Exploring Author Gender in Book Rating and Recommendation

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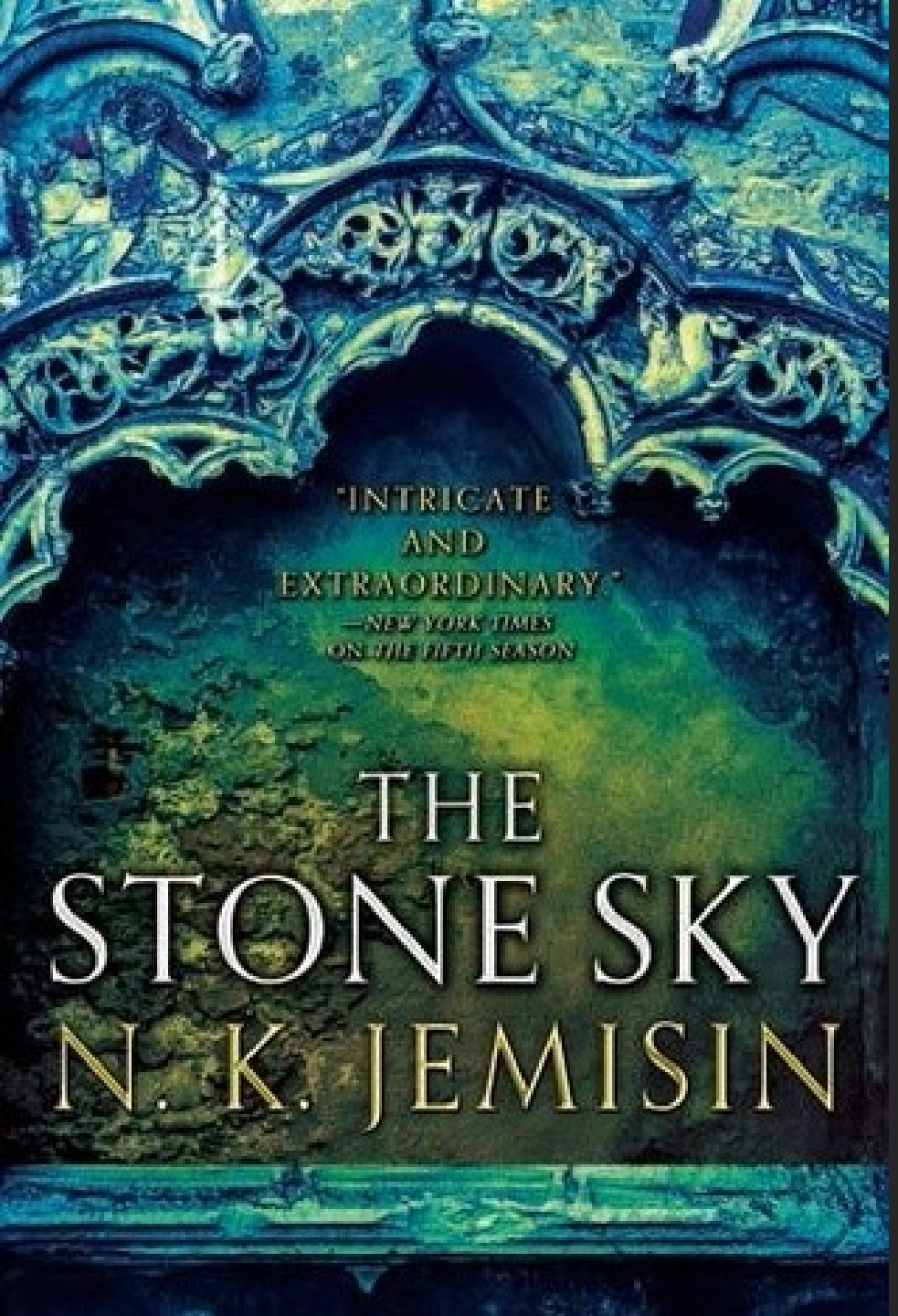
https://boi.st/RecSys2018Gender



