Women in Physics: Context, Challenges, and Changes

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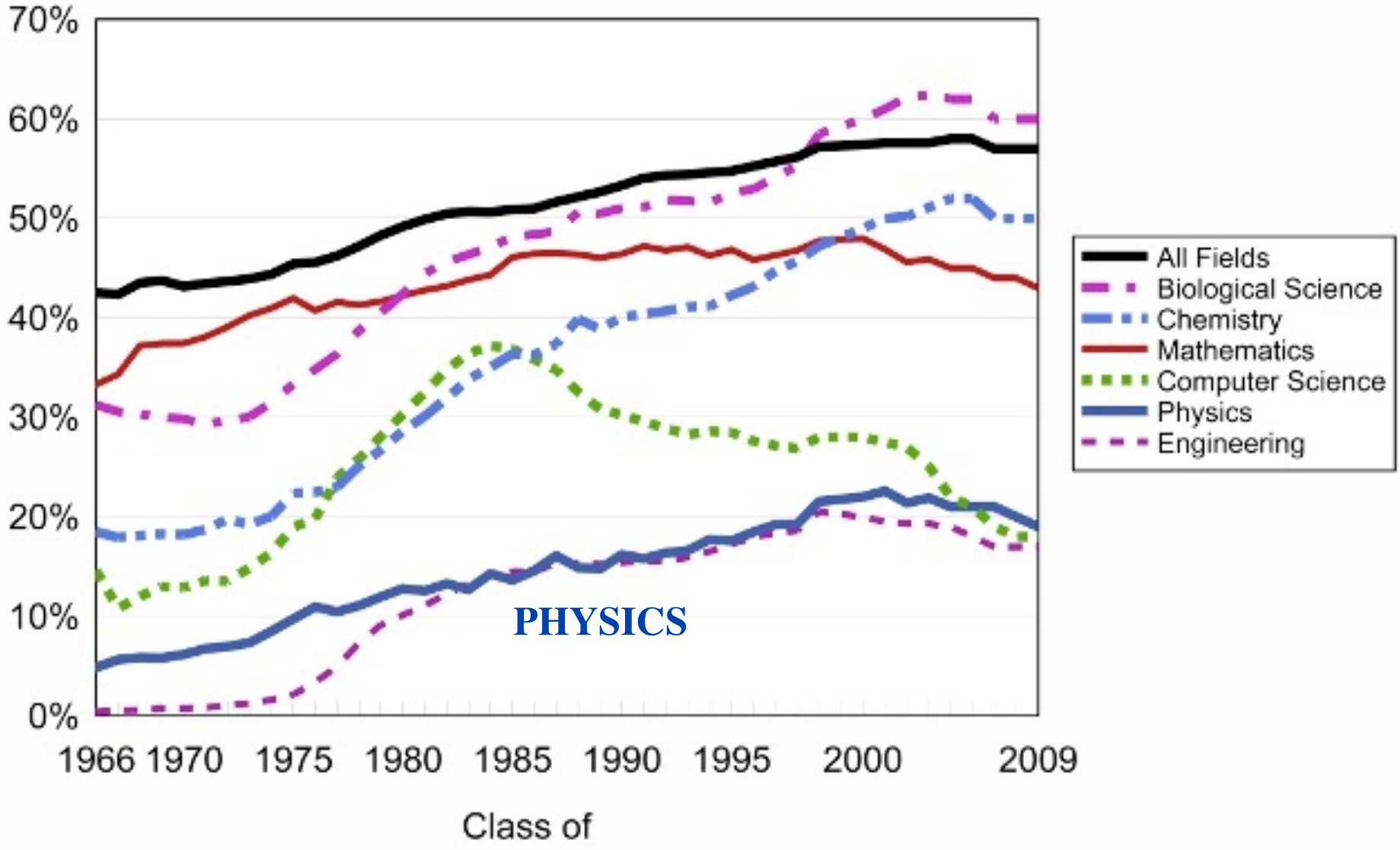
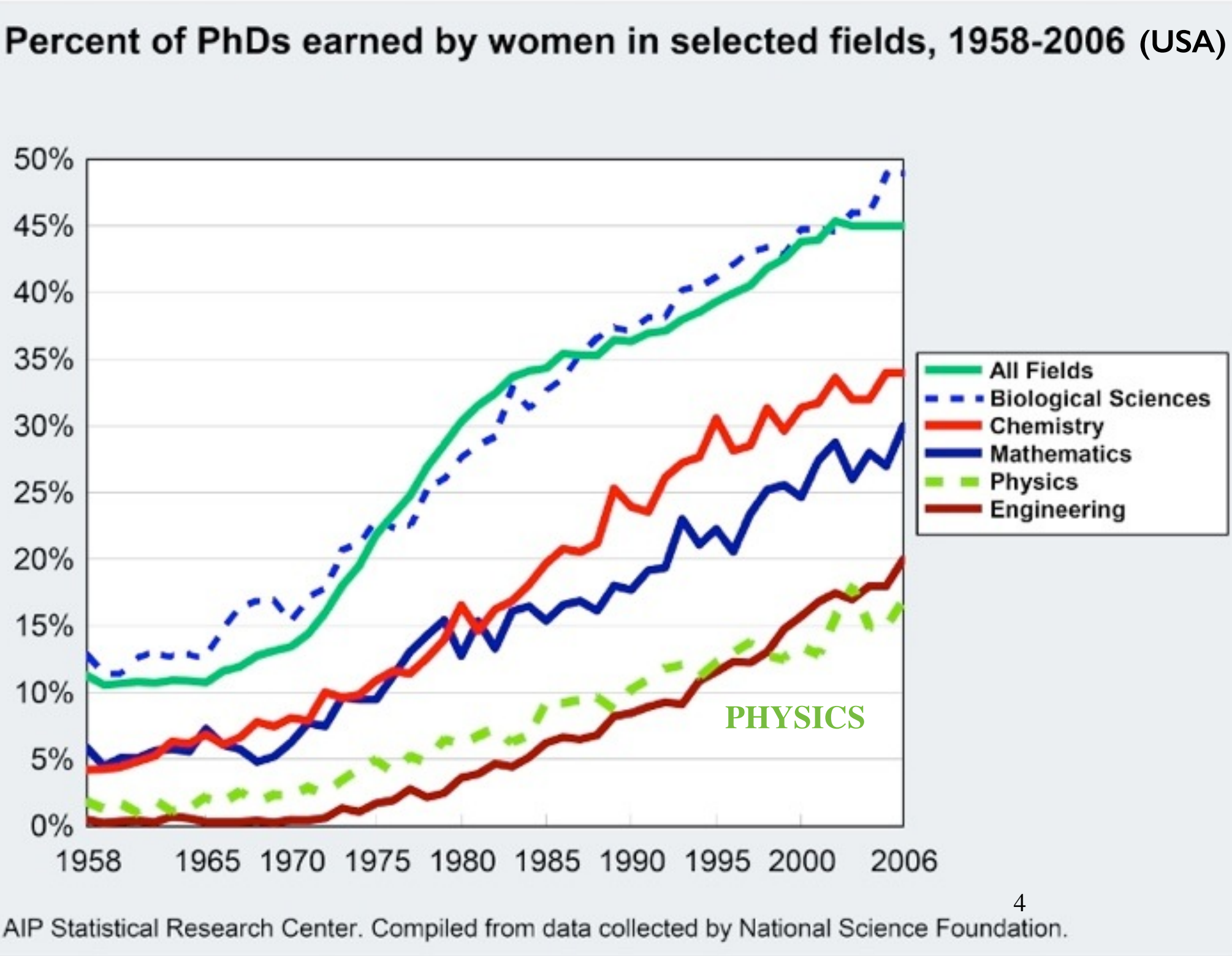
Context

