

Culture, Knowledge, & Data

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Outline

- 1. Sociology of culture and knowledge**
- 2. Computational interpretive science**
- 3. Case: knowledge synthesis through scholarly review**

1. Sociology of culture & knowledge

Culture and knowledge

Sociology of Culture

Scientific study of the *meaning* assigned to objects, actions, people and other objects in the social milieu

- ⋮ Overt symbols and gestures
- ⋮ Cognitive and linguistic aspects of sense-making



Sociology of Knowledge

Study of the shared understandings about the world, how it works, and what they “know” about it

- ⋮ Scientific knowledge
- ⋮ Social discernment of truth from non-truth

The screenshot shows the Minneapolis Police Department website. At the top, there is a navigation bar with links for Home, Newsroom, Community, Investigations, Our Team, Get Connected, and MPD: Ad. The main content area features a news article titled "Man Dies After Medical Incident During Police Interaction". The article is categorized as "UNCATEGORIZED". It was posted on May 26, 2020, by John Elder. The text of the article states: "May 25, 2020 (MINNEAPOLIS) On Monday evening, shortly after 8:00 pm, officers from the Minneapolis Police Department responded to the 3700 block of Chicago Avenue South on a report of a forgery in progress. Officers were advised that the suspect was sitting on top of a blue car and appeared to be under the influence."

Culture and knowledge

Social sense-making

Sociology of culture and sociology of knowledge share a fundamental interest in the way that humans *interpret* and *come to understand* their world in response to their social context

Emphasis on *relationality* of meaning and knowledge

Relations between people, ideas, events, ...

Emphasis on the contextual *situatedness* of meaning and knowledge

Candace Owens @RealCandaceO

I'm glad people are finally being encouraged to speak about vaccination reactions.

I know 3 young women who received the Pfizer vaccine and have not had a regular menstruation cycle since.

No official "scientific" explanation from their doctors and they are worried.

11:35 AM · May 7, 2021 · Twitter for iPhone

7,158 Retweets 435 Quote Tweets 29.4K Likes

Interpretative science

Interpretation

Describing the cultural, scientific, political, etc. knowledge that exists between people



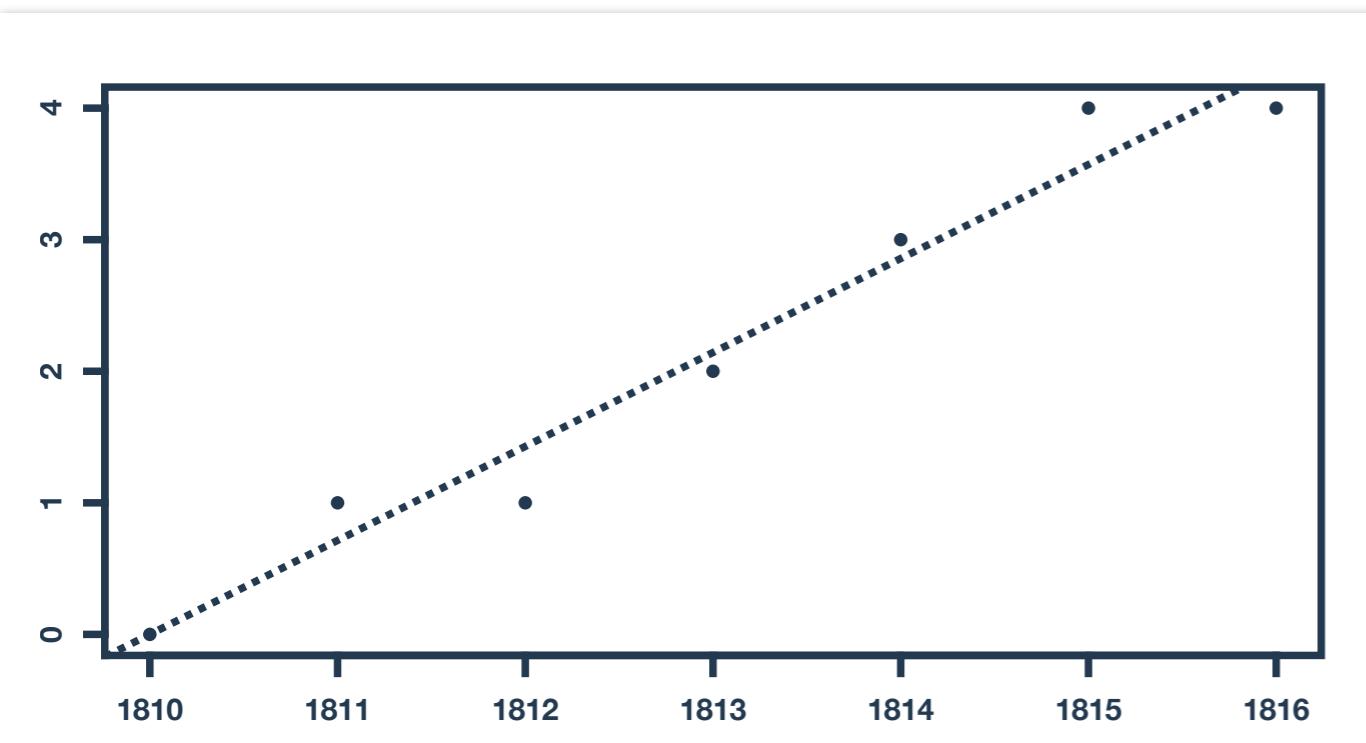
Interpretation by *researchers* (translating observations into disciplinary frames)

Interpretation by *research subjects* (describing significance, building narrative)

Interpretative science

Qualitative methods have traditionally been at the core of the sociology of knowledge and culture
(Interviews, participant observation, case study, ...)

- : E.g. Lamont, Bourdieu on class distinction



Quantitative methods are historically seen as a bad fit for these kinds of questions
(Survey, regression, ...)

- : Categorical coding erases nuance
- : Tendency toward “general linear reality” (Abbott 1988)

2. Computational interpretive science

Computational ‘turn’

Methodological advances

Network analysis

: *Representing, analyzing, and theorizing relations*

Natural language processing

: *Representing, analyzing, and theorizing text*

Machine learning

: *Neural nets, spatial embeddings, classifiers, ...*

Computational 'turn'

Methodological advances

Network analysis

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Machine learning

: Neural nets, spatial embeddings, classifiers, ...

