CS 209:
Barriers to Meritocracy

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Economics vs Academics

No outside tutoring / SAT prep courses
Can't afford expensive books for studying
Lack of reliable access to information (e.g. internet)
Hunger
Stress
School itself may have sub-par facilities & teachers
Brain at a disadvantage from hearing fewer words in preschool
Balance work with school
Overall perception of school / academics
Fewer extracurriculars
Lack of educated role models
Transportation to and from school – time & money
English may not be someone's first language
Hygiene – students embarrassed to come to school with no clean clothes
Summer academic losses

Economics vs Academics

- Challenges students in low-income households face:
  - Supervision (Parents with inflexible jobs)
  - Hunger
  - Hygiene (Clothes, hair, deodorant)
  - Summer learning loss
  - Books

Minority Status vs Academics

Language barrier
Code switching
Stereotypes – teacher bias
Not culturally relevant education
Not be taken seriously by peers & teachers
Lack of encouragement
Lack of role models
Lack of teachers who are like them
Lower in the "pecking order" socially
Implicit bias
Stereotype threat

Minority Status vs Academics

Teacher bias –
- Not recommended for GATE testing (gifted)
- Didn't give the same type of feedback
- Different disciplinary actions
- Letters of recommendation
- Recommend for awards

Lack of role models
Need to belong would not be fulfilled
Make sexist / racist statements about what certain groups can or can't do
Negative comments when they get awards (claiming only because affirmative action)

Minority Status vs Academics

- Challenges minority students face:
  - Isolation
  - Stereotype Threat
  - Lack of role models
  - Lack of encouragement
  - Implicit bias
  - Discrimination
  - Examples do not pertain to them

Together yet Separate

- Circumstances where who you are matters:
  - Legal system
  - Tying school funding to property taxes
  - Networking − informal professional networks
  - Professional promotion
  - Personal safety

Together yet Separate

- Circumstances where who you are matters:
  - Job employment − discrimination in hiring and fitting in if they get hired
  - Police, law enforcement, criminal justice system
  - Men & women treated differently on the job (especially in IT)
  - Personal safety

Together yet Separate

- Circumstances where who you are matters:
  - "X while African-American"
  - Avoiding sexual assault

Case Study: Women in CS

- Why do fewer females choose CS?
- Why do they transfer out citing "failure" at a higher GPA than males?

Why don't females choose CS? Societal effects

- Fear
  - Experience Gap
  - Confidence Gap
- Disinterest
  - Computer Science Image
  - Lack of Role Models

Experience Gap Boys' vs Girls' toys

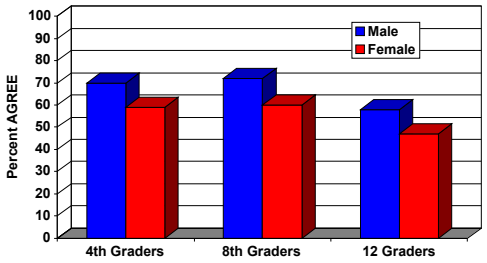
- Action Figures
- Tool sets
- LEGOs
- Science / Circuit Kits
- Dolls
- Kitchens
- Easy Bake Oven
- Craft Kits

Note: This is getting better. There are LEGOs for girls. But many of these are still marketed heavily by gender.

Experience Gap

- CMU: Females in CS usually oldest in family or no brothers
  - Conclude that other females spend less time with father, get less experience in computing.

Confidence Gap
Girls less likely to agree with "I am good at math"



SOURCE: National Center for Education Statistics, 2000

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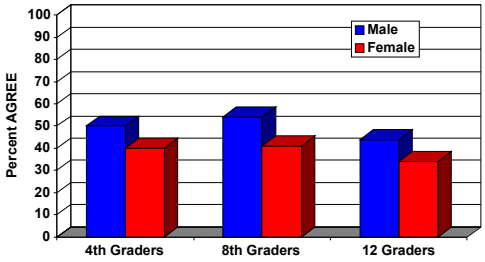

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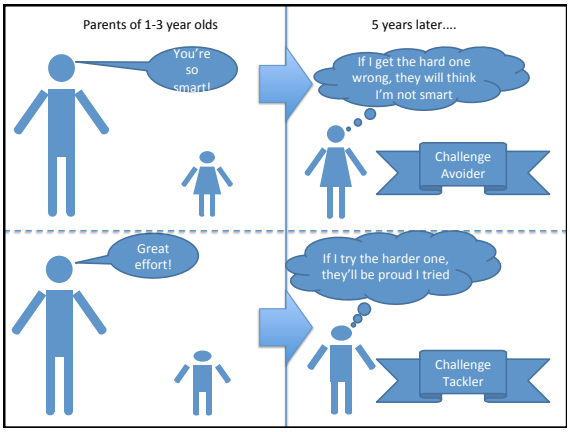

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- Disinterest
  - Computer Science Image
  - Lack of Role Models

Image: Computer Scientist search

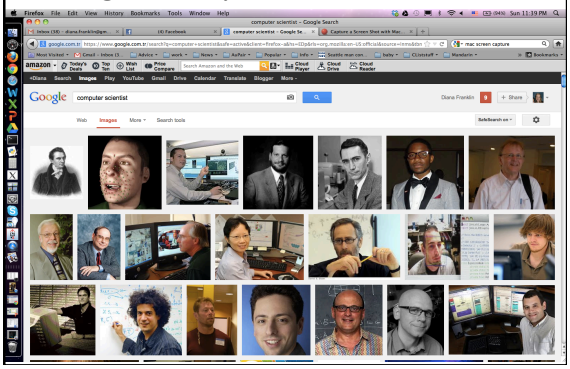


Image: Portrayals in movies, TV

People chose computer science because of an obsession with computers, not because of helping people

