Collaboration in Science and Technology

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Talk for Women in Technology, Harvard University, April 9, 2015
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This Talk

1. Increase in collaboration
2. What makes teams and collaborations work better
3. How collaboration relates to women
4. Why it is important for women and world’s global progress
1. Increase in Collaboration
More and Larger Teams

Used 19.9M papers and 2.1M patents over 50 years

Teams = More highly cited work
Collective Intelligence

- Collective Intelligence (group ability) MORE PREDICTIVE of group performance than individuals IQ
- Collective intelligence $\neq$ average member IQ
- Higher collective intelligence $\neq$ groups with high IQ members

2. What makes teams and collaborations work better
What Optimizes Collective Intelligence

Study shows that teams perform better with:

- **Shared Discourse**: Members contribute more equally to team, rather than a few members dominate
- **Social Cognition**: Members have the ability to read and respond to social cues (social cognition)
- **More women in the team**

Is the ability to read and respond to social cues only present face-to-face?

Follow up study shows:

- Collective intelligence results are similar for face-to-face and online teams.

Source: Engel, Wooley, Jing, Chabris, Malone, 2014. Reading the Mind in the Eyes or Reading between the Lines? Theory of Mind Predicts Collective Intelligence Equally Well Online and Face-To-Face. PLOS One
Social Connection

“We all work as a family because she treats us as such.”

“She knows everyone in the office and has a personal relationship with each one of us.”

“She does not get upset when we make mistakes but gives us the time to learn how to analyze and fix the situation.”

“less emotionally connected” = “less likely to be productive”

(About Archana Patchirajan, founder of technology startups)

What lies at the root of social connection?

authenticity and vulnerability = replacing “professional distance and cool” with awareness of uncertainty, risk, and emotional exposure

Source: René Brown study with thousands of interviews
Common Knowledge

Let’s say that A and B need to coordinate about plan X to work together (For example, releasing a software version)

Is it more likely they will together with

1) **Private knowledge:** A doesn’t know if B knows plan X
2) **Shared knowledge:** A knows that B knows plan X
3) **Common knowledge:** A and B hear publicly about plan X

Study finds that:

- A and B are more likely to work together with common knowledge.

It also shows that:

- Being more agreeable or open makes no difference to working together with private or common knowledge (but yes with shared).
- Common knowledge is a distinct cognitive category.

Creating Community

- Collaborative engagement creates community
- Collecting and analyzing data helps knowing how to grow it

Source: Millington, 2012, Buzzing Communities; acknowledgement: Matthew Turk, open source
3. How collaboration relates to women
Sex Differences

- Facial, gesture expression recognition
- Emotionally expressive
- Egalitarian
- Extraversion
- Multi-tasking, parallel processing

- Visuospatial, pattern recognition
- Emotional regulation
- Dominance hierarchy
- Competition
- Serial processing

Notwithstanding, in the words of Susan Sontag, “What is most beautiful in virile men is something feminine; what is most beautiful in feminine women is something masculine”

Source: Helen Fisher, 1999. THE FIRST SEX: The Natural Talents of Women and How They are Changing the World
Well Suited to Collaborate

- Facial, gesture expression recognition
- Emotionally expressive
- Egalitarian
- Extraversion
- Multi-tasking, parallel processing

Collaboration
- Shared discourse
- Social cognition
- Social connection
- Common knowledge
- Creating community
4. Why it is important for women and world’s global progress
Individual stereotypes...

Lego Series 7 Computer Programmer

Lego Series Women Scientist

...but a new reality
Women in Technology

By 2020:
- 1.4M computer science jobs available

Now (2013):
- women are 26% of computing force
- 57% women of total graduates
- < 20% women in computer science

Data source: nces.ed.gov/programs/digest/2013/tables.asp
Author: Randy Olson (randolison.co/) (randal.olson)
Note: Some majors are missing because the historical data is not available for them
Most extensive study to-date shows:

- Academic science is a rewarding career for many, women and men alike

Source: Ceci, Ginther, Khan, Williams, 2015 Women in Academic Science: A Changing Landscape, APS
A Changing Landscape

The future of technology includes teams with a mix of skills, combining scientific and technological talents.

Teams achieve highest impact

Being collaborative essential

Teams with women perform better

Collaborative environments well suited to female mind

Improves science and technology
A quantum leap for women

Step by step, student group helps to sculpt computer science 2.0

Harvard Women in Computer Science (WICS) addresses: The “yearning for a sense of community”

From Amna Hashmi ’16, a computer science concentrator and one of the co-chairs of this year’s WECODE, and Harvard Women in Computer Science (WICS)
“Money is the most egalitarian force in society. It confers power on whoever holds it.”  (Roger Starr, NYT, CBS commentator)

“The full realization of women’s equality would have the biggest impact on economic, political and social progress.”  
(Melanne Verveer, director of the Georgetown institute for Women, Peace & Security and former U.S. ambassador-at-large for global women’s issues)

Bringing it Back Home

- Social Connection
- Common Knowledge
- Creating Community

Research Community

Harvard

IQSS

Open Source Community

IQSS Data Science
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THANKS

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