Relations between people, groups, and actions

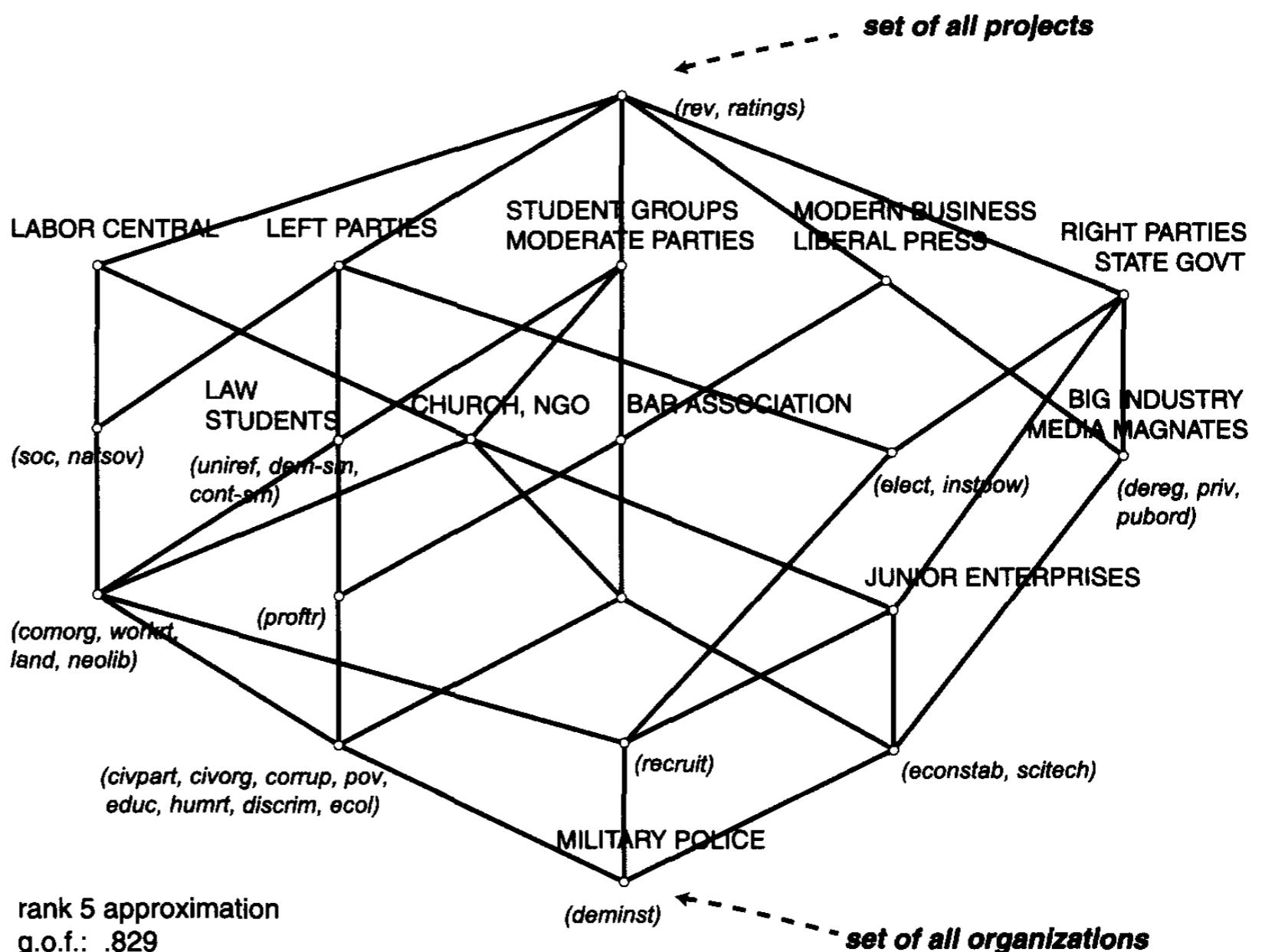


Fig. 2. Bipartite lattice (organizations by projects - 22x29).

Computational ‘turn’

Methodological advances

Network analysis

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Natural language processing

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Relations between concepts

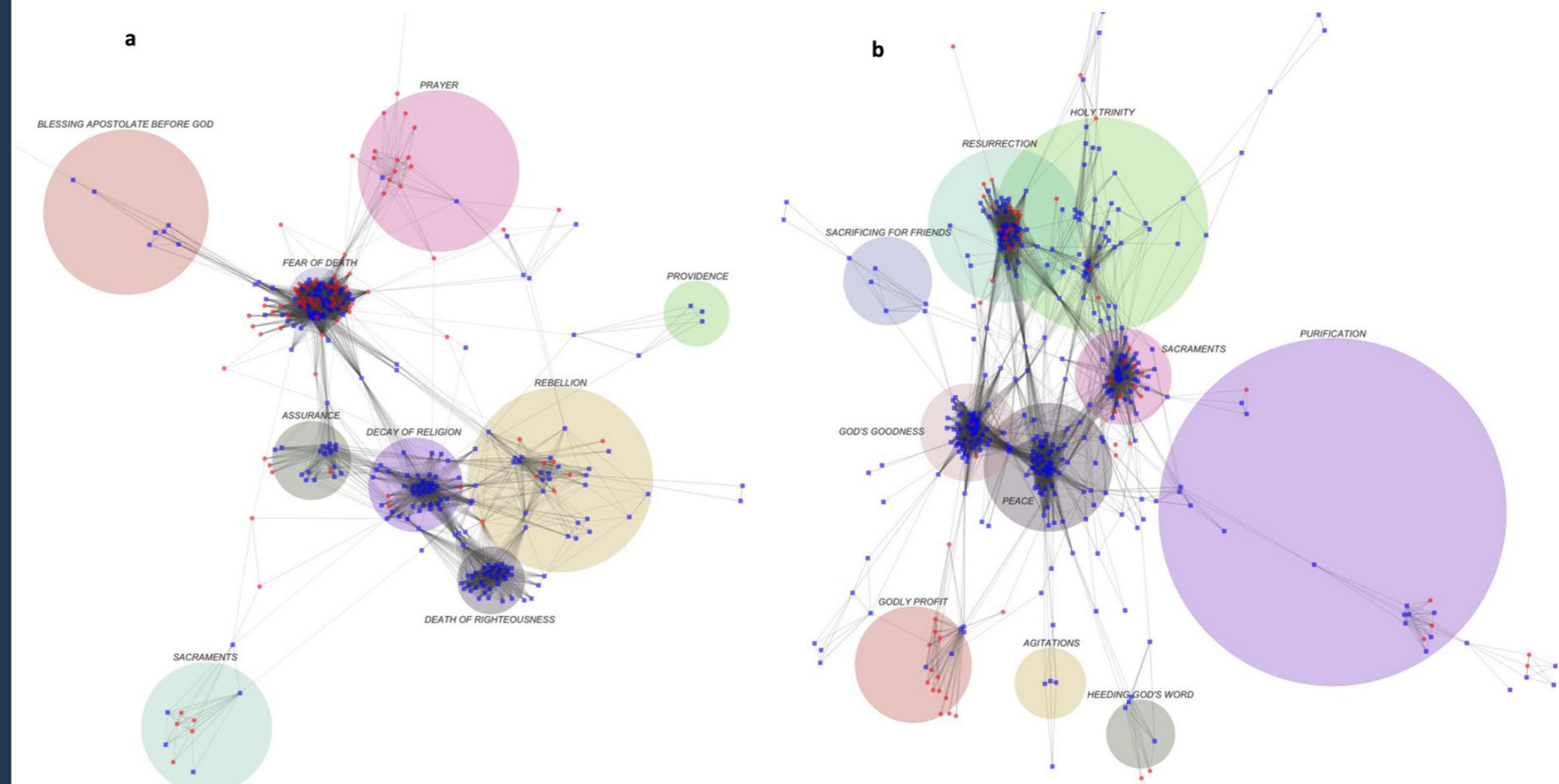


Fig. 6. Panel A: The Dissenting Structure of Topics. Panel B: The Conformist Structure of Topics.

Hoffman, Mark Anthony, Jean-Philippe Cointet, Philipp Brandt, Newton Key, and Peter Bearman. “The (Protestant) Bible, the (Printed) Sermon, and the Word(s): The Semantic Structure of the Conformist and Dissenting Bible, 1660–1780.” *Poetics* 68 (June 1, 2018): 89–103.

