Gender Dependent Structures of Dialogue Networks in Films

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female representation in films

the under- and misrepresentation of female characters in movies

- infrequent appearances of women in visual media
- gender role stereotyping

Alison Bechdel’s "Dykes to Watch Out For" (1985)

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Alison Bechdel's "Dykes to Watch Out For" (1985)

the bechdel test

- two named female characters
- who talk to each other...
- ...about something other than men

data: wonder woman

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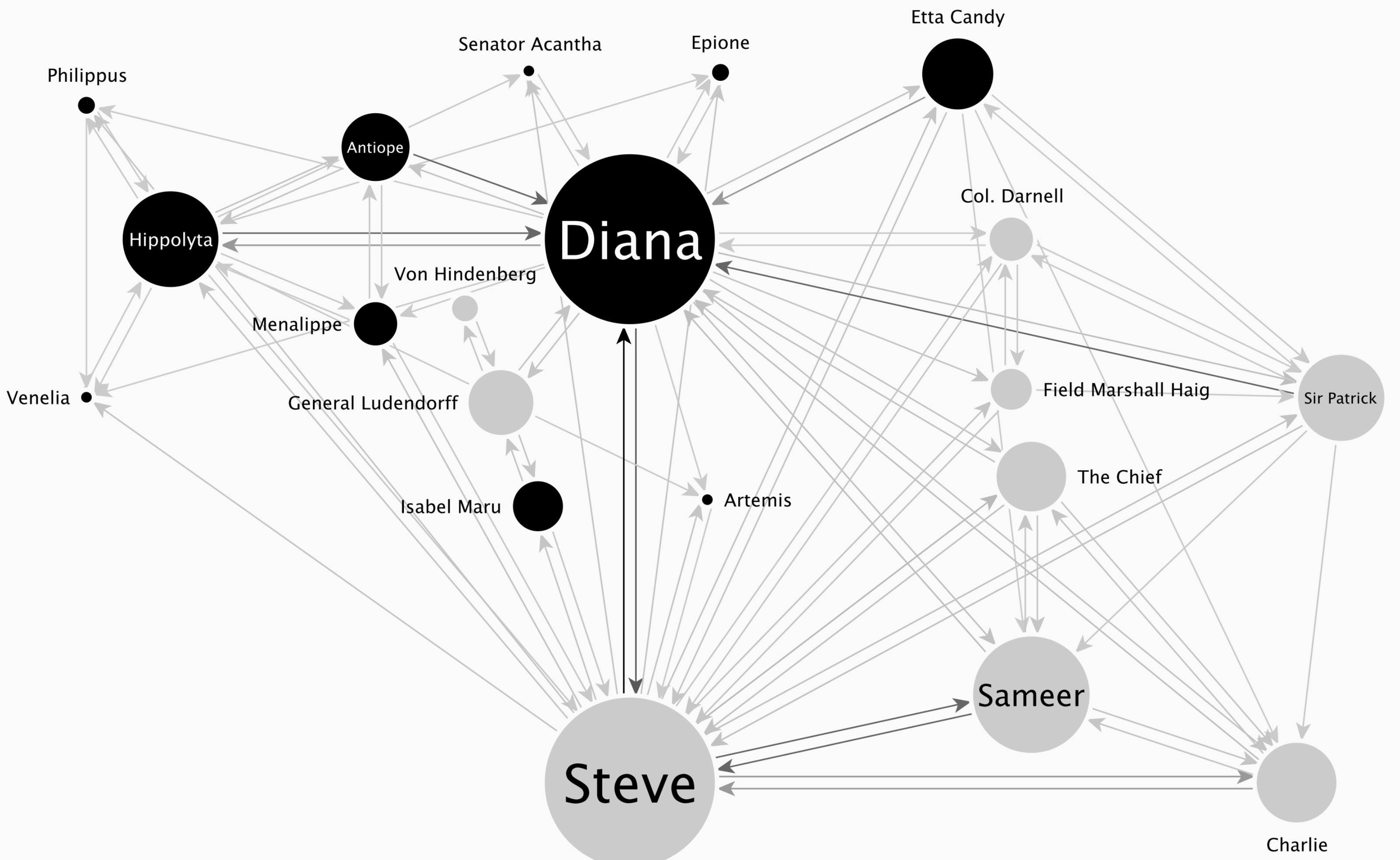

Pete Jones (2018): *Diana in the World of Men: a character network approach to analysing gendered vocal representation in Wonder Woman*, Feminist Media Studies

data: wonder woman

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no. scenes	no. lines	no. characters
61	769	20

% characters female	% lines out female	% lines in female
55	43.04	49

edge variables

- who talks to who?
- how many times?
- what do they say?

node variables

- character gender
- total number of lines
- total number of lines in

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coding conversation topic

dialogues coded based on topic being **about a man** or **not about a man**

corpus of male referenced words:

`he` `him` `himself` `his`

`brother` `brothers` `son` `sons` `father`

`man` `men` `boy` `boys` `guy` `guys`

`steve` `sammy` `charlie` `general`

etc.

