

Ranking people

Joint work with:

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This talk:

- **Part I: MOTIVATION**

How is ranking people different from ranking documents?

- **Part II: RANKING OF MINORITIES IN SOCIAL NETWORKS**

How can inequalities in rankings emerge?

- **Part III: CONCLUSIONS**

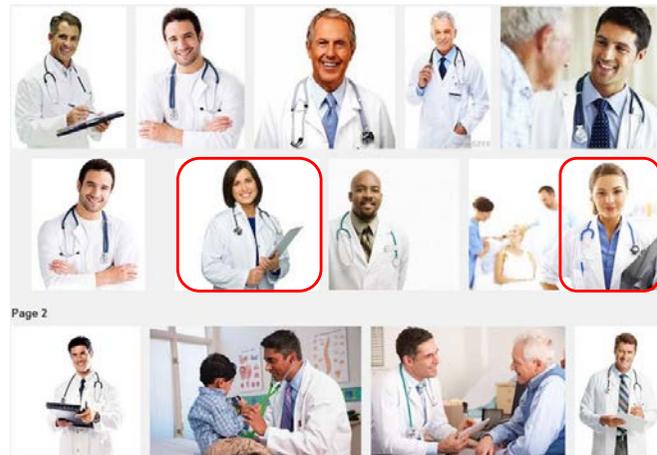
What are implications for information retrieval?

Part I: Motivation

How is ranking people different from ranking documents?

Problem I: Ranking images of people

Google image query: „Doctor“



Google image query: „Nurse“



„evidence for stereotype exaggeration and systematic underrepresentation of women“

Kay, Matthew, Cynthia Matuszek, and Sean A. Munson. "Unequal Representation and Gender Stereotypes in Image Search Results for Occupations." *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*. ACM, 2015.

Problem II: Ranking people

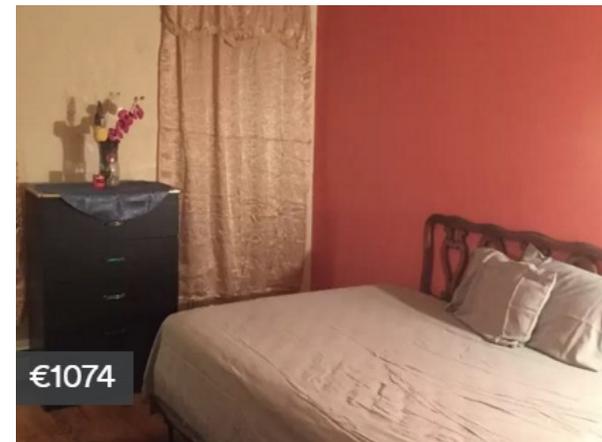
- „observe **significant and consistent group unfairness** against feminine candidates in roughly 1/3 of the job titles we examine.“
- „This may be of **particular concern** in technical professions like **Electrical, Mechanical, Network, and Software Engineering [...]**.“

The screenshot shows a LinkedIn search interface. The search bar contains 'chief executive officer'. Below the search bar, there are filters for 'People', 'Locations', 'Connections', 'Current companies', and 'All Filters'. The search results are displayed in a list format, showing 555,182 results. The first six results are visible, each with a profile picture, name, title, location, and a 'Connect' button. The results are as follows:

Name	Rank	Title	Location	Action
Navid Tabrizi	3rd	Chief Executive Officer	Cologne Area, Germany	Connect
Thomas Müller	2nd	Chief Executive Officer at Mueller Business Holding UG	Cologne Area, Germany	Connect
Bezu Christophe	3rd	Chief Executive Officer at Odlo	Cologne Area, Germany	Connect
Andreas Wortmann	3rd	Chief Executive Officer at ara AG	Cologne Area, Germany	Connect
Stefan Krüger	3rd	Chief Executive Officer	Cologne Area, Germany	Connect
Joerg Weidenfeld	3rd	Chief Executive Officer at Aura Light	Cologne Area, Germany	Connect

Chen L, Ma R, Hannák A, Wilson C. Investigating the Impact of Gender on Rank in Resume Search Engines. InProceedings of the 2018 CHI Conference on Human Factors in Computing Systems 2018 Apr 21 (p. 651). ACM.

“non-black hosts are able to charge approximately 12% more than black hosts, holding location, rental characteristics, and quality constant.”



Request to Book

Brooklyn, NY, United States

Edelman, Benjamin G. and Luca, Michael, Digital Discrimination: The Case of Airbnb.com (January 10, 2014). Harvard Business School NOM Unit Working Paper No. 14-054. <http://dx.doi.org/10.2139/ssrn.2377353>



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Search

Event Planning

SORTED BY: Recommended

Matthew P. \$50/hr
 ✓ No Event Planning related tasks completed.
 🗨️ No Event Planning related reviews.
How I can help:
 I've planned dinners and retreats for 50+ people in the past. Expect the plan to be well detailed. Let me know if I can help.
"Matthew was fantastic! He showed up early and prepared. We had to put together a very large wardrobe and he had already taken a look at the piece online so he knew what he was getting into. It was a hard job, but when he told us he was a structural..."
 - November 18, 2015

John G. \$45/hr
 ✓ 1 Completed Event Planning Task
 🗨️ 1 Event Planning Review: 100% Positive
How I can help:
 I have over 15 years in the event production and planning industry. Since college I have booked entertainment, produced shows, researched venues, managed caterers, tent vendors and other special event services. And I am well connected in the business.
"John was extremely responsive and communicative. He was excellent to work with and really helped company out! I highly recommend John."
 - June 06, 2015

DIANE H. \$125/hr
 ✓ 1 Completed Event Planning Task
 🗨️ 1 Event Planning Review: 100% Positive
How I can help:
 I am very good at motivating workers to get the event done with out any hip cups. I have planned and ran a staff up to 100 workers, no event is to big or small. I also stay with in your budget.
"Diane did a wonderful job in the kitchen - always a joy to work with!"
 - December 07, 2011

Worker Profile

Hello, I'm **DIANE H.**
 Last online: This morning

99% positive rating
 Facebook and ID Verified

✓ I've done **353 tasks.**
 I've been a Tasker since 2010.