Computational ‘turn’

Methodological advances

Network analysis

: Representing, analyzing, and theorizing relations

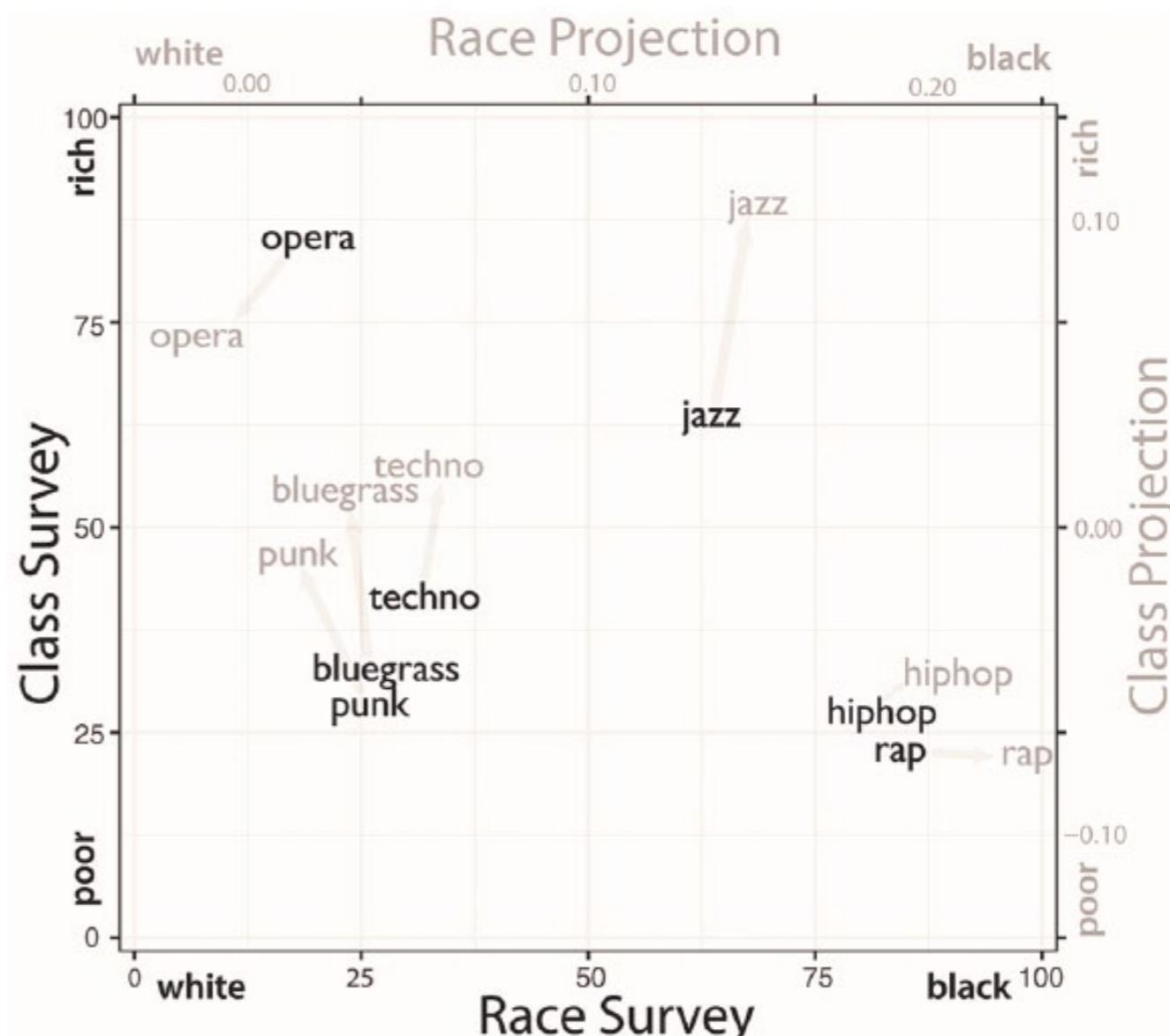
Natural language processing

: Representing, analyzing, and theorizing text

Machine learning

: Neural nets, spatial embeddings, classifiers, ...

Word embeddings



Kozlowski, Austin C., Matt Taddy, and James A. Evans. “The Geometry of Culture: Analyzing the Meanings of Class through Word Embeddings.” *Am. Sociol. Rev.* 84, no. 5 (2019): 905–49.

Computational 'turn'

Interpretive synthesis

- Computational methods *facilitate* interpretation
- Computational methods occur at any stage of research
(question formation, data gathering, quantitative analysis, visualization, ...)
- Computational methods meaningful only when coupled with theory

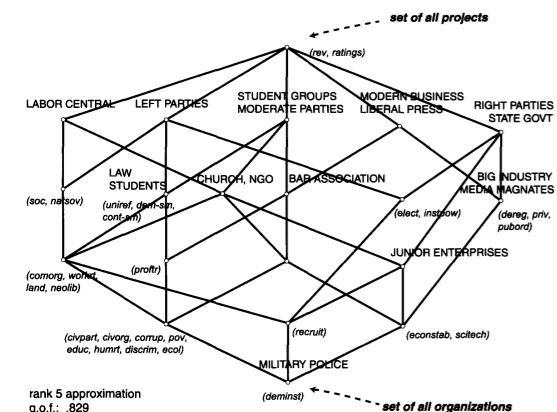
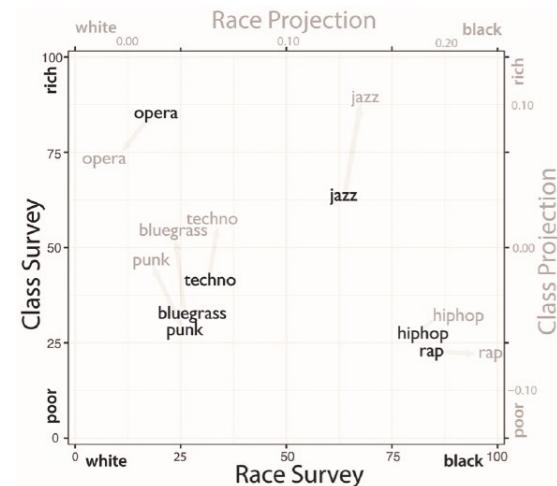