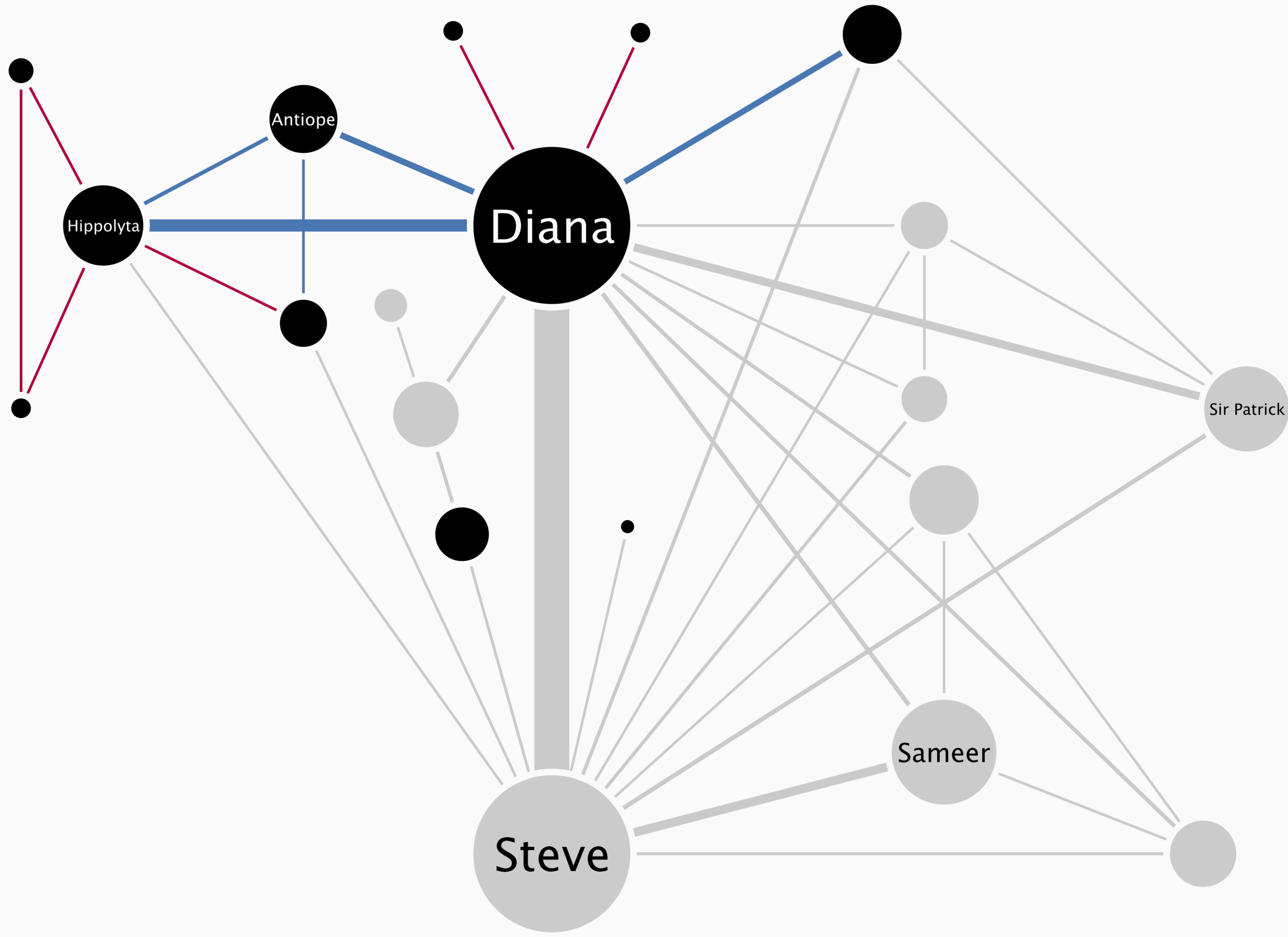
if a line between character u and v contains male referenced word

`topic = 1`

else

`topic = 0`

- `pass` if <25% of all lines between character u and v are male referenced
- `fail` otherwise


Antiope
Hippolyta
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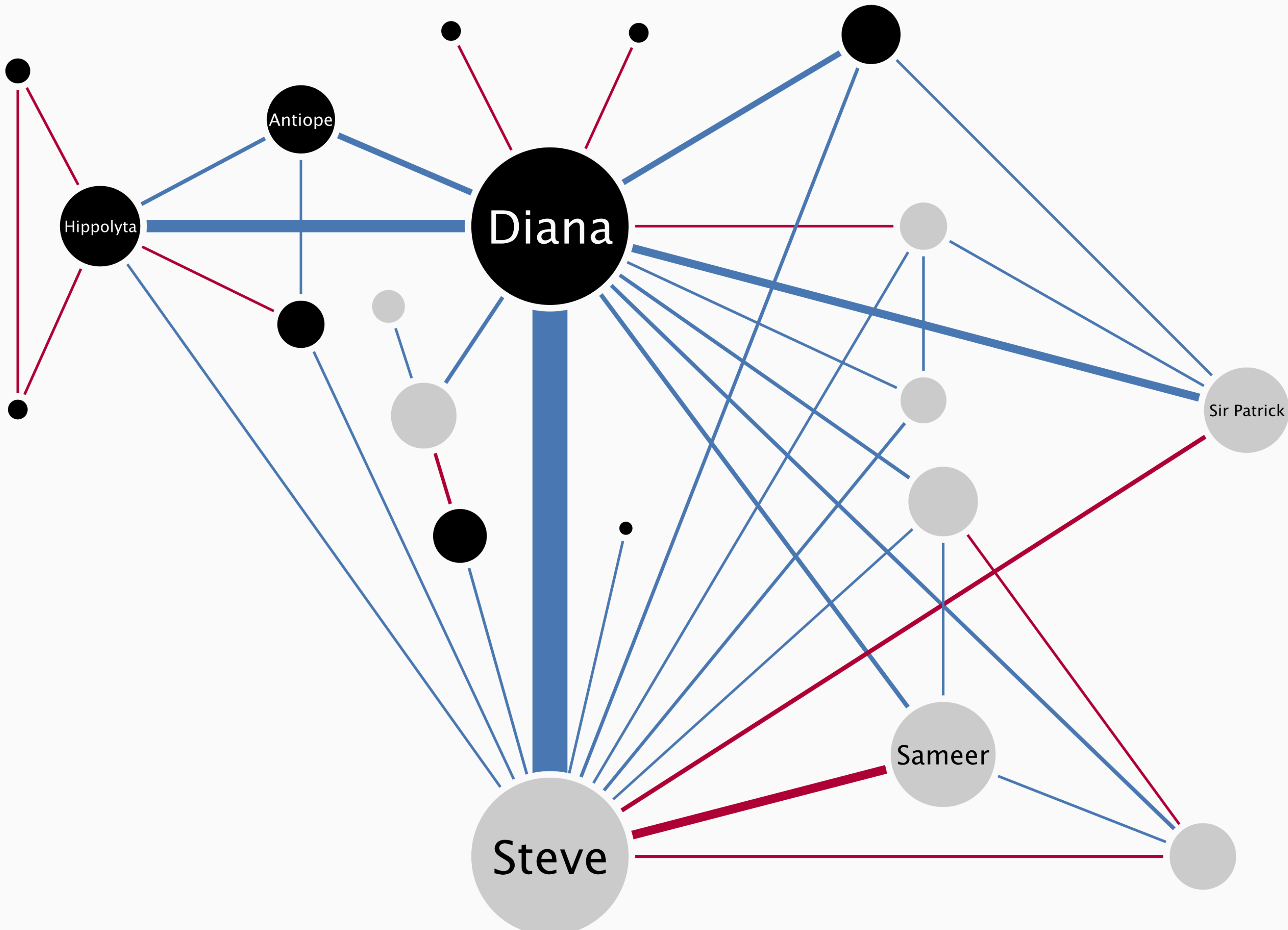
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Steve

analysis tools

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statistical entropy analysis

