Title: Why women leave: Model women and models of discrimination

Speakers: Susama Agarwala

Collection: Women at the Intersection of Mathematics and Theoretical Physics

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Abstract: " In this talk, I posit two concepts from the economics literature as hypotheses for the observed data on women in academia. This talk includes time for discussion about how these concepts can inform our approach to mentoring junior women.
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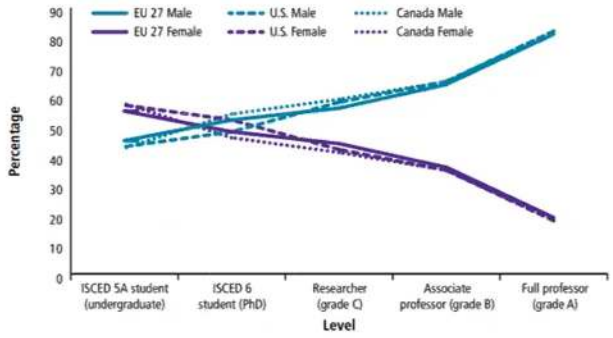
Why women leave: Model women and models of discrimination

WIMTP 2021

Susama Agarwala

JOHNS HOPKINS
APPLIED PHYSICS LABORATORY

Leaky Pipeline

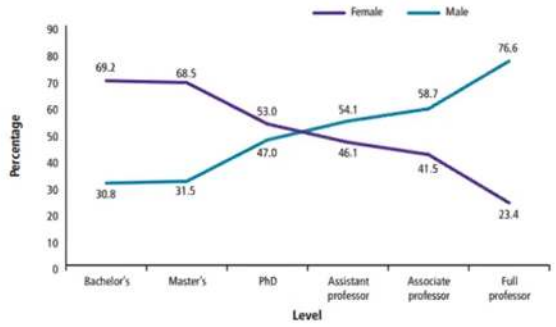


(Data Source: European Commission, 2009); Statistics Canada n.d.b.; Cacace, 2009)

Figure 3.8

Canada Compared to the EU and U.S.: Similar Profiles

This figure depicts the proportion of female and male students and academic staff in a typical academic career in Canada, the U.S. and the EU, 2007.

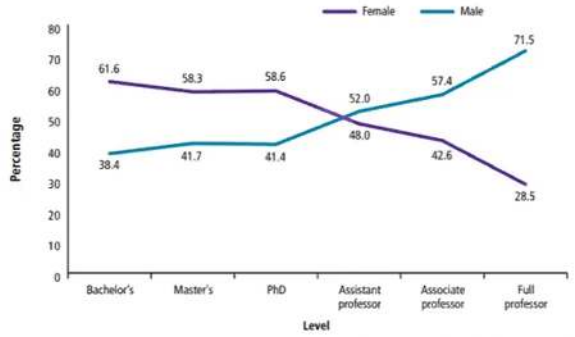


(Data Source: Statistics Canada, n.d.d., n.d.b.)

Figure 3.3

Percentage of Women and Men at Different Academic Levels in LS

This figure displays the percentage of women and men in life sciences in 2008–2009 at various stages of the academic career in Canadian universities.

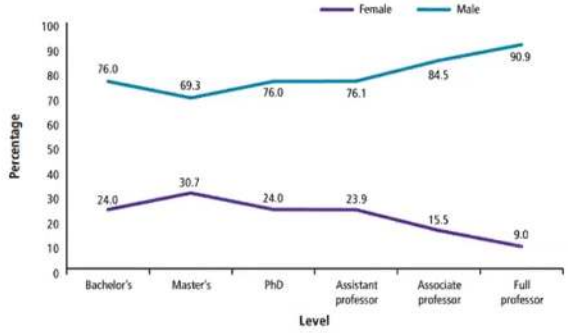


(Data Source: Statistics Canada, n.d.d., n.d.b.)

Figure 3.2

Percentage of Women and Men at Different Academic Levels in HSE

This figure displays the percentage of women and men in humanities, social sciences, and education in 2008–2009 at various stages of the academic career in Canadian universities.



(Data Source: Statistics Canada, n.d.d., n.d.b.)

Figure 3.4

Percentage of Women and Men at Different Academic Levels in PCEM

This graph depicts the percentage of women and men in physical sciences, computer science, engineering, and mathematics (PCEM) in 2008–2009 at various stages of the academic career in Canadian universities.

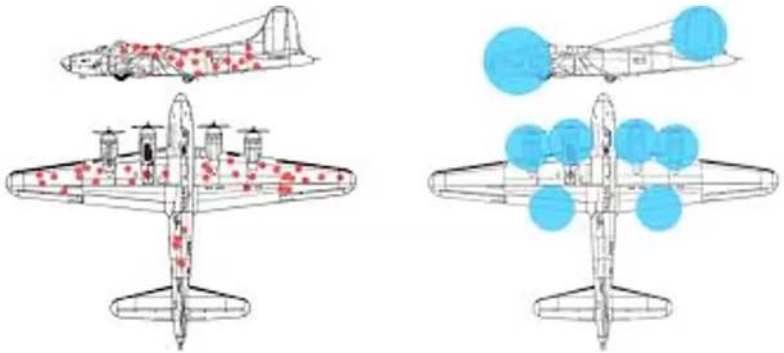
Survival Bias: Another form of selection bias

Definition: If there is a screening process then those that pass the screening process have different characteristics than those that did not pass the screening process.

What if we can't observe the screening process?

