Better Computing Culture with a Research Mindset

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More Innovation

Kathryn S McKinley
as a scientist

Google Cloud

Computing Culture

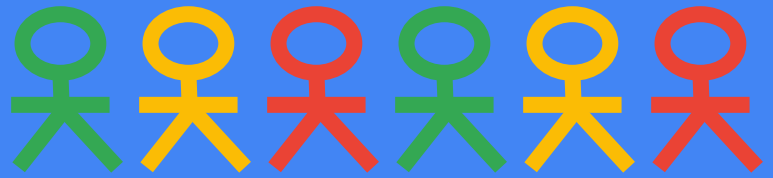
FACTS

MYTHS

Myth of the isolated genius

Facts Partnerships and Teams

Teams?



Measure Team Performance on McGrath Circumplex Tasks

Woolley & Malone
Science 2010

Teams: 190 ad-hoc groups of 2-5 people

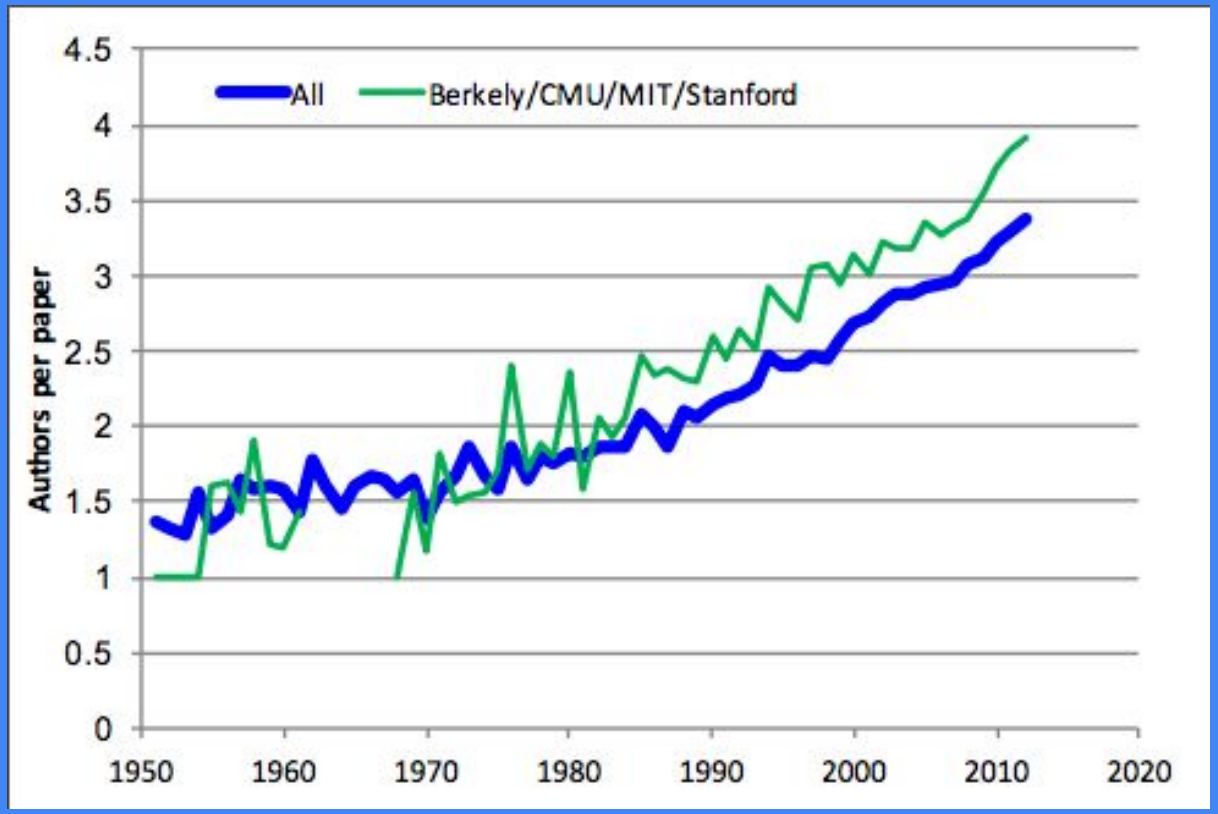
Measure: solutions, interactions, IQ, gender, etc.