- assess (conditional) dependencies
- association graphs
- prediction power plots

random multigraph models

- generate random multigraphs
- compare expected to observed
- infer significant differences

statistical entropy analysis

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entropy is a measure of uncertainty of random variables

univariate entropy $$H(X) = \sum_x p(x) \log_2 \frac{1}{p(x)}$$

bivariate entropy $$H(X,Y) = \sum_x p(x,y) \log_2 \frac{1}{p(x,y)}$$

joint entropy

$$J(X,Y) = H(X) + H(Y) - H(X,Y)$$

non-negative and equal to 0 iff $X \perp Y$

expected conditional entropy

$$EH(Y|X) = H(X) + H(Y) - H(X,Y)$$

non-negative and equal to 0 iff $X \rightarrow Y$

statistical entropy analysis

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⇓

association graphs

expected conditional entropy

$$EH(Y|X) = H(X) + H(Y) - H(X,Y)$$

non-negative and equal to 0 iff $X \to Y$

⇓

prediction power plots

edge variables

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only consider variables with the same domain together

variable	observed/transformed	range
gender	node variable → edge variable	r = 3
number of lines	node variable → edge variable	r = 3
number of lines in	node variable → edge variable	r = 3
talk (dialogue)	edge variable	r = 2
topic	edge variable	r = 2

association graphs

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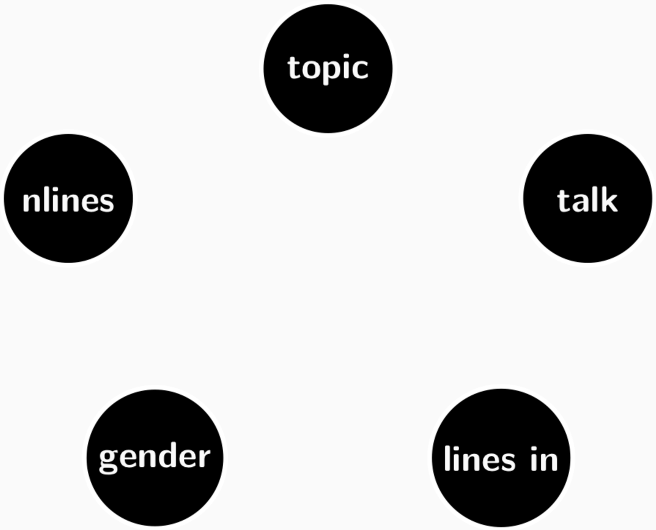
j	#(J = j)	#(J ≥ j)
2.02	1	1
0.72	1	2
0.31	1	3
0.29	1	4
0.27	1	5
0.24	1	6
0.23	1	7
0.19	1	8
0.05	1	9
0.02	1	10



association graphs

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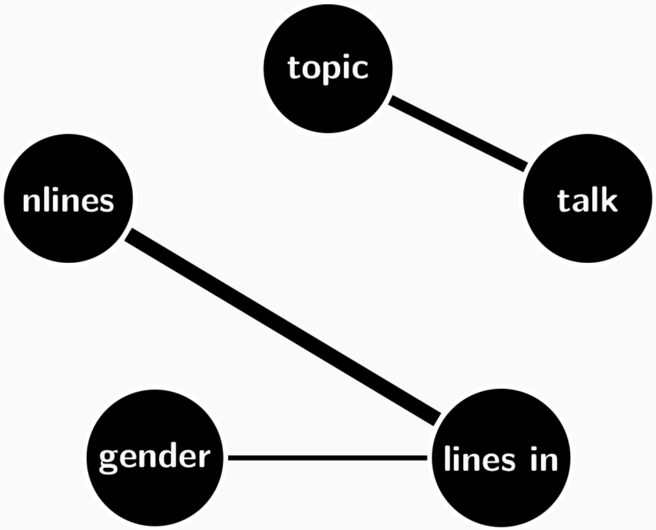
0.02	1	10

$J \geq 0.30$



strongest association between

- number of lines and number of times spoken to
- speaking and topic of conversation
- gender and number of times spoken to

association graphs

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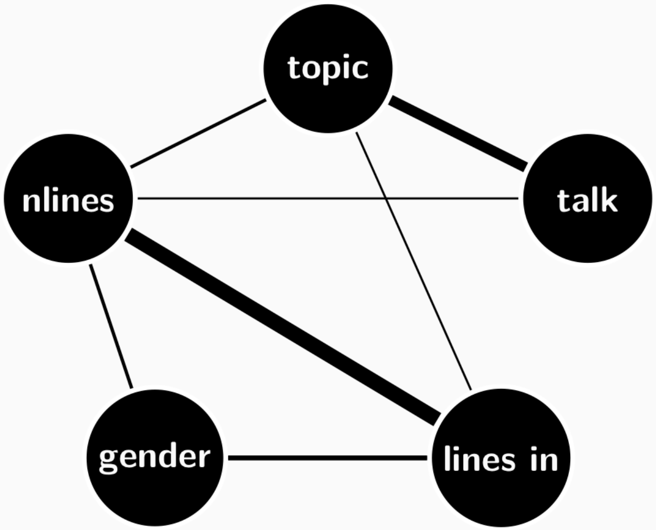
0.02	1	10

