ETH zürich

# Gender Asymmetries in Reality and Fiction: The Bechdel Test of Social Media

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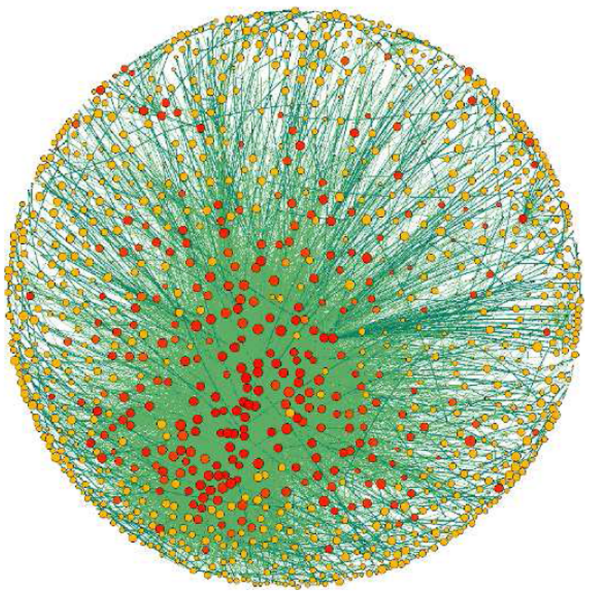
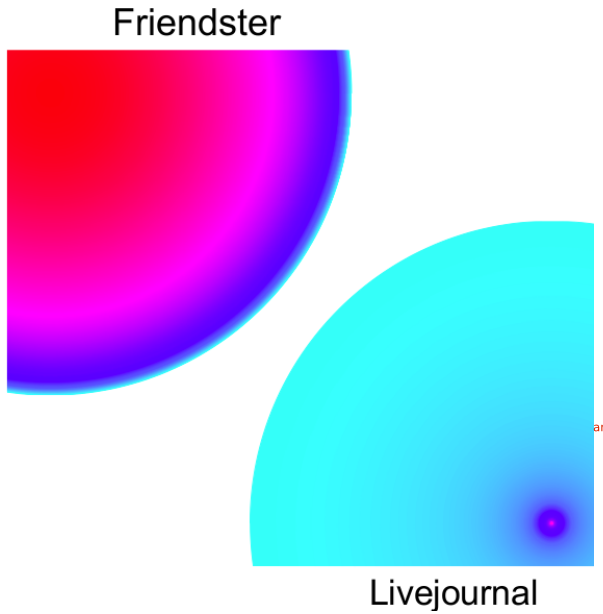
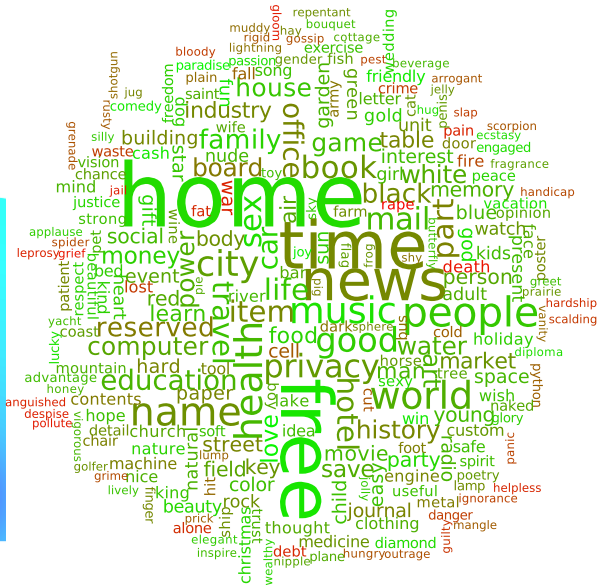
## Main Research Areas

- **Adaptive Social Systems:** Online communities, animal societies...
- **Economic Networks:** Ownership, R&D, financial networks, ...



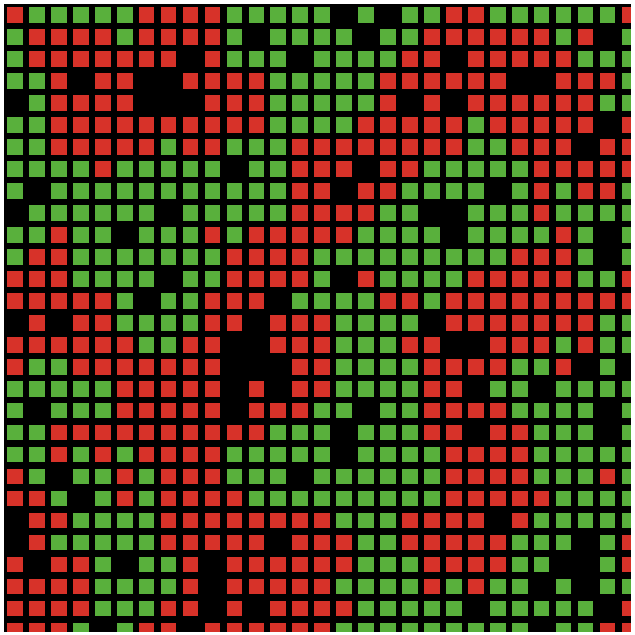



## Methodological approach: **Data Driven Modeling**

- **Digital traces**: Written interaction, online social networks
- **Computational modeling:** Agent-based modeling, network dynamics