Diversity and Representation in Book Authorship

2015 CWILA COUNT REVIEWS: IN ENGLISH	BY WOMEN	BY MEN	BY NON-BINARY REVIEWERS	BY MIXED GENDER CO-REVIEWERS	BY ANONYMOUS REVIEWERS
TOTAL COUNTED: 4462	2104 (55.21%)	1607 (42.17%)	5 (0.13%)	11 (0.29 %)	84 (2.20 %)
OF BOOKS BY WOMEN	55.32%	29.31%	40.00%	27.27%	45.24%
CANADIAN	35.93%	18.79%	20.00%	18.18%	32.14%
NON-CANADIAN	19.39%	10.52%	0.2	9.09%	13.10%
OF BOOKS BY MEN	38.78%	64.28%	40.00%	63.64%	46.43%
CANADIAN	22.43%	35.53%	20.00%	36.36%	33.33%
NON-CANADIAN	16.35%	28.75%	20.00%	27.27%	13.10%
OF BOOKS BY NON-BINARY AUTHORS	0.19%	-	20.00%	-	-
CANADIAN	0.10%	-	-	-	-
NON-CANADIAN	0.10%	-	20.00%	-	-
OF BOOKS BY MIXED GENDER CO-AUTHORS	5.47%	6.16%	-	-	8.33%
CANADIAN	3.80%	3.24%	-	-	8.33%
NON-CANADIAN	1.66%	2.92%	-	-	-
OF BOOKS BY VARIOUS/UNKNOWN	0.24%	0.25%	-	9.09%	-

Source: Canadian Women in the Literary Arts. http://cwila.com/2015-cwila-count-methods-results/

How do recommender systems interact with these efforts?

Hurdles by Ragnar Singsaas, used under CC-BY-SA 2.0. https://flic.kr/p/5jgjJP

Research Questions

RQ1 How are author genders distributed in cataloged books?

RQ2 How are author genders distributed in user book ratings?

RQ3 How are author genders distributed in recommendations?

RQ4 How do recommendations respond to user profiles?

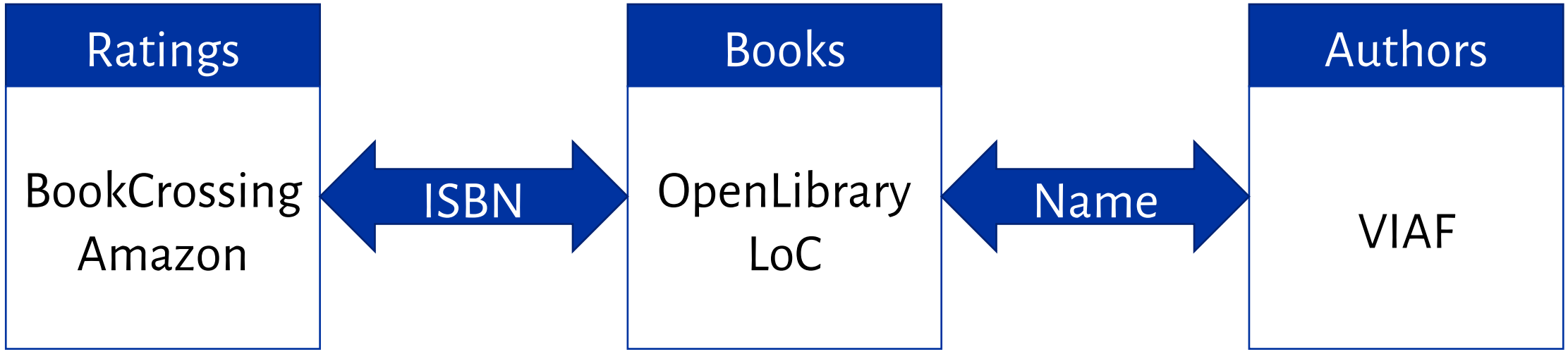
Fairness Positioning

Provider fairness (sort-of…) [Burke 2017]