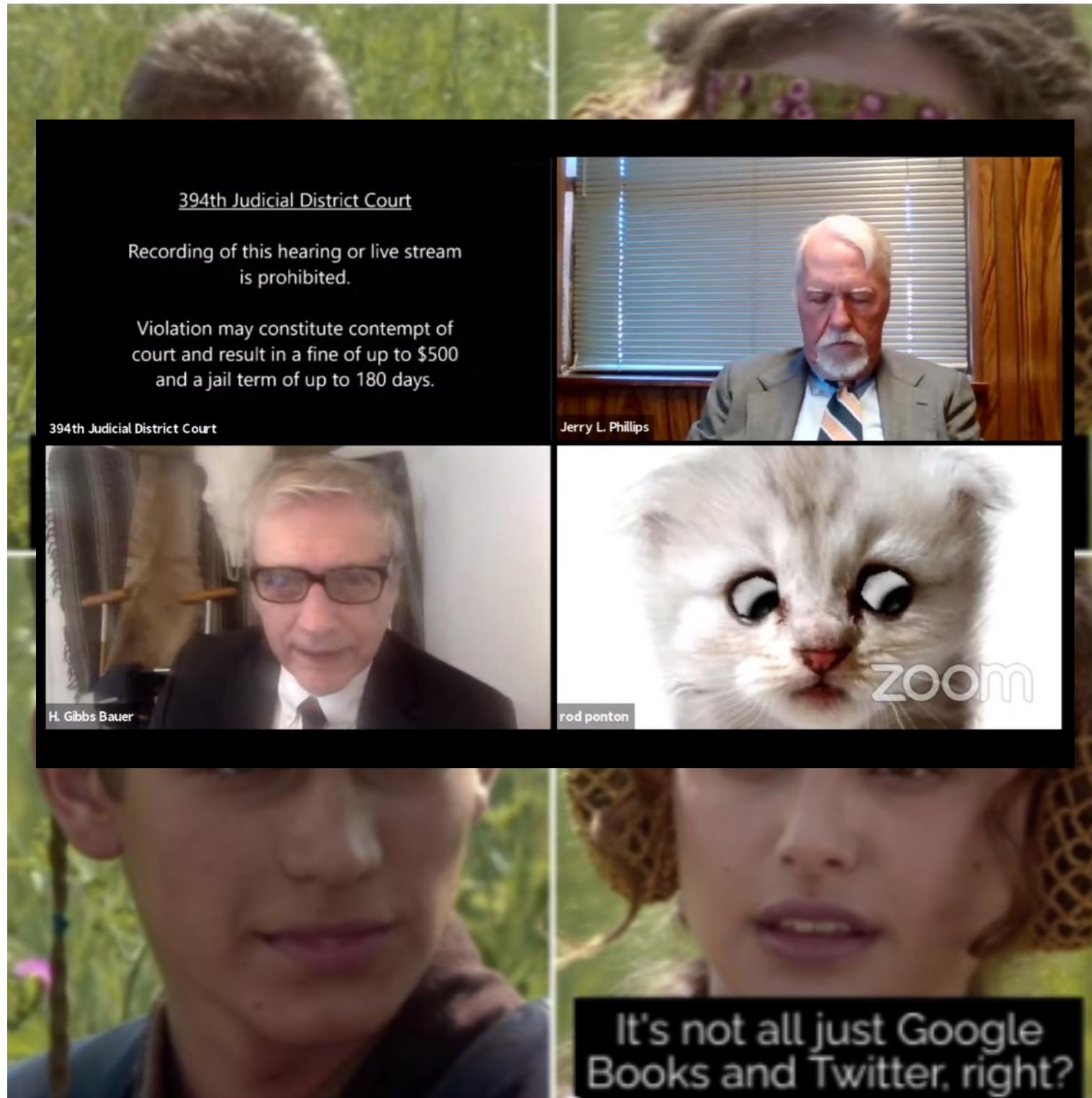
Fig. 2. Bipartite lattice (organizations by projects - 22x29).

Opinionated methods

- Methods are not 'neutral'
- Training data, categorical schema, assumed ontologies, etc.
- Growing body of research on the ways that machine learning and AI encode existing cultural/knowledge standpoints
(e.g. Mar Hicks, Ruha Benjamin)



Computational ‘turn’



But it's *not* just
about new
methods

Recent years have seen
an explosion of
machine-readable data

- ⋮ *Social media*
- ⋮ *Device tracking*
- ⋮ *Digitization*

Increasingly, our
interactions and the
production and
consumption of culture
are digitally mediated

Research on “found”
data (e.g. Waller &
Anderson 2020) and
experimental data (e.g.
Centola 2010; Salganic
and Watts 2008)

3. Case: knowledge synthesis through scholarly review

Case: Knowledge Synthesis

What do reviews do?

Curated *summaries* of the important concepts, innovations, and debates within a scholarly area.

“inform interested readers who have limited knowledge of [a] topic, whether students new to the field or seasoned researchers from other domains.”

(Freeman and Jeanloz 2015)

Summarization as translation

Synthesis of knowledge is not neutral; “packing down” is a *creative* act.

Black boxes

Whitley

Boundary objects

Latour; Star and Griesemer

Exemplars

Bourdieu; Kuhn; Frickel and Gross

The screenshot shows the homepage of the Annual Review of Sociology. At the top, there's a blue header bar with the journal logo (A and R in a square), a search icon, a shopping cart icon with a '0' notification, and a menu icon. Below the header, there are social media sharing options: Save, Email, Facebook, Twitter, LinkedIn, Reddit, and RSS. The main title 'Computational Social Science and Sociology' is displayed in large white text on a dark brown background. Below the title, the journal name 'Annual Review of Sociology' is in bold, followed by 'Vol. 46:61-81 (Volume publication date July 2020)' and 'First published as a Review in Advance on April 28, 2020'. A URL is provided: <https://doi-org.proxy3.library.mcgill.ca/10.1146/annurev-soc-121919-054621>. In the middle section, author names are listed: Achim Edelmann,^{1,2} Tom Wolff,³ Danielle Montagne,³ and Christopher A. Bail³. Below the authors, their institutional affiliations are given: Institute of Sociology, University of Bern, 3012 Bern, Switzerland; email: achim.edelmann@soz.unibe.ch; Department of Sociology, London School of Economics and Political Science, London WC2A 2AE, United Kingdom; and Department of Sociology, Duke University, Durham, North Carolina 27708, USA; email: christopher.bail@duke.edu. At the bottom, there are buttons for 'Full Text HTML', 'Download PDF', and 'Article Metrics'. Navigation links include 'Permissions | Reprints | Download Citation | Citation Alerts'.

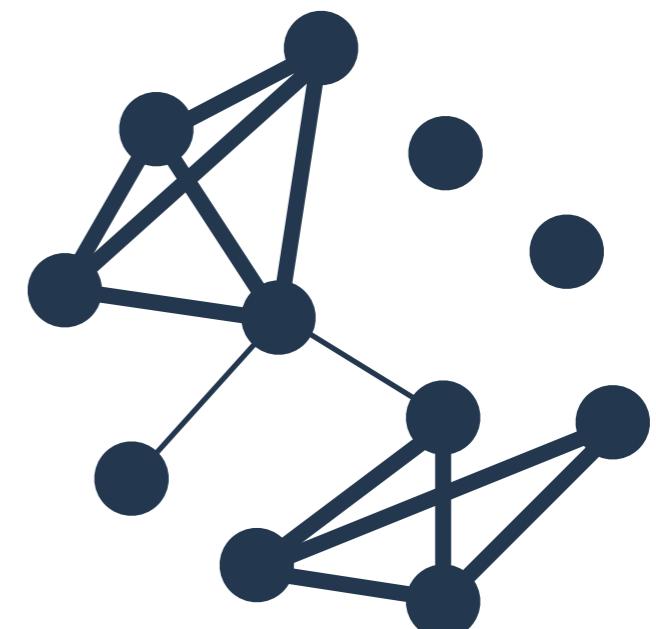
Cocitation networks

How to operationalize the **structure** of a scientific **subfield**?

Cocitation measures the shared attention (positive *and* negative) that articles receive.

