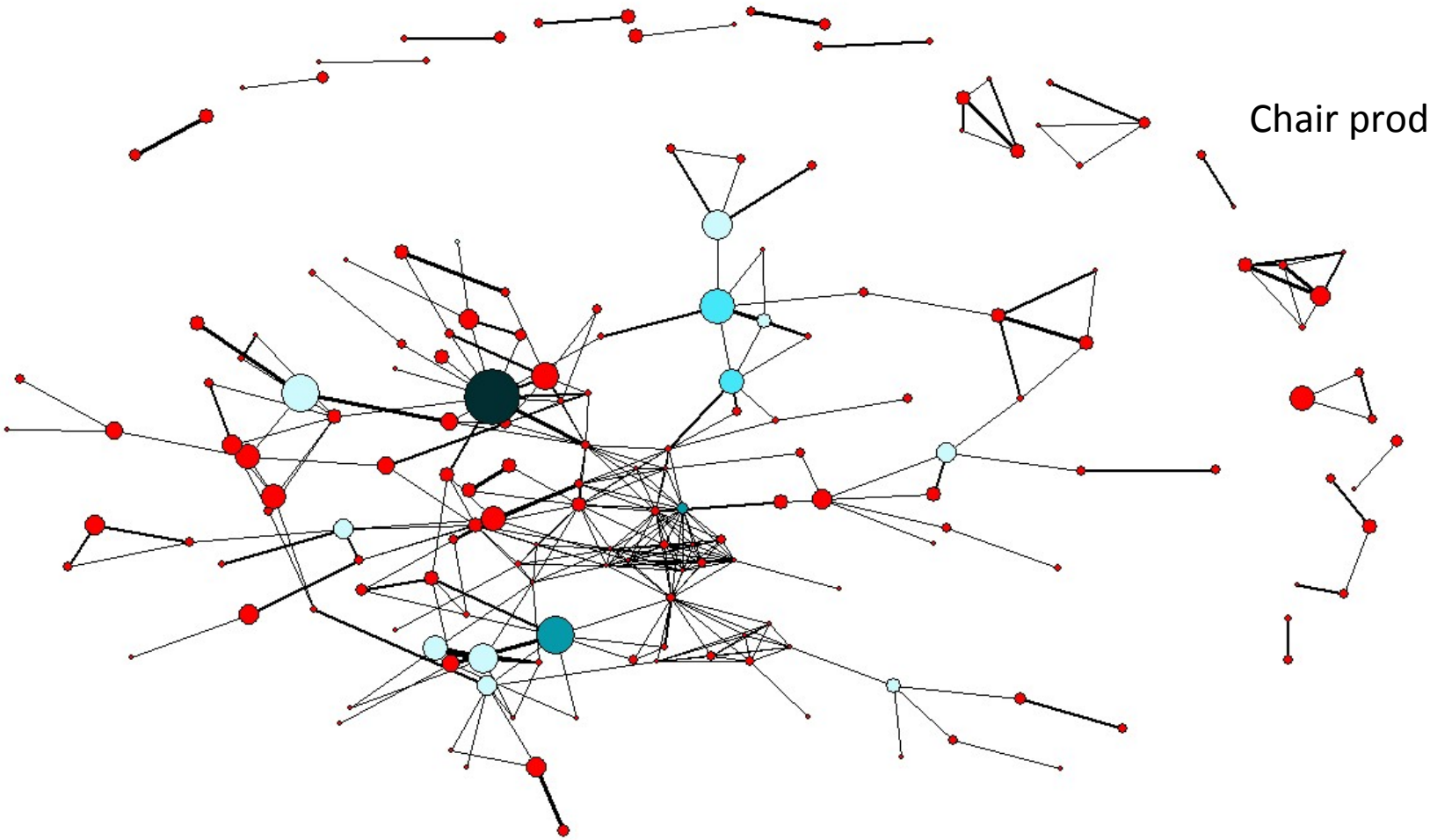
H-Index



H-index-sum: -.02
H-index-dif: .02*

Size = h-index value

Conference Chairs



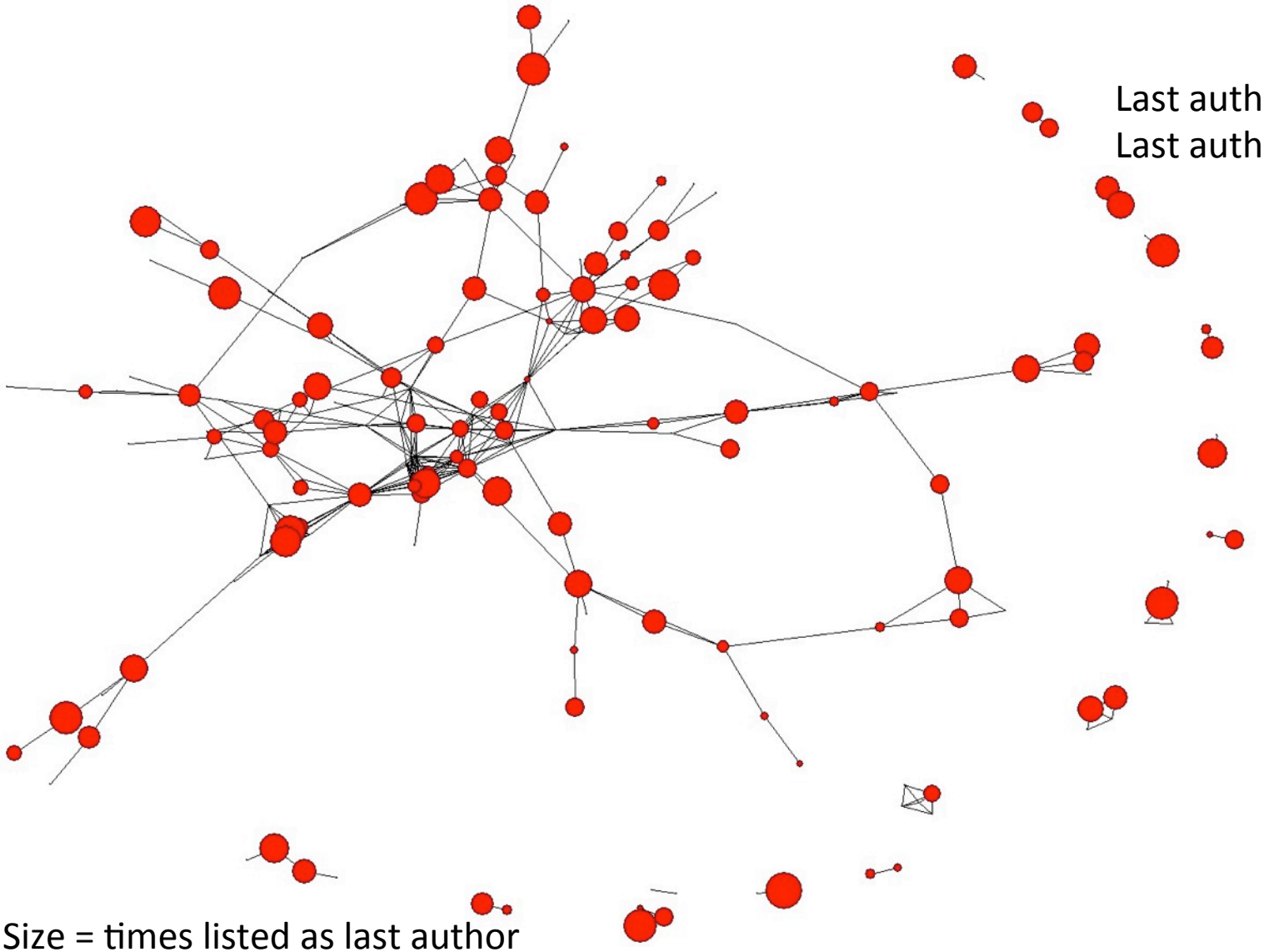
Chair product: .00

Blue = chairs (darker attended more)
Size = times chaired

Inner Circle

"She's in a different category… Intellectually, she has this capacity to… work to make discoveries that are leaps and bounds ahead of other people. Now at the same time, some of her work seems like really like… generic and boring, and she'll sell it like it's fantastic….But everyone knows that, come on, you know. She'll still get into *Science*."

Last Authors



Last author-sum: -.04**
Last author-dif: .01$

Size = times listed as last author

Competition

Elena [postdoc] says there are some folks who just don't cite Lance's [PI] work even though they do the same things. They don't acknowledge him at all – she says it's weird.

"[On getting a reagent] Now if they are a friend of Marco's [PI], that's not a problem for us. If they're a direct competitor, then we might try to find the reagent from somebody else. […] [one usually asks what it's for]…Depending on who you're dealing with, they may or may not try to steal your idea." - *Postdoc*

Summary

- Collaboration more likely when institutions are geographically close to one another
- Co-attending conferences leads to collaborations over time
- Institutional ranking has no significant effect on collaboration
- Preferential attachment: High impact scientists attract low impact collaborators
- PIs do not significantly collaborate with one another

Binz-Scharf, M.C., Yuval Kalish, and Leslie Paik (2015). Making Science: Evolution of collaboration in a scientific field. American Behavioral Scientist 59(5):531-547.