Working in Boston
 I have a **Car** if you need one.

Why I'm your Tasker:

I'm the right person for the job...

I have been one of TaskRabbit's Runners for over 5 years. I have excellent reviews. I give a 100% to every job I am assigned. There are a couple of negative reviews you might see. The 1st task he is not complaining about the work I did. The 2nd task I have no idea why she gave me a thumbs down.

When I'm not tasking...

I work for the new England Patriots and several other Arenas in the area. I enjoy spending time with my Family. I also volunteer for The Moose Fraternity raising money for Children and Seniors

- Cleaning:**
 Diane is great at communicating and getting the job done! Will hire again for sure!!
 Rachel G., November 17, 2015
- Cleaning:**
 Rachel G., November 10, 2015
- Organization:**
 Diane is fantastic! We've hired her multiple times, all great experiences.
 Jessica S., November 04, 2015

Picture
 Name
 Experience

Biography

Reviews and
 ratings

Online freelancing websites



Ranking bias:

Women/black are **ranked lower** in the search results

Rating bias:

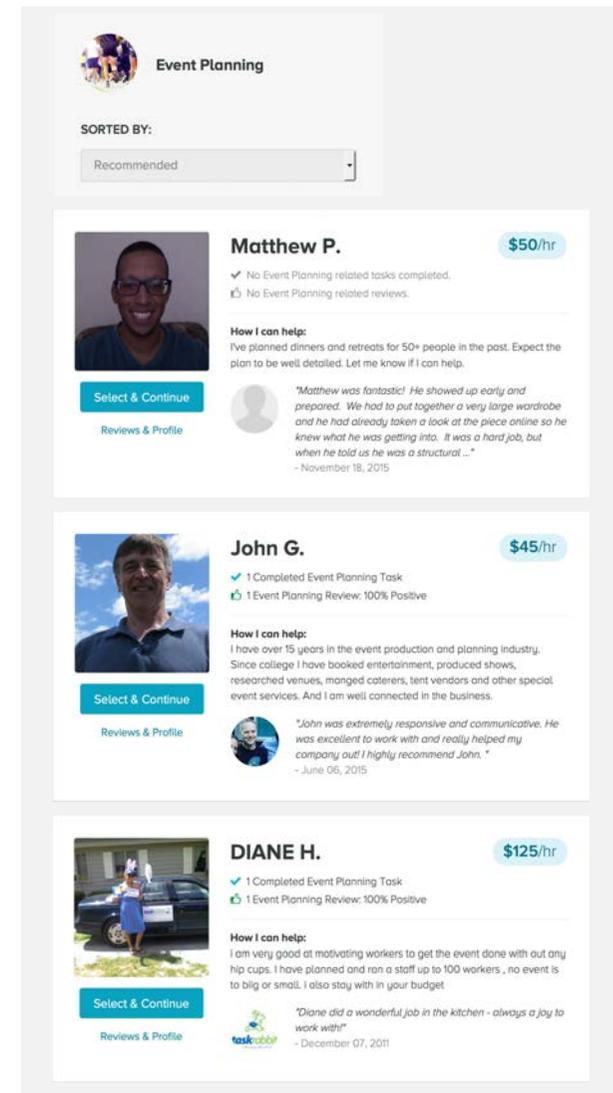
Black men receive **worse ratings** than Black workers

Review bias:

White women receive **10% fewer reviews** than those perceived to be White men

Gender and race affects how many jobs people get and how those are evaluated

A. Hannak, C. Wagner, D. Garcia, A. Mislove, M. Strohmaier and C. Wilson. Bias in Online Freelance Marketplaces: Evidence from TaskRabbit and Fiverr. In the 20th ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW2017), Portland, OR, ACM, 2017.



Documents

- Content
- Written artefacts
- Mostly static
- Copyright
- Topical focus
- Passive objects
- Sentiment
- Filtering desirable
- Relevance?

People

- Intent
- Living human beings
- Dynamic and evolving
- Human rights and freedoms
- Stereotypes
- Active subjects
- Opinions
- Discrimination illegal
- Importance?

Many „real world“ social phenomena have the potential to spill over to the online world.

- Inequality

- Family
- Radicalization
- Religion
- Morality
- Health
- Culture

- Elections
- Politics
- Polarization
- Discrimination
- Personality
- Hate
- Crime