# Subconscious components of gender inequality



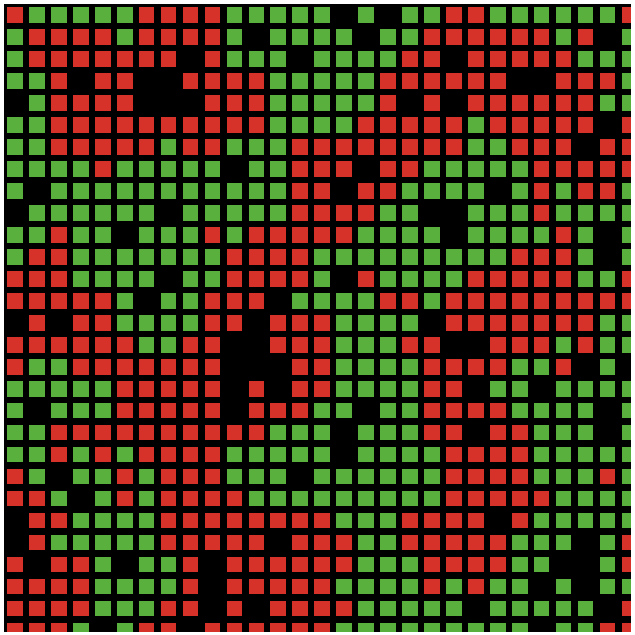
Macroscopic social phenomena can emerge from subtle, subconscious biases

- Example: Urban segregation

**Culturomics**

Quantitative understanding of culture through computational processing of text

# Subconscious components of gender inequality



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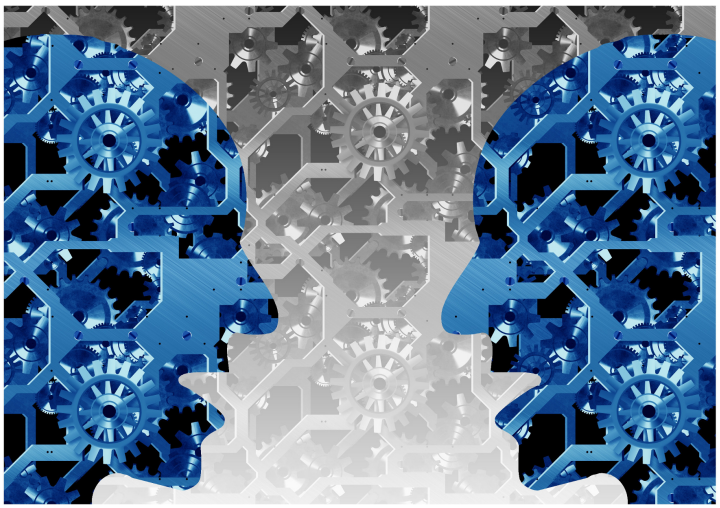
Two sources to measure gender bias:
**movie scripts** and **online interaction**

1. Movie industry shows a male bias
2. Gender bias is absent in online interaction

# Social gender scripts



**Behavioral script (Bower et al. 1979)**

Patterned social arrangements that are both emergent from and determinant of the actions of the individuals.

**Objective:** Quantifying gender biases in behavioral scripts

1. Imagined scripts: Computational processing of movies
2. Real scripts: Online dialogues between individuals
3. And beyond: Movie impact, demographics of gender bias...

# Testing gender asymmetry

## The Bechdel Test for Movies

A movie passes the test if:

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A movie passes the test if:

1. It has two female characters

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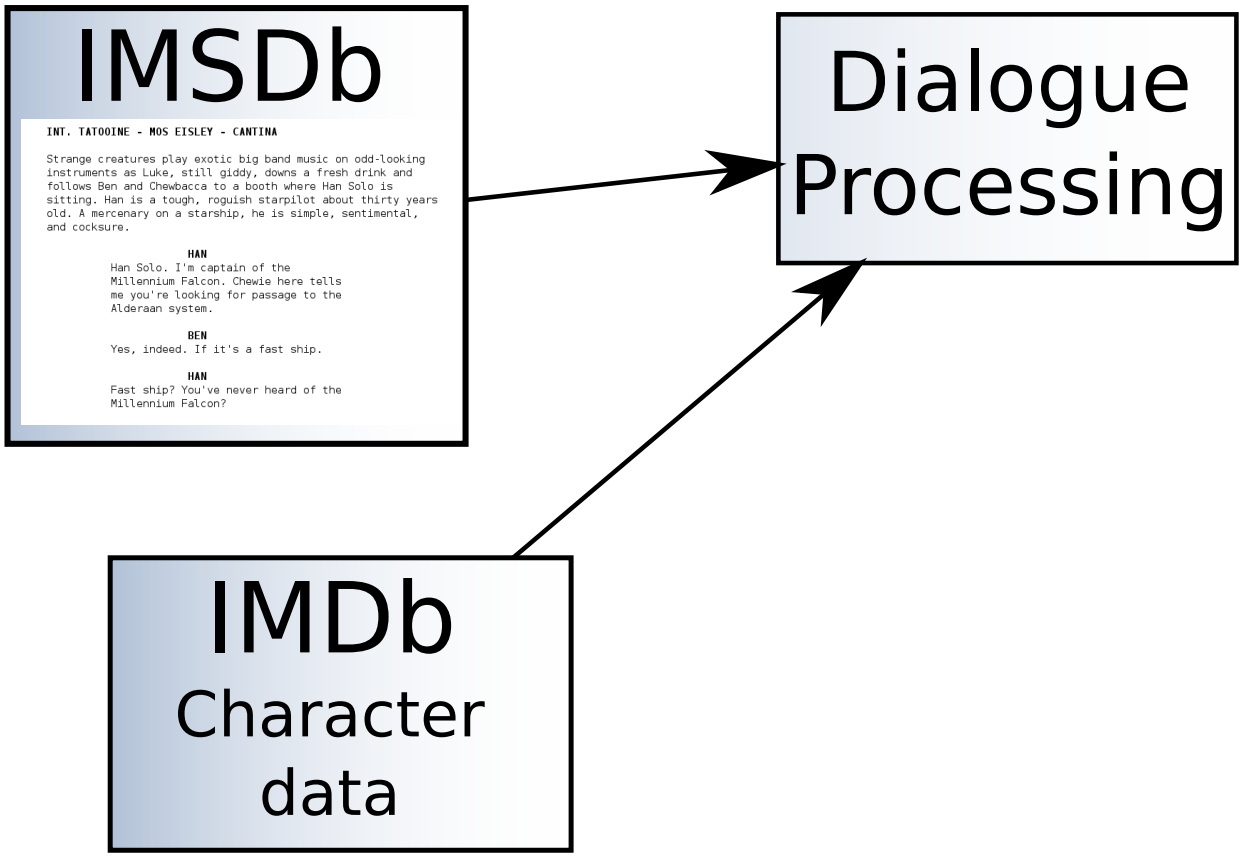
# Computational analysis of movie scripts