Percent of Bachelor's Degrees Earned by Women in Selected Fields, 1966-2009 (USA)

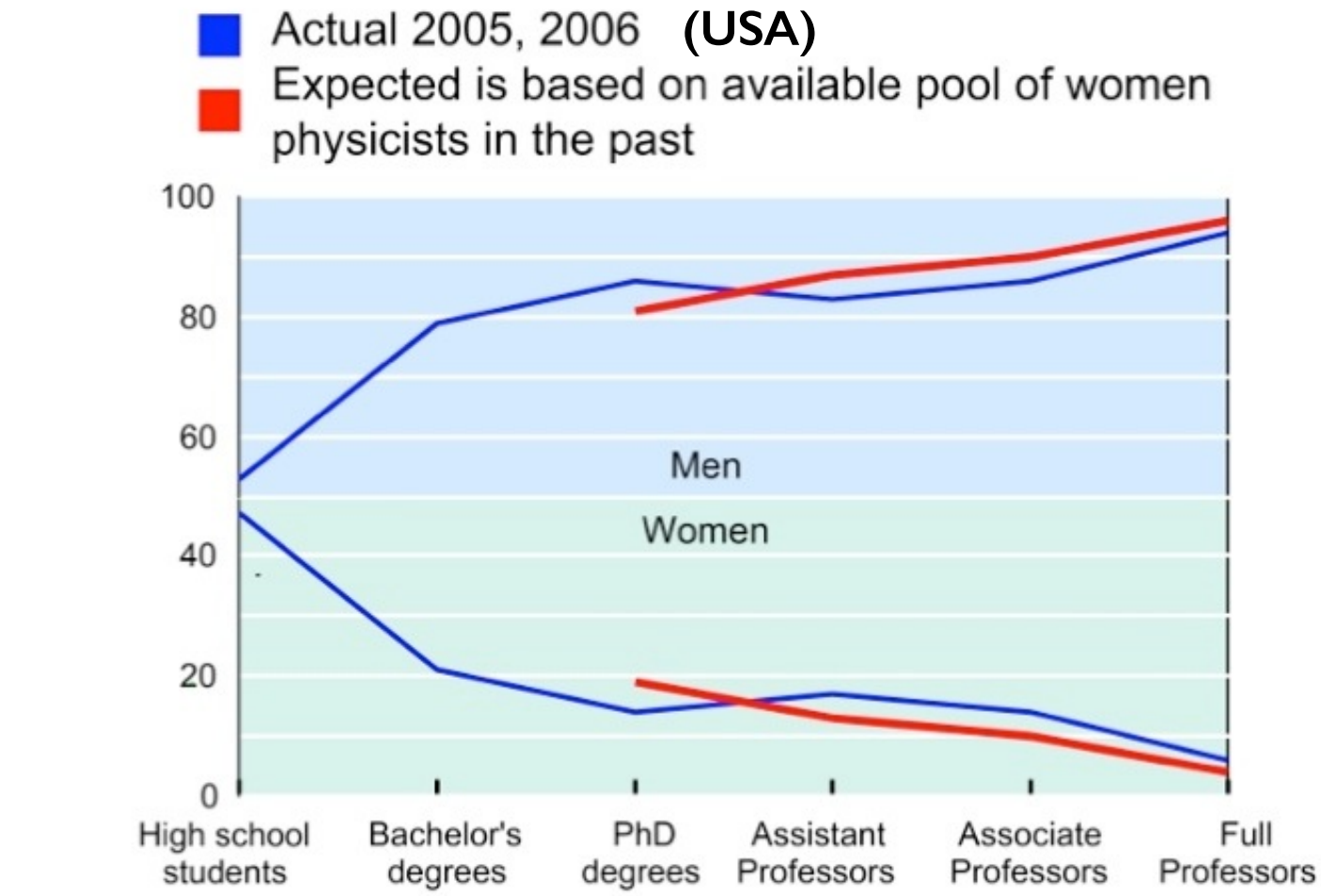


National Center for Education Statistics. Data for class of 1999 were not available.

