Stereotypes

and the

Nature and Nurture of

Intelligence

Joshua Aronson
New York University
NCWIT, May 23, 2012
Question:

Black babies generally have the same intellectual abilities as white babies so why do they do worse on IQ tests and in school as they grow and move through school?
Questions

If girls have the same math potential as boys, why do they do worse on the math SAT and why do so few major in engineering and computer science?
Questions

What keeps bright students from developing their gifts?
Questions

How do we motivate students who don’t care much about performing well in school?
Question

How do we solve the growing income-inequality education gap, which is now greater than race gap?

“The problem is a puzzle. No one has the slightest idea what will work. The cupboard is bare.”

Douglas J. Besharovon
NY Times, 2012
Question

Why did George W. Bush so often talk like an idiot?

Partial answers to these questions lie in the nature of intelligence
The Nature of Intelligence
“Human intelligence is among the most fragile things in nature. It doesn’t take much to distract it, suppress it, or even annihilate it.”

--Neil Postman
“Human intelligence is both more fragile and malleable than most people realize, and far more so than the makers of standardized tests would lead us to believe.”

--Joshua Aronson (2009)
The Fragility of Intelligence

Some physical factors that impair intelligent thought

- Malnutrition (Breast feeding)
- Sleep Deprivation
- Blow to the Head
- Lust
The Fragility of Intelligence

Social factors that impair intelligent thought

- Mistrust (Bryk & Schneider, 2002; Cohen)
- Threatened Safety (Sharkey, 2009)
- Threatened Belongingness (Baumeister, 2002)
- Stereotype Threat/Identity threat (Steele & Aronson, 1995)
Stereotype/Identity Threat

Apprehension arising from the awareness of a negative stereotype or personal reputation in a situation where the stereotype or identity is relevant, and thus confirmable

– everyone experiences this in some form
Examples of Identity Threat

- Jewish person in a money context
- African American Taking an IQ test
- Woman called upon in math class
- George W. Bush and public speaking
“They misuderestimated me”
--G.W. Bush, Nov 6, 2000

Estimate my SAT Score

Average estimate = 1030  Bush’s Actual Score = 1330
Stereotype Threat
Anecdotal Evidence

“When I talk in class, I feel as though I’m totally on stage, like everyone’s thinking, ‘oh what’s the Black girl going to say?’ But I don’t speak up in class much anymore, so I guess it’s not a big deal.”

—Stanford Undergraduate
Stereotype Threat

Anecdotal Evidence

“Group work was a nightmare. I could tell that no one thought my ideas were any good because I’m Latina.”

—NYU Undergraduate
“Everyone expects me to be good at math because I’m Asian, so I feel extra stupid because I’m not so good at math.”

—NYU Undergrad
Stereotype Threat
Your Anecdotal Evidence

Your Story Here:

Write for one moment about an experience of stereotype threat at school, work, or wherever as you experienced it. Share?
Laboratory Experiment on Stereotype Threat


- **Method:** Reducing Evaluative Scrutiny
- **Measure:** Blacks’ and Whites’ Verbal GRE Performance
Verbal Test Performance

- "Measuring Your Ability":
  - blacks: 4
  - whites: 11

- "Not Measuring Your Ability":
  - blacks: 1
  - whites: 0
Verbal Test Performance

- Blacks
- Whites

Comparison of test performance between "Measuring Your Ability" and "Not Measuring Your Ability" for blacks and whites.

- "Measuring Your Ability":
  - Blacks: 5 items solved
  - Whites: 11 items solved

- "Not Measuring Your Ability":
  - Blacks: 7 items solved
  - Whites: 9 items solved
Verbal Test Performance Corrected for SAT

![Bar chart showing the number of items solved by whites and blacks under stereotype and no stereotype conditions.]

- **Blacks**:
  - Stereotype Threat: 4 items solved
  - No Stereotype Threat: 8 items solved

- **Whites**:
  - Stereotype Threat: 8 items solved
  - No Stereotype Threat: 10 items solved
Laboratory Experiment on Stereotype Threat

Steele & Aronson (1995)

Method: Inducing the Relevance of Race

Measure: Blacks’ and Whites’ Verbal GRE Performance
Verbal Test Performance

Number of items solved by race and whether asked to indicate race.