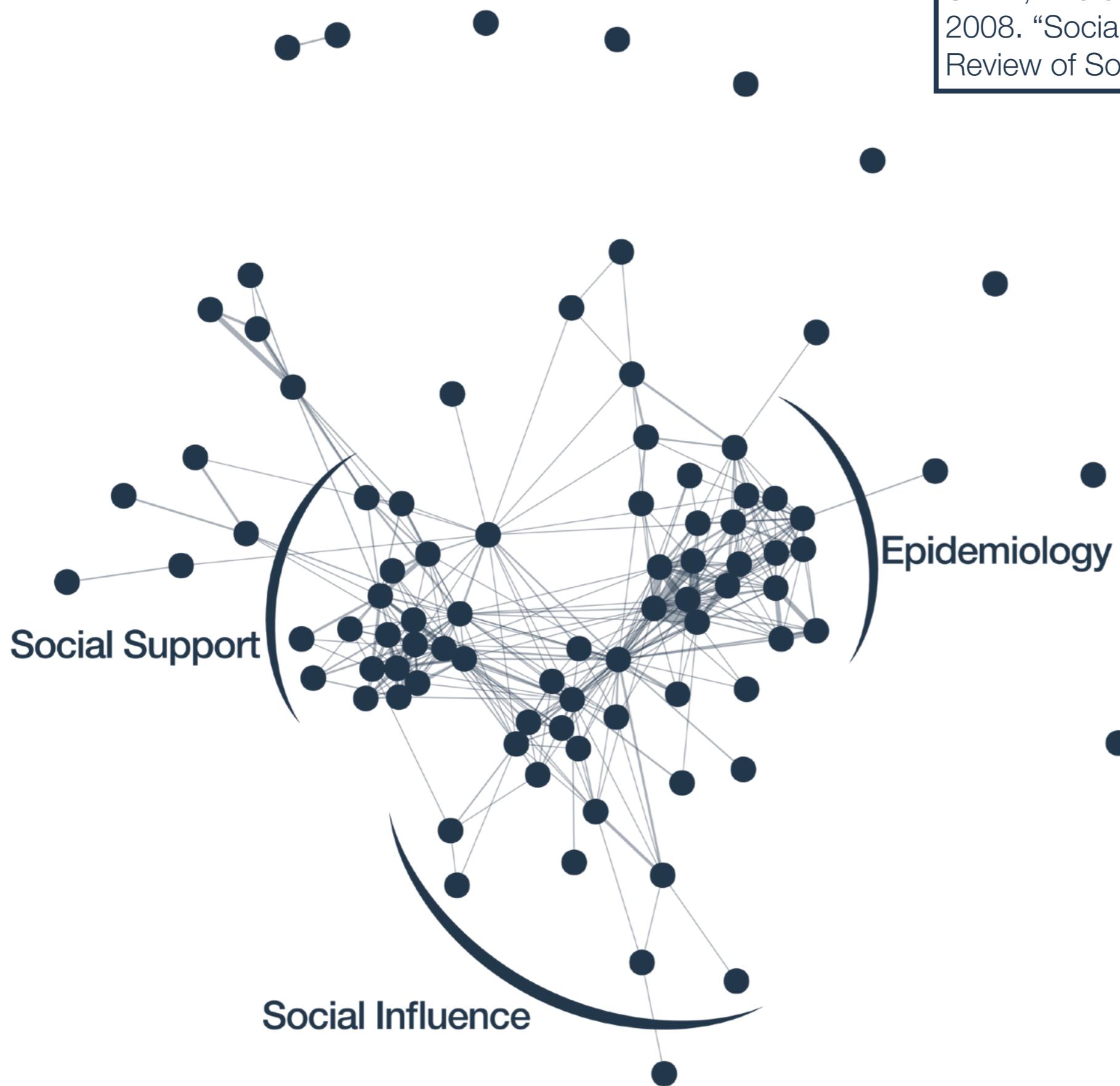
Cocitation focuses on the way research is *used* in scholarly discourse.

Cocitation networks reveal a meaningful *relational* structure among published work.



Cocitation networks

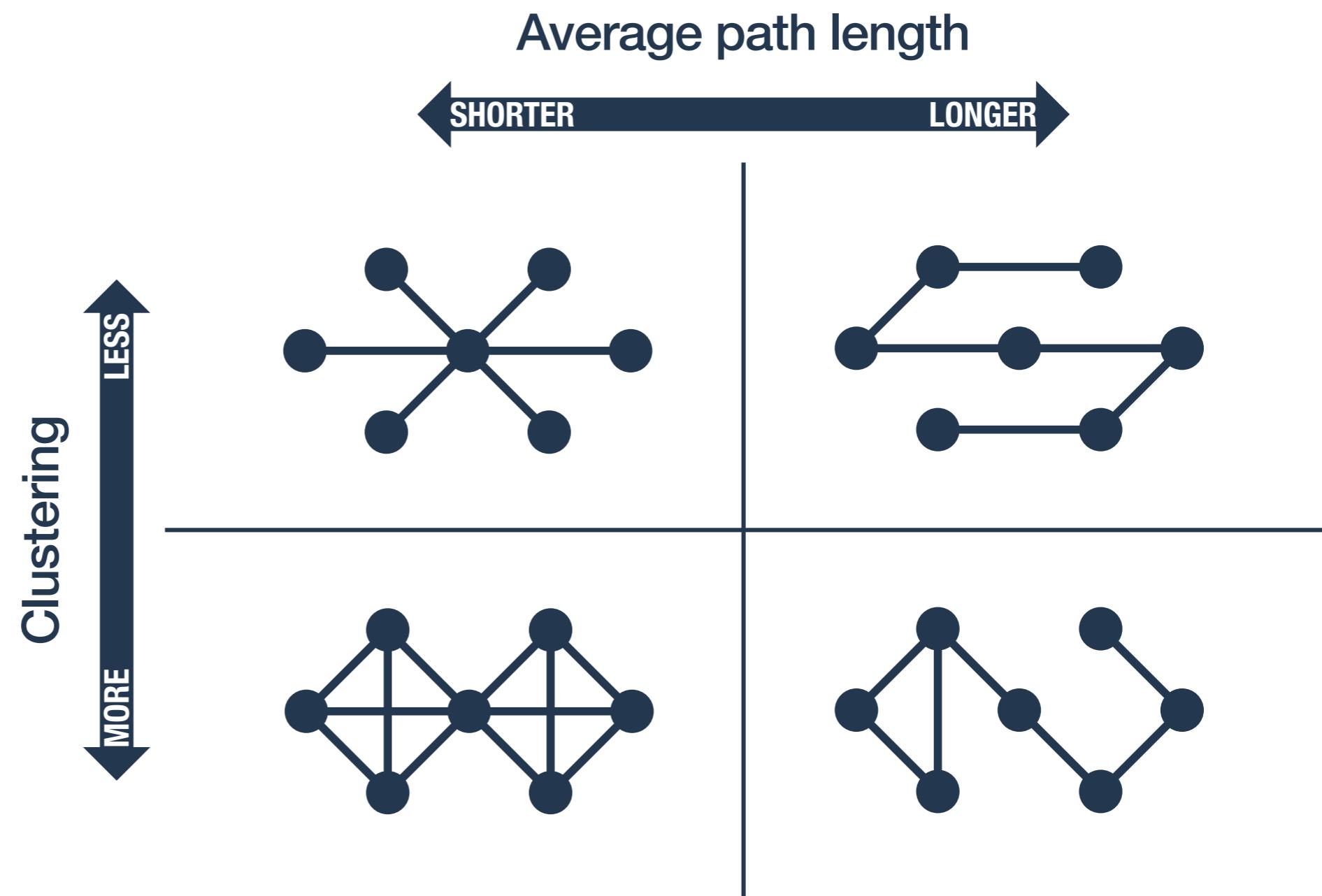
Smith, Kirsten P., and Nicholas A. Christakis. 2008. "Social Networks and Health." *Annual Review of Sociology* 34 (1): 405–29.