Compiled by American Institute of Physics Statistical Research Center

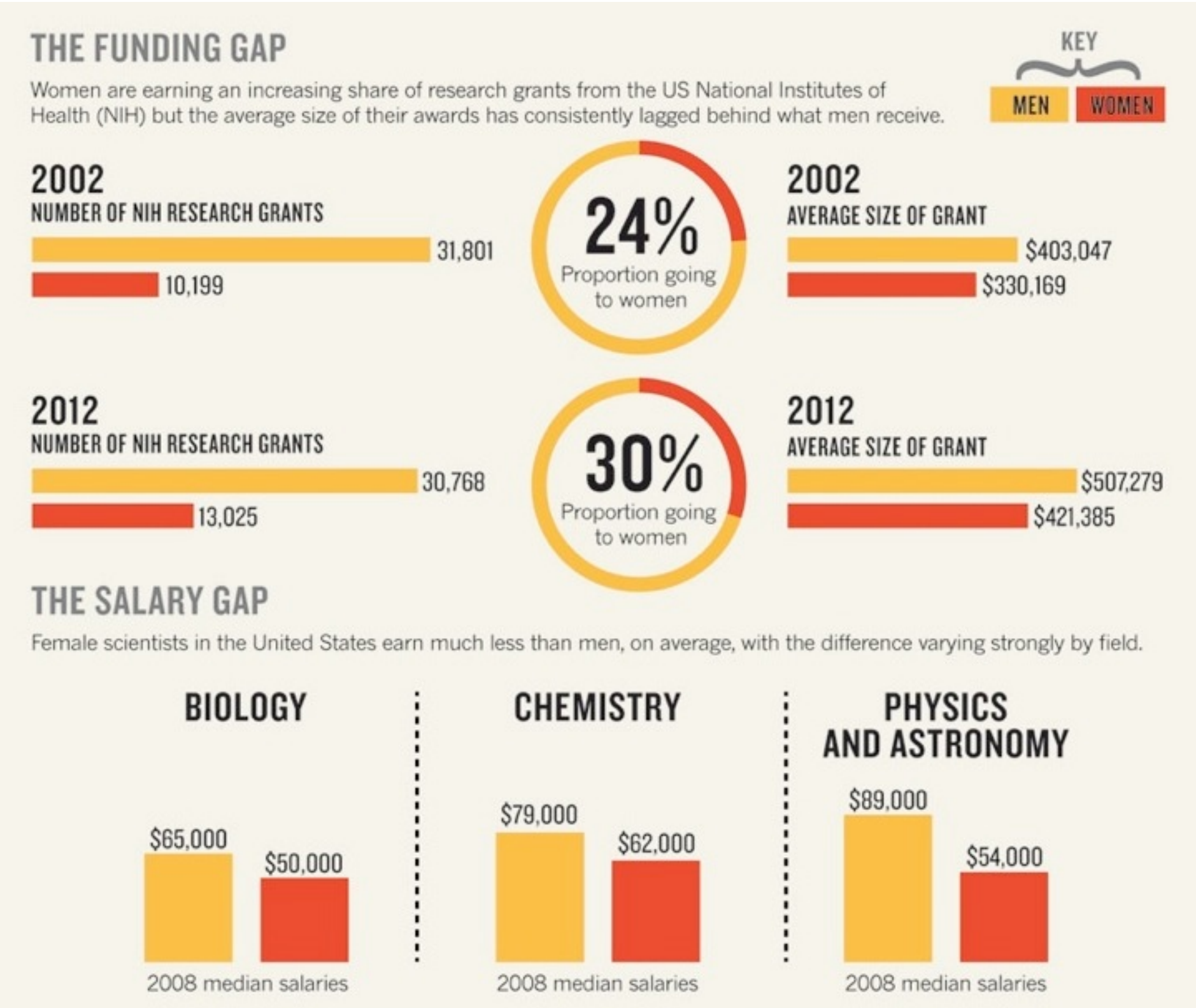

Percent of PhDs earned by women in selected fields, 1958-2006 (USA)
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
1958
1965
1970
1975
1980
1985
1990
1995
2000
2006
All Fields
Biological Sciences
Chemistry
Mathematics
Physics
Engineering
PHYSICS
AIP Statistical Research Center. Compiled from data collected by National Science Foundation.

The "scissors plot" summarizing these results reveals a relative scarcity of women physicists



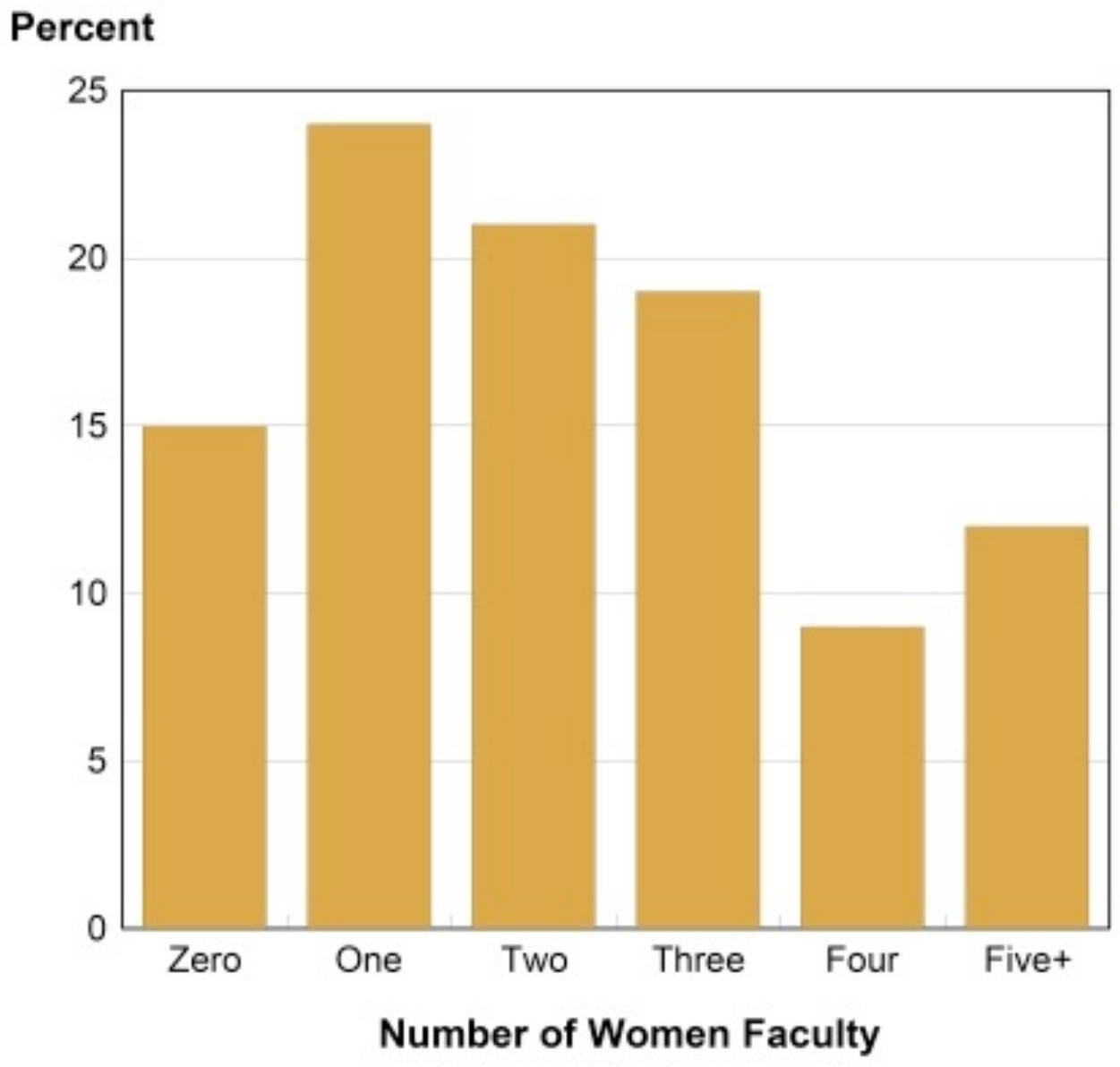
Source: American Institute of Physics Statistical Research Center

This is a problem for Physics… and STEM!



Nature, Vol 495, 7 March 2013

Percent of PhD physics departments by number of women in professorial ranks, 2006 (USA)



There are 189 such departments and the median number of faculty is 25.

AIP Statistical Research Center

Causes for Concern

[adapted from APS Women in Physics site
http://www.aps.org/programs/women/reports/bestpractices/]

No effort to develop a sense of community or improve the climate. Denial that such issues matter to people.

A sub-critical mass of female employees; premature departure of female employees.

Lack of investment in and/or promotion of female employees at all levels. No visible leadership roles for female employees in the unit.

Isolation or marginalization of female employees.

Derogatory comments about female employees to reduce their ability to bring about change (e.g., "difficult" or "troublemaker").

A highly politicized climate where decision-making processes are not transparent.

Inability on the part of senior female scientists or engineers to get sufficient laboratory space, research funding, or other resources needed to become leaders in their fields.

Strong support for more junior employees who are not in a position to drive change, but weak support for senior female employees who attempt to change the climate.

Who has access to professional resources?

AIP Global Survey of Physicists 2012

Table 1. Percentage of respondents with access to key resources.