$J \geq 0.20$



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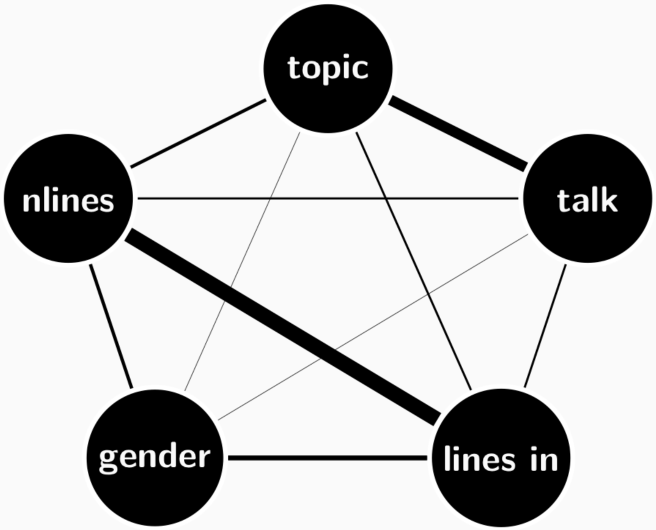
$J \geq 0.02$



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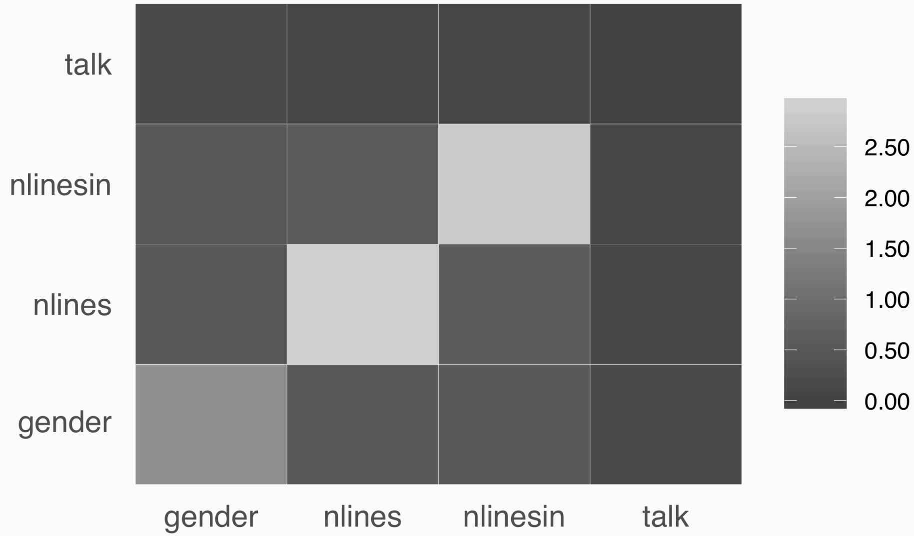
prediction power plots

predicting `topic`



strongest predictions

- talk variable alone or in combination with any of the other variables (not surprising)
- gender in combination with number of lines

multigraphs

graphs where loops and multiple edges are permitted

- can appear directly in applications
- can be constructed by different kinds of aggregation in graphs

multigraphs

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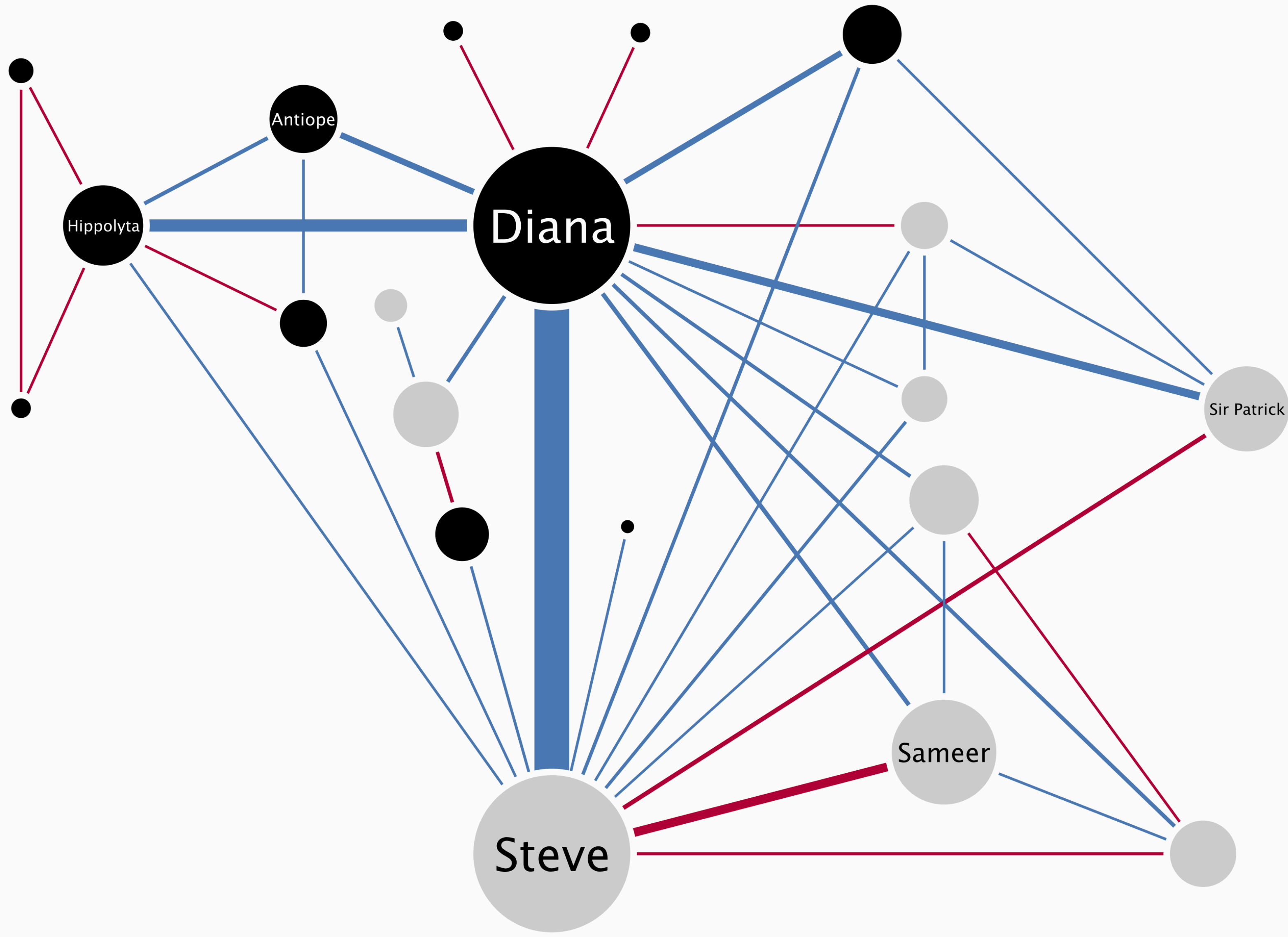
graphs where loops and multiple edges are permitted