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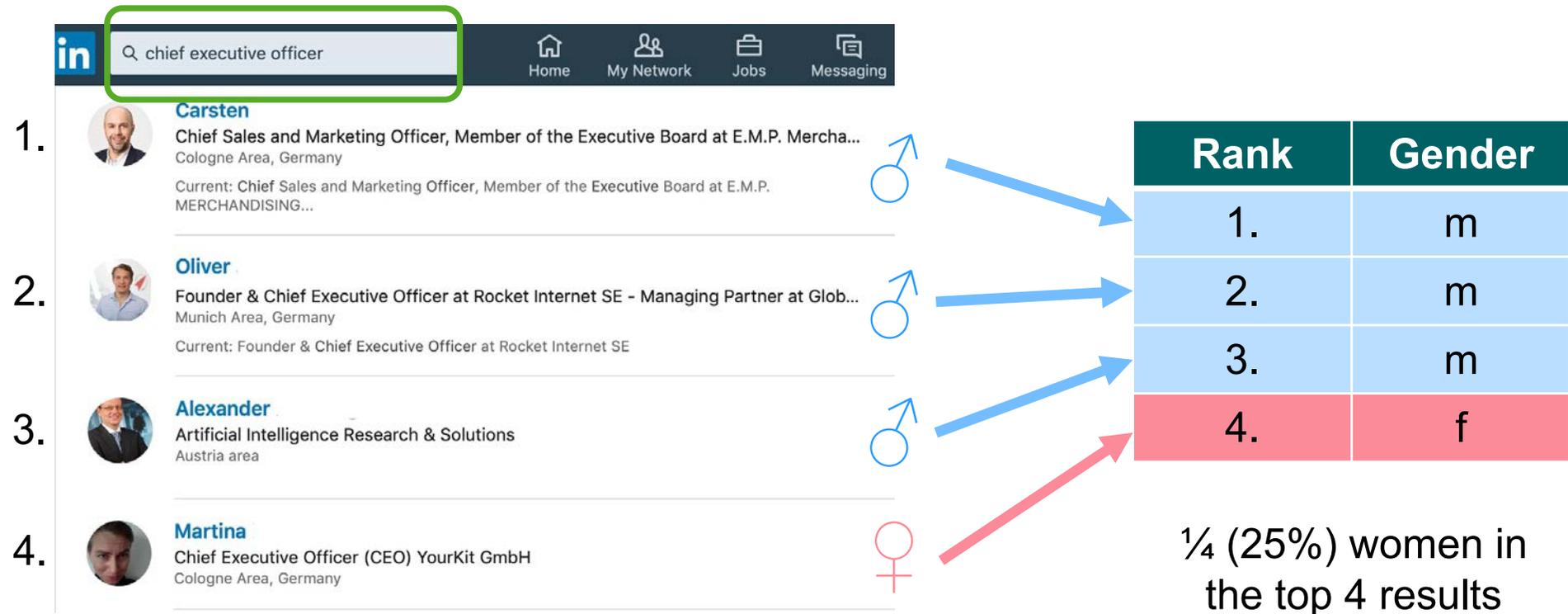
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Part II: Ranking of Minorities in Social Networks

What are mechanisms that can explain the emergence of inequalities in rankings?

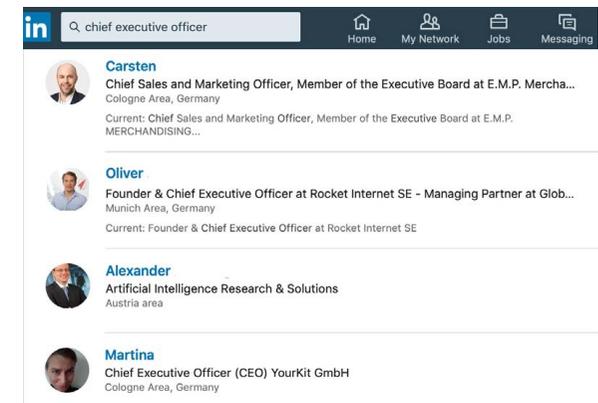
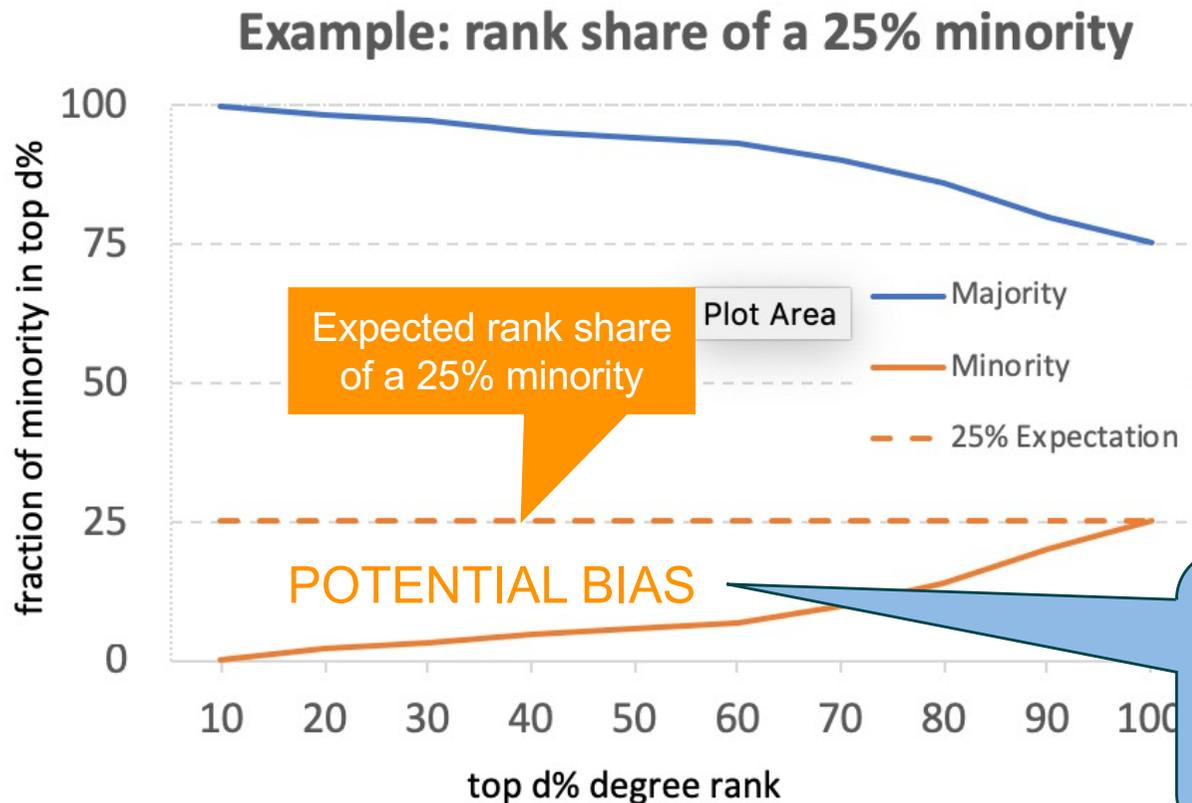
Karimi, F., Génois, M., Wagner, C., Singer, P. and Strohmaier, M., 2018. **Homophily influences ranking of minorities in social networks.** *Scientific Reports*, 8.