	Less developed countries		Very highly developed countries	
	Women	Men	Women	Men
Funding	34	51	52	60
Office space	64	74	72	77
Lab space	42	47	46	52
Equipment	42	49	58	64
Travel money	31	47	57	64
Clerical support	22	38	30	43
Employees or students	42	53	33	43

Who has access to career-advancing experiences?

Table 2. Percentage of respondents with career-advancing experiences.*

	Less developed countries		Very highly developed countries	
	Women	Men	Women	Men
Gave a talk at a conference as an invited speaker	51	67	58	73
Served on committees for grant agencies	22	37	26	36
Conducted research abroad	54	71	61	69
Acted as a boss or manager	38	53	46	61
Served as editor of a journal	16	24	11	19
Advised graduate students	63	77	58	70
Served on thesis or dissertation committees (not as an adviser)	52	66	37	52

AIP Global Survey of Physicists 2012

Challenges

Implicit Bias

The Gender Equity Project, Virginia Valian

- We are all (women and men) prone to unintentional bias

  Think not? try the Implicit Associations Test at

  https://implicit.harvard.edu/implicit/demo

- This affects affects many decisions we make in the course of our professional duties

- Relevant concepts include:
  - gender schemas
  - stereotype threat
  - accumulation of disadvantage

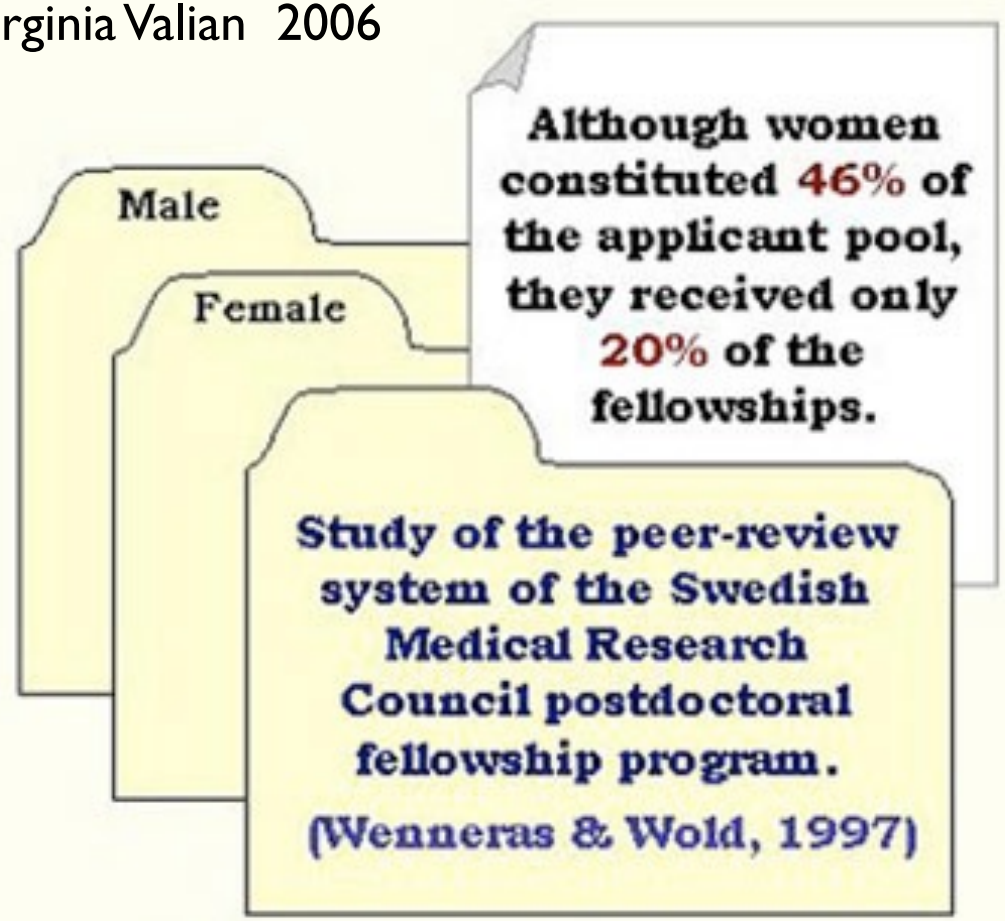
What are Gender Schemas?

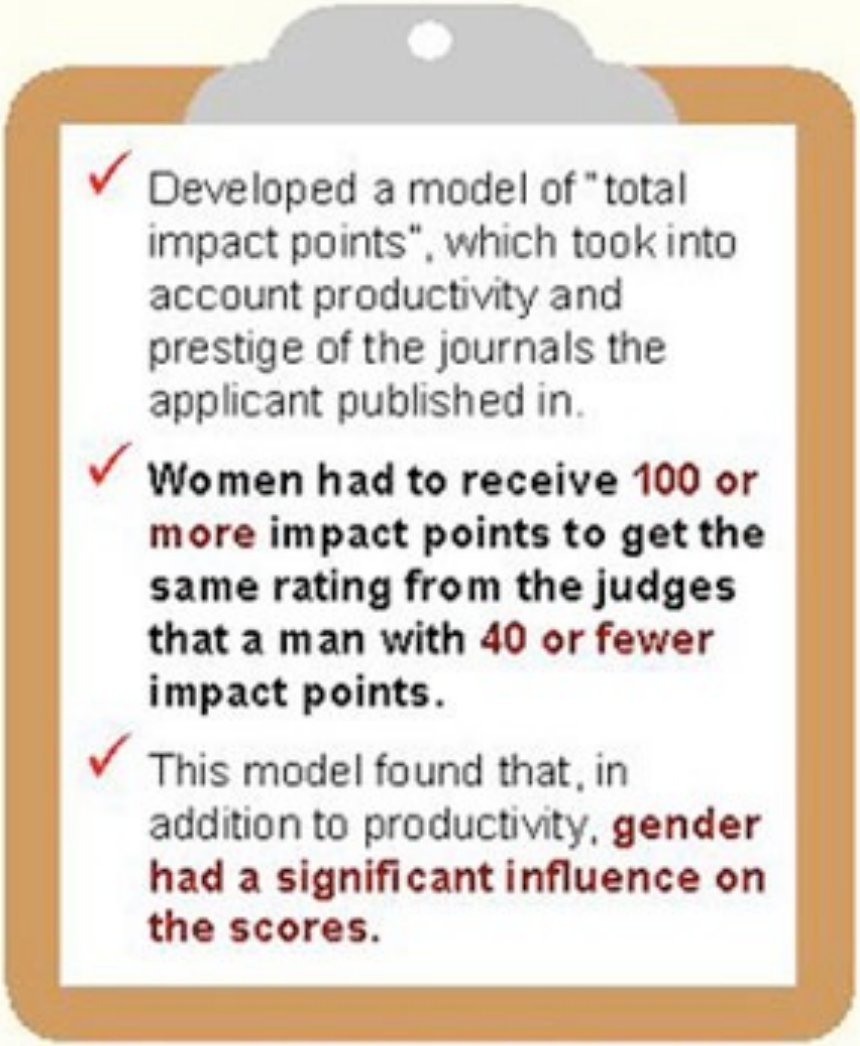
The Gender Equity Project,
Virginia Valian 2006

- Gender schemas are hypotheses about what it means to be male or female.
- We all - male and female alike - share these hypotheses.
- Schemas assign different psychological traits to males and females (Martin and Halverson, 1987).