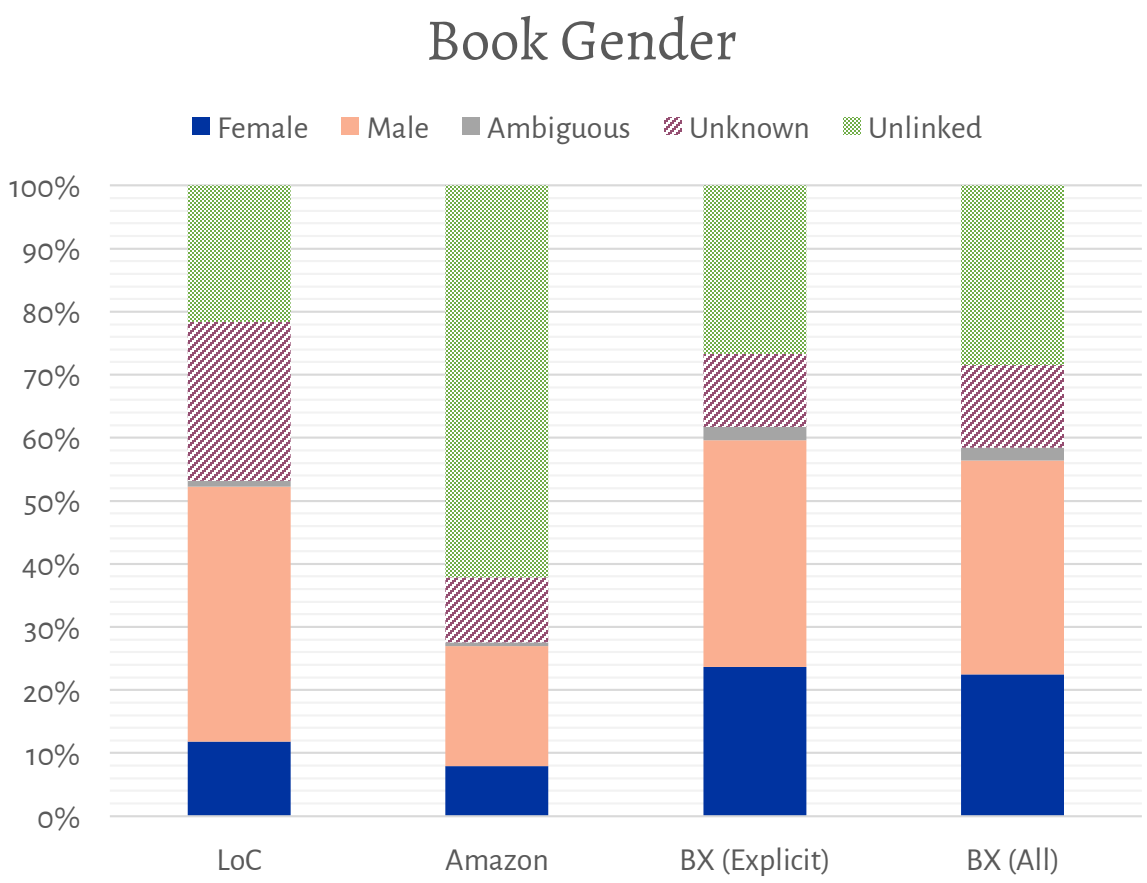
Calibrated fairness [Steck 2018]