Cocitation structure

Number of “steps” to traverse a community
(six degrees of separation)

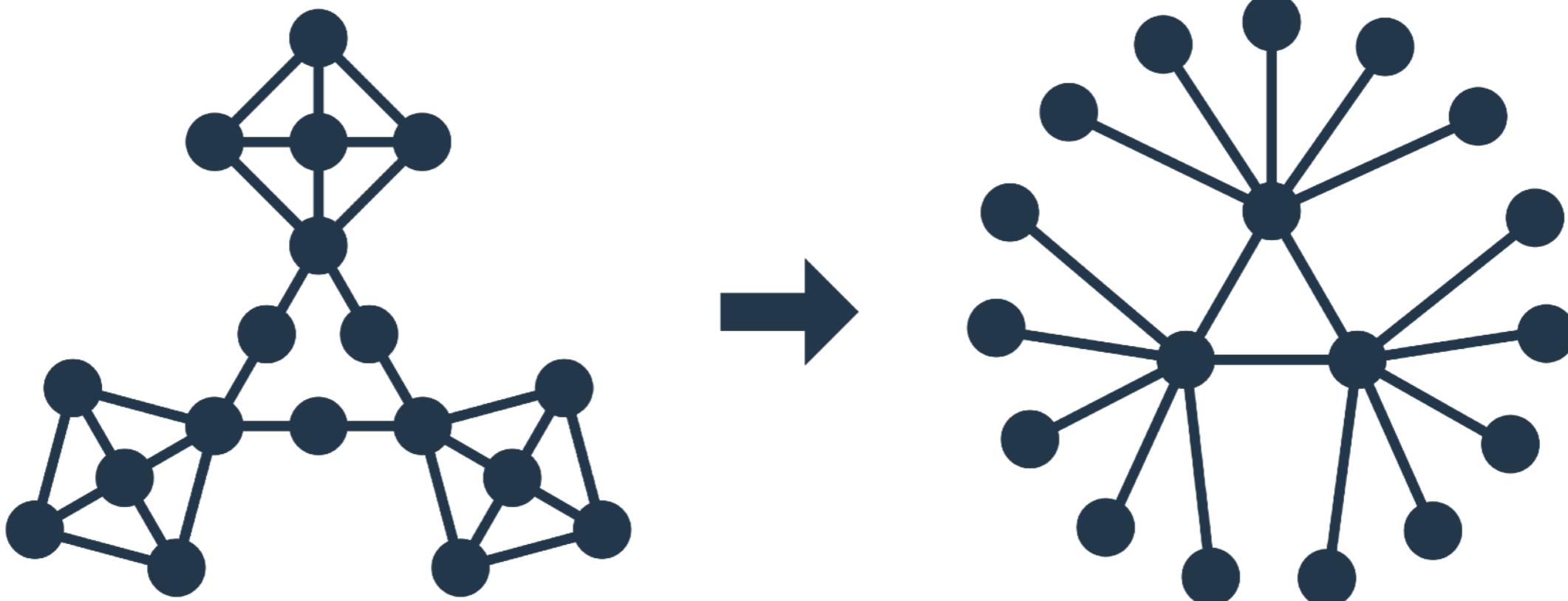
Tendency toward tightly connected clusters of research



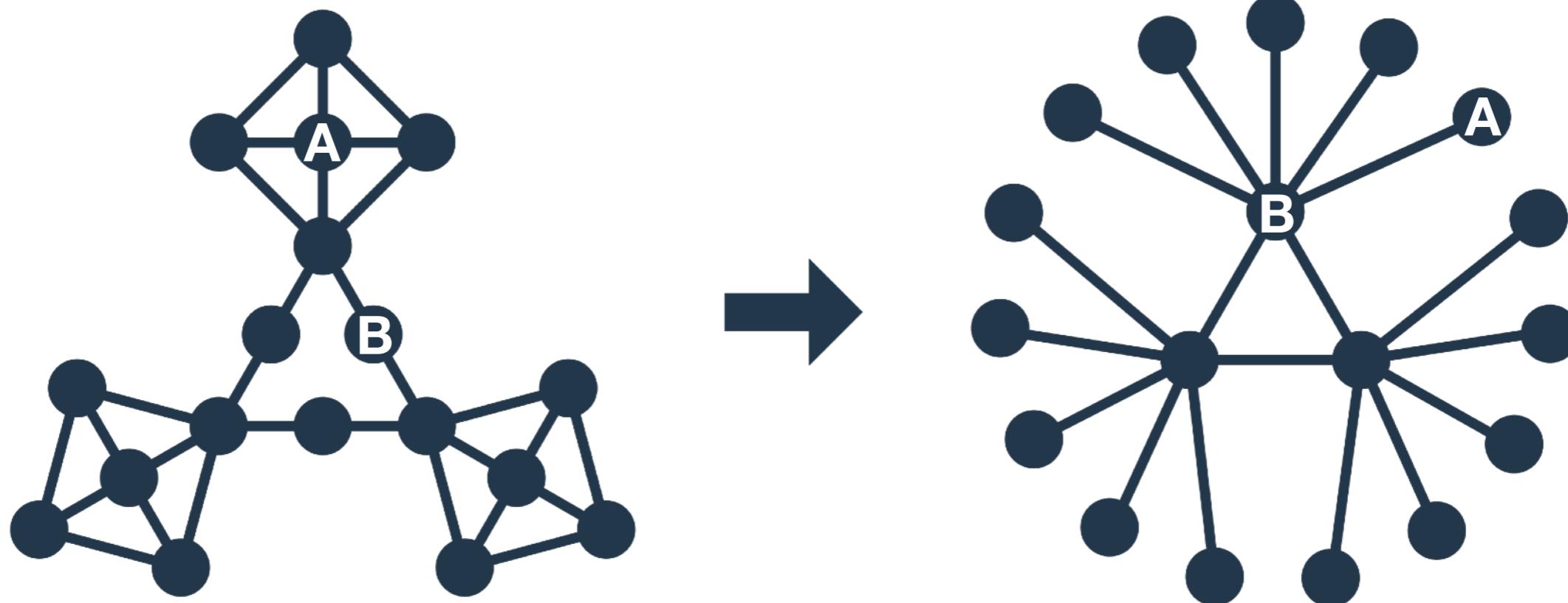
Structural change

Structural effects of review

- | We compare cocitation structure over seven years *before* and *after* the publication of a review
- | Matched sample controls for characteristics of emerging scientific subfields
- | Reviewed specialties have significantly *shorter path lengths* and *fewer cohesive sub-clusters*



Centering exemplars



Which articles do reviews elevate as *exemplars* within a scientific specialization?

Future conversation is *not* centered around already-central research (**A**)