- First defined by Abraham Wald
- Studying aircraft shot down in WWII

- Q: What type of damage can an aircraft take and survive?
  - Have the data on the planes that return
  - The most valuable data comes from the aircraft that the group does not have access to (those that do not return)



Hit distribution

Reinforced areas

The danger of only asking the people in the room

- New school wants to start a parent teacher association

The danger of only asking the people in the room

- New school wants to start a parent teacher association
- Principal calls a meeting of interested parents at 10 am
- After a survey of people in the room, concludes that this is an acceptable time.

The danger of only asking the people in the room

- New school wants to start a parent teacher association
- Principal calls a meeting of interested parents at 10 am
- After a survey of people in the room, concludes that this is an acceptable time.
- What might the group miss in this process?

Survival bias: Why we can't ask female professors why women leave

- Studying what the survivor group has in common does not help understand the problem. One must also study how they are different from the screened group

By looking at successful start-up founders, like Steve Jobs, Bill Gates, and Mark Zuckerberg, an individual could conclude that to reach their level of success, they must simply have an idea, drop out of school, and dedicate their time to their start-up

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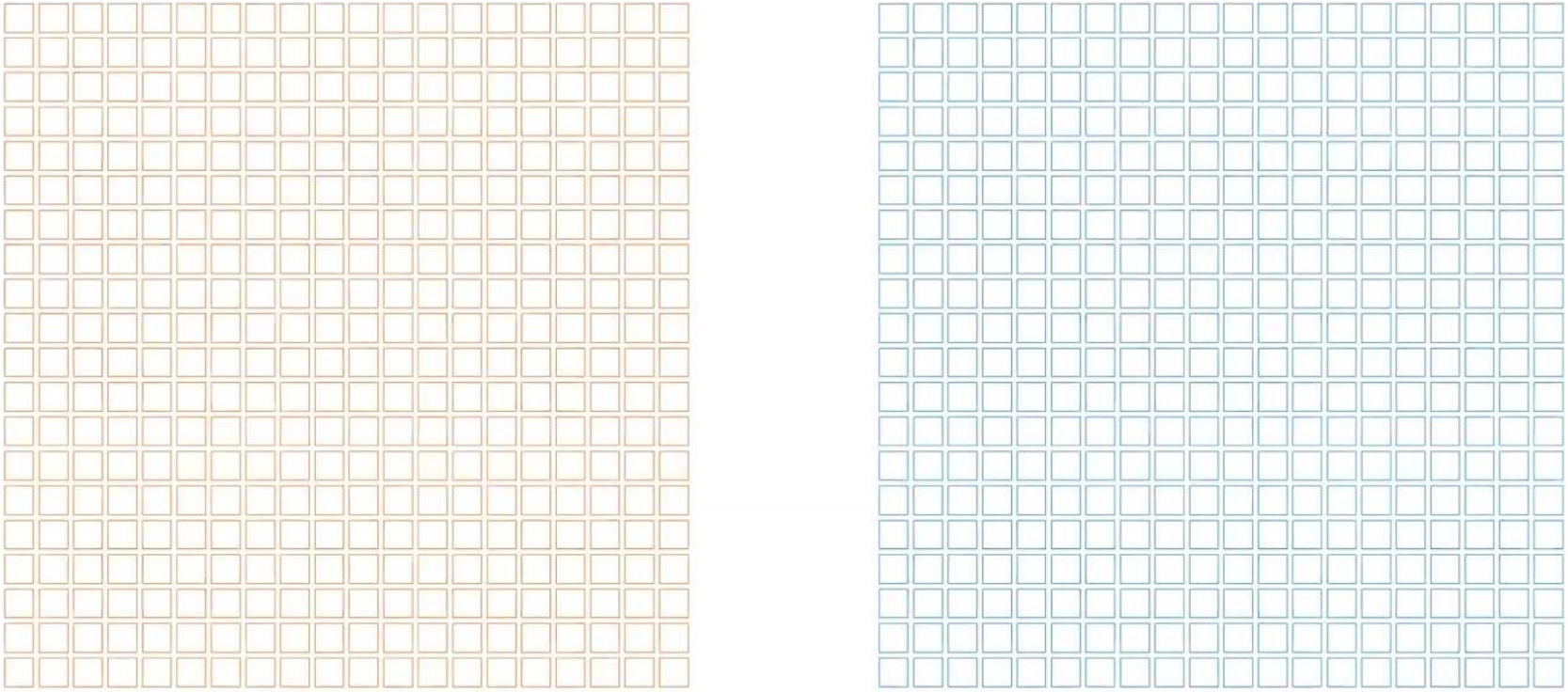
- Systematic discrimination is a stochastic process.
  - It is difficult to prove whether a specific person was discriminated against, only that certain classes of people are *more likely* to face discrimination
  - It is impossible to say *which* highway accidents were due to inclement weather, only that inclement weather causes more accidents