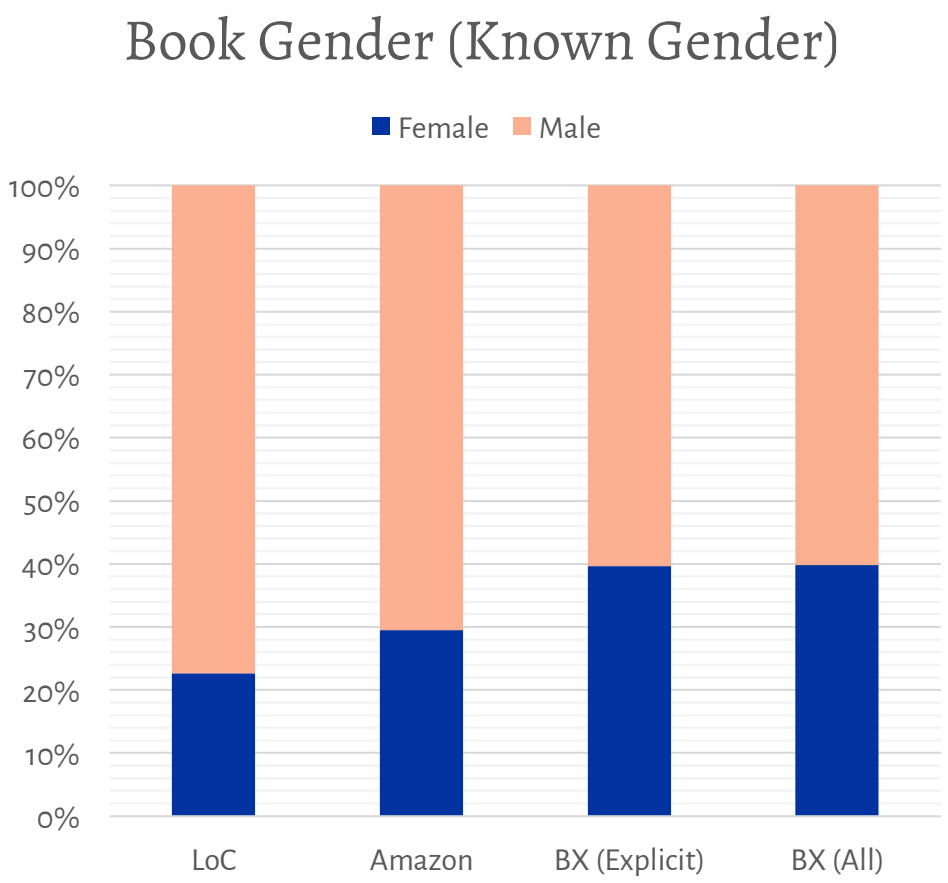
Descriptive, not normative

Data


Ratings
BookCrossing
Amazon
ISBN
Books
OpenLibrary
LoC
Name
Authors
VIAF

RQ1: Catalog Distribution

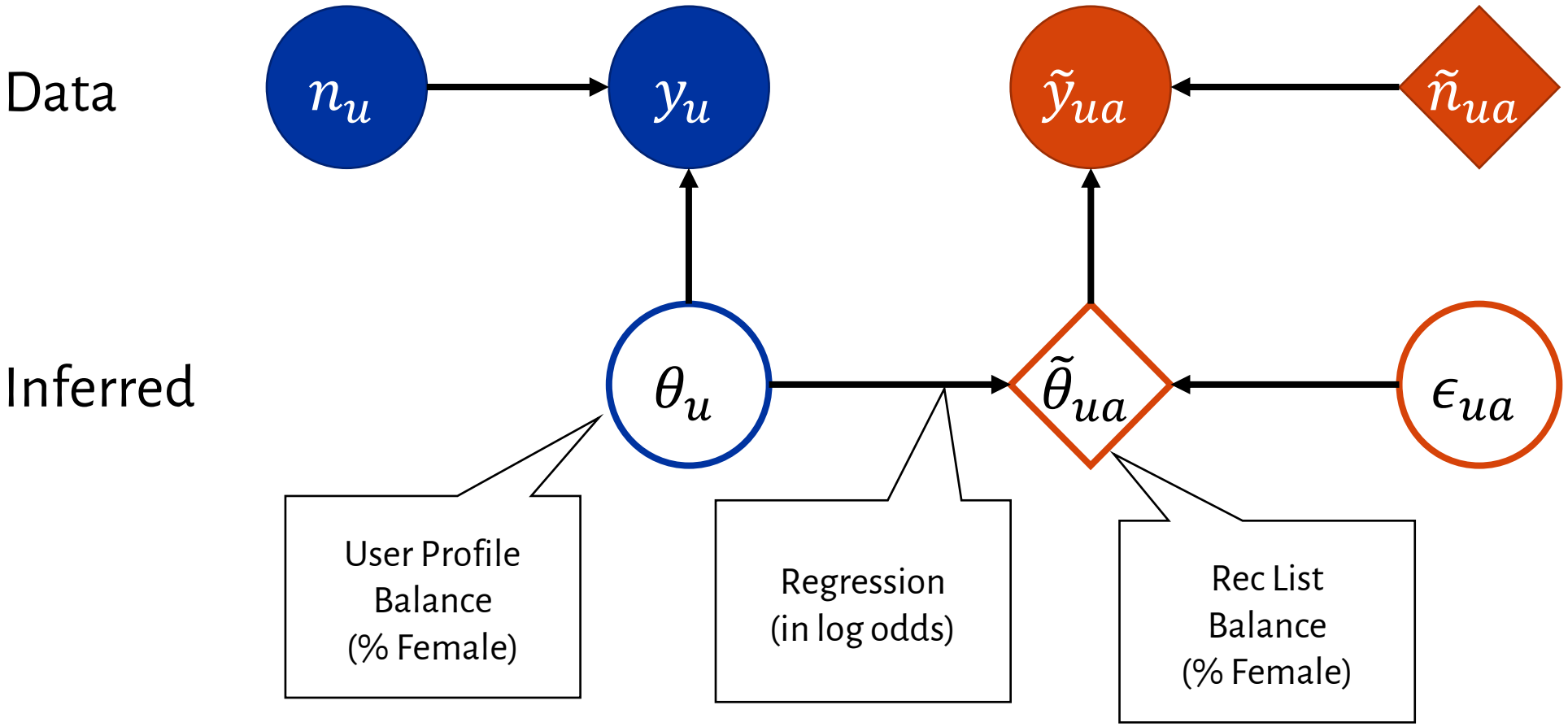




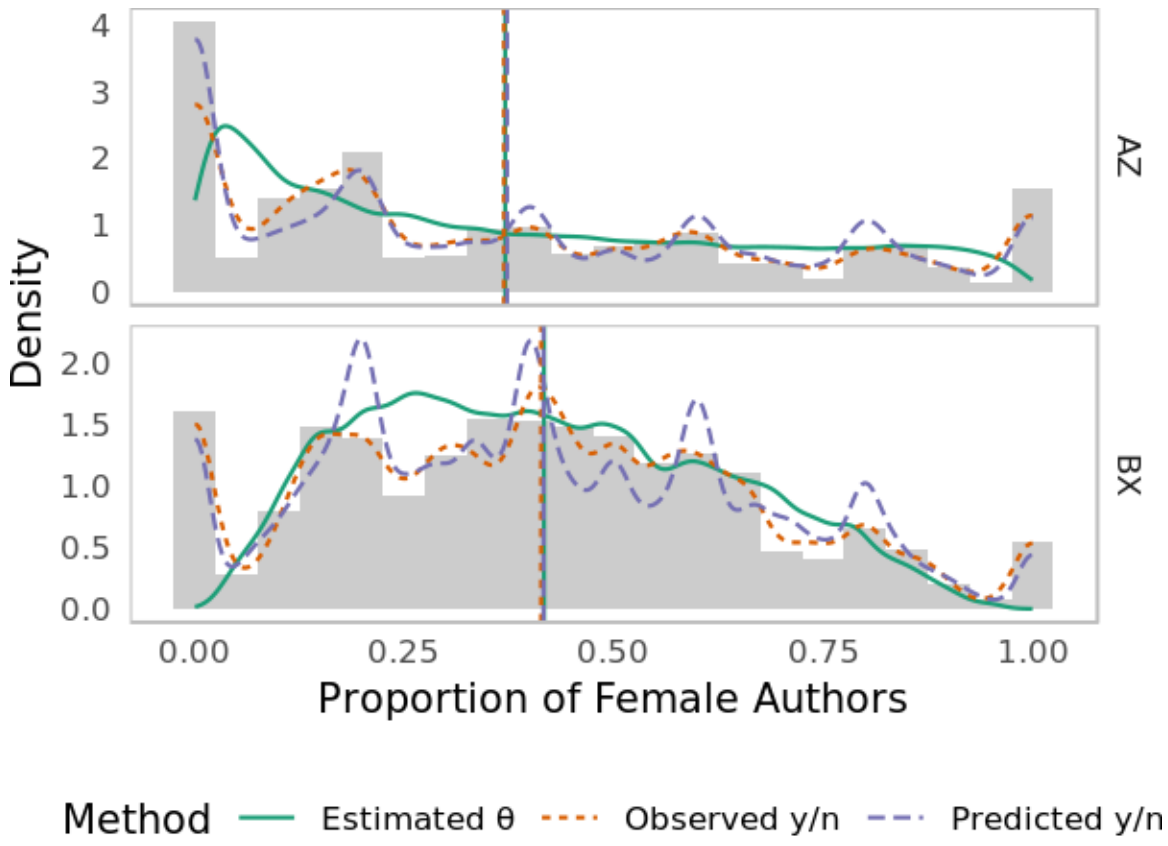