Ranking of minorities in online social networks



Actual ranking algorithm unknown.
But likely to use the LinkedIn social graph topology.

How visible are minorities in rankings?



Where does this potential bias come from?
Algorithmic or social?

Main Take-Away of this talk

SOCIAL MECHANISMS LIKE
HOMOPHILY ALONE
can create biases and disadvantages
when ranking people in social networks

Paul F. Lazarsfeld and Robert K. Merton (1954)
Friendship as Social Process; A Substantive and Methodological Analysis
FREEDOM AND CONTROL IN MODERN SOCIETY

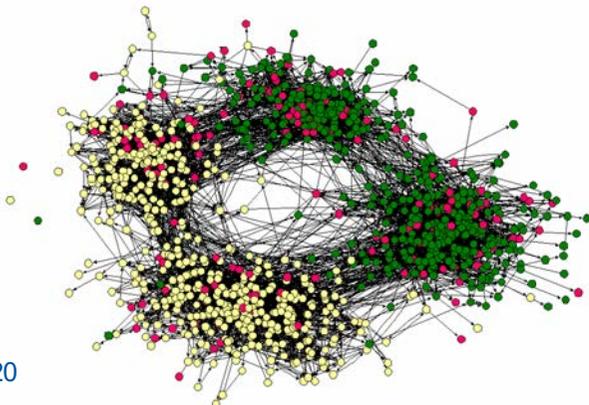
Oddly enough, the English language lacks a word to signify...

Value
homophily

“a tendency for friendships
to form between those who are alike
in some designated respect”

Status
homophily

*useful, to speak of “degrees of homophily,” as measured by indices of
positive correlation between the attributes of friends*



20

friendship networks based on race
(Moody 2001)

Two „universal“ laws found in social networks

1) Homophily

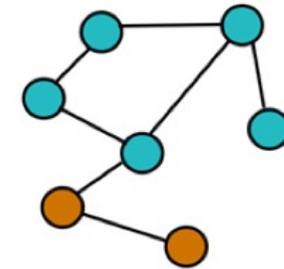
The tendency of similar nodes to attach to each other

→ yielding communities

2) Preferential Attachment

The tendency of nodes to preferentially attach to nodes of high degree

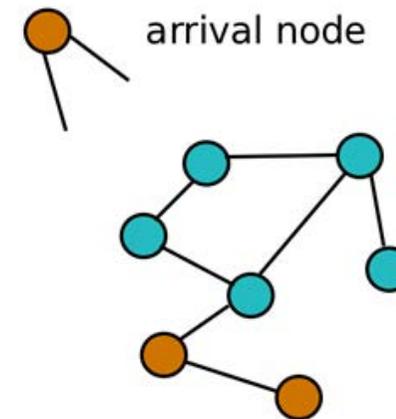
→ yielding scale-free networks



Adapted Barabasi-Albert network generation model

Arrival nodes connect to existing nodes based on

- preferential attachment (k)
- homophily (h)



$$P_{\text{connect}} \sim h \cdot k$$

$$0 \leq \text{homophily } (h) \leq 1$$

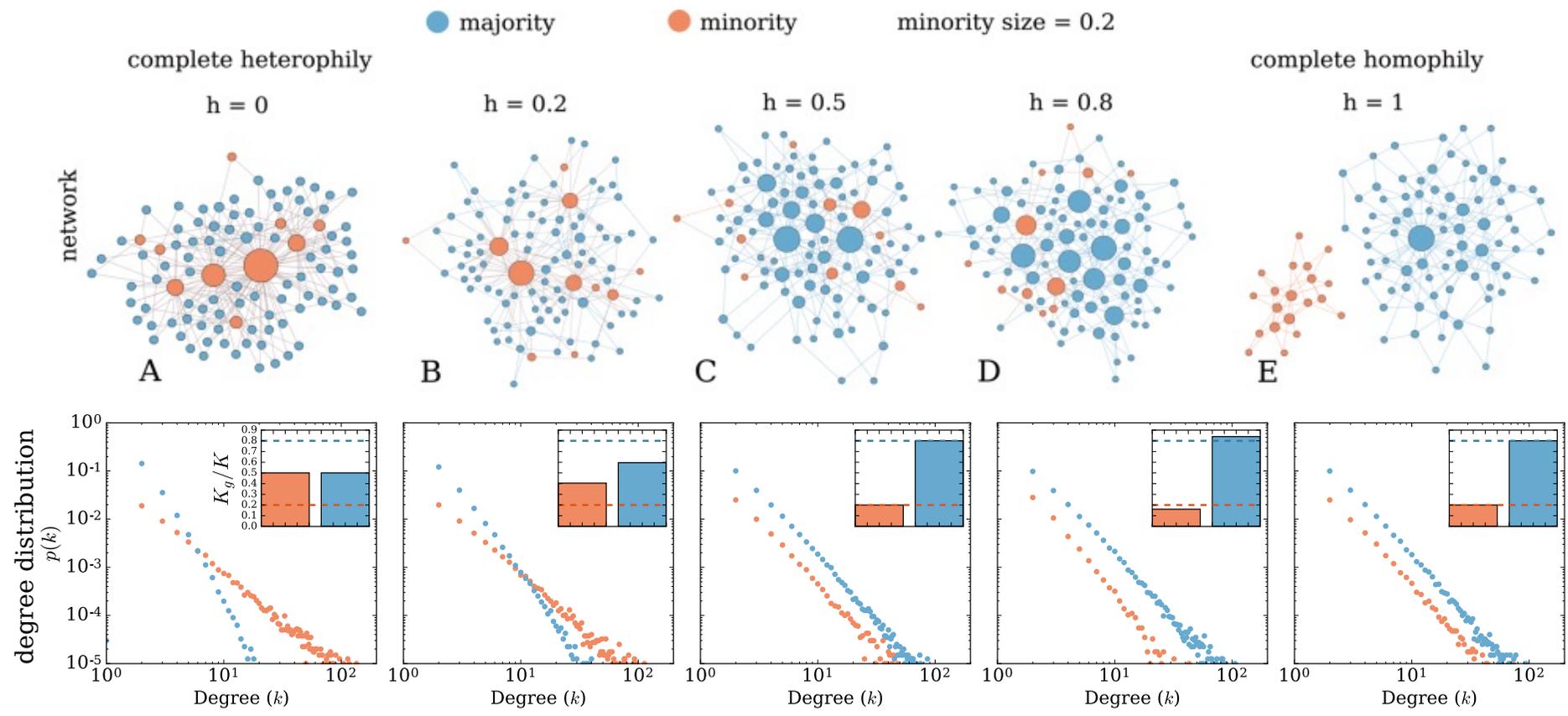
Visual demo:

<https://maxohn.github.io/networkgeneration/>

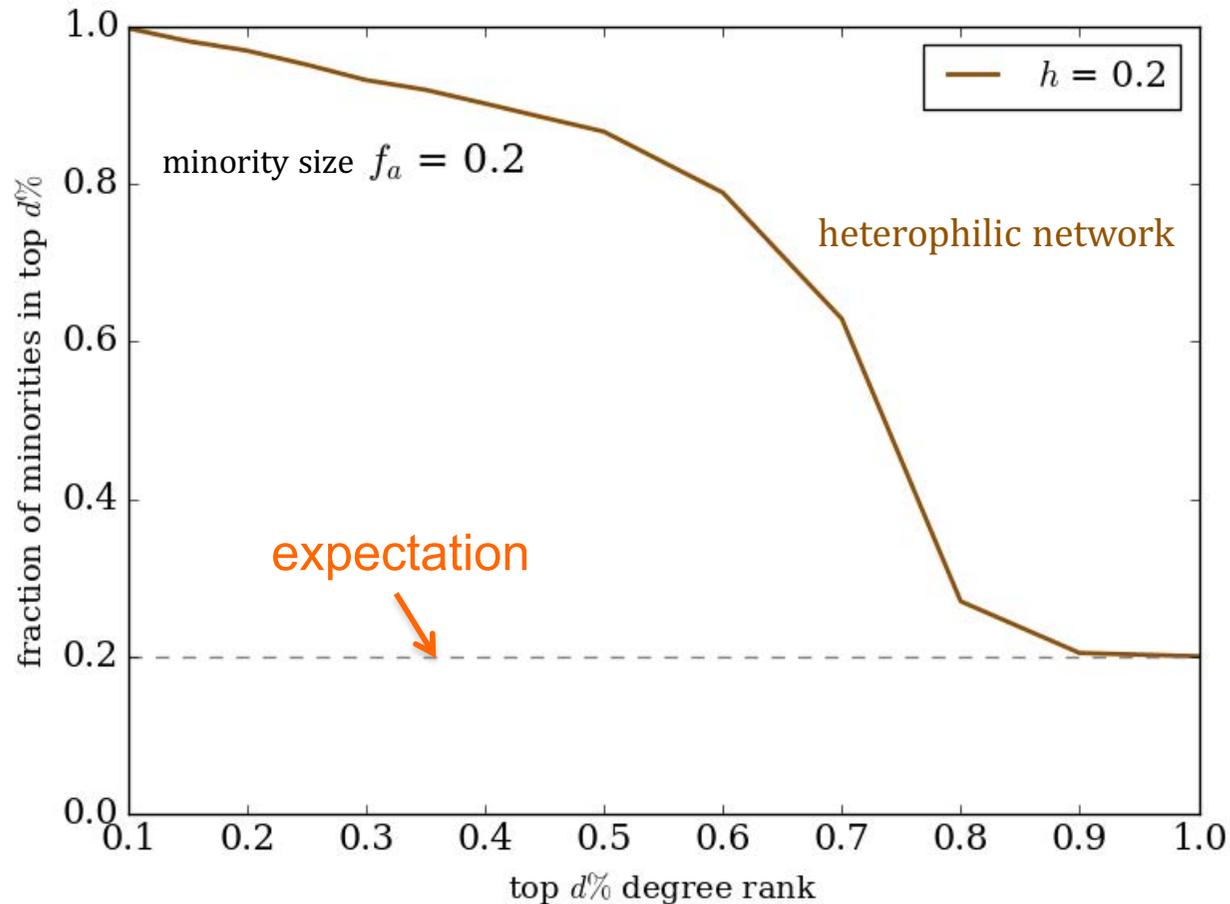
Homophily and preferential attachment in social networks

How does homophily influence degree distributions of minorities?