Predictors of team performance

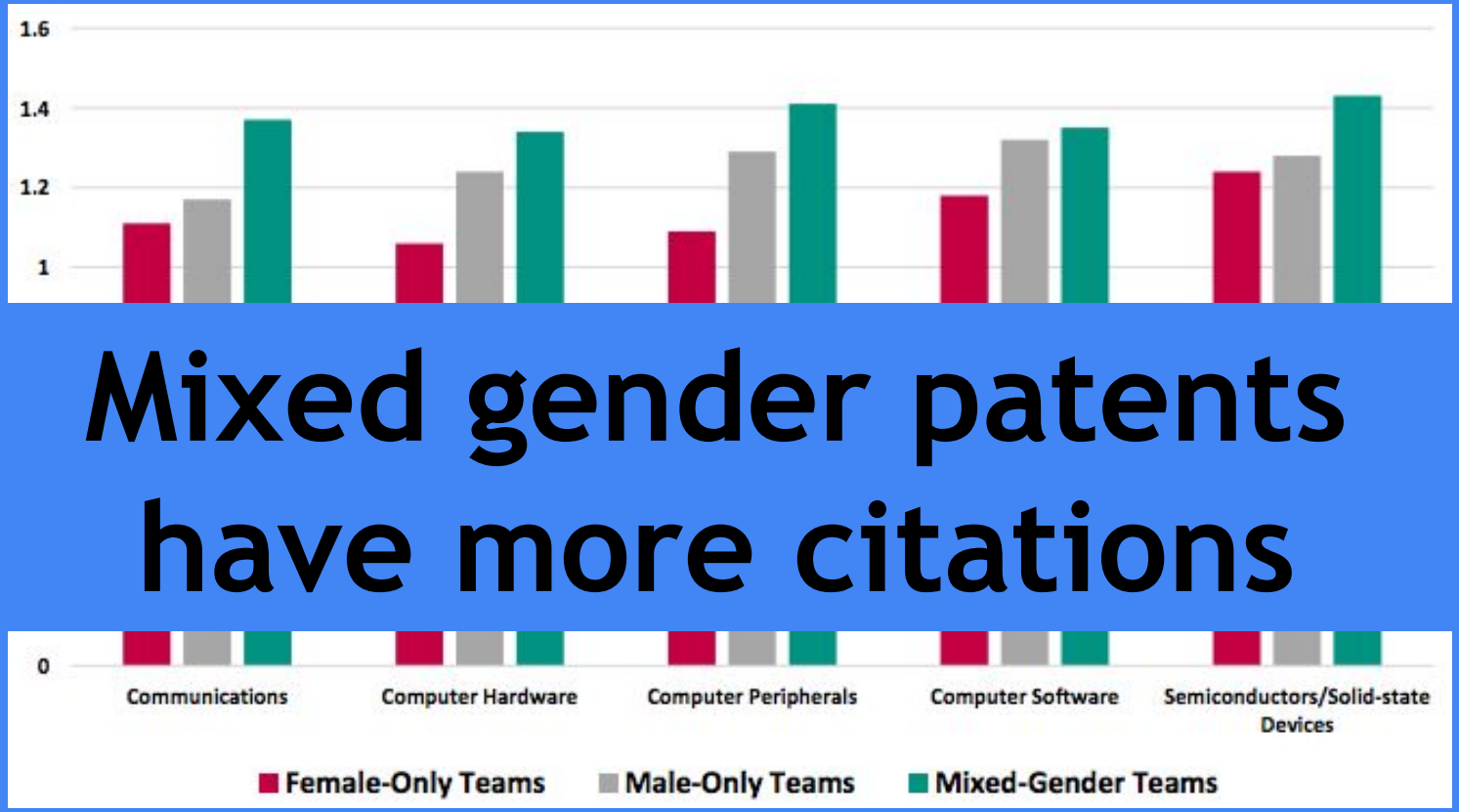
- Average social sensitivity of group
- Equality of conversational turn taking
- Number of women in group

Not maximum individual IQ or average IQ

ACM Paper Authors Blackburn, McKinley, & Xie 2019, arXiv:1909:02212



Citations to Patents 1980-2010 Ashcraft & Breitzman 2012



Mixed gender patents have more citations

Myth

Women are not interested in computing

Art Analogy

Do women have to be naked to get into the Met. Museum?
Less than 5% of the artists in the Modern Art Sections are women, but 85% of the nudes are female.
GUERRILLA GIRLS
Box 1056 Cooper Sta. N.Y. NY 10276
CONSCIENCE OF THE ART WORLD