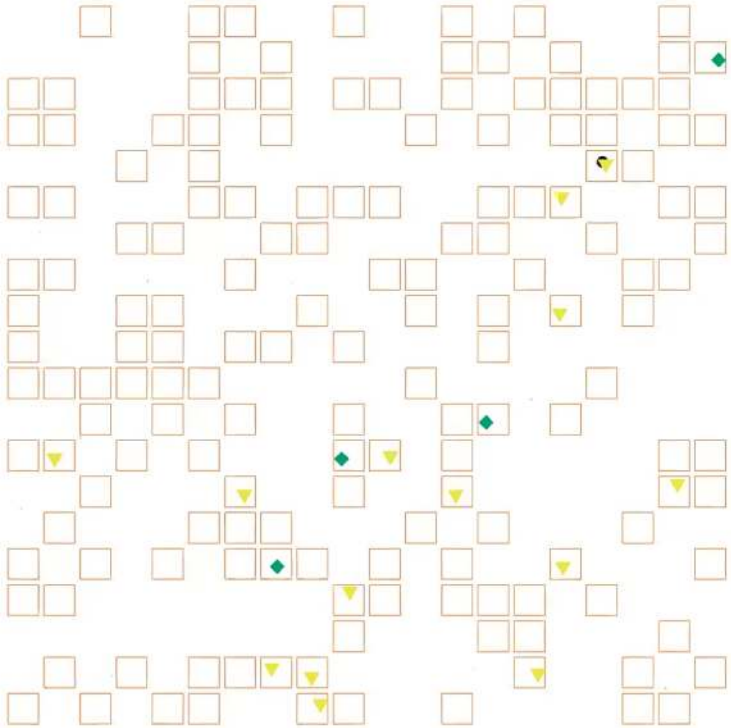
Survival Model

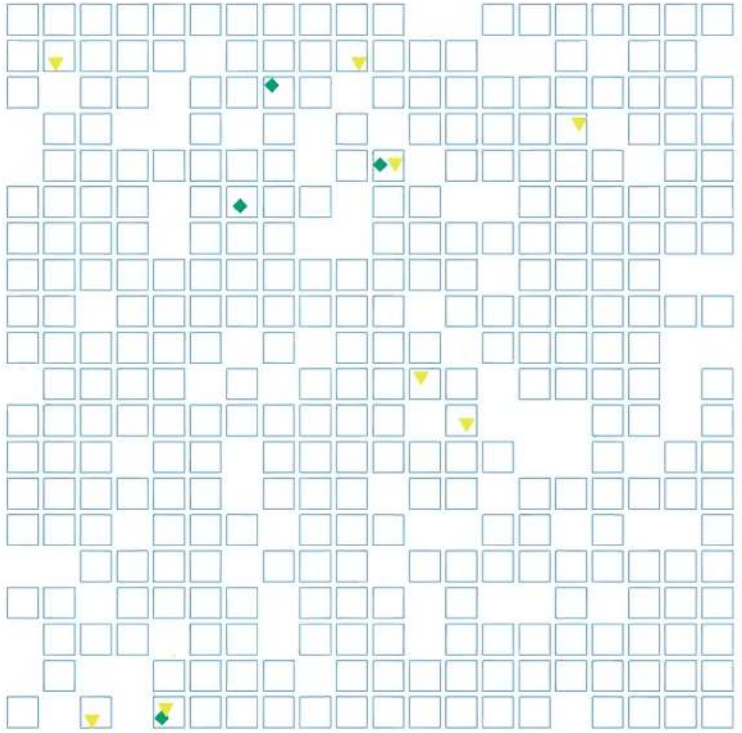
Stage 0: Two Identical populations



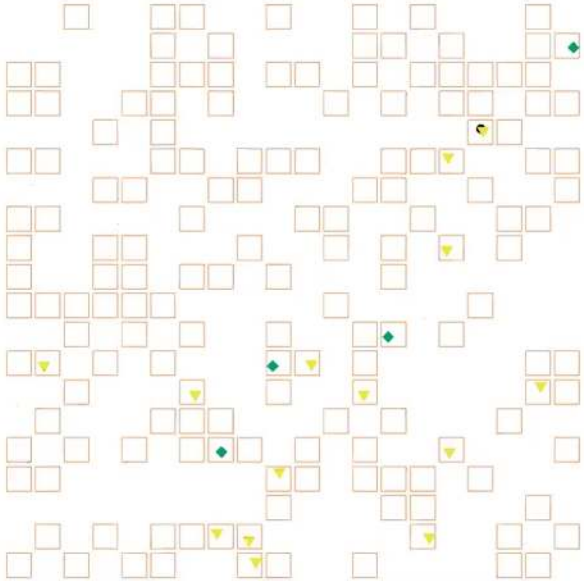
Survival Model

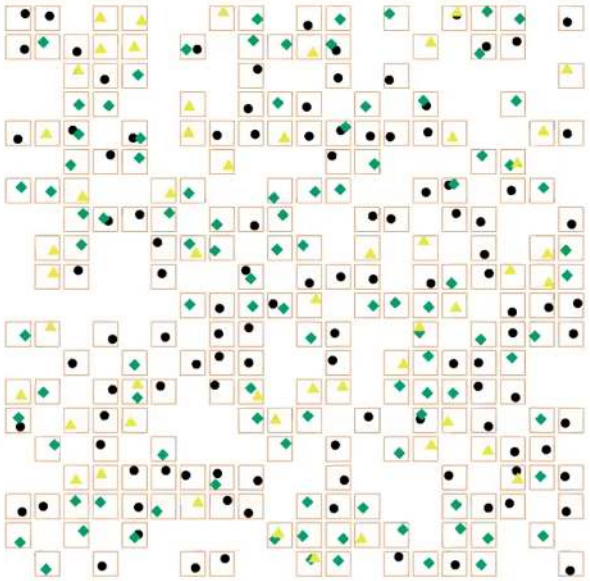
Stage 3

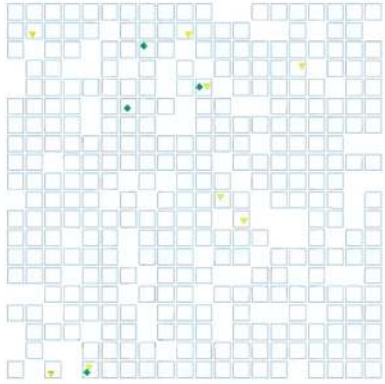


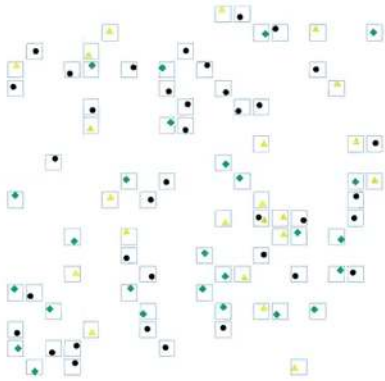


Screened populations have different characteristics than those who did not survive the screening