Gender Bias in Peer Review

Slide from: The Gender Equity Project,
Virginia Valian 2006



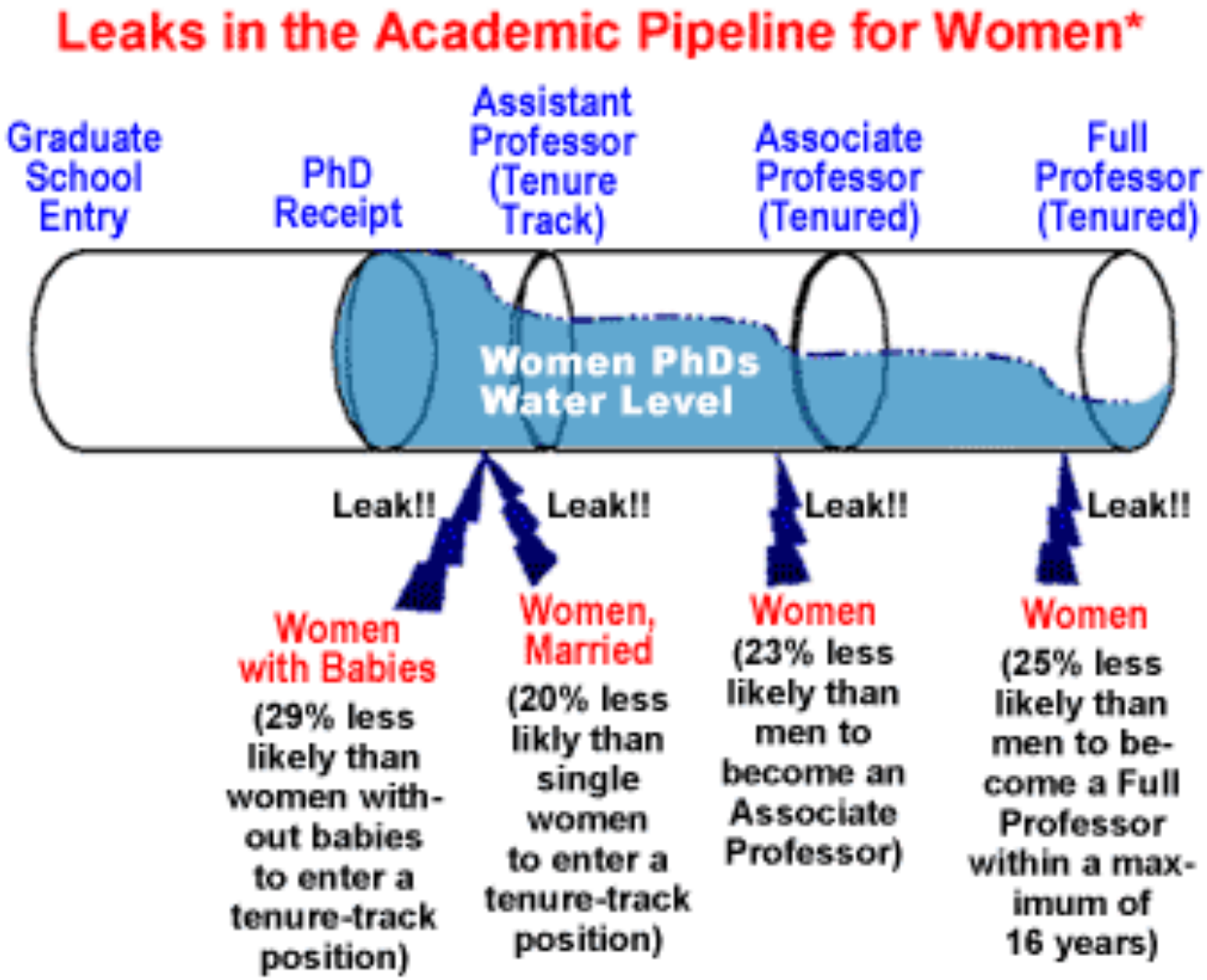


IMPACT Women have to meet a higher standard in order to receive the same recognition that men do.

Has time cured this? Alas no... see Moss-Racusin et al., PNAS 12111286109 (2012).