Women are interested in computing, art, film, and fashion

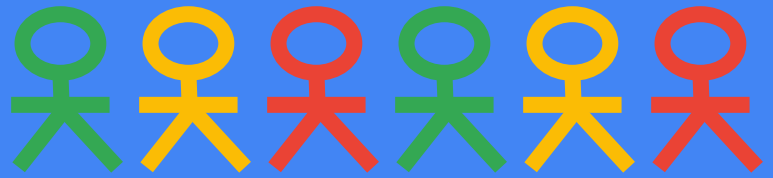
Myth

It’s a pipeline problem

It’s a pipeline problem

36% of 1986 Computing Undergraduates were Women, but Women do not make up 36% of Computing Leadership today

Research Culture



Kathryn McKinley

Career

1980	RICE UNIVERSITY	BA, MA, PhD
1992	MINES ParisTech	Post Doc
1993	UMASS	Assistant → Associate Professor
2001	TEXAS	Associate → Full → Endowed Professor
2011	Microsoft Research	Principal Researcher
2017	Google	Senior → Principal → Distinguished

demotion!

Life

My PhD Student Culture

Everyone falls down

Help others

Publish or Perish
!=
Publish at All Cost

Perverse Incentives lead to Perverse Behaviors

Be mindful of how incentives affect your behavior and those around you. Check your own motivations. Are they healthy? Do they need a refresh? Is the environment you're in a healthy one?

TINA THE TECH WRITER
I DECIDED TO BASE YOUR SALARY ON THE NUMBER OF PAGES YOU WRITE.
www.dilbert.com scottadams@aol.com
FINE. I'LL GIVE YOU A HIGH VOLUME OF LOW QUALITY WORK.
11-27-07 ©2007 Scott Adams, Inc./Dist. by UFS, Inc.
SOMETIMES THE BEST YOU CAN DO IS MOVE THE HAIRBALL TO ANOTHER POCKET.

More Lessons

- Research Mindset: Personal Agency
    - Examine and counter all my biases
    - Expect and learn from mistakes and failures
    - Learn to Innovate Technically
- Listen
- Ask questions, even if when I have some answers
- Acknowledge and repeat what other people say
- Scientists have no one “look” or personality

Research Mindset Exercise Part I

Framing

1. Permanent or temporary causes?
2. Personalization: you or not you?

Your paper gets rejected

- How do you react? Write it down (4 minutes)

Your paper gets accepted

- How do you react? Write it down (4 minutes)

Flexibile Optimism

Taking Risks & Failing

- Many events in the world and in your personal life are unpredictable
- Research results are unpredictable, as no one has done it before, but **research events are predictable**
  - have ideas, work, discuss, feedback, work, write, submit, feedback, work, give talk, etc.
  - You will fail some (or take more risks!)

So you need to prepare for failure & success!

Flexible Optimism better than Pessimism

Optimists

- Good events have permanent general causes
- Bad events have temporary causes specific to event
- I can make good things happen

Pessimists

- Good events have temporary causes
- Bad events have permanent causes
- My efforts are futile

Research Mindset Exercise Part II

Get in groups of 2 (5 minutes)

1. Did you frame paper rejection and acceptance as
   a. Permanent or temporary causes?
   b. Personalization: you or not you?
2. What can you learn for your next paper submission?

Learn to Innovate

Learn to Innovate

It is easer to innovate if

1. You can identify the need for it
2. You ask WHY
3. You are good at asking WHY and answering
4. You love what you do
5. You create a practice and framework for it.

Innovation Frameworks

1. Learn how to read research papers.
2. Become familiar with the classic results in your research area.
3. Question assumptions, seek to generalize.
4. Set aside time for thinking.
5. Collaborate with others.

Your courses, your adviser, and other students can help you develop these practices.

Research Mindset Concepts

- Cognitive bias, curiosity, and creativity
- Growth mindset
- Flexible optimism for persevering

You are always learning!

Some resources

- Carol Dwick, “Mindset: The new Psychology of Success”
- Martin Seligman, Learned Optimism
- Daniel Kahneman, “Fast versus Slow Thinking”
- Implicit Bias Testing: https:implicit.harvard.edu
- Olivia Goldhill: “The World is Relying on a Flawed Psychological Test to Fight Racism”

Better Culture
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More Innovation

- Go slow to counter bias
- Hire diversely
- Encourage students equally
- Equal air time, listen
- Research mindset
- Learn to mentor

Acknowledgements
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