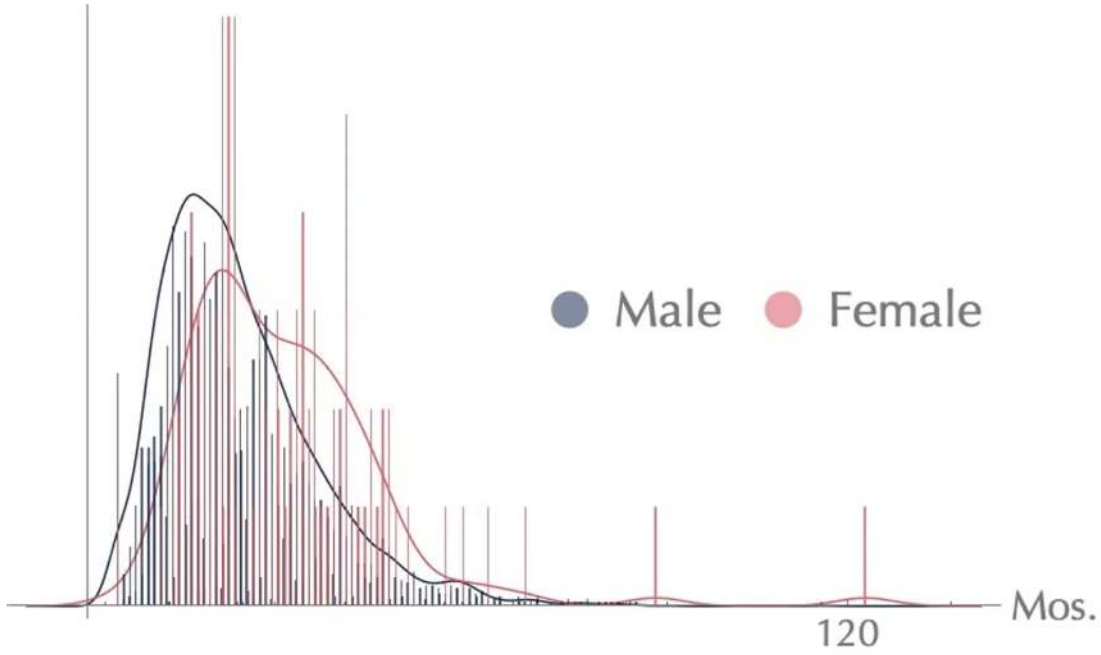








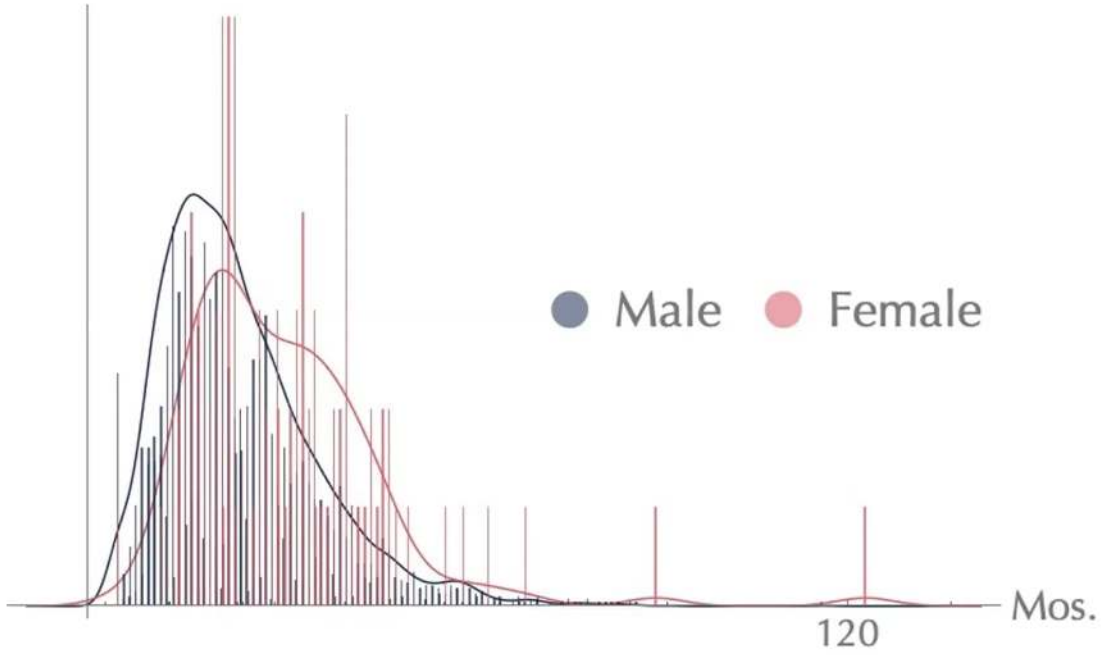
Survival bias: an example from Econ publications



Distributions of review times for all 3,798 papers entirely by men and all 112 papers entirely by women in 2 top economics journals

Survival bias: an example from Econ publications

- Papers by women on average take 3-6 months more to referee than *equivalent* papers by men
- Those drawing longer review times may publish less, thus get fewer job offers