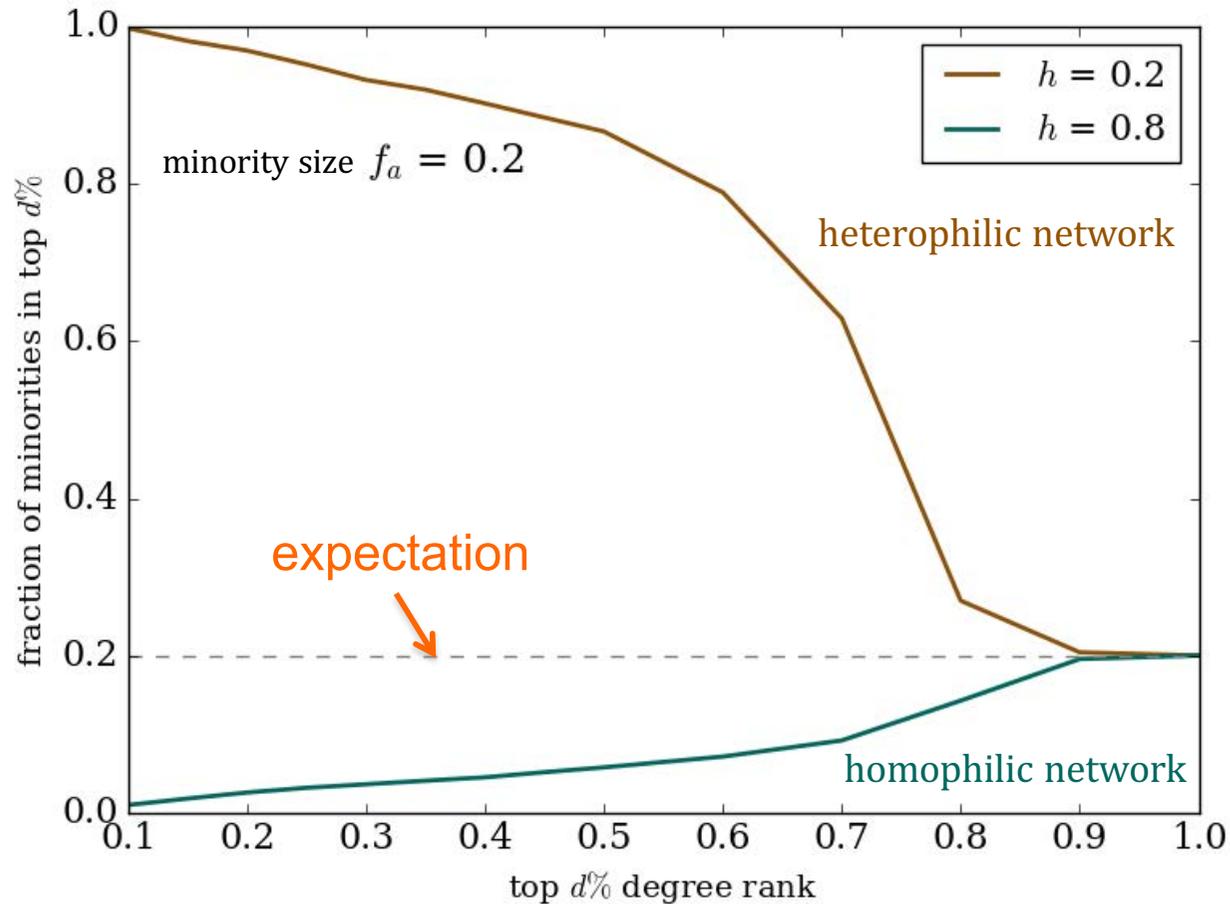
- Barabasi-Albert model with a homophily parameter



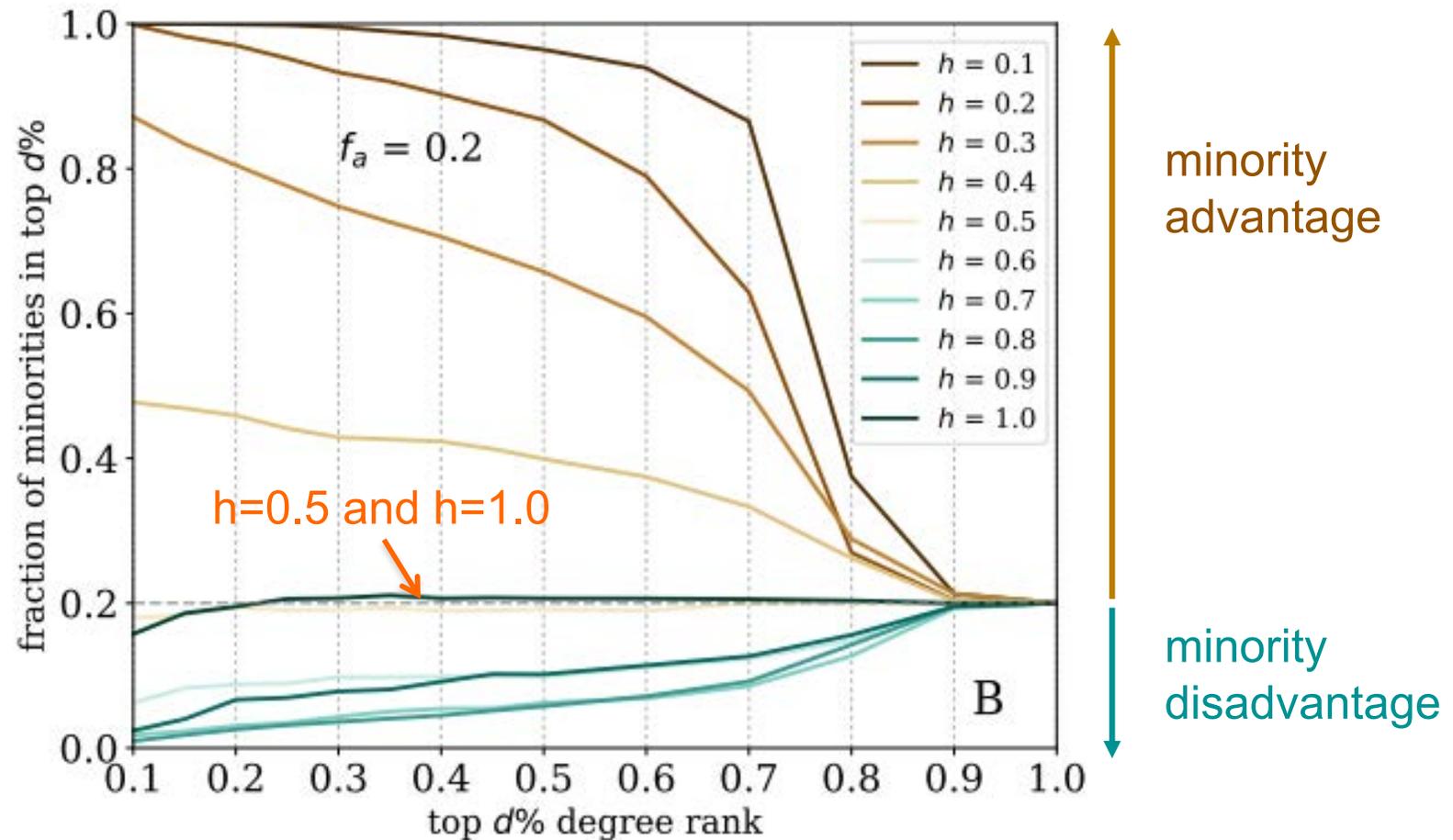
Visibility of minority nodes in top $d\%$ (ranked by degree)



