Diversity in Computer Science
Learning Goals

You should be able to:

• Justify the need for diversity in the field of Computer Science with at least two different, valid reasons

• Outline changes in enrolment of women in Computer Science over the last 40 years
RQ:

"Do you personally feel a burden to be extraordinary as a woman in computer science?"
There are lots of different kinds of diversity that computer science doesn't do well at

- Gender
- Ethnic/racial
- Disabilities

Note that many of the stats that I have come from the US. They still generally hold for Canada, but it's harder to get good numbers/graphs.
RQ: North American bias

"The article about the amount of women that are graduating in the field of computer science talks only about women in the US. Could there be differences in the amount in other countries and also could it be the US culture that causes females to not want to go into computer science?"
Let's start with the state of CS Women in the US

Women scarce in computer science

The percentage of computer science degrees awarded to women surged from the early 1970s until the mid-1980s, but then went into a long decline. The current percentage is less than half of what it was in 1983-84.

Source: Department of Education, National Center for Education Statistics
KARL KAHLER/BAY AREA NEWS GROUP
Underrepresented minorities in the US

31% of US population was Black or Hispanic or first nations in 2010

Connecting with Computer Science
www.ugrad.cs.ubc.ca/~cs101
RQ: What about UBC?

"The data shown here is of national averages. Are there gender stats of which are related to CPSC majors within UBC? Are we doing a better job than the average with this case?"

I don't have minority data for UBC.
"If anyone male/female was deeply interested in a certain occupation should they not view it simply as a profession they love, rather than a male or female dominated field?"
Why diversity matters

As shown in the first reading, different ideas come from different people with different perspectives.
"Two years ago, we had a woman speaker ... who is in charge of chassis design for the Ford Windstar. She gave an uproariously funny talk about the difficulty women have with a car that has been designed for the 50th-percentile male. Women have different needs, women carry purses, women use a vehicle differently, women are of a different size, etc., all of which make the 'male car' difficult to use.

As I said, it was a very funny talk. However, when I mentioned this to my wife, who has a long involvement with the Defense Department, she said, 'Yes, and it's just as true of fighter planes where it's not funny; it's a life and death matter.'"

- Bill Wulf – member of the National Academy of Engineering
Another reason is that there are more computer science jobs than qualified people

"120K technical computing jobs produced annually, but we graduate only 40K BS degrees in computer science disciplines (i.e., 80K new jobs go unfilled each year)"


It's easier to recruit from those who aren't participating much.
A nice graph on the deficit for WA state
Let's look back at those UBC graphs

https://www.cs.ubc.ca/our-department/women/statistics
Finally, computer science is of growing importance to other fields

I'll let Maria Klawe take this one:

https://www.youtube.com/watch?v=FNSzfPnB0uc&t=12m02s
But why not worry about so few men in elementary education?

• I worry about that, too
• But this is a computer science class
• Plus female dominated fields tend to pay substantially less than male dominated fields
"Are men and women naturally better suited for certain job positions? It seems that personalities could play role in preferences for certain occupations (women occupying a majority of elementary school teaching positions as an example). Could the difference in the proportions of genders in Computer Science be a result of human biology?"
Why does this imbalance in CS happen?

- We have some guesses
- No one's entirely sure
- But there are some factors that we can say are issues (we'll do those next)
One problem: it starts early

We can use high school Advanced Placement (AP) exams as a proxy for this

Overall:

Computer Science

Demographics of the Graduating Class and AP Exam Takers in 2013

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Graduating Class</td>
<td>100%</td>
</tr>
<tr>
<td>AP Exam Taker Population</td>
<td>60%</td>
</tr>
<tr>
<td>Population Scoring 3+ on an AP Exam</td>
<td>10%</td>
</tr>
</tbody>
</table>

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RQ:

Would changing education systems to teach young kids more about gender equality and social issues help to break us out the barriers that keep women from the sciences?
The Lego Ad mixer!

Not just informative about how we shape gender values at a young age, a great example of fun with HTML5!

http://www.genderremixer.com/lego/
RQ

Does UBC have any kind of a program that encourages women to get into the sciences?
One example UBC CS Focus on Women in CS (FoWCS) is working on

One example: Girlsmarts  UBC CS's annual workshops for grade 6 and 7 girls
Subjects like robotics, HTML, Human Computer Interaction

https://www.cs.ubc.ca/grades-k-12/girlsmarts
RQ: Bias

"We see that the numbers of women in the science had increased throughout the years, and we see that women are actually extremely intelligent in this field, but why do people still worry and have doubts in women in science? Is it because of norms? What can be done to change the thoughts of these people?"
Let's talk about bias. There are two main ones involved.

- **Conscious bias** is when you're biased and you know it (and you're generally not sorry)
- **Unconscious bias** is when you're biased... and you may not know it (and if you do, you're sorry)... and you may even be biased against what you believe!
An example of unconscious bias

- [http://wwest.mech.ubc.ca/diversity/unconscious-bias/](http://wwest.mech.ubc.ca/diversity/unconscious-bias/)
RQ:

"Reading the article, 'Bras in Space' showed me how women's work had a huge impact in the Space Race. But why is it that contributions made by women to science are largely dismissed (only heard of this finding now, YEARS later) instead of given immediate appraisal like the works of men?"
Bias exists many ways

"A research article written by a woman and published in any of the top journals will still receive significantly fewer citations than if that same article had been written by a man."

"Articles published by women in the top IR [International Relations] journals are cited less often than those written by men even after controlling for the age of publication, whether the author came from a [top research] school, the topic under study, the quality of the publishing venue, the methodological and theoretical approach, and the author’s tenure status."

http://curt-rice.com/2013/10/19/the-great-citation-hoax-proof-that-women-are-worse-researchers-than-men/
It even exists in how we think about ourselves

Self-citations are citations made to the author's own work

<table>
<thead>
<tr>
<th>TABLE 5. T-test comparing self-citations among author gender</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
</tr>
<tr>
<td>Single-authored</td>
</tr>
<tr>
<td>Men</td>
</tr>
<tr>
<td>Women</td>
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<tr>
<td>Difference</td>
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<tr>
<td>Coauthored</td>
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<td>Men</td>
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<td>Women</td>
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<tr>
<td>Difference</td>
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<tr>
<td>Men</td>
</tr>
<tr>
<td>Mixed gender</td>
</tr>
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<td>Difference</td>
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</tbody>
</table>

Notes: ** p < .05; *** p < .01.

http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=9038606
Often [HUGE STEREOTYPE DISCLAIMER HERE!] women and underrepresented minorities tend to be more motivated by how to use technology than how it works.

That's not to say that white/Asian males aren't motivated by this as well.
Another factor: people tend to like what they feel they do well in

- Boys tend to have more computing experience with computing than girls
- White people and Asians tend to have more computing experience than underrepresented minorities

This can lead to a classroom where women and underrepresented minorities feel intimidated.
"It seems that computer scientists have to be 'amazing' at math… Is it important to excel in math or is it just a stereotype?"
RQ: class stats

I noticed there were more female students present at the beginning of the term than the end of the term, what's the reason for so many female students leaving this course?
statistical spot check

- Based on 1st day survey, 49% were women
- 101 this term: 57 out of 121 women (47%)
- 110 this term: 121 out of 310 women (39%)
- 304 – Databases – last term: 21/114 (18%)

I can't get data on racial background
In case you're interested in more…

There's an annual celebration of women in computer science:

http://www.gracehopper.org

There's a regional one here May 9 & 10:

Learning Goals Revisited

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