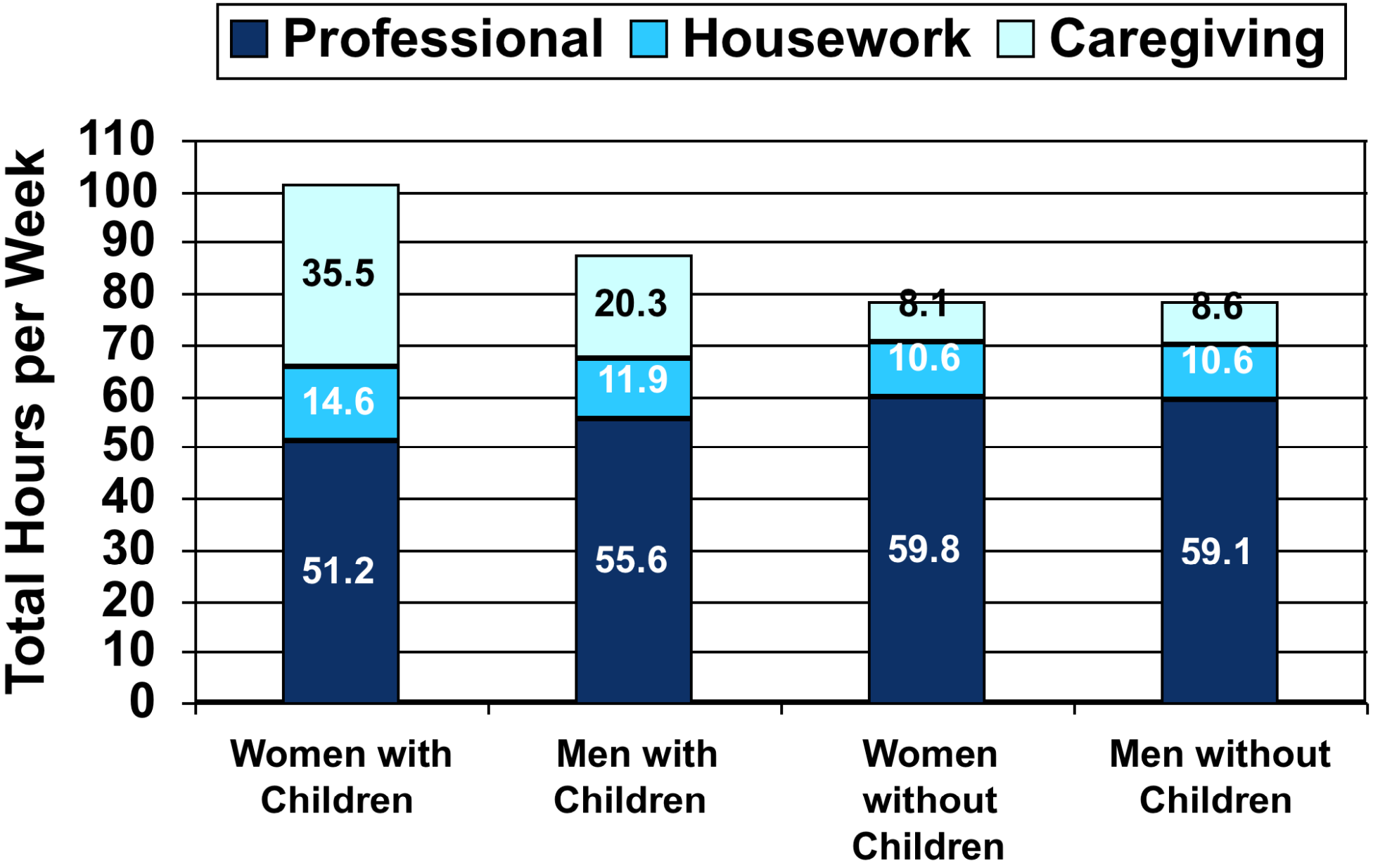
Family Responsibilities

Report on the UC Work and Family Survey; Mary Ann Mason, Angelica Stacey, and Mark Goulden, 2004; *Do Babies Matter?* Mary Ann Mason and Mark Goulden 2002



Mason, Stacy, and Goulden, 2004; Data from NSF Survey of Doctorate Recipients 1981-1995

Everybody is Very Busy



Mason, Stacy, and Goulden, 2004; Data on UC faculty, ages 30-50

Who does the Housework around the world?

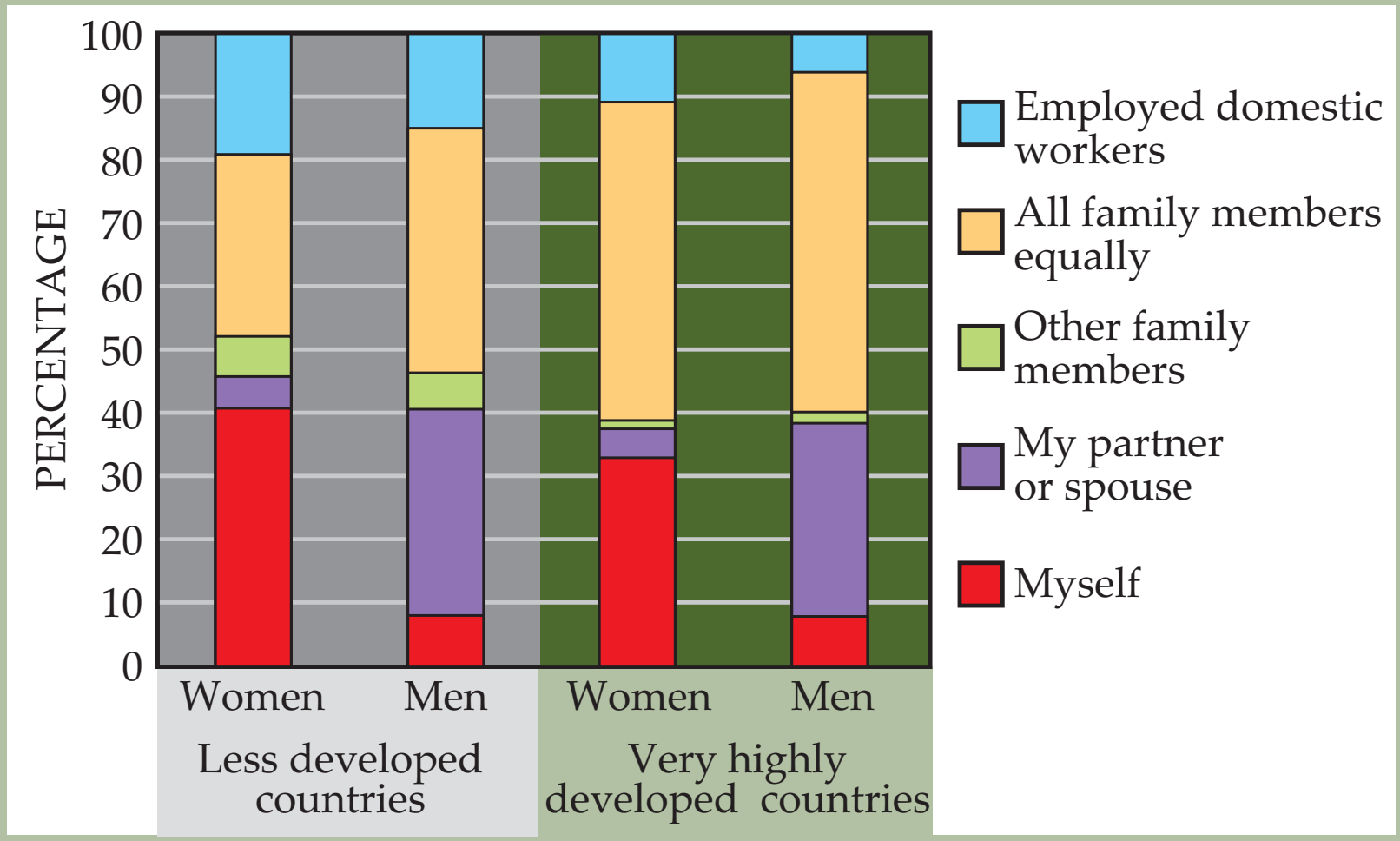
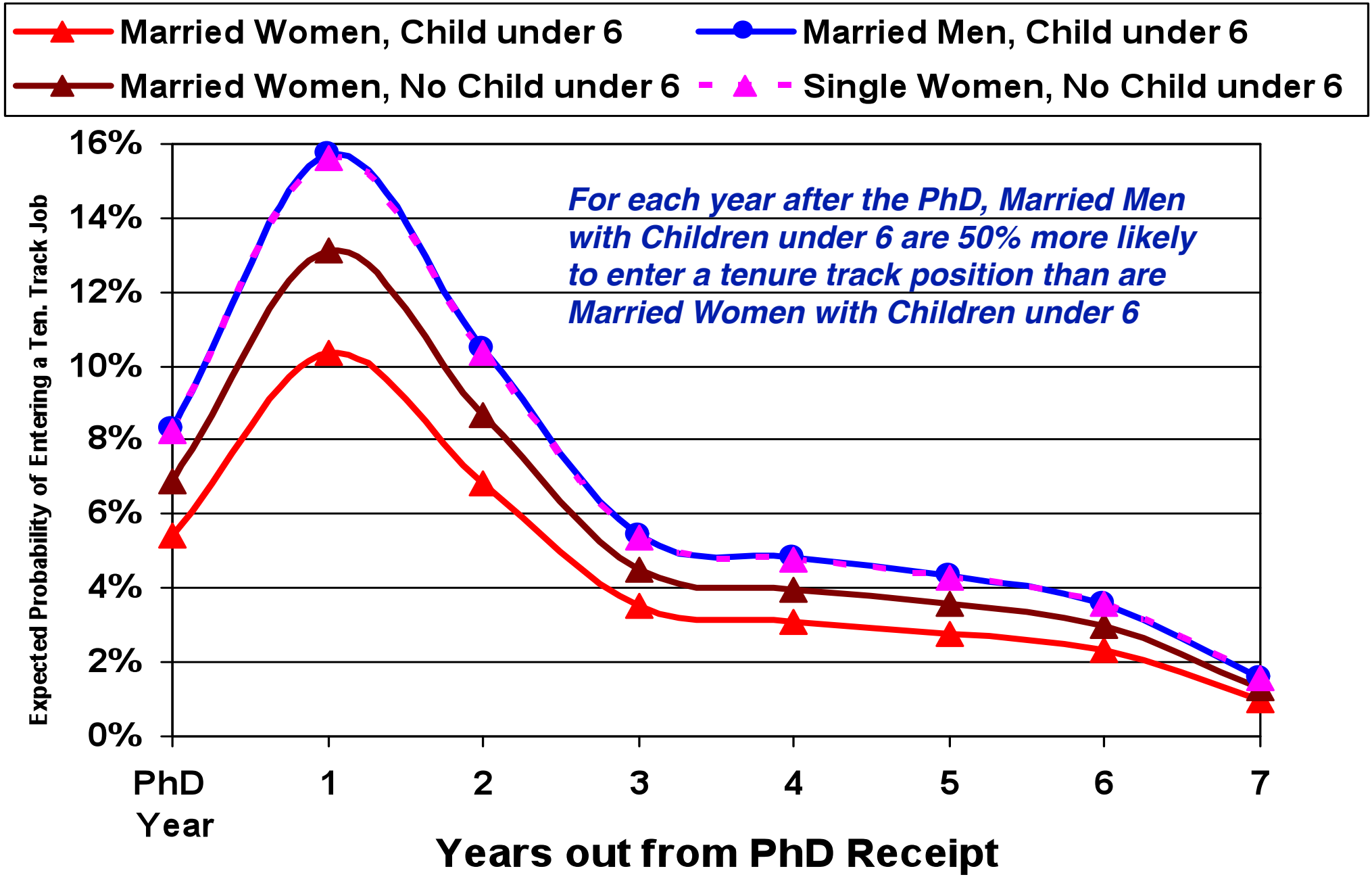