Recommender Experiment

1. Sample 1000 users (each rating 5 books with known author gender)
2. Measure user profile gender distribution (RQ2)
3. Generate 50 recommendations for each user
    1. User-User
    2. Item-Item
    3. MF (Funk SVD) [didn't personalize - ignore]
    4. Poisson factorization
4. Compute recommendation list distribution (RQ3)
5. Compare recommendation lists to user profiles (RQ4)

Hierarchical Bayesian Model



RQ2: Profile Distribution

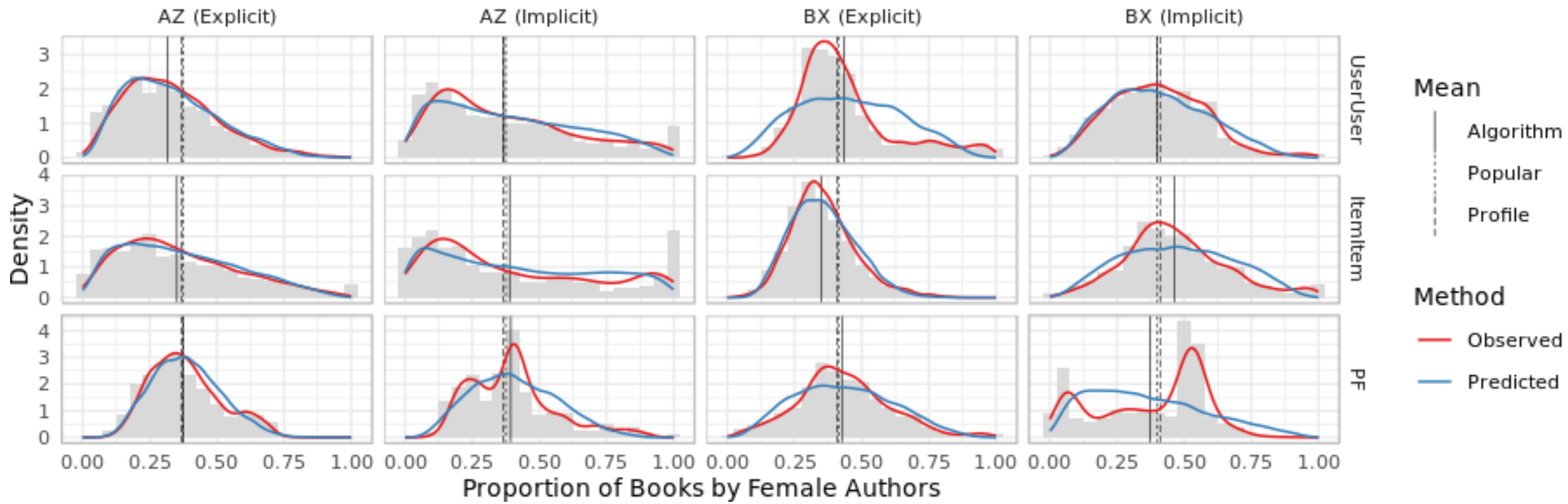


Mild tendency towards male authors (mean < 0.5)