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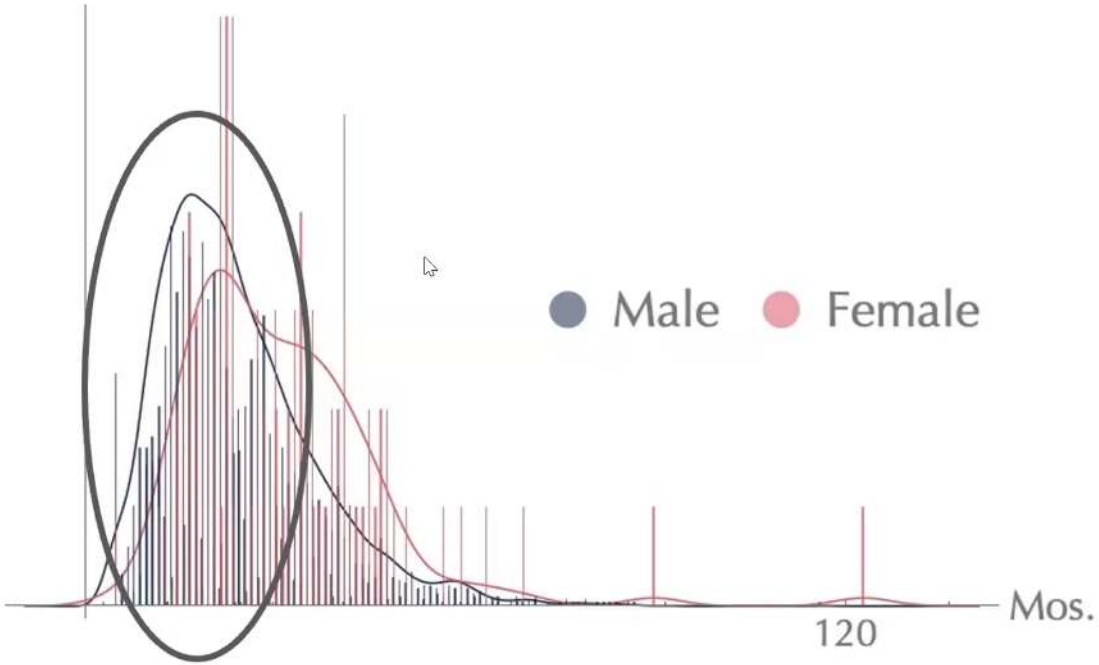
- If we only ask those on the left side of the distribution how to succeed, what will we miss?



Distributions of review times for all 3,798 papers entirely by men and all 112 papers entirely by women in 2 top economics journals

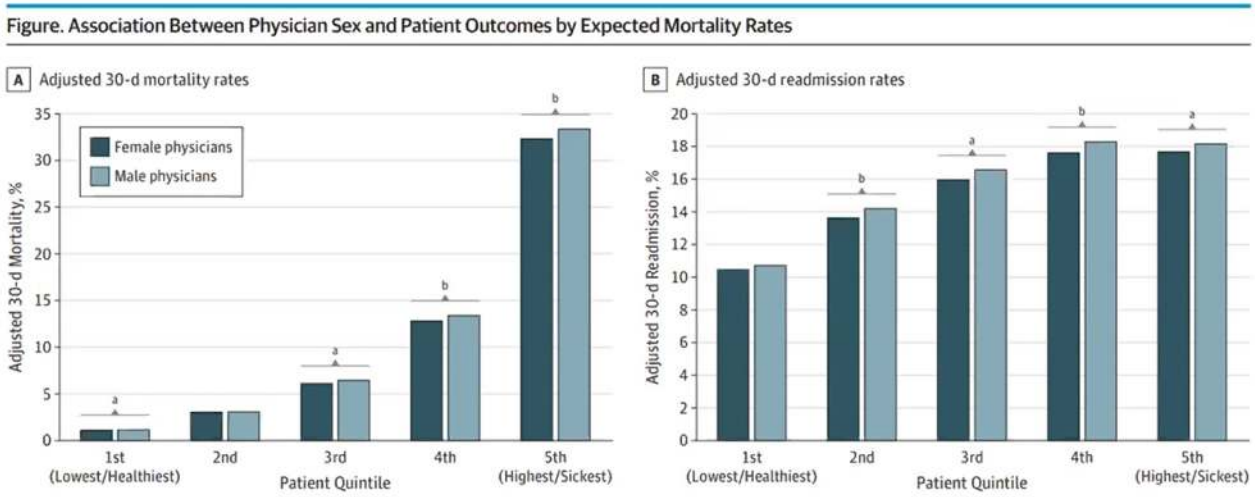
Jackie Robinson Effect: Why the existence of many talented women is evidence of discrimination

If management is more comfortable with white players than black players, a black player has to be better than a white player to be considered.