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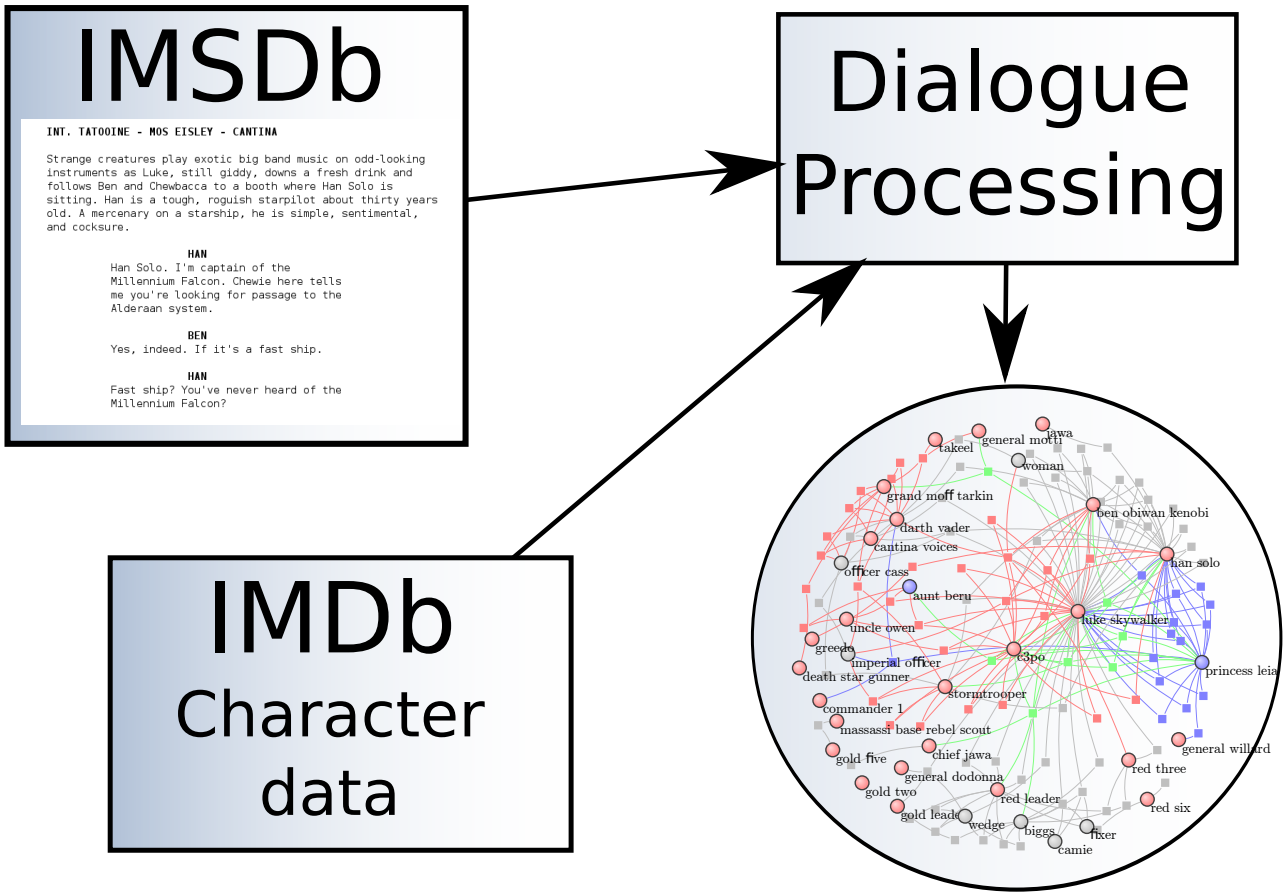


# Computational Analysis of Movie Scripts

**IMSDb**

INT. TATOOINE - MOS EISLEY - CANTINA

Strange creatures play exotic big band music on odd-looking instruments as Luke, still giddy, downs a fresh drink and follows Ben and Chewbacca to a booth where Han Solo is sitting. Han is a tough, roguish starpilot about thirty years old. A mercenary on a starship, he is simple, sentimental, and cocksure.

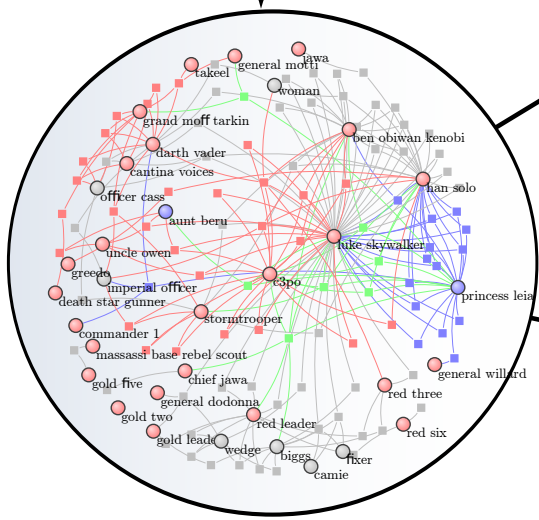
HAN
Han Solo. I'm captain of the Millennium Falcon. Chewie here tells me you're looking for passage to the Alderaan system.