High variance in user profile composition

Average is more balanced than book catalog

RQ3: Recommendation List Distribution

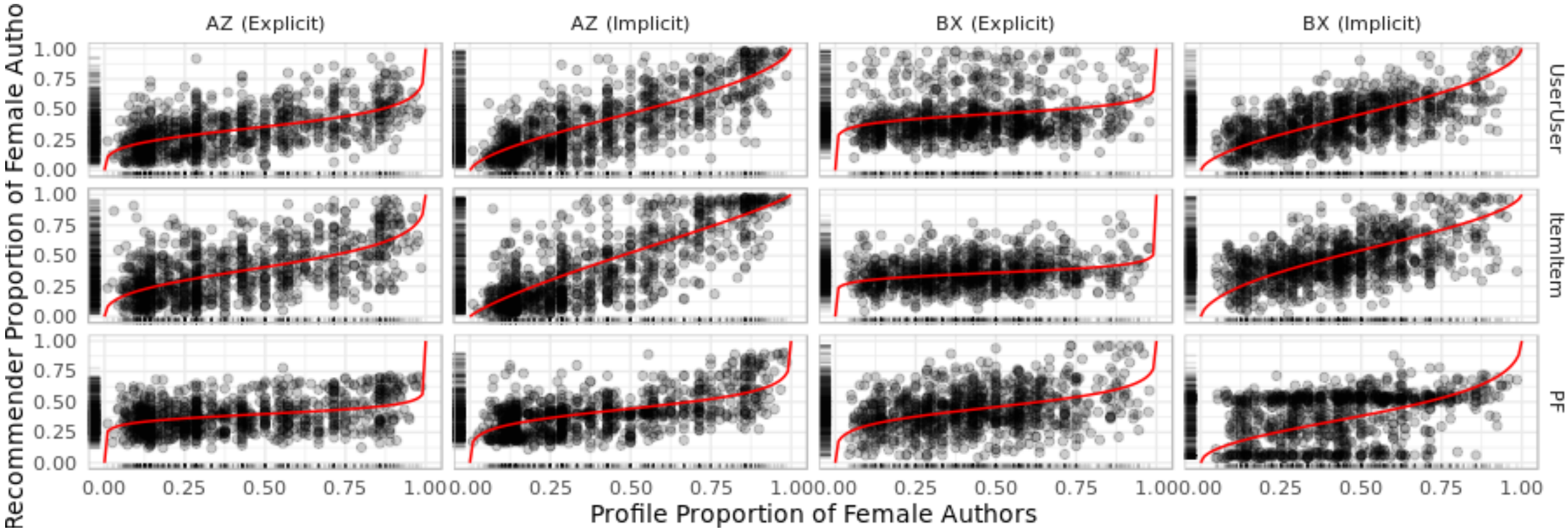


Less variance than user profiles

Average balance usually comparable

Nearest-neighbor had most shift (U-U on explicit ratings, I-I on BX)

RQ4: Recommendation List Response



Input balance propagates, though extent varies

Limitations

- Rating data is extremely sparse
  - Algorithms didn't perform particularly well
  - MF very non-personalized
- Only considers binary gender identities
  - Working on statistical models to overcome that
- Just a few algorithms

Philosophy: expand knowledge with what we have, work on the limitations.

Conclusion

Code and Slides:
https://boi.st/RecSys2018Gender

Summary

- Users exhibit mild, diffuse tendency towards male authors
- User profiles more balanced than book catalog
- Nearest-neighbor & PF algorithms propagated (some) user balance to recommendations

Future Work

- Better data
- Better statistical model
- More author features
- More domains
- More algorithms
- Study diversifying algorithms

Questions?