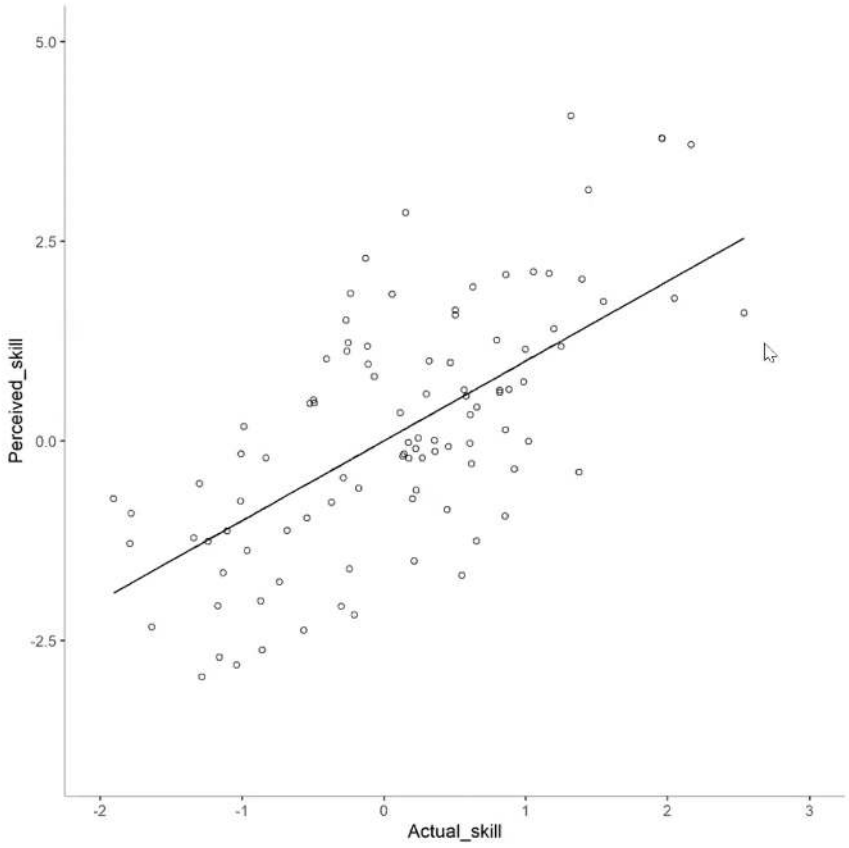
For example: in 1968 black players at each position had higher batting averages than white players at the same position (Pascal and Rappling 1972)

Evidence of Jackie Robinson Effect

- Female Members of the US Congress pass more bills and bring home more money for their districts than males (Anzia and Berry 2011)
- Patients seen by female doctors are less likely to die and less likely to be readmitted to the hospital (Tsugawa et al. 2017)