Figure 1. The majority of housework is more likely to be done by women than by men. The results shown here were derived from the responses to a global survey conducted by the American Institute of Physics and filled out by almost 15 000 physicists. To generate this graph we disregarded the responses of those physicists whose spouse or partner was not employed. The disproportionate burden of housework on women holds independent of level of development of the respondent's country.

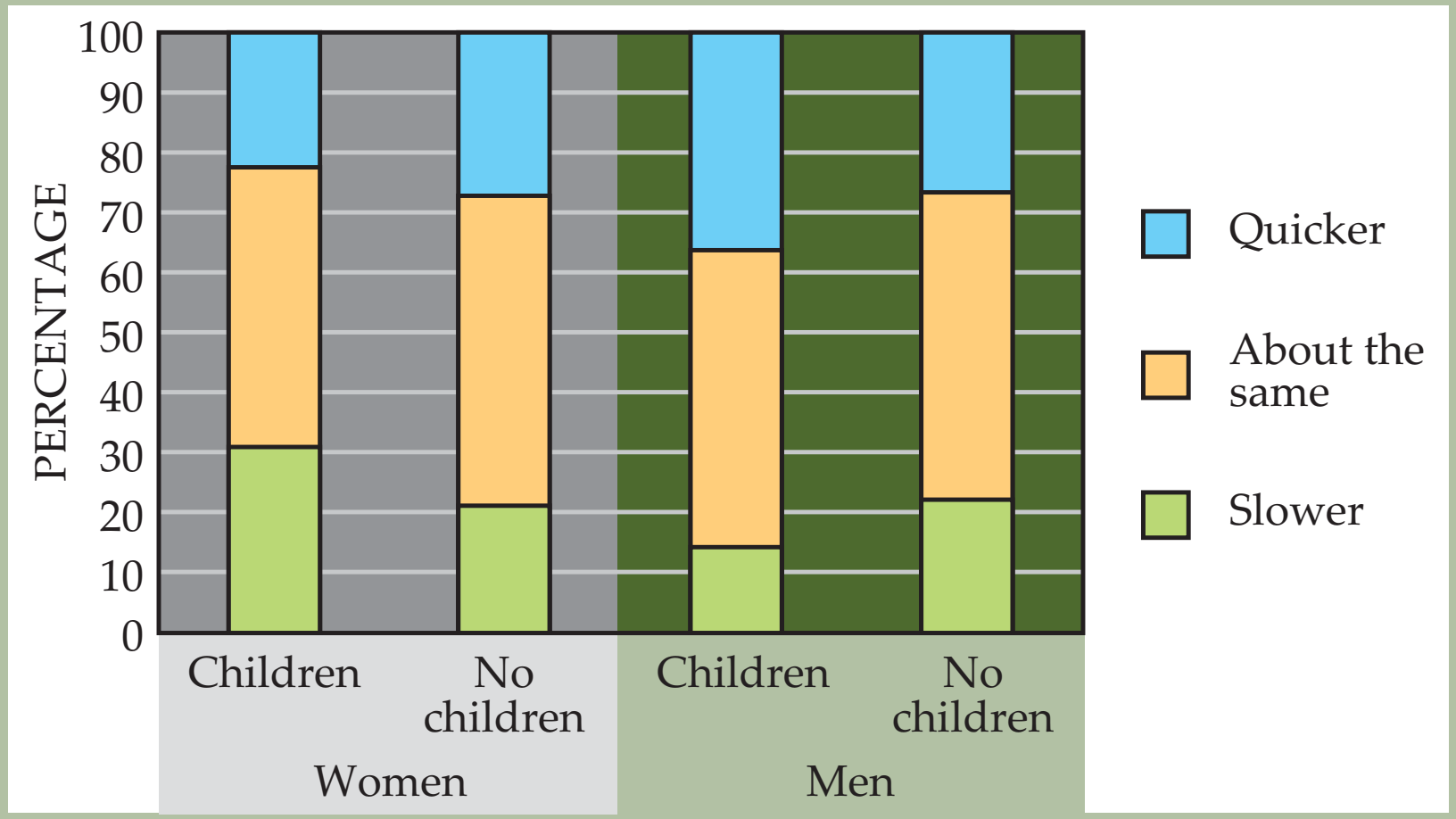
AIP Global Survey of Physicists 2012

Leaks in the Pipeline: PhD to Tenure Track Position



Mason, Stacy, and Goulden, 2004; Data from NSF Survey of Doctorate Recipients 1981-1995

What is the career impact of having children?



