A Balanced Portfolio?

The relationship between gender and funding for U.S. Academic Professors

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Presented by: Dakota Murray







Universalism

"The acceptance or rejection of claims entering the lists of science is not to depend on the personal or social attributes of their protagonist; **his** race, nationality, religion, class, and personal qualities are as such irrelevant."



Research Question

What is the relationship between gender and funding among U.S. professors?

Unfair Grant Review?

"...in all, among grant applicants men have statistically significant greater odds of receiving grants than women by about 7%."

Bornmann & Daniel (2007). Gender differences in grant peer review: A meta-analysis

Journal of INFORMETRIC

tor-in-Chief: Ludo Waltman

ecial Section on Size-independent dicators in citation analysis

Fair Grant Review?

"...the weight of evidence overwhelmingly points to a gender-fair grant review process..."

Hurstinoms make irostines

- Ceci & Williams (2011). Understanding current causes of women's underrepresentation in science.

Conflicted Literature

The grant review process is fair (probably)

Conflicted Literature

The grant review process is fair (probably)

But women still hold less funding

General Population

"...on average, women at universities in Québec receive less funding for research than men..."

- Larivière et al. (2011). Sex differences in research funding, productivity and impact: an analysis of Québec university professors



Studies often limited

Limited in Scale

Size and Geography



Discipline or Source



Limited to Peer Review



Our Three Goals

Goal #1

Examine a broad population of professors in the United States



Goal #2

Examine a broad population of professors in the United States

Uncover the relationships between gender and funding



Goal #3

Examine a broad population of professors in the United States

Uncover the relationships between gender and funding

Introduce a new dataset



Academic Analytics



Academic Analytics

Collected Manually or with institutional co-operation

Tenure/TT faculty expected to produce research of of AA release 2014 Release



An Administrator's View

							~		Select Quantile:	Percentiles	•
Name 🔺	Awards	Books	Grants	Grant \$	Articles	Citations		Awards	100 -		
Ariana Manigo	1	2	0	\$0	0	0	^	100		05	7
Arlene Tull	0	0	1	\$61,120	4	27		80-	90 -		
Avis Doi	0	0	0	\$0	4	34		60	80	84.8	87.6
Carlene Mixson	0	1	0	\$0	6	126		Grant \$ Books			
Carmella Rollin	0	0	1	\$99,792	20	154			70		
Charles Nantz	0	0	3	\$106,358	15	105		20	a 60		
Chester Hibbitts	0	0	1	\$7,881	9	122			Ē		
Clayton Boose	0	3	2	\$21,159	15	359			9 50		
Clinton Neugebauer	0	0	0	\$0	6	69			a 40		
Darius Romanelli	0	0	0	\$0	0	0		Grants Articles	e		
Darren Bautch	0	0	2	\$45,933	10	105			30		
Derrick Bennetts	0	0	0	\$0	20	341		•	20		
Guy Apel	0	1	0	\$0	0	0		Citations			
Hugh Paik	0	0	4	\$511,868	8	97			10		
Jason Kahn	0	0	0	\$0	18	190			0.0	0.0	
Javier Backlund	2	2	1	\$62,196	2	58		 Median Books Citations Grant \$ Awards Articles Grants 	Award	ls Cites Books Artic	les Grants
Jesse Becker	0	2	0	\$0	10	151				004014	
Jessie Ridinger	2	4	0	\$0	14	78	\checkmark			2010 Varia	ples

Names are not actual, for representation only

Benchmarking



397 Institutions Represented

Institution Name

University of Michigan Pennsylvania State Univer.. Ohio State University, The University of Minnesota, T.. University of Wisconsin - .. University of Washington Texas A&M University Purdue University Michigan State University University of Illinois at Ur.. University of California, L. University of Southern Cal.. University of North Caroli.. University of Florida Johns Hopkins University New York University University of Pennsylvania University of Georgia Arizona State University University of Pittsburgh University of California, B... Harvard University Cornell University University of Arizona, The



Faculty Resistance

"...taken on their own terms, the measures of books, articles, awards, grants, and citations within the Academic Analytics database frequently undercount, overcount, or otherwise misrepresent the achievements of individual scholars"

- Graduate Faculty Resolution from Rutgers University

Validation Study

Comparable coverage to other sources Useful for most disciplines Conference proceedings unreliable

What does this data look like?