- **Asked to Indicate Race**
  - Blacks: 4
  - Whites: 8

- **Not Asked to Indicate Race**
  - Blacks: 8
  - Whites: 8
Additional Studies Finding Performance Effects

- Women Taking Math Tests
- Latinos taking verbal tests
- Elderly taking short-term memory tests
- Low SES Students taking verbal tests
- Blacks and Miniature Golf
- Women taking tests of Political Knowledge, Driving, Chess, Computers
- White males taking tests of social sensitivity
- Princeton Students from Non-preppy backgrounds on math tests
- White Males Taking Math Tests
When White Men Can’t Do Math

Test of Your Math Ability

Test of Your Math Ability Relative to Asians
When White Men Can’t Do Math

Test of Your Math Ability

Test of Your Math Ability Relative to Asians

\[ d = .93 \]
Conclusions From 350 Published Studies

• Impairment occurs both on IQ tests and in terms of GPA
• Impairment on tests results from anxiety, high blood pressure; arousal, reduced working memory capacity, impaired self-regulation; not typically a function of reduced effort
• Can affect elite or non-elite students
• Can arise as a function of simply mixing students
• ST is much more likely to affect African Americans than immigrant black students; gender effects more likely in US
• Moderated by racial and gender identity, identification with academics, self-monitoring, implicit theories
Stereotype Effects in the “Real World”
Educational Testing Service
Field Study:
The AP Calculus Test
ETS Field Study: Asking Gender Before Taking AP Calculus Test Hurts Girls

Educational Testing Service Study: Asking Gender Before AP Calculus Test Hurts Girls, Helps Boys
Field Experiment: Women in the Science Pipeline

Highest Level Calculus Students
Field Study: Women in the Science Pipeline

Highest Level College Calculus Students

Good, Aronson, & Harder (in press) *Journal of Applied Developmental Psychology*
Field Study: Women in the Science Pipeline

Advanced Level Women Outperform Advanced Men in Calculus When Threat Reduced

California Exit Study Experiment: Comparing performance on High and Low Stakes Tests

Do High Stakes Tests Hurt Minorities?

Reardon et al. (2011)
Effects of High Stakes on High School Graduation

Effect of CAHSEE Requirement on Graduation Rates, Bottom Quartile Students, By Race
(estimates adjusted for prior ELA achievement, poverty, ELL status, and gender)

2003 (Pre-CAHSEE)

Graduation rate

<table>
<thead>
<tr>
<th>Race</th>
<th>Graduation Rate</th>
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<tbody>
<tr>
<td>Whites</td>
<td>44%</td>
</tr>
<tr>
<td>Hispanics</td>
<td>31%</td>
</tr>
<tr>
<td>Blacks</td>
<td>53%</td>
</tr>
<tr>
<td>Asians</td>
<td>61%</td>
</tr>
</tbody>
</table>

2003 (Pre-CAHSEE)
"No circle is more vicious than the one having to do with intelligence. Children who may be only a little behind their peers to begin with tend to avoid those things that could have made them a little smarter. As a result they fall further and further behind. Meanwhile the kids who started out a little ahead are doing push-ups with their brains."

Judith Rich Harris
From Vulnerability to Low ability

- Stereotype
- Threat
- Lower ability
- Avoidance of challenge/evaluation
- Underdeveloped competence/competence
The Nurture of Intelligence
The Nurture of Intelligence

To encourage students

NCWIT.ORG
Reducing Stereotype Threat:
Change the situation
Workshop Question:

What, in a word, is the one solution to almost any social problem or predicament?
Q: What, in a word, is the one solution to almost any social problem or predicament?

A: Community
Reducing Stereotype Threat
Change The Mindset
The Growth Mindset
The Fixed Mindset

"Bombshell. Not genius. Not even brilliant. Unbelievable. Thank principal and leave. Keep cool. . .control wobbly knees. . .125. Not brilliant. Not undiscovered genius. How can I tell my wife? Did they laugh when I applied to medical school? IQ has no meaning. Totally discredited. No one takes it seriously. All it measures is ability to take IQ tests. Who was Otis anyway? IQ doesn’t measure creativity. . . Maybe I had an earache. Bad night’s sleep. . .Winston Churchill. . .Maybe I lost time daydreaming---creatively. Cultural bias. . . .But cultural bias all in my favor! Wife: National Merit Scholar, skipped two grades. Early photos show strange bulging forehead. . . . We lie in bed, not touching. Is she talking more slowly than usual to make sure I understand? What is it like not to be brilliant, she wants to know. What kinds of thoughts don’t you get? And what do you do in the long wait between ideas?"
Experiment

Question:
Can a growth mindset improve math test scores among black school children (aged 9-13) ?

Method: Black North Carolina students primed for race or not, given growth mindset or not.

Measure: Math Test Performance (EOG)
Math Test Performance
Black Grade School Students

- RACE PROMPT
- No RACE PROMPT

% items solved

GROWTH MINDSET

NO GROWTH MINDSET
Reducing the effects of Stereotype Threat In the real world: Shaping implicit theories

Question: Can getting people to believe in expandable intelligence reduce effects of stereotype threat on GPA?

- Method: Attitude change
- Measure: End of year GPA
Year End Follow-Up:

GPA

Reducing Stereotype Threat in Middle School: A field Intervention

Question: Can psychological intervention raise test scores of minority students?