- Nerd with no social skills
- Treats those without knowledge with scorn
- Loves programming to the exclusion of all else

Image: Historical figures minimized

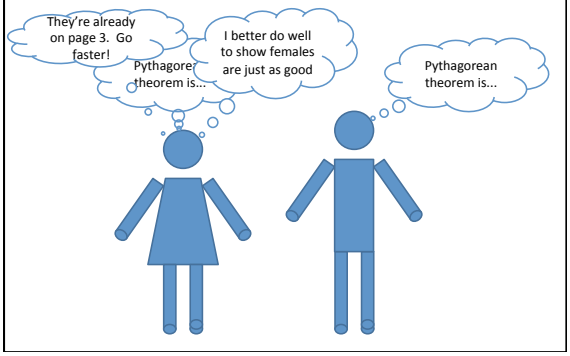
Computer science is appropriate, but…

- Just not for me.

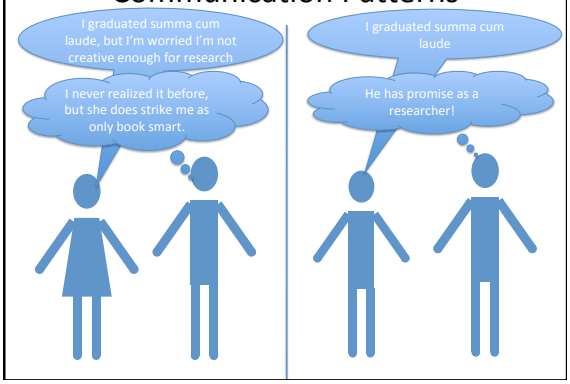
Females leave CS

- Male-dominated field puts females at a disadvantage
  - Stereotype Threat
  - Communication Patterns
  - Lingering discrimination

Stereotype Threat



Communication Patterns



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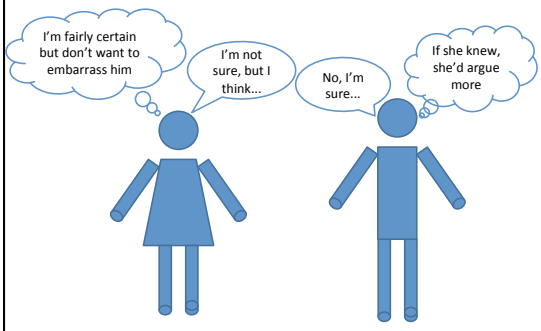

Lingering Stereotypes

- Bias judging resumes
- Bias writing letters of recommendation
- Backlash when a woman takes on leadership roles that need "male" attributes
- Unequal assignment of tasks in groups
- Unequal assignment of credit in groups

Economics vs Academics

- Challenges
  - Supervision
  - Hunger
  - Hygiene
  - Summer learning loss
  - Books
  - Teacher bias
- Solutions
  - year-round school
  - summer school / camp
  - teacher training for implicit bias
  - free/reduced school lunches / breakfast
  - well-stocked library
  - Giving everyone books
  - Offer parents resources, sign up families existing aid opportunities
  - Taking kids to school trip for public library
  - Washing machines in schools
  - Don't expect parents to purchase materials for projects
  - Get rid of magnet schools
  - Fund education

Economics vs Academics

Challenges	
Supervision	Free tutoring program / after school homework clubs
Hunger	ACT tutoring course offered in school
Hygiene	UChicago is now test optional
Summer learning loss	Peer tutoring
Books	Laundry machines in school
Teacher bias	Free breakfast / lunch - nutritional
	Teacher libraries, Book swap
	Free after-school programs
	Good on-school computing / internet
	Summer lunch program, summer school
	Busses, late bus for activities, metro cards
	Hire more diverse teachers
	Teaching learning through games
	Make school more enjoyable
	1-to-1 chromebooks
	Discounts, coverage for AP tests
	Free curriculum on the internet
	Education for teachers
	Have fewer teacher policies
	Teachers use anonymized grading
	Remove tracking in math

Minority Status vs Academics

Challenges	**Solutions**
Isolation	Implicit bias trainings
Stereotype Threat	More quantitative grading / interview criteria
Lack of role models	Explicit behavior standards
Lack of encouragement	Use diverse role models in educational materials
Implicit bias	Blind grading, applications
Discrimination	Mentoring programs for different groups
Examples do not pertain to them	

Minority Status vs Academics

Language barrier	Hire more diverse teachers
Code switching	Coursework in other languages, ESL
Stereotypes – teacher bias	Legislation to protect minority students
Not culturally relevant education	Use culturally-relevant examples
Not be taken seriously by peers & teachers	Hire teachers who would talk more like at home
Lack of encouragement	Know the student population better – adapt the curriculum for the audience
Lack of role models	Education about social dynamics
Lack of teachers who are like them	More role models (naming of buildings, rooms, etc.)
Lower in the "pecking order" socially	Include prominent minority figures in history
Implicit bias	Bring in community leaders as role models
Stereotype threat	Offering communities or groups outside of class
	Classes structured around people with disabilities

Culturally-Relevant Design

- Cultural Background
- Contemporary Culture
- Personalization
- Teaching style

Culturally-Relevant Design

- Cultural Background
  - Role models
  - Identity
- Contemporary Culture
  - Shared experience
  - Engagement
- Personalization
  - Identity
  - Engagement
- Teaching Style
  - Academic Learning

Culturally-Relevant Design: Two Perspectives

Different ways we can incorporate culture

- Generate your own list of ideas: 5 minutes – list and add to participation notes
- Get together in with another group and share your ideas
- Choose a few you want to share out

Ideas

Ideas

- Artwork
- Characters
- Historical events / figures
- Music
- Contexts
- Individual customization
- Methods of learning
- Incorporating family elements