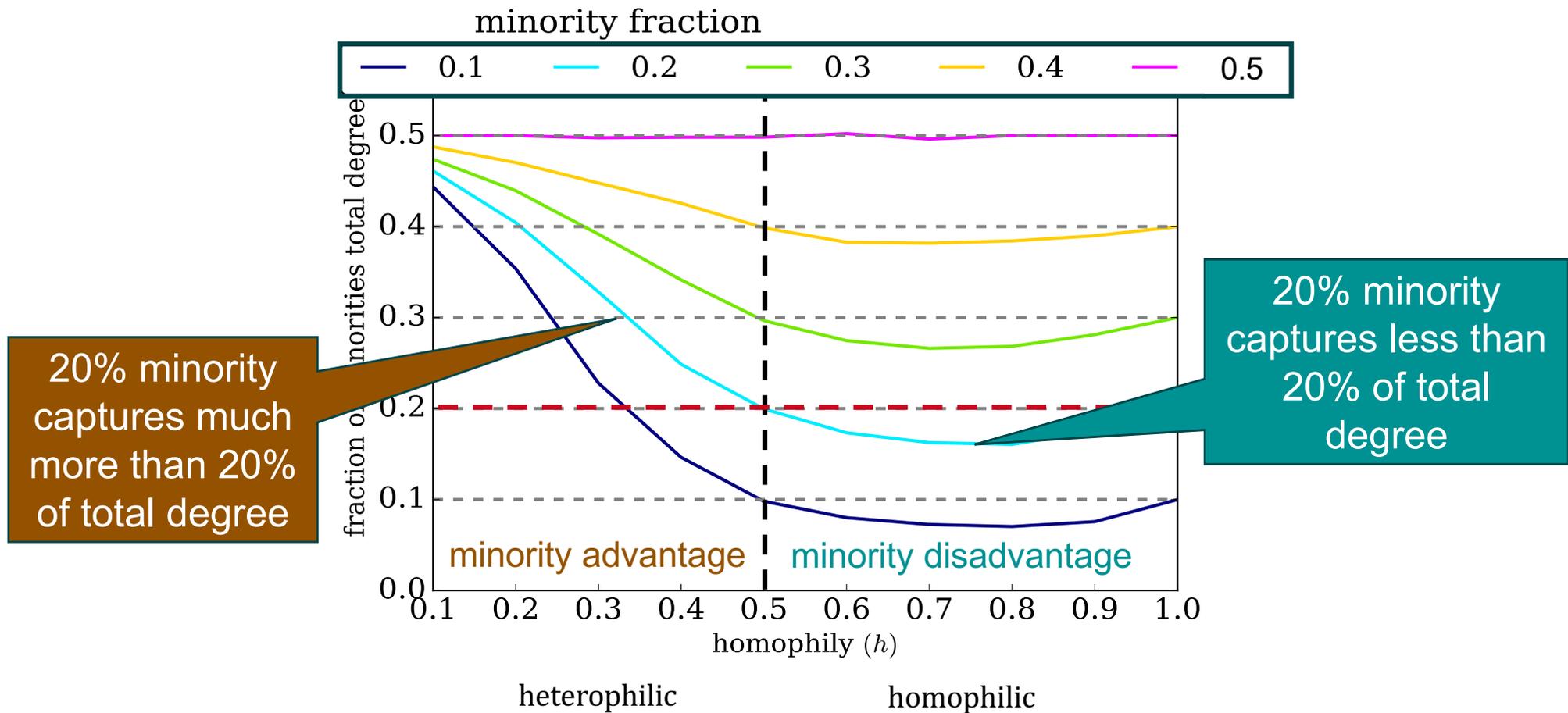
Visibility of minority nodes in top $d\%$ (ranked by degree)