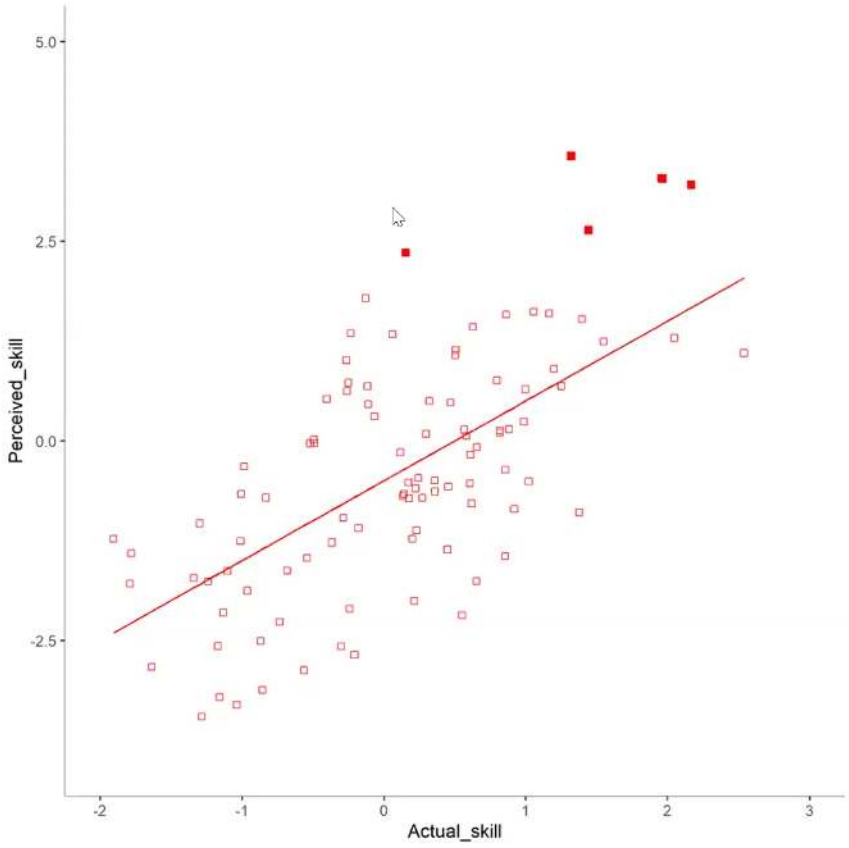


Jackie Robinson Effect Model



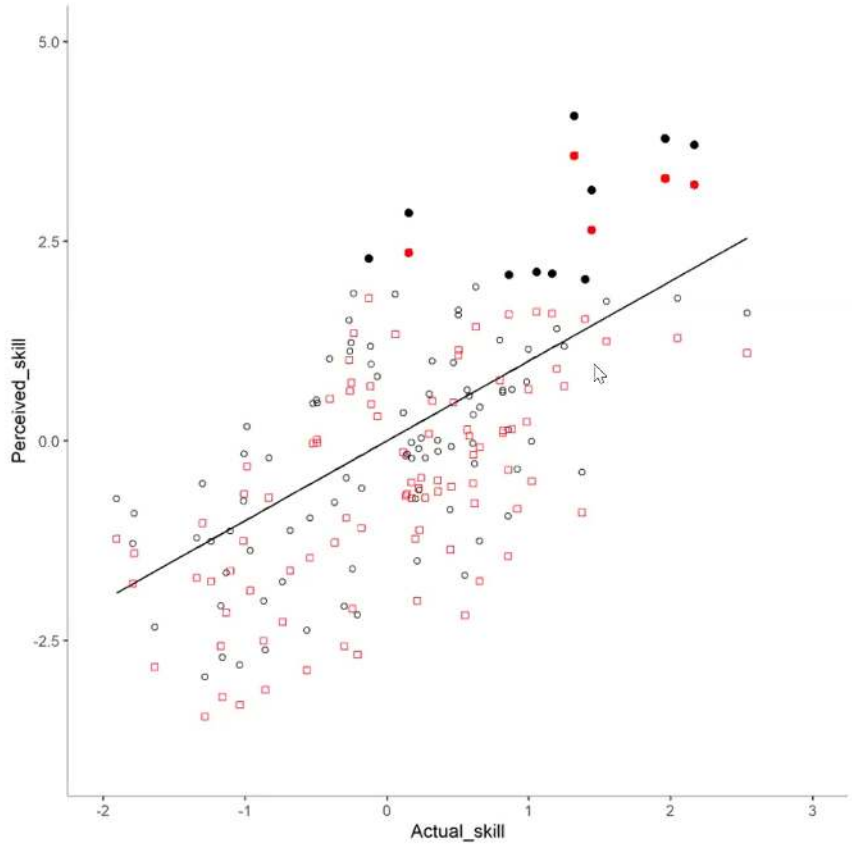
Hiring with noise

Jackie Robinson Effect Model



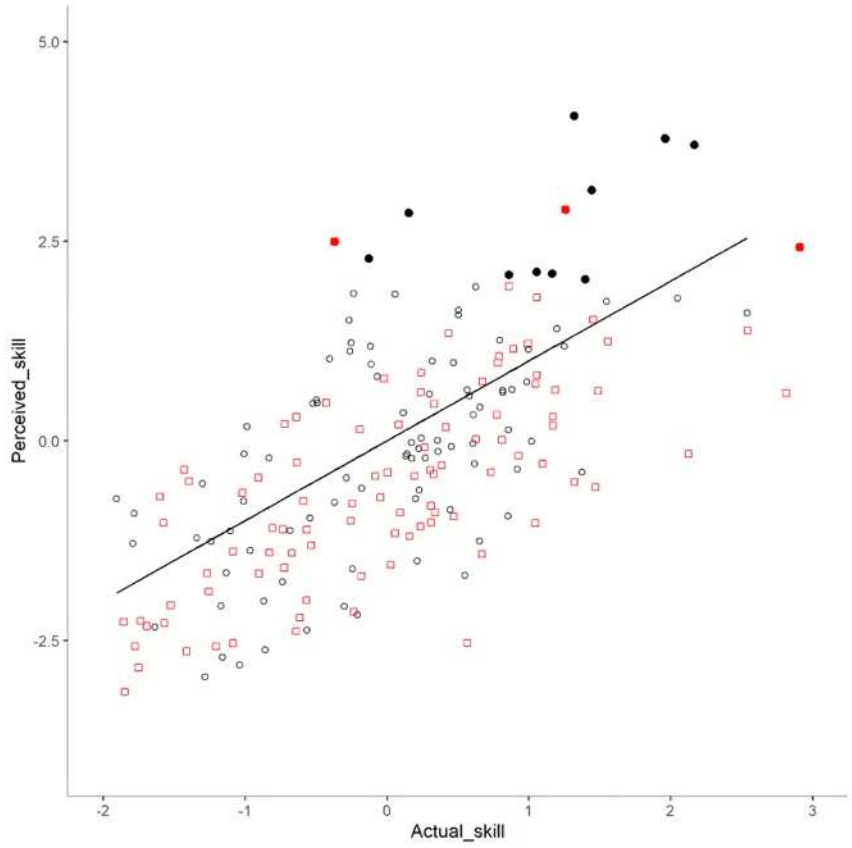
Hiring with noise and bias

Jackie Robinson Effect Model



Who gets hired

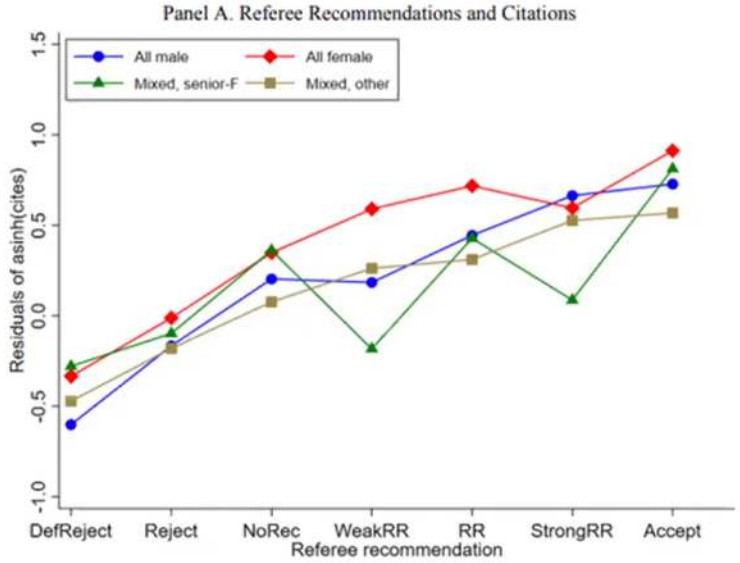
Jackie Robinson Effect Model



Who gets hired: different draws

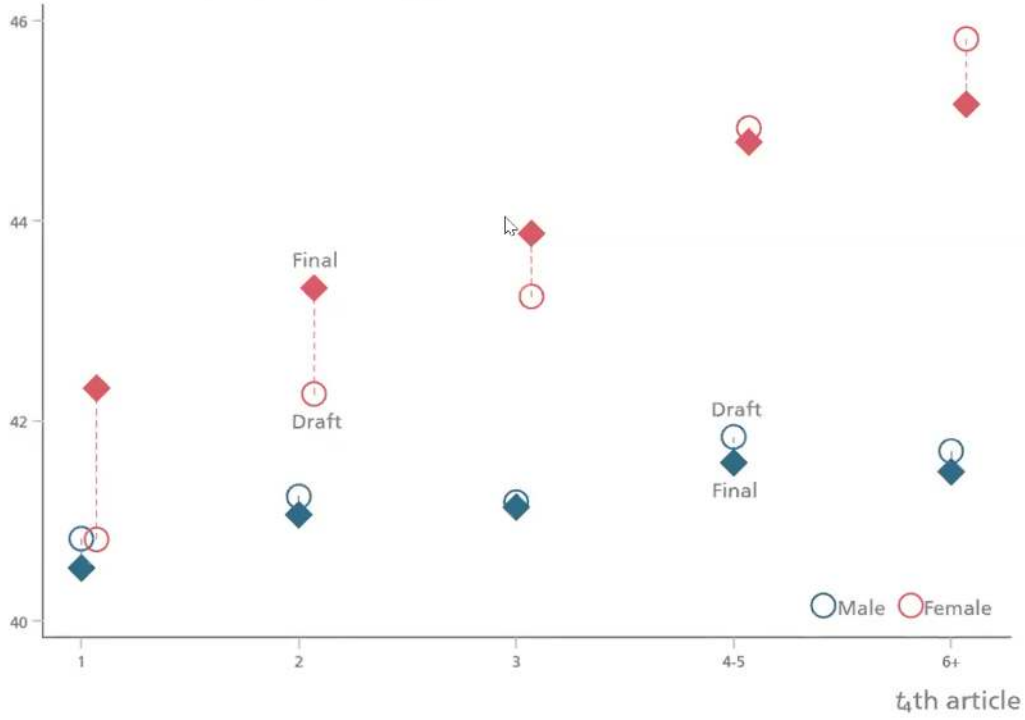
Jackie Robinson Effect in publication

- Papers authored by female economists are cited more than papers by similar male authors (Card et al. 2020)



Jackie Robinson Effect in publication

Figure 5 Flesch Reading Ease marginal mean scores for authors' first, second, third, fourth, and sixth and up, publications in the data.



Jackie Robinson Effect in publication

- Men and women produce equal quality initial drafts
- Women's revisions lead to better writing
- Each subsequent paper is even better written