BEN
Yes, indeed. If it's a fast ship.

HAN
Fast ship? You've never heard of the Millennium Falcon?

**IMDb**
Character data

**Dialogue Processing**




**Male Bechdel Score**

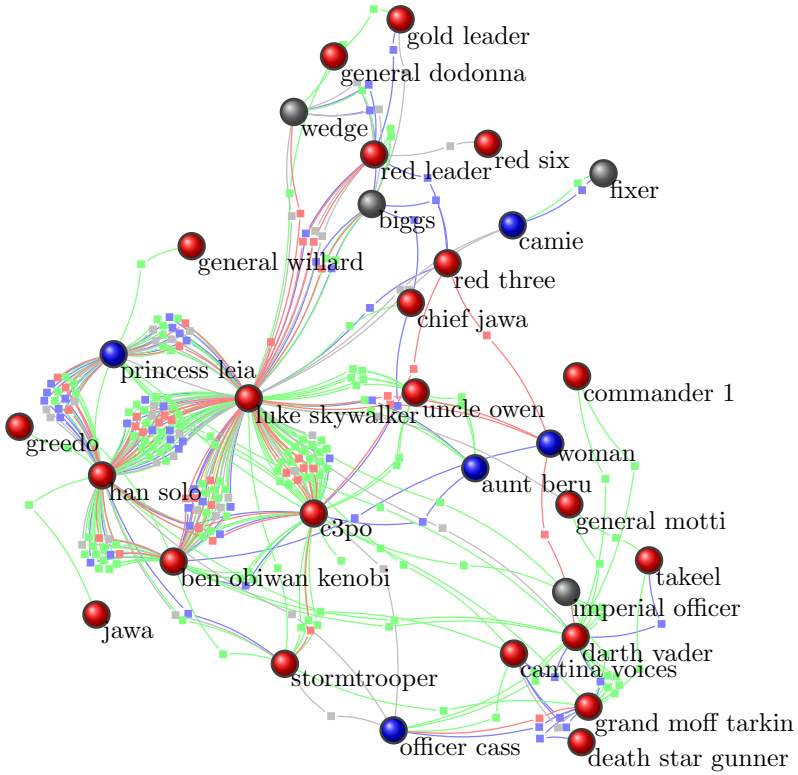
$$B_M = \frac{|D(M, M, *, 0)|}{|D|}$$

**Female Bechdel Score**

$$B_F = \frac{|D(F, F, 0, *)|}{|D|}$$

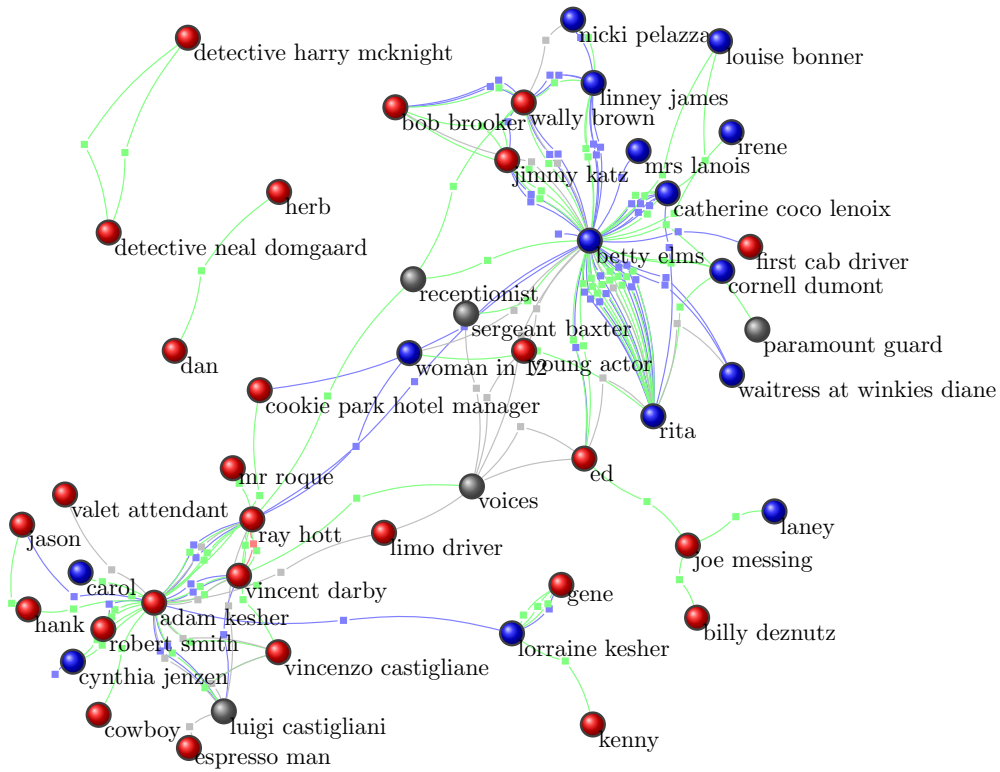
# Movie script network examples

## Star Wars: A new hope (1977)



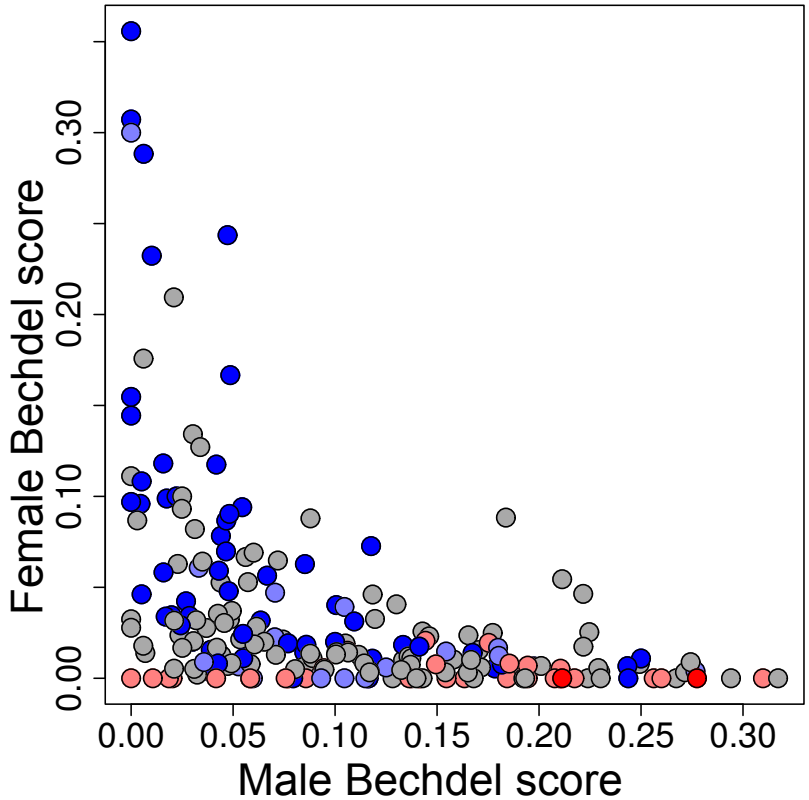

- Male Bechdel score: 16.3%
- Female Bechdel score: 0%

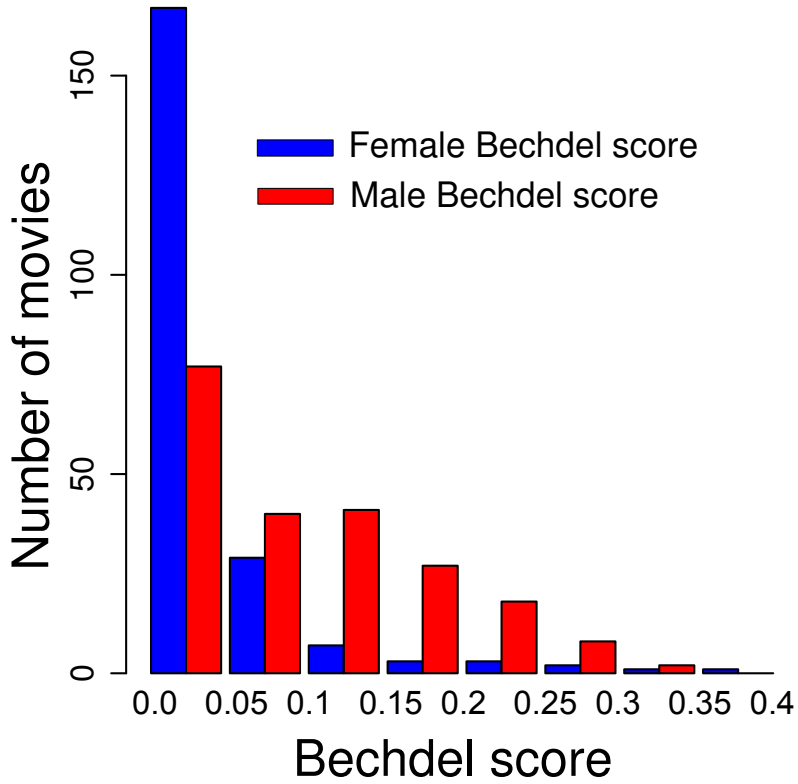
## Mulholland Drive (2001)




- Male Bechdel score: 4.9%
- Female Bechdel score: 16.6%

