What Keeps People Away?

The Impact of Stereotypes and Stereotype Threat
Lecia Barker
Reasons few girls and women pursue computing

**Stereotypes**
- Reduce confidence and interest

Affect Educational policies
- Lack of information/misconceptions
- Allow choices influenced by stereotypes
Stereotypes: Generalized Beliefs

- Valuable mental shortcuts for quick decisions
- Combine cultural and real-life knowledge
- Associated with the members of a social group
- Superficial, easily-observed characteristics can lead us to draw inferences about traits we cannot immediately observe

<table>
<thead>
<tr>
<th>Interests</th>
<th>Likely reactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tendency to violence</td>
<td>Intelligence   Life goals   Upbringing</td>
</tr>
<tr>
<td>Affiliations</td>
<td>Voting preferences               Trustworthiness</td>
</tr>
</tbody>
</table>
Stereotypes Are Good ...

Mental shortcuts for generalizing knowledge to other situations
And Stereotypes Are Bad ...

They can lead to mistakes, or miscategorization

Source: www.xkcd.org
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with modification by Cohoon 2012
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Stereotypes Can Shape our Expectations for Others

False dichotomies
What empirically identifiable attitudinal differences are *stable across time* in the U.S.?

<table>
<thead>
<tr>
<th>Women</th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greater interest in protection of environment</td>
<td>Greater interest in warfare, warring technology</td>
</tr>
<tr>
<td>Reservation wages: lower</td>
<td>Reservation wages: higher</td>
</tr>
</tbody>
</table>
Common Stereotype:
Feminine ≠ Technical

Lagesen 2005
Stereotypes Aren’t Just About Gender

Race
Age
Body mass
Religion
Social class
...
Example: Who scores higher on math tests?

A. White male engineering students  
B. Asian male engineering students
Stereotypes Can Create Threatening Situations

Fear of confirming negative beliefs about my group ...

- Hinders performance
- Affects choices and aspirations
- Leads to harsh personal standards, opting out if not met

Correll 2004; Chasteen et al. 2005
Stereotype Threat: Easy to Trigger; Affects Motivated Students

Some triggers:
- Gender imbalance in room
- Stereotyped physical space
- Attention called to gender
Stereotype Threat Masks Ability

Remove threat and women test better

» Advanced calculus course with 100 male, 57 female students
» No gender difference in course grades
» Significant difference in test performance without threat

Stereotype Threat Reduces Learning and Persistence

Note-taking skill reduced by stereotype threat

Appel et al. 2011; Good et al. 2012
Stereotype Threat Reduces Feelings Of Belonging

I Don’t Belong Here

Murphy, Steele, & Gross, 2007, *Psychological Science*
Stereotypic Physical Environments

Cheryan et al., 2009, *Journal of Personality & Social Psychology*
Stereotypic Virtual Environments

Cheryan et al., 2011, *Computers & Education*
Stereotype Threat Has Subtle Negative Effects Too

» Don’t speak up in groups or classes

» Reluctant to take leadership roles

» Discount their performance
Mindset Amplifies Impact of Stereotypes

• Fixed or Growth?
  – Innate ability or developed mastery?

• Stereotypes imply that ability is innate

NCWIT Tips: 8 Ways to Give Students More Effective Feedback Using a Growth Mindset

Effective feedback gives students information they actually use to increase their learning and improve their performance. It should employ a “growth mindset” that focuses on developing intelligence through effort and practice, and “wise feedback” that spurs additional effort.
Fields Have General Mindsets

• Leslie, Cimpian, & Meyer assessed scholars’ mindsets across 30 academic (12 STEM) disciplines
  – Being a top scholar in [math] requires a special aptitude that just can't be taught

  – When it comes to [math] the most important factors for success are motivation and sustained effort; raw ability is secondary
Mindset Strongly Correlates With Women’s Representation

$\text{Fields Mindsets}$

$\text{% Female PhDs}$

$r = -0.64, p = 0.025$

Leslie, Cimpian, & Meyer
Lack of Information and Misconceptions

- Computer science is what? Programming? Keyboarding? Excel spreadsheets?
- Few students, parents, or teachers know what computer scientists do
- Too many sources misinform and reinforce stereotypes

*I don’t wanna sit in front of a computer all day*
- Carter 2006
Policies Allow Stereotype-Based Choice

Carter 2006

Charles & Bradley 2006
Policies Steer Girls Away

• Choices made when gender stereotypes are most influential

• Fewer women in countries with
  – Belief in gender differences
  – Weak STEM requirements

• Restricted choices
  – Real CS rarely offered
  – Competes with electives
We can take action every day to change the stereotypes that shape thinking and policies.