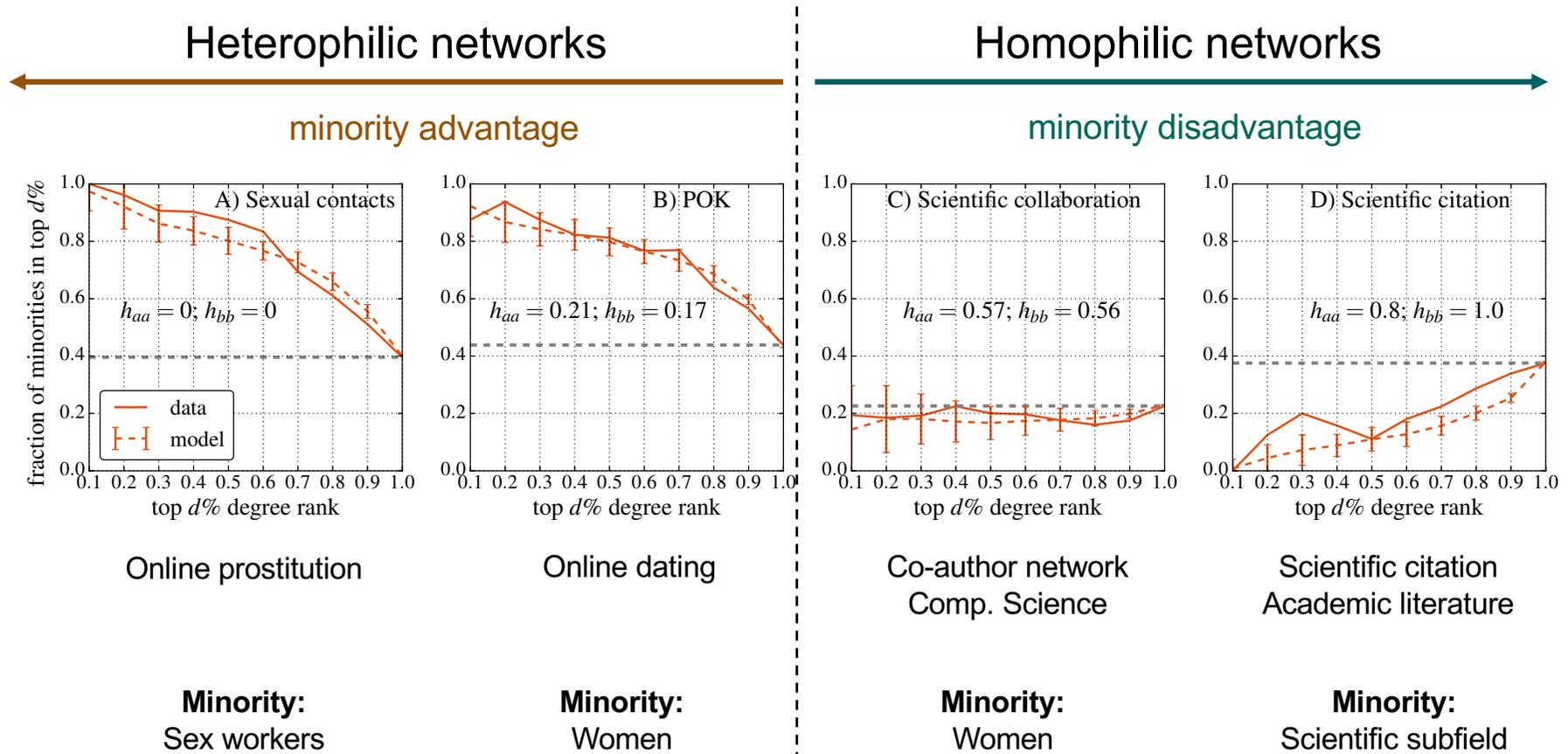
Visibility of minority nodes in top $d\%$ (ranked by degree)



Fraction of minorities total degree vs. homophily



What about empirical datasets?



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Main Take-Away of this talk

SOCIAL MECHANISMS LIKE
HOMOPHILY ALONE
can create biases and disadvantages
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Ranking People – Implications for Information Retrieval

1.) Human social behavior alone can cause inequalities

designers of people ranking systems need to be mindful when designing algorithms

2.) IR evaluation must expand to evaluate sociological issues

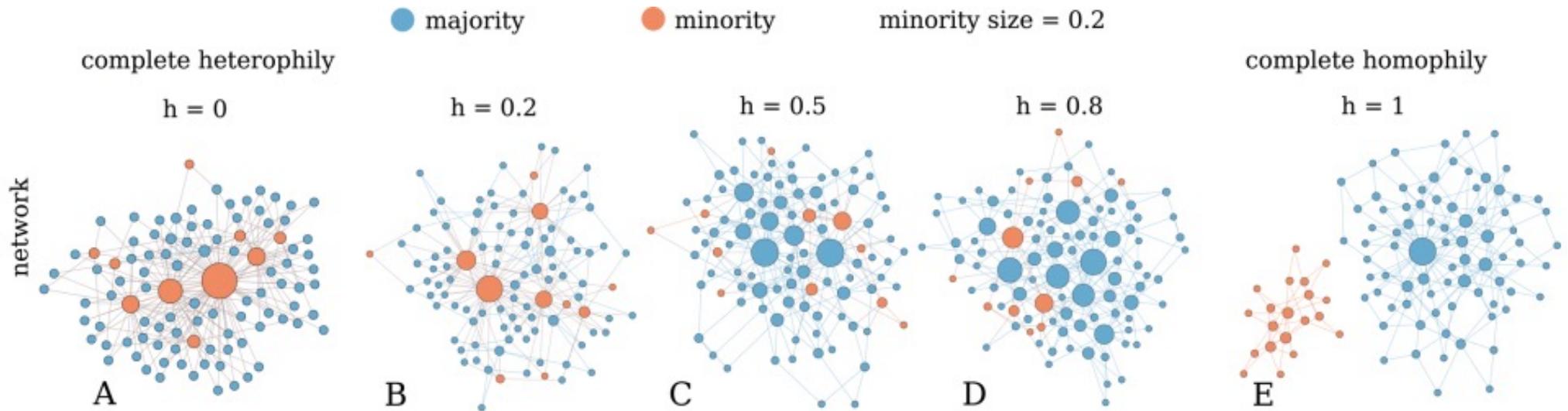
must include new techniques for bias, discrimination, fairness, inequality, polarization, etc detection.

3.) People ranking != document ranking algorithms applied to people

it is a new field of research requiring a whole new *interdisciplinary* approach to design

4.) Let us stop calling them „users“, let us call them „people“

Computer scientists like abstraction, but „users“ exist only in relation to systems. „People“ is a much richer and more useful representation of reality.



Thank you!

Markus Strohmaier

References:

Karimi, F., Génois, M., Wagner, C., Singer, P. and Strohmaier, M., 2018. **Homophily influences ranking of minorities in social networks.** *Scientific Reports*, 8.

Wagner, C., Singer, P., Karimi, F., Pfeffer, J. and Strohmaier, M., 2017, April. **Sampling from Social Networks with Attributes.** In *Proceedings of the 26th International Conference on World Wide Web* (pp. 1181-1190).

Lee, E., Karimi, F., Jo, H.H., Strohmaier, M. and Wagner, C., 2017. **Homophily explains perception biases in social networks.** *arXiv preprint arXiv:1710.08601*.