# The male bias of movies




- The Bechdel score is consistent with *bechdeltest.com* ratings
- **Evidence for the existence of a male bias in movie industry**
- *YouTube* trailers of movies that do not pass have more views and likes
- Movies that pass are more likely to be shared in *Twitter* by women

# Gender in social media dialogues

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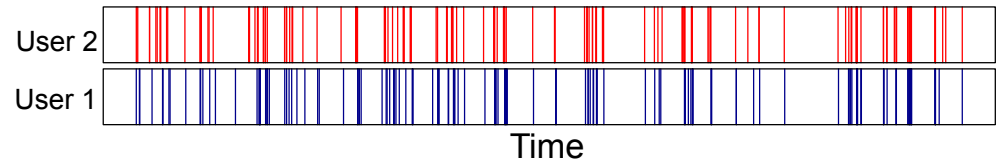


Dialogue Processing

Twitter: 2.2M
MySpace: 3K

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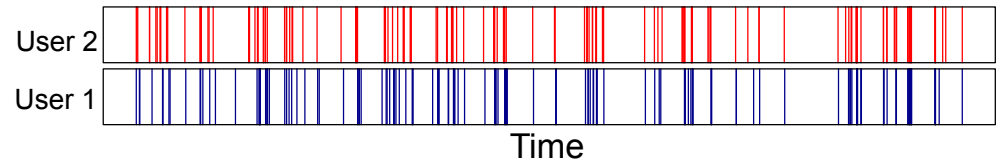


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- Location (US)
- Gender
- Student?
- Parent?