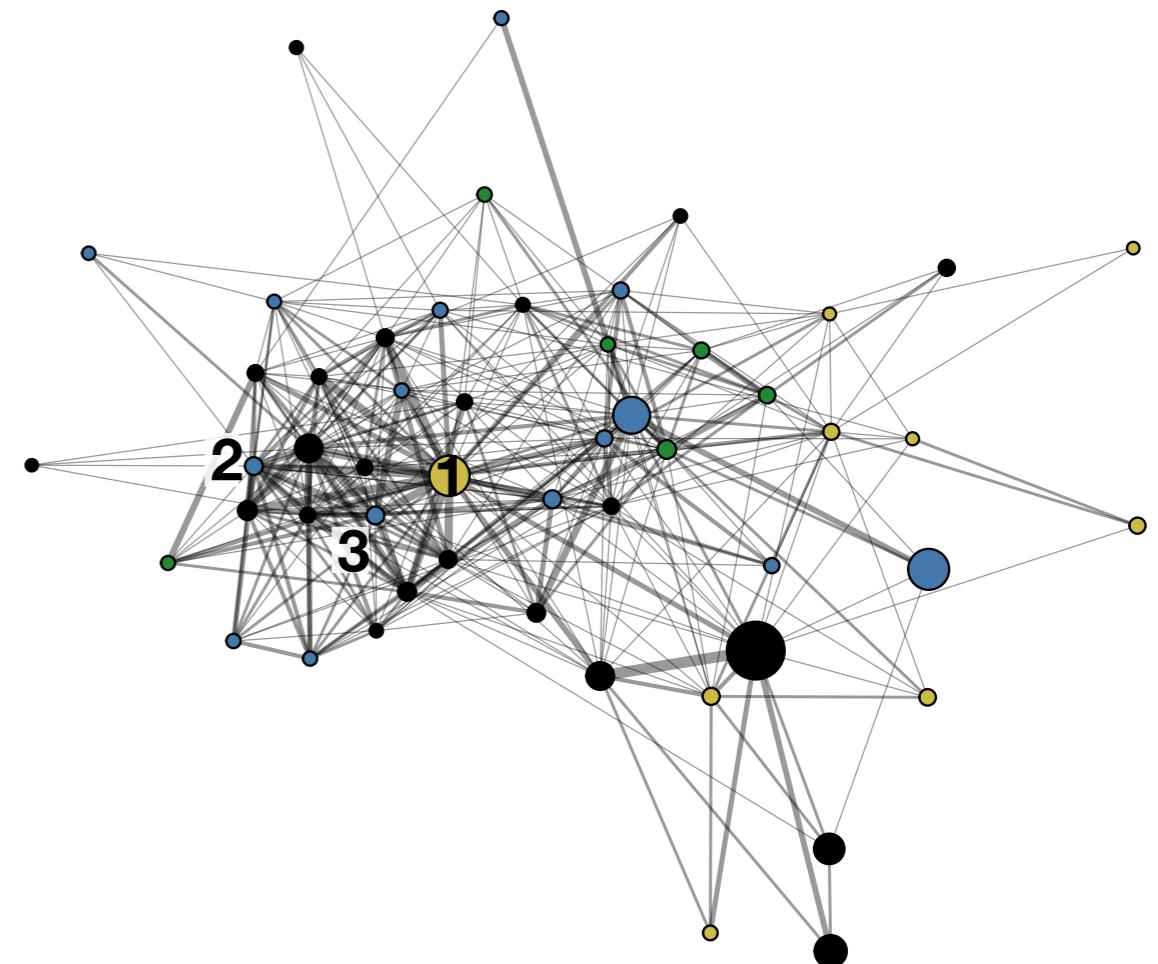
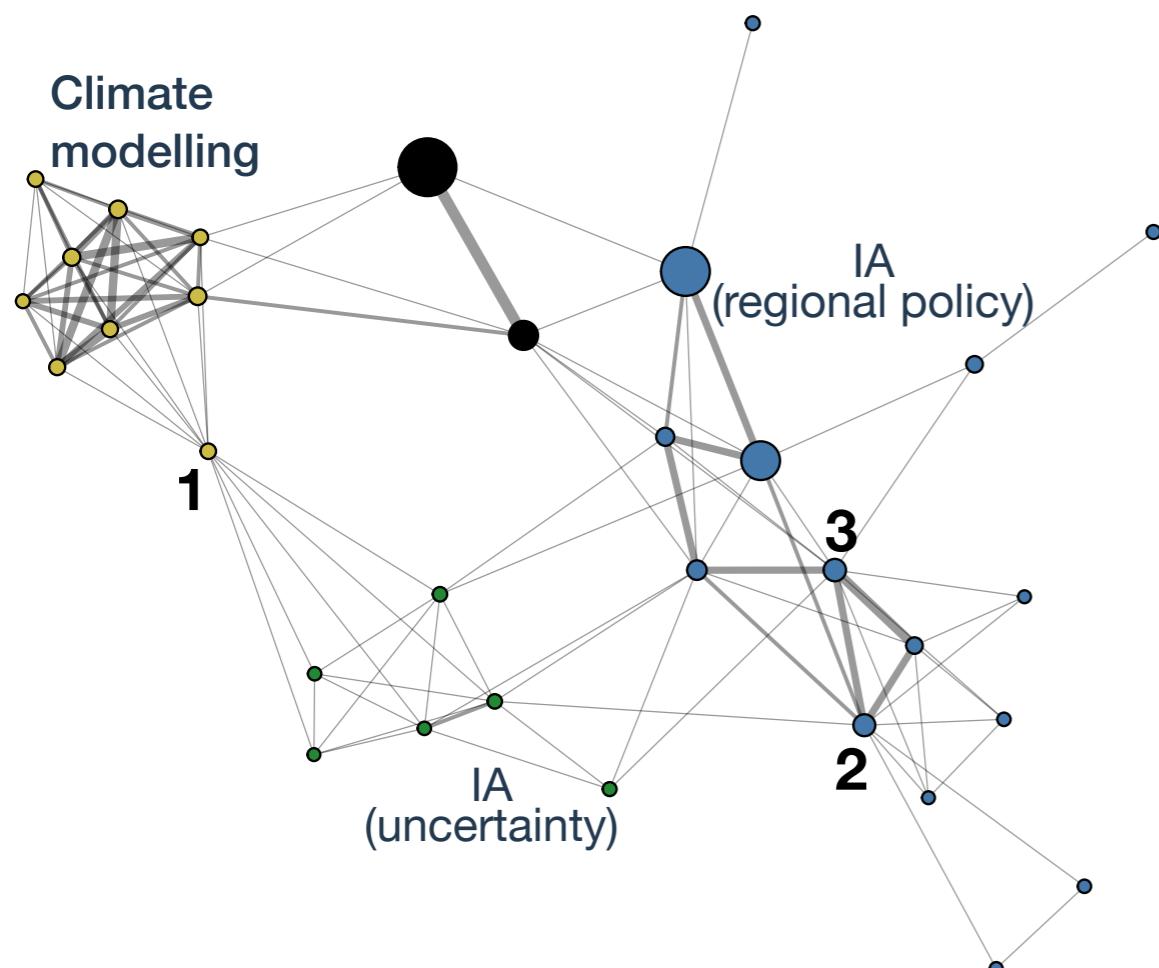
Highly cited and central work will likely be pushed toward the periphery after a review is published

Exemplars chosen from *bridging articles* (**B**)

Research that connects contrasting communities experiences the biggest boost in centrality

Restructuring knowledge

Integrated assessment models of global climate change
(Parson and Fisher-Vanden 1997)