- No such pattern for men

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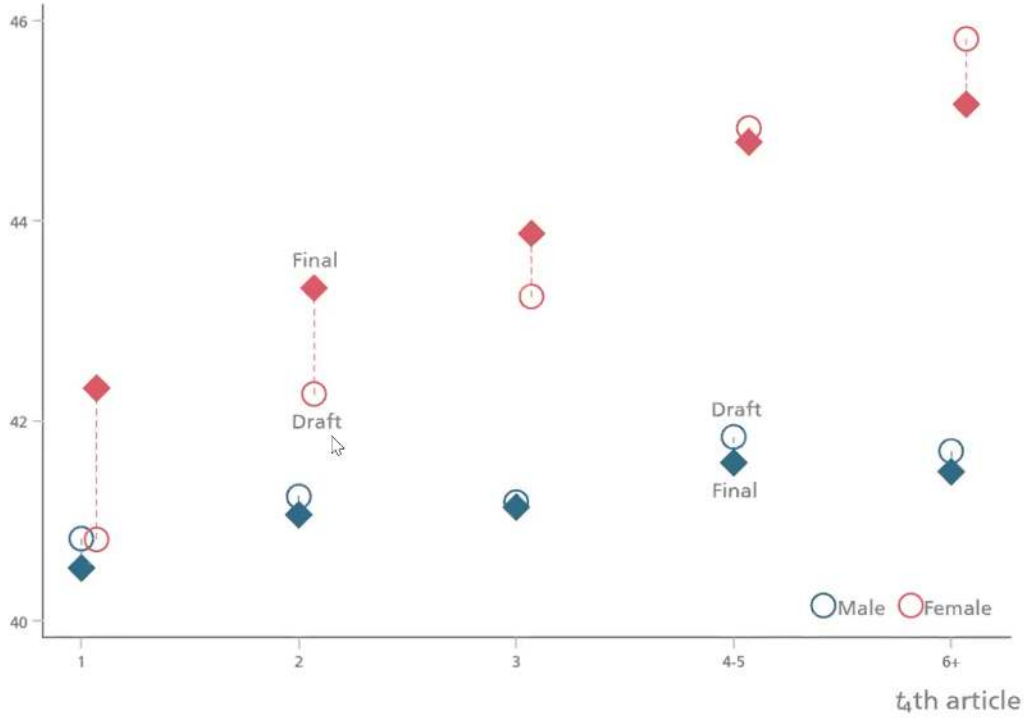

"Are men just better informed about referees' expectations? Yes and no. Male and female draft readability scores for first-time publications are exactly the same. This suggests that men and women start out with identical beliefs. But those beliefs reflect standards that apply only to men; women's 'mistake' is in initially thinking the same standards apply to them, too."

Study on the status of women faculty in science at MIT

- MIT Faculty study (MIT 1999)
  - "The Committee documented differences in salary in the recent past, in amount of 9-month salary paid from grants, in access to space, resources, and inclusion in positions of power and administrative responsibility within departments or within the broader MIT community. Differences resulted in women having less or in their being excluded from important professional opportunities."