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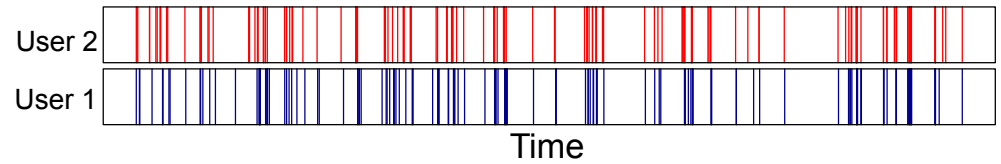


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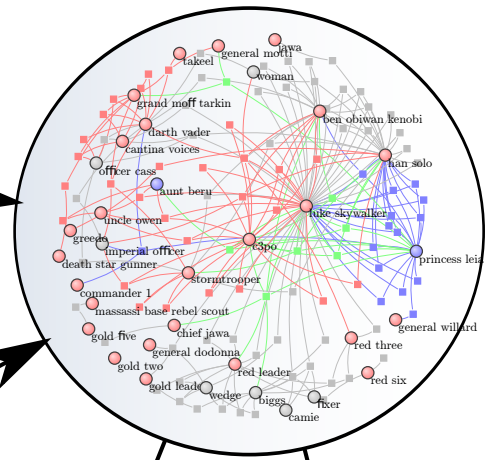
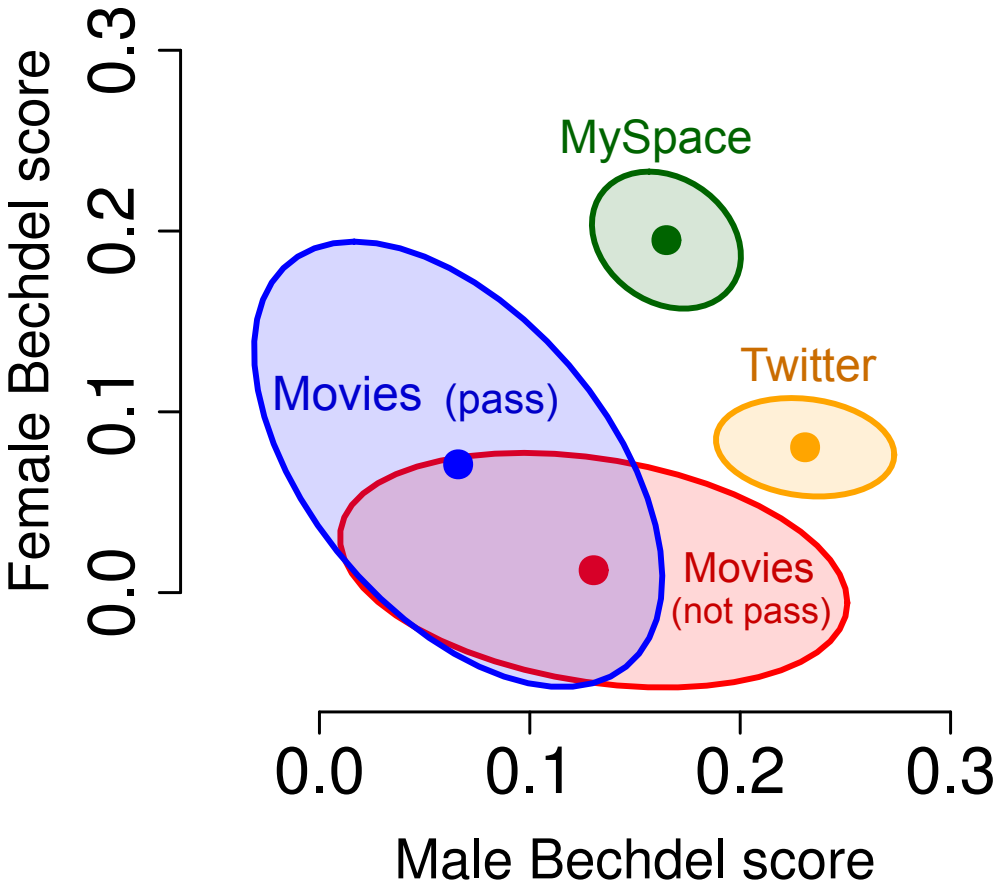



Male Score

Female Score

# Gender bias in online interaction




- MySpace shows no asymmetry
- Twitter is closer to movies that do not pass the test

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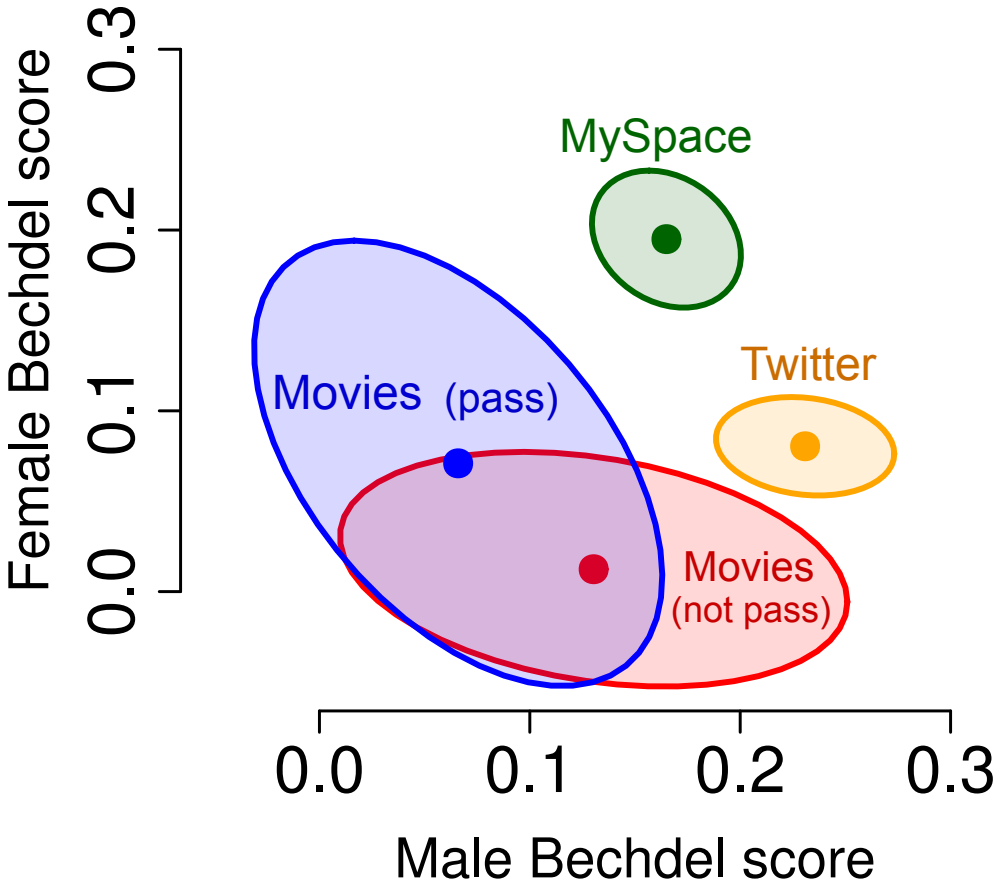