- can appear directly in applications
- can be constructed by different kinds of aggregation in graphs

aggregation can be based on single or multiple vertex attributes

- number of lines (low/high)
- gender (female/male)

(disregard `topic` as a start)



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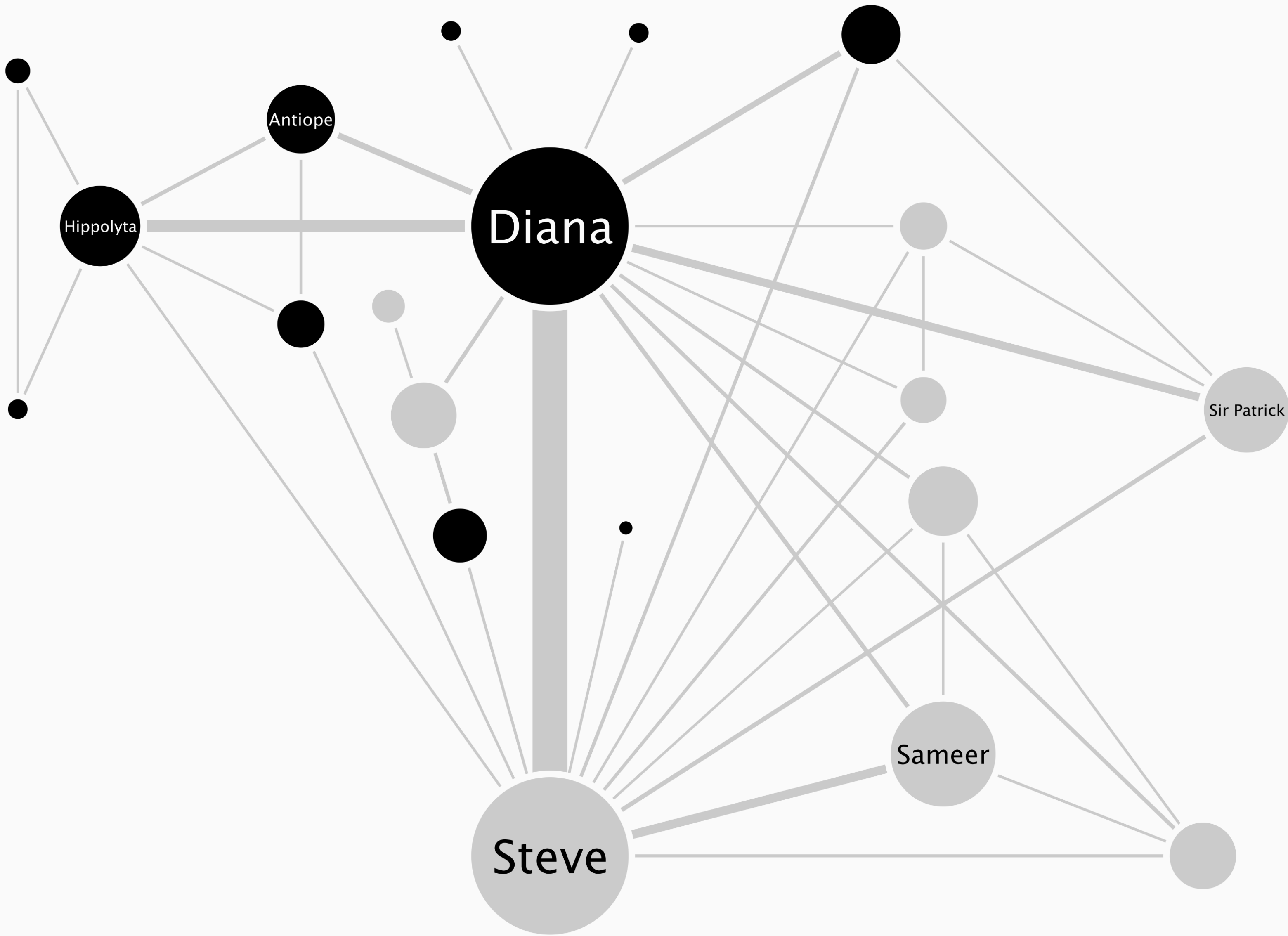

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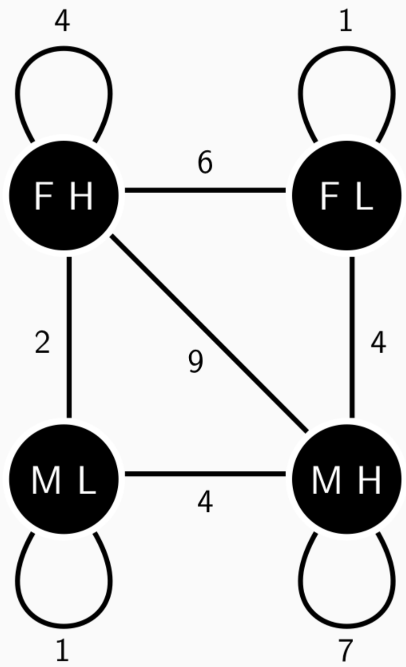
multigraphs

aggregated by number of lines (L/H) and gender (F/M)