Conclusions

- Easier access to data and each other, yet collaborations based on trust relationships
- Traditional structures (roles, hierarchies, departments) remain strong
- Collaborations predicted by face-to-face interactions, preferential attachment, effort to keep competitors at arm's length

Implications

- Focus on individual performance measures for tenure and promotion discourages collaboration
- "Imposing" knowledge sharing doesn't work
- Meetings are important boundary-spanning mechanisms (foci)
- To create a collaborative culture, incentives are needed
  - Revise peer review process
  - Give credit for alternative research outputs, such as shareable resources
- Role models and mentors are key enablers
  - Network grooming

One final implication…

Friend an ethnographer!

Thanks to

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Collaborators

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Jagjit Singh
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People who did the actual work

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Hypotheses

- Geography: "Death of Distance" (Cairncross 1997) vs. "Distance Matters" (Olson and Olson 2000)

  HP 1: Scientists are more likely to collaborate if their institutions are located in the same geographical region

- F2F interactions: Virtual teams function better if reinforced by non-virtual ties (Maznevski&Chudoba 2000); strong ties more conducive to sharing tacit knowledge (Hansen 1999)

  HP 2: The more often two scientists attend the same conference together, the more likely they are to collaborate

Hypotheses (cont.)

- Democratizing science: Databases can remove hierarchies of knowledge production (Hine 2006), yet institutional rankings are predictor for collaboration (Jones et al 2008)

  HP 3: Two scientists are more likely to collaborate with each other the more similar the rank of their affiliated institution

- Matthew effect: "the rich get richer, and the poor get poorer" (Merton 1968; Jones, Wuchty, and Uzzi 2008); high prestige nodes attract more ties via preferential attachment (Barabasi&Albert 1999)

  HP 4: The higher the scientist's prestige, the more likely others collaborate with her/him

  HP 5: Scientists collaborate with other scientists of similar levels of prestige

Measures

- Collaboration (dep. variable)
  - Coauthorship on conference paper
- Geography
  - Location based on current affiliation
  - Categorized into regions: US, Europe, Asia
- Conference attendance
  - Number of times attended
- Institutional ranking
  - Academic Ranking of World Universities (ARWU)
  - Six tiers, top-tier categorized as binary variable
- Prestige
  - H-index
  - Paper vs poster presentations
  - Session chair
  - Last author

QAP/MRQAP Results

	B	beta	QAP correlation
Intercept	-0.04	0	
UNI-same	0.01	0.02*	0.02**
GEO-same	0.03	0.06**	0.06**
TOPTIER-product	0.00	0.01	0.03**
ATTEND-sum	0.00	0.02*	0.04**
ATTEND-Diff	0.00	-0.02*	0.02*
APPEAR-sum	0.00	0.12**	0.08**
APPEAR-Diff	0.00	-0.04**	0.04**
Hindex-SUM	0.00	-0.02	0.03**
Hindex-Diff	0.00	0.02*	0.02*
CHAIR-product	0.00	0.00	0.02*
PREGULAR-sum	-0.01	-0.01	-0.01
PREGULAR-diff	-0.04	-0.03**	-0.04**
last_SUM	-0.02	-0.04**	0.01
last_DIF	0.01	0.01$	0.00
Adjusted R-square	2.4%		

Correlations Between Study Variables

	Coauthorship (QAP)	APPEAR-sum	ATTEND-sum	CHAIR-product	GEO-same	Hindex-SUM	last_SUM	PREGULAR-sum	TOPTIER-product
APPEAR-sum	0.08**								
ATTEND-sum	0.04**	0.52*							
CHAIR-product	0.02*	0.20*	0.10*						
GEO-same	0.06**	-0.02	-0.02	0.01					
Hindex-SUM	0.03**	0.54*	0.22*	0.16*	0.02				
last_SUM	0.01$	0.41*	0.32*	0.04*	-0.03	0.40*			
PREGULAR-sum	-0.04**	0.10	0.08	0.05*	0.09*	0.34*	0.07		
TOPTIER-product	0.03**	0.09	-0.04	0.05*	0.14*	0.13*	-0.04	0.13*	
UNI-same	0.02	0.02	0.05	0.01	0.10*	0.05	0.04	0.03	0.34*