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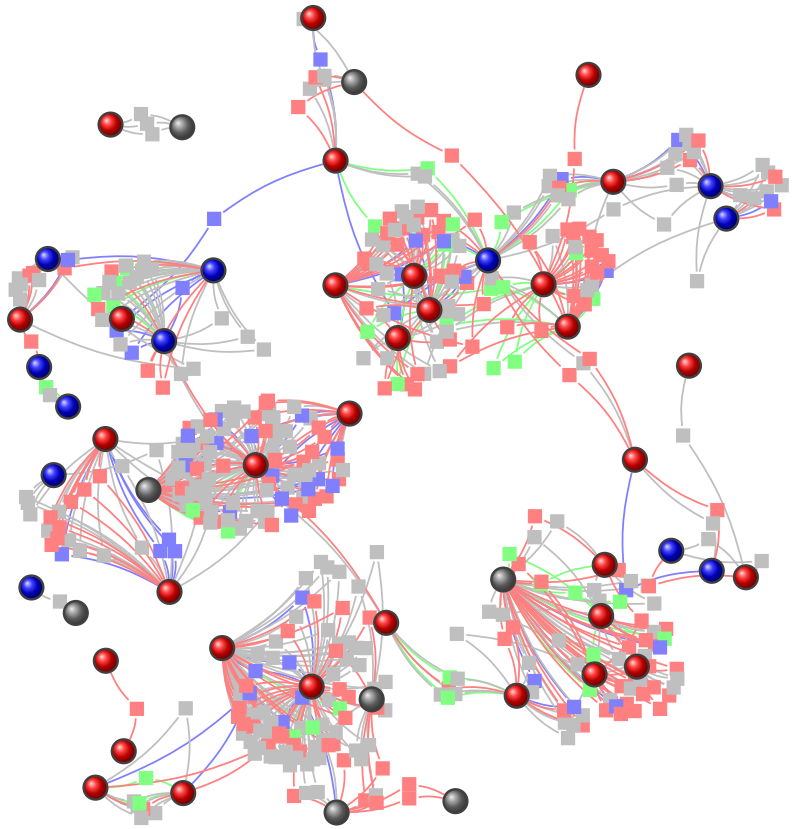


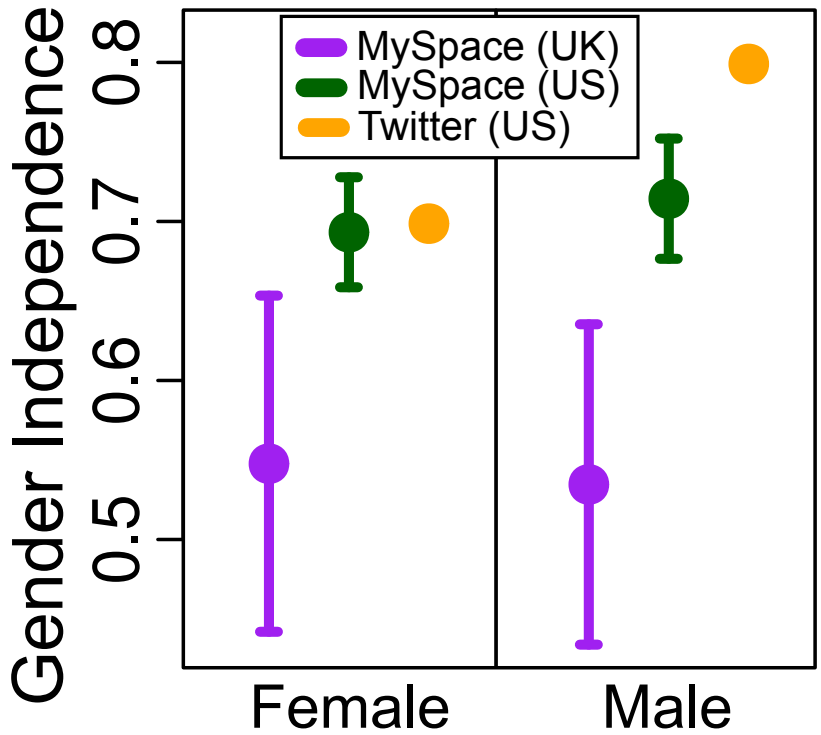
- Interactions between Twitter users from Ann Arbor
- $B_M = 36\%$, $B_F = 6\%$

# Calculating representative bias

- Ecological validity of Bechdel score?
  - 64% of Twitter users are male
  - $\sim$ 49% male population in US
- Solution: normalization over gender-aligned dialogues