Name	Institution	Program Name	Level 1 Name	Gender	DegreeYear
Cassidy Sugimoto	Indiana University - Bloomington	Information Science	Information Science/ Studies	F	2010
Cassidy Sugimoto	Indiana University - Bloomington	Information Science	Social Sciences various	F	2010

Name	Institution	Program Name	Level 1 Name	Gender	DegreeYear
Cassidy Sugimoto	Indiana University - Bloomington	Information Science	Information Science/ F Studies		2010
Cassidy Sugimoto	Indiana University - Bloomington	Information Science	Social Sciences various	F	2010
		 Each affiliation Departments disciplines 	on they hold classified as belong	ging to mu	ltiple

Name	Institution	Program Name	Level 1 Name	Gender	DegreeYear
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				1	

- Small sample Confirmed by visual inspection
- Or inferred by genderize.io using first name

Name	Institution	Program Name	Level 1 Name	Gender	DegreeYear
Cassidy Sugimoto	Indiana University - Bloomington	Information Science	Information Science/ Studies	F	2010
Cassidy Sugimoto	Indiana University - Bloomington	Information Science	Social Sciences various	F	2010
					Â

- Year that the researcher obtained their PhD
- "Scientific Age"

Name	Level 1 Name	Article Count	Citation Count	Grant Count	Grant Dollars	Award Count	Book Count
Cassidy Sugimoto	Information Science/ Studies	39	443	2	191331	2	2
Cassidy Sugimoto	Social Sciences various	39	443	2	191331	2	2

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•	Articles pub #Citations	olished in la accumulate	st 4 years d over last 5 ye	ears		Cr	ossref

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 STAR METRICS Grants where they appear as PI over last 5 years Annualized USD amount of grant 										
USDA Museumand SERVICES										

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Cassidy Sugimoto	Social Sciences various	39	443	2	191331	2	2
						1	

- Nobel prizes to individual society awards
- Somewhat vaguely defined/collected

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Books/Book Chapters Published over last 10 years

Record Duplication

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AVERAGE	Information Science/ Studies	6.47	62.35	1.22	185146	0.556	0.535
AVERAGE	Social Sciences various	8.16	108.87	0.74	127774	0.93	1.29

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New Classification Scheme

AA's Detailed Classification

Accounting

Linguistics

Molecular Pharmacology

Plant Sciences

Computer Engineering
New Classification Scheme



What can this data show?



Disciplinary Overview



Understudied Disciplines



Gender Distribution of Each Disciplinary Category



Research Funding



• Relatively equal in the humanities, natural, and social sciences



- Relatively equal in the humanities, natural, and social sciences
- Women in the medical sciences are less likely to hold a grant



- Relatively equal in the humanities, natural, and social sciences
- Women in the medical sciences are less likely to hold a grant
- Women in engineering *more* likely to hold a grant





• Women engineers get less average funding



- Women engineers get less average funding
- The pattern is repeated for medical and natural sciences



- Women engineers get less average funding
- The pattern is repeated for medical and natural sciences
- Women receive slightly more funding in social sciences and humanities



Effects of Age

Scientific Age of Individuals



Scientific Age of Individuals



Proportion holding grant by (Scientific) Age



Proportion holding grant by (Scientific) Age

Younger women at a disadvantage



Proportion holding grant by (Scientific) Age

Younger women at a disadvantage

Selection Bias



Potential Selection Bias















Women are underrepresented in most disciplines



Women are underrepresented in most disciplines

Strong disciplinary differences in the distribution of funding



Women are underrepresented in most disciplines

Strong disciplinary differences in the distribution of funding

Prominent disparity in funding for scientifically young women Medical sciences

Engineering



Interpretations

If Not Peer Review

"Despite this overwhelming counterevidence, numerous organizations continue to suggest grant review is discriminatory (47), thus diverting attention from legitimate factors limiting women's participation in math-based careers."

- Ceci & Williams (2011). Understanding current causes of women's underrepresentation in science.



Women less "Successful"



Jagsi et al (2011). Similarities and differences in the career trajectories of male and female career development award recipients.



Parenting Roles

"Our findings suggest that after the birth a child, productivity growth declines, but more so for women. Thus, children account for part of the gender gap in rates of productivity over time."

Hunter & Leahey (2010). *Parenting and research productivity: New evidence and methods.*



Implicit Bias

"...the majority of these studies reveal a consistent and continuing range of biases at each stage of the hiring, tenuring, and promotion process as well as in peer review and teaching evaluation."

Danica Savonick & Cathy N. Davidson, Gender Bias in Academe: An Annotated Bibliography of Important Recent Studies.

http://tiny.cc/academicgenderbias


Gendered Division of Scientific Labor

"Women were significantly more likely to be associated with performing experiments, and men were more likely to be associated with all other authorship roles. This holds true controlling for academic age..."

Macaluso, B., Larivière, V., Sugimoto, T., & Sugimoto, C. R. (2016). Is Science Built on the Shoulders of Women? A Study of Gender Differences in Contributorship. Academic Medicine

Feedback Loop



Feedback Loop



• Introduced a new dataset



- Introduced a new dataset
- Relationships between gender and funding



- Introduced a new dataset
- Relationships between gender and funding
- Identified areas of disparity



- Introduced a new dataset
- Relationships between gender and funding
- Identified areas of disparity
- Potential interpretations



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- My co-authors and mentors, Cassidy R. Sugimoto and Vincent Larivière
- Academic Analytics, for graciously providing us access to their data
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Thank You!

Questions, comments, or suggestions?

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