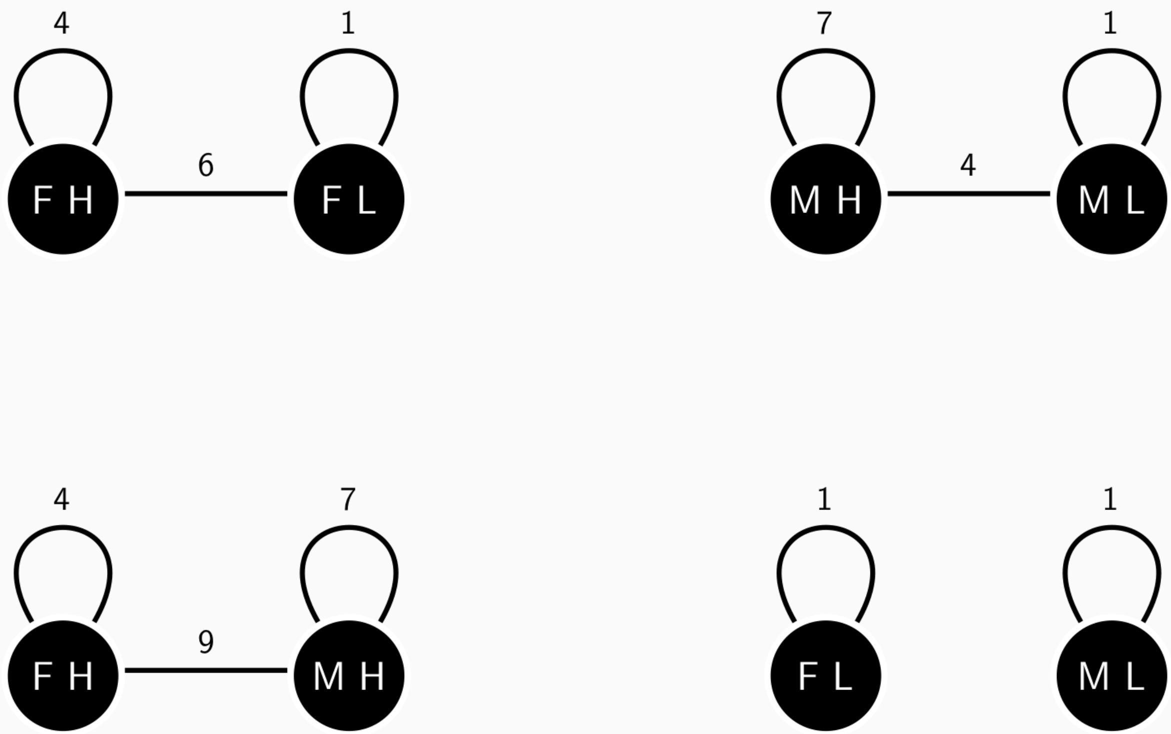


random multigraph model given fixed degree sequence used to compare

- observed to expected number of loops and non-loops
- convey structural dependencies and generative social processes

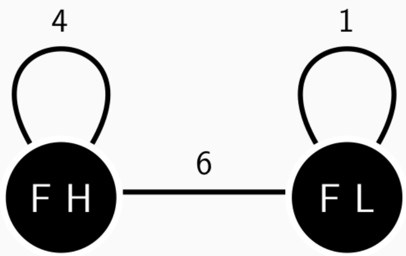
multigraphs

to make the interpretations meaningful we need to aggregate one step further...

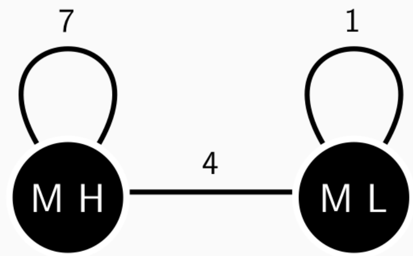


random multigraph model

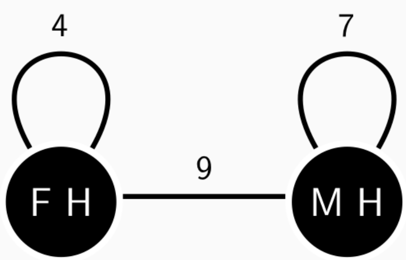
random stub matching given fixed degree sequence