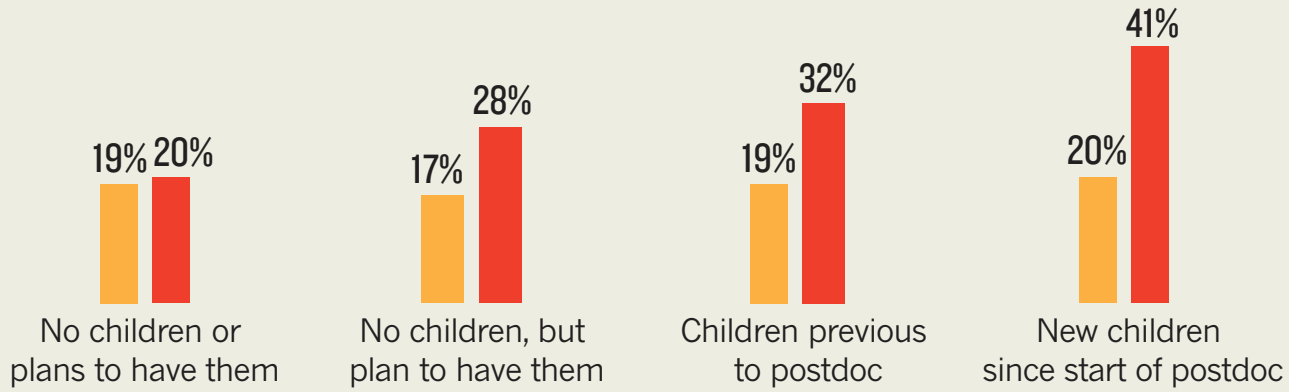
AIP Global Survey of Physicists 2012

Figure 2. Having children tends to slow the career progress of women physicists but not that of their male counterparts. To generate the data that produced this graph, a global survey analyzed responses from some 15 000 physicists to compare their career progress with that of their colleagues.

POSTGRADUATE POSITIONS

A 2009 survey of postdoctoral fellows at the University of California showed that women who had children or planned to have them were more likely to consider leaving research.

POSTDOCS WHO DECIDED AGAINST CAREERS AS RESEARCH FACULTY MEMBERS (2009)



"The plan to have children in the future, or already having them, is responsible for an enormous drop-off in the women who apply for tenure-track jobs."

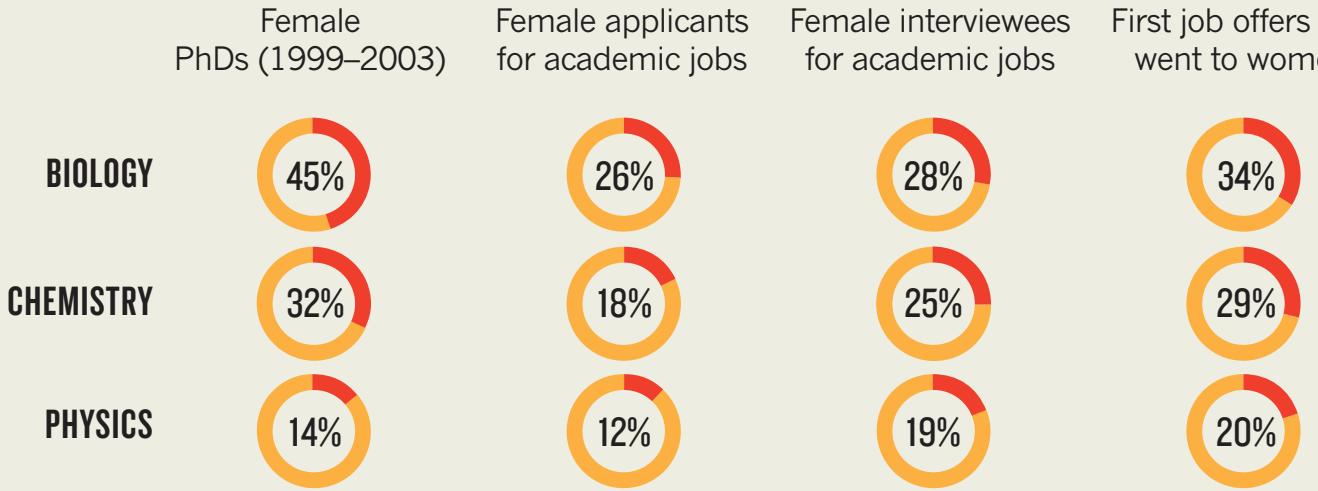
Wendy Williams, Cornell University

EARLY CAREER

Female representation among science and engineering faculty members in the United States has lagged behind gains in graduate education, in part because many women do not apply for tenure-track jobs. But women who do apply are more likely than men to receive interviews and offers.

"At least part of the lack of applications is due to the fact that women look at these careers and don't see people like themselves."

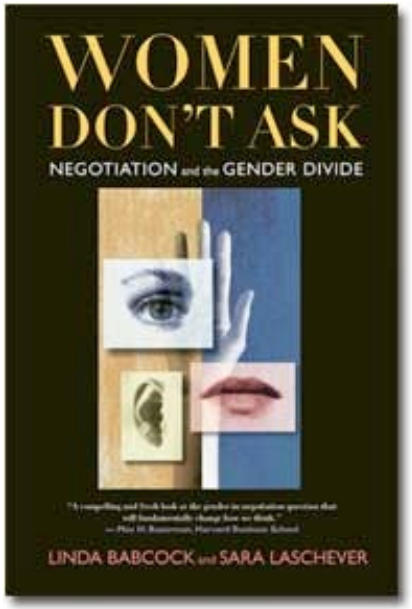
Hannah Valantine, Stanford University



Negotiation

Women Don't Ask: Negotiation and the Gender Divide (Linda Babcock & Sarah Laschever, 2003)

- Women avoid negotiation because they are
  - unsure what they "deserve"; fear asking too much
  - worried about harm to relationships
  - less optimistic about benefits of negotiation
  - not confident of their negotiation skills
  - relatively risk-averse



- In negotiations, women tend to
  - ✳ ask for less -- and therefore receive less
  - ✳ use "interest-based" negotiation approach, focused on underlying needs/motives rather than narrow concrete goals (*Getting to Yes: Negotiating Agreement Without Giving In, Roger Fisher & William Ury, 1990*)

Changes

- **Context & Challenge**: Scarcity!
  - Women's participation rate in physics (and other STEM fields) remains low compared to that of men.
  - Social Science research reveals numerous causes: family responsibilities, dual-career issues, implicit bias, negotiation skills, isolation...
- The sessions you will participate in during this ICTP workshop will identify **solutions** that can make a difference — and equip you with **skills** to help you advance in your career.
- Let's start working together!

FOR FURTHER INFORMATION

American Institute of Physics Statistical Research Center: www.aip.org/statistics/

American Physical Society
Gender Equity Report: www.aps.org/programs/women/workshops/gender-equity/
Best Practices: http://www.aps.org/programs/women/reports/bestpractices/

Univ. of California Faculty Family Friendly Edge: ucfamilyedge.berkeley.edu/

The Gender Equity Project: www.hunter.cuny.edu/genderequity/

Women Don't Ask [*Negotiation and the Gender Divide]*: www.womendontask.com/
Ask for It *[How Women can Use the Power of Negotiation...]*

NSF ADVANCE Portal Website: www.portal.advance.vt.edu/
Michigan State's ADAPP-ADVANCE Project: www.adapp-advance.msu.edu/

LGBT+ Physicists Best Practices Guide: lgbtphysicists.org/files/BestPracticesGuide.pdf

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