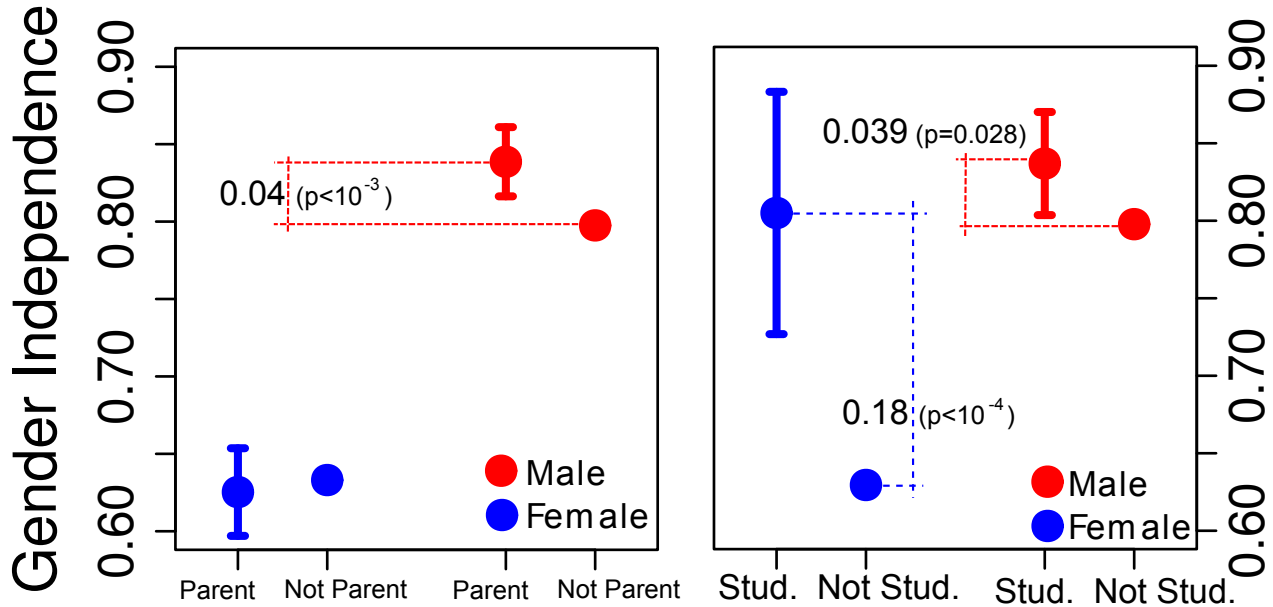
$$I_F = \frac{|D(F,F,0,*)|}{|D(F,F,*,*)|}$$

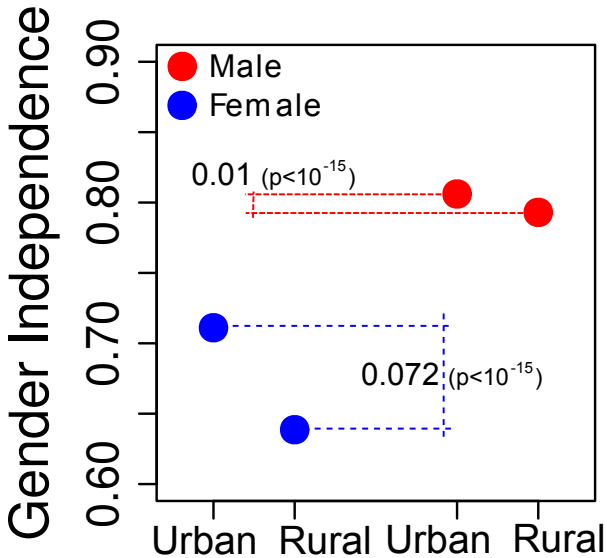
$$I_M = \frac{|D(M,M,*,0)|}{|D(M,M,*,*)|}$$




**Twitter male bias is significant when controlling for unequal gender samples**

# Demographic factors




- Dialogs between fathers tend to mention women less...
- No significant asymmetry for students
- Female independence lower in rural areas

# Geographic and cultural factors

## Disposable male theory

Human cultures evolved into patterns of independent and risk-seeking males as a response to adverse conditions

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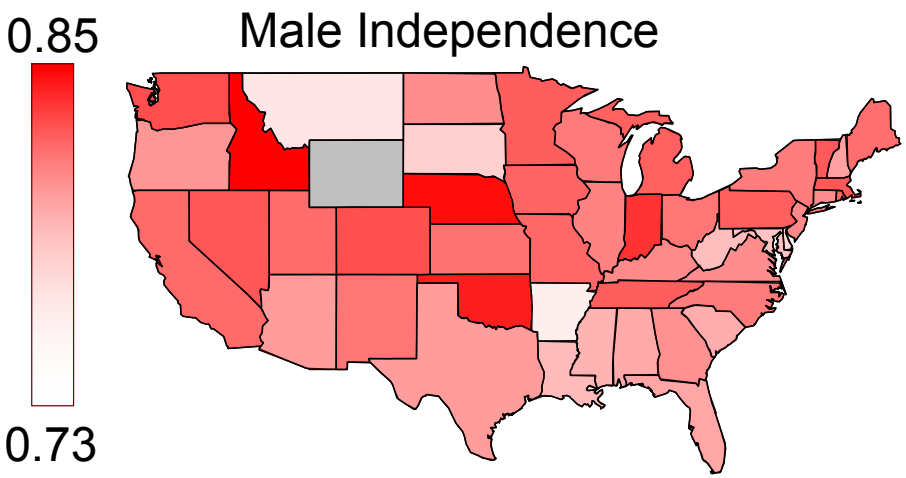


- Correlation analysis between state gender independence and latitude Controls: long., avg. income, Gini
- Male Independece score in Twitter increases with latitude
- Female Independence score decreases with average income

# Summary

- We designed a computational extension of the Bechdel test
- We integrated data from Twitter, MySpace, YouTube, bechdeltest.com, IMDB, IMSDB
  - We processed 490 movie scripts
  - More than 2M conversations from Twitter and MySpace
- Twitter shows a male bias, but not MySpace
- Demographic and geographic factors in gender asymmetries

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## Conclusion

- The male bias of movie industry is not a fantasy
- Twitter is not the Cyberfeminst utopia

# Thank you!