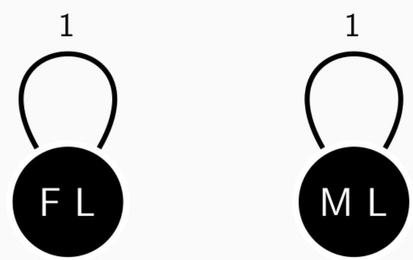
$d_1 = 14,\ d_2 = 8$



$d_1 = 18,\ d_2 = 6$

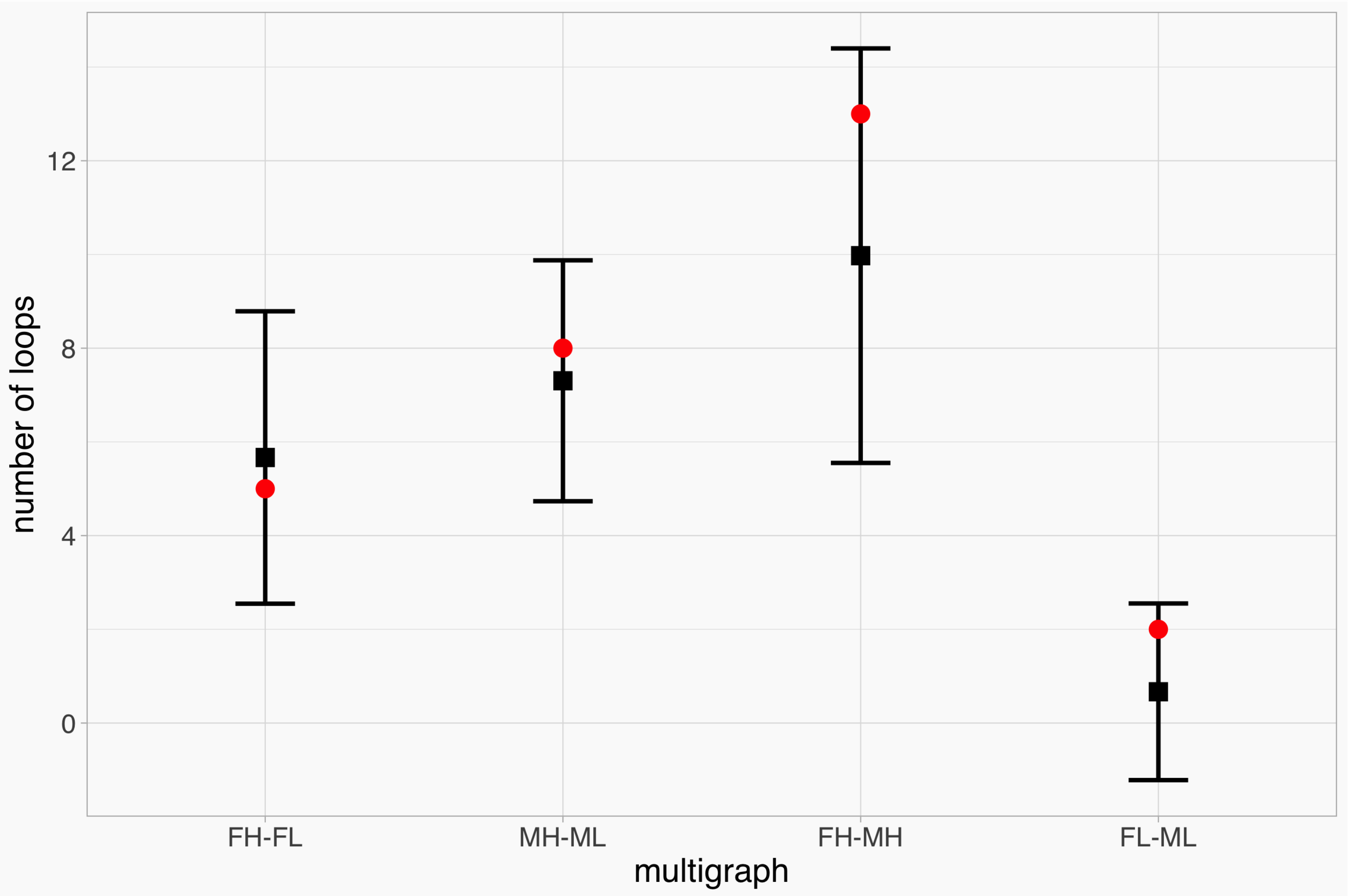


$d_1 = 17,\ d_2 = 23$



$d_1 = 2,\ d_2 = 2$

number of loops



number of non-loops

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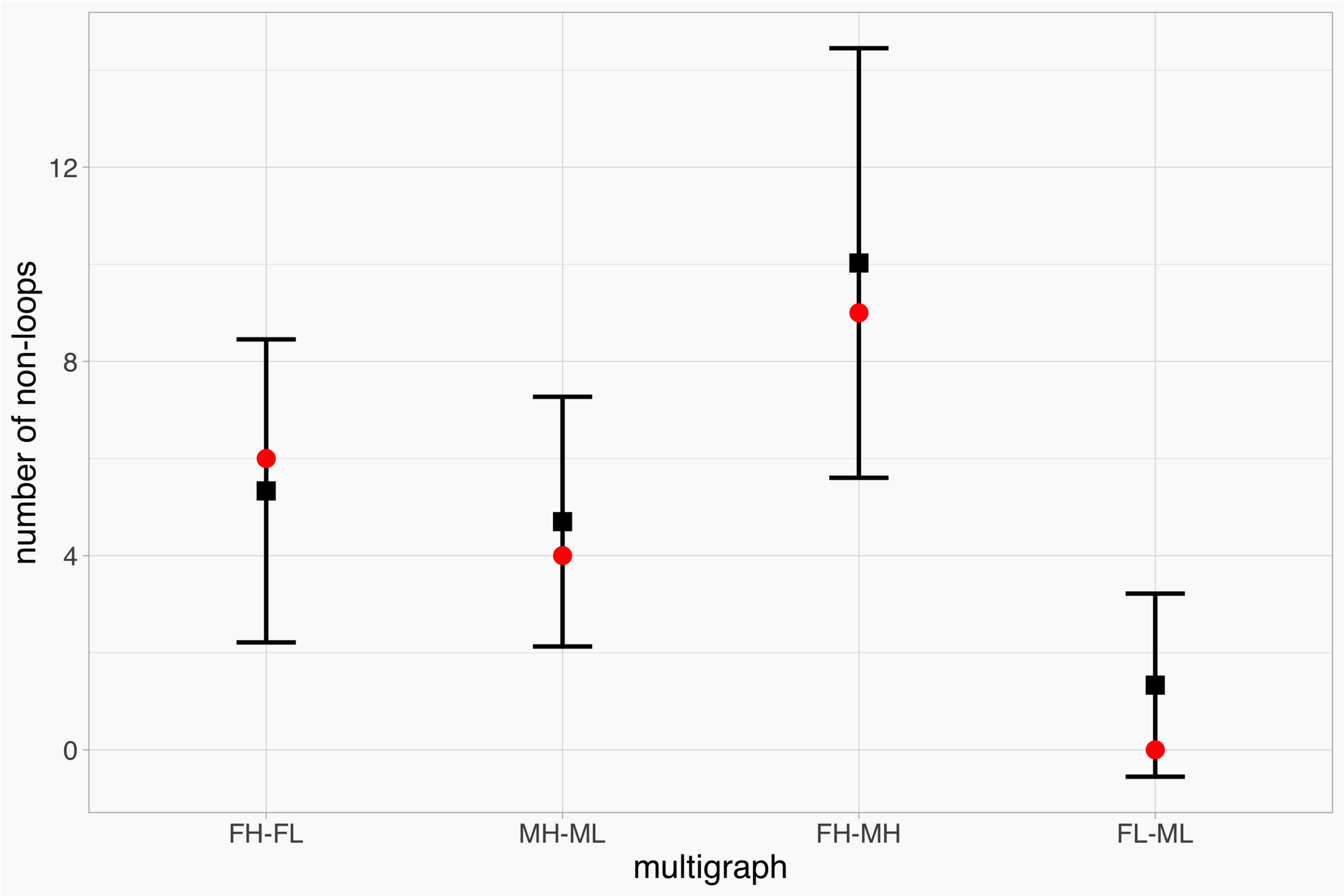
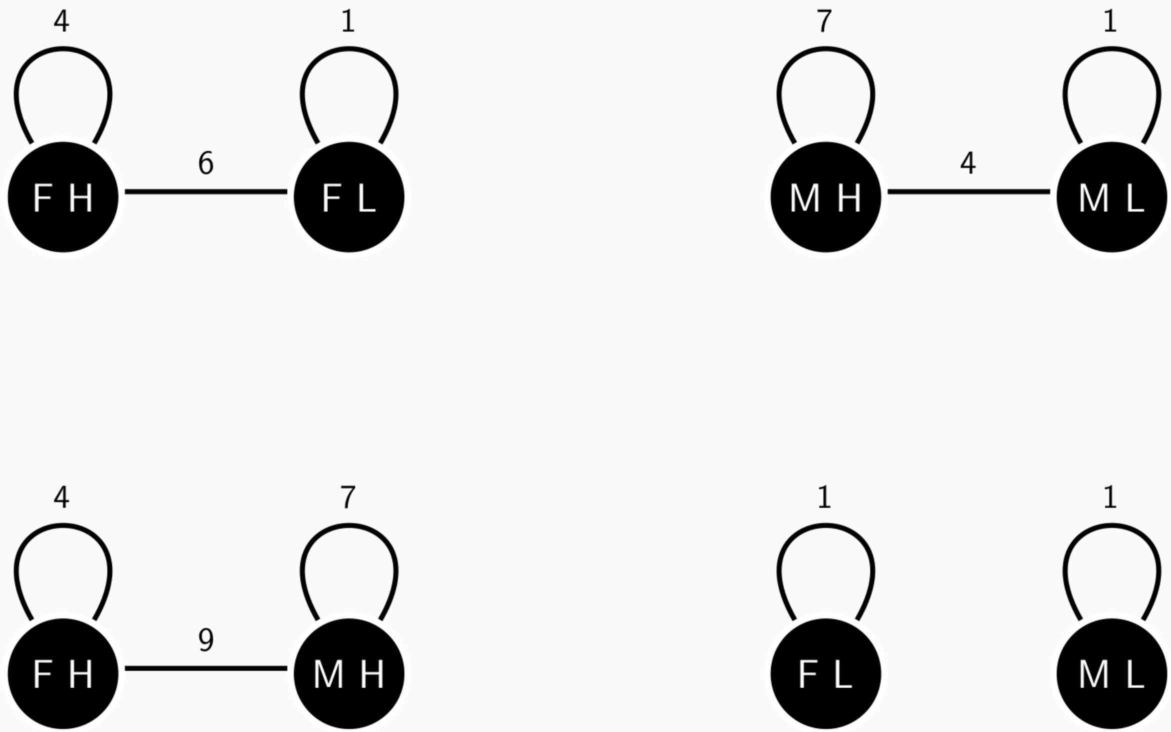