Knowledge synthesis

Crystallization of research specialties

Moment of legitimization for research area

Independent research programs cohere into unified whole

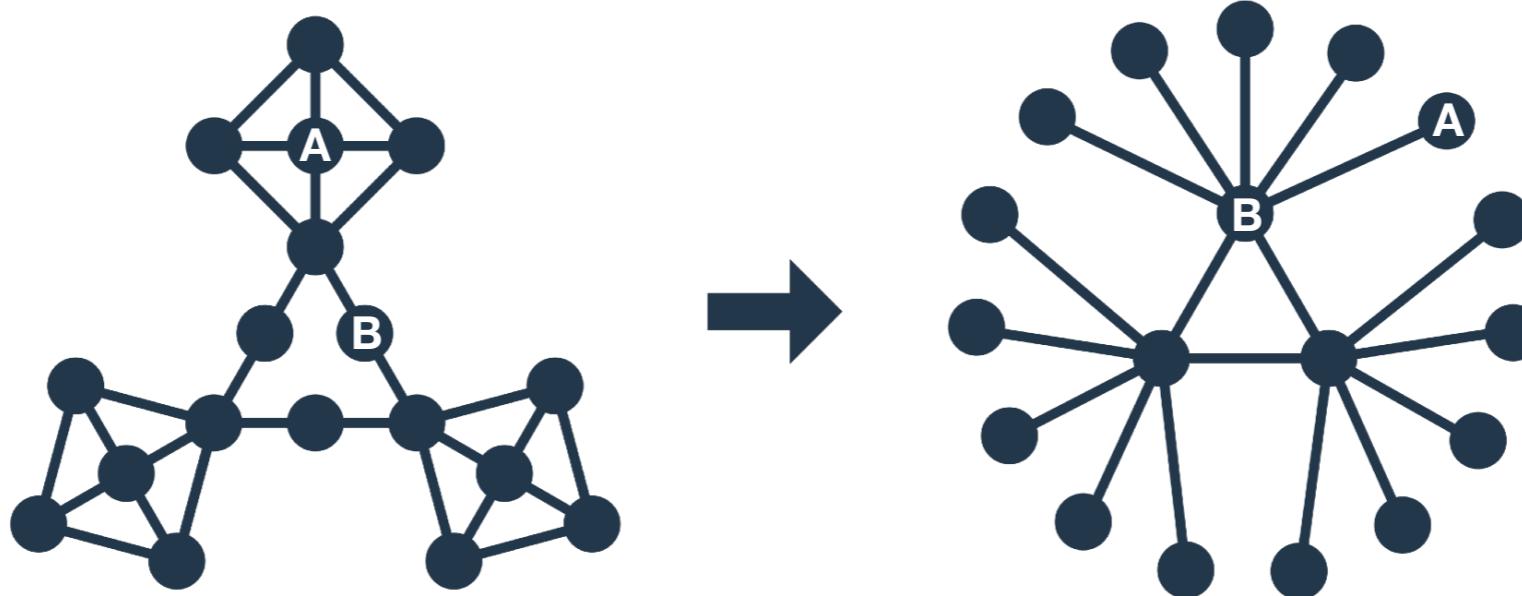
Reviews curate and restructure knowledge

Need to simplify findings in an ever-expanding body of knowledge

Details are lost in order to incorporate into the larger body of scientific knowledge



Knowledge synthesis



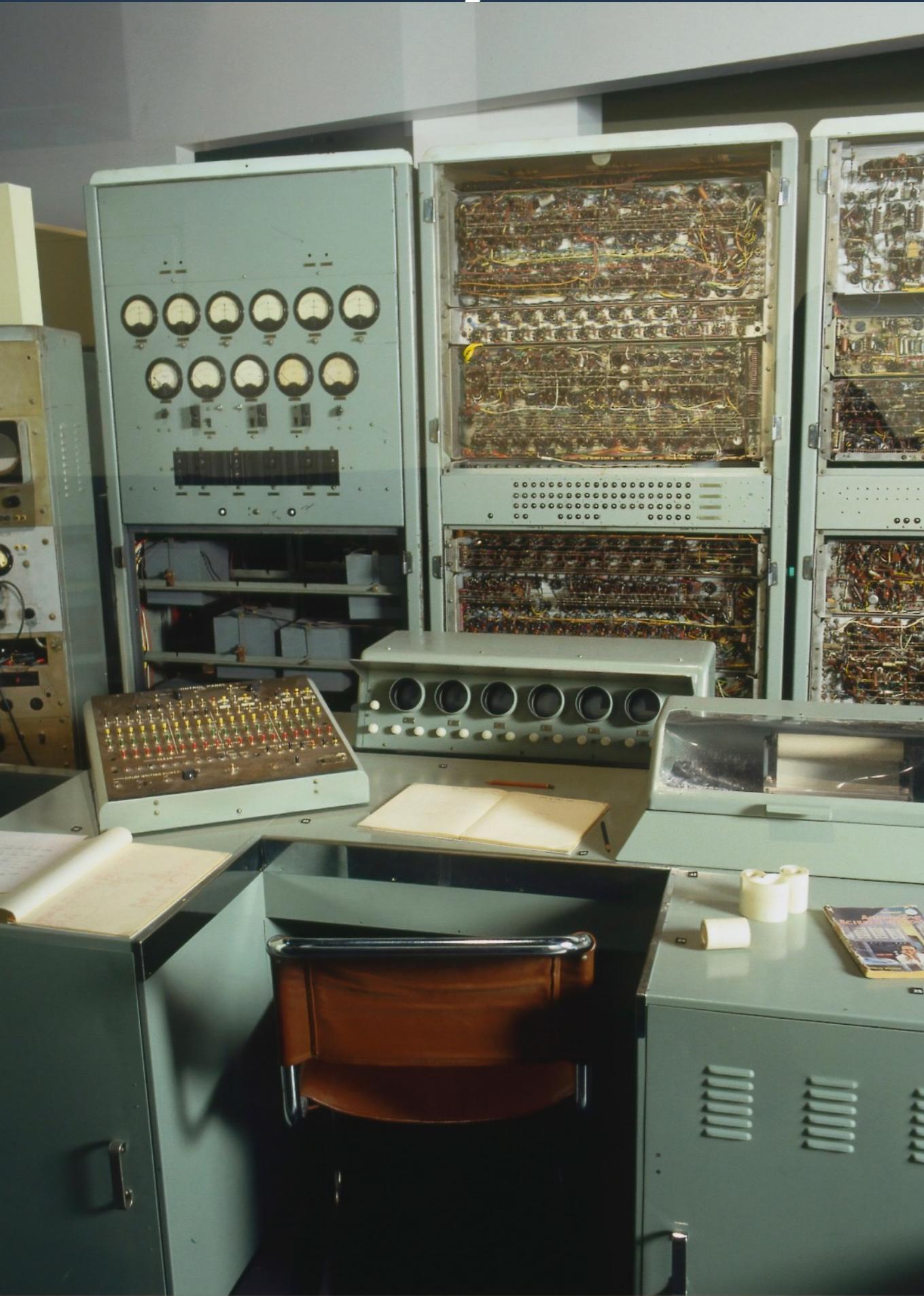
Interpretive synthesis

- ⋮ Computational methods used to gather and process data, analyze network structure, estimate statistical models, explore and visualize data and results
- ⋮ Results interpreted through theoretical lens of knowledge translation
(Latour, Callon, Star and Griesmer, etc)

Opinionated methods

- ⋮ Citation measures a specific form of scholarly engagement that is implicated in structures of power and money
- ⋮ ML methods for data ‘cleaning’ encode cultural biases (e.g. author name disambiguation)

Takeaways



Computational social science can transcend historical barriers to quantitative methodologies

- ⋮ Methodologically diverse
- ⋮ Methods tailored to theory and question
- ⋮ Overcomes “general linear reality”

Computational social science can be (and usually *should* be) interpretive

- ⋮ CSS enables co-existence of quantitative and interpretive research

Computational methods are not “magic bullets”

- ⋮ Methods need to be used critically and reflexively
- ⋮ Computational methods are not neutral

Thank you & Questions

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Slides available at
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Image credits



Image by THE CANADIAN PRESS/Ryan Remiorz, via ctvnews.ca



Screenshot via [New York Times](#)



Original Minneapolis PD statement on the death of George Floyd ([via @jaketapper on Twitter](#))



Screenshot of Christopher Barrie's talk at SICSS Oxford, via [@Dima_Alexandre](#)



[Tweet from @RealCandaceO](#)

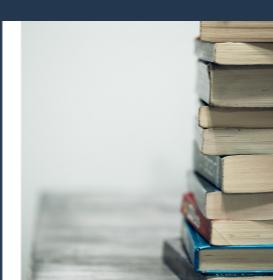


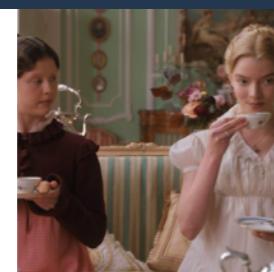
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