further directions

aggregated by number of lines (L/H) and gender (F/M)...



further directions

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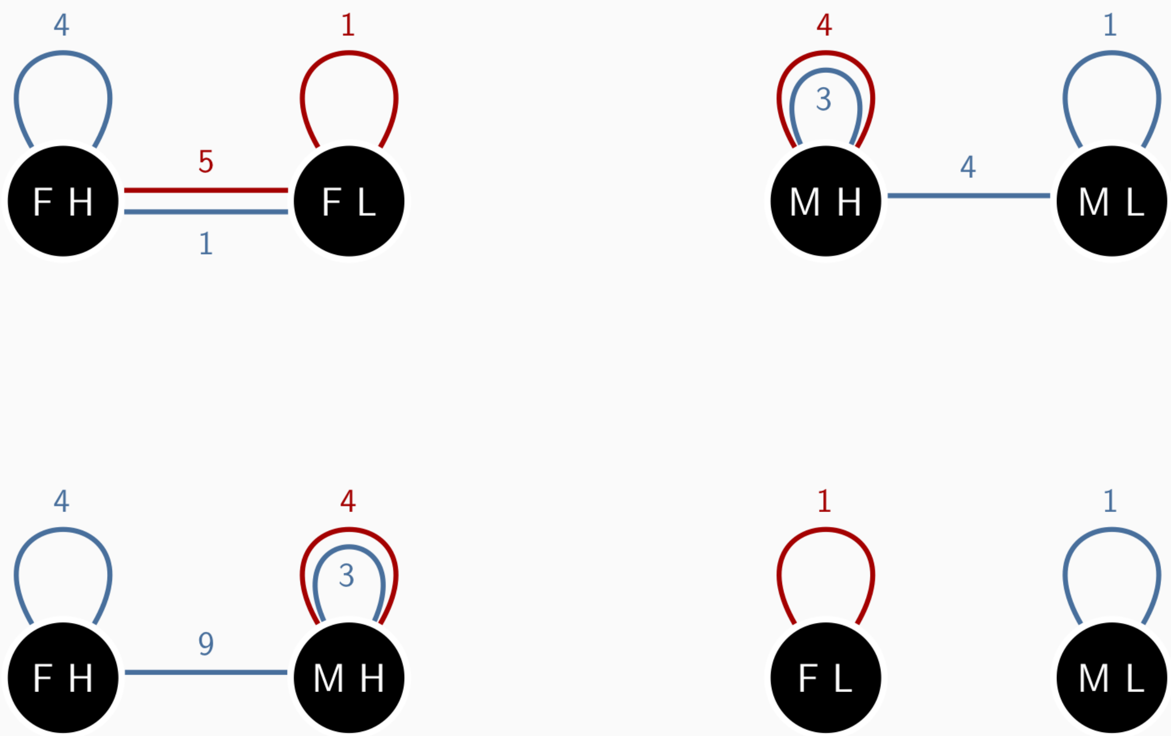
...but keep topic and model 8 multigraphs



improve and generalise the content analysis

further directions

- improve and generalise the content analysis (suggestions welcome)
- aggregate based on more vertex attributes
- apply other random multigraph models
- apply to corpus of movies

further directions

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- **improve and generalise the content analysis (suggestions welcome)**
- aggregate based on more vertex attribute
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some references:

- Termeh Shafie (2016): *Analyzing local and global properties of multigraphs*, The Journal of Mathematical Sociology, 40:4, 239-264
- Ove Frank and Termeh Shafie (2016): *Multivariate entropy analysis of network data*. Bulletin of Sociological Methodology/Bulletin de Méthodologie Sociologique, 129(1), 45-63.
- Termeh Shafie (2015): *A Multigraph Approach to Social Network Analysis*. Journal of Social Structure, 16.
- Pete Jones (2018): *Diana in the World of Men: a character network approach to analysing gendered vocal representation in Wonder Woman*, Feminist Media Studies