• Method: mentoring study; attitude change
• Conditions:
  – Malleability of intelligence
  – Role Models: senior students who stress the normality of early difficulty
  – Control (drug abuse message)
• Measure: Texas Assessment of Academic Skills (TAAS)
7th Grade Reading TAAS--Latinos

7th Grade Girls’ Math TAAS

Reducing Identity Threat: The role of awareness

Aronson & Williams (2011).

Question:
Can understanding Stereotype threat reduce its effects?

Method: Forewarning about ST or Test Anxiety

Measure: Blacks’ Test Performance a week later
African American’s GRE Performance

- Forewarning-ST
- Forewarning-Test Anxiety
- Control

Stereotype threat
No stereotype threat
Positive Identity Salience
Spatial Ability Test Performance

- Largest sex differences: Spatial Ability
- May account for most of the math test score gap
- Testosterone?
- Trainability
- Can Identity Salience move scores around?
Vandenberg Mental Rotation Task

A meta-analysis containing 286 data sets and 100,000 subjects found a highly significant male advantage for mental rotation; this pattern remains stable across age and has not decreased in recent years.
Identity Salience Influences Women’s Mental Rotation Performance

GENDER  | ELITE COLLEGE STUDENT | CONTROL
--- | --- | ---
WOMEN | | 15
MEN | | 20

Identity Salience Influences Women’s Mental Rotation Performance

Identity Salience Influences Mental Rotation Performance
Boys and Girls got one of 2 questionnaires at a college fair—one about cafeteria food; the other about resisting conformity, being a “trailblazer”

1. All students expressed negative attitudes toward conformity and cafeteria food.

2. No effect on boys

3. Girls who received the conformity measure before selecting pamphlets were twice as likely to express take pamphlets STEM majors
How Many Girls Requested Information Pamphlets on STEM Majors?

Number of Girls Taking Pamphlets

- Cafeteria Food Survey
- TrailBlazer Survey
Crellin Elementary School, a poor school on the Maryland West Virginia border; could be the best school in America

Went from 0% proficiency to 100% proficiency in 3 years after new principal (50% of students reached advanced level)

7 years after graduating from Crellin, graduates comprise 75% of the students in AP classes in high school despite being 1/3 the size of the other feeder elementary schools
Many lessons to be learned from Crellin

Students do science rather than study science, so they identify themselves as scientists very early.

Principal and teachers constantly remind them that they are “Crellin students” and thus are special:

“Crellin girls tie their own shoes”
“Crellin girls don’t say ewww when they do science”
“Crellin students work hard, etc.”
“We don’t do that here at Crellin”
Meaningfulness
“Victim” of Stereotype Threat

“In the perception of society my athletic talents are genetic; I am a likely mugger-rapist; my academic failures are expected; and my academic successes are attributed to others. To spend most of my life fighting these attitudes levies an emotional tax that is a form of intellectual emasculation”

--Neil de Grasse Tyson
Meaningful Work

• “We don’t make anything any more”
• The “Box”
• 2 dimensional vs. 3 dimensional problems
• Hulleman & Harackewicz
• Tara Chklovski and Iridescent
• Creltin Elementary: we do mainly real work
Seymour Papert:

“We teach numbers, then algebra, then calculus, then physics. Wrong! Start with engineering, and from that abstract out physics, and from that abstract out ideas of calculus, and eventually separate off pure mathematics. So much better to have the first-grade kid or kindergarten kid doing engineering and leave it to the older ones to do pure mathematics than to do it the other way around.”

• Benezet Experiment
Meaning/Relevance Nudge

- Harackiewicz had students in 9th grade science classes evaluate their expectations for success in their science class. Students were then randomly assigned to one of two conditions:
- 1) Control condition: Students wrote a brief essay summarizing the material they were covering in science class
- 2) Experimental condition: Students wrote about the value and usefulness of the material they were covering in class, and how it might relate to their own life.
Science Interest

Low Expectations | High Expectations

Personal Relevance and Performance

Course Grades

Some Students Need more than a Nudge
"Think about Snooki, seriously, when we talk about teachers, and we try to lay all the blame on them ... watch 'Jersey Shore,' watch it. And tell me what teacher could possibly have reached any one of them, to get any one of their scores up, in any subject."

Lawrence O’Donnell
Helping others as a universally meaningful motivator?
Solar Students
Solar Students
Solar Students
Solar Students
Experiment: Motivation in the Face of Threat

Essay paradigm:

108 college students of different ethnicities write essay on the pleasures of college; They get harsh feedback from an editor.

Manipulation:

“published in a book”

“published in a book to be distributed to poor children in Harlem”

DV: How many students will overcome the ego sting and submit revised essays?
Number of Students who revised essays after harsh feedback

- "Published in a Book"
- "Published in a Book for Children"

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>&quot;Published in a Book&quot;</th>
<th>&quot;Published in a Book for Children&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whites</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Hispanics</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Blacks</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>
Need for Autonomy
Students don't like school because their teachers don't have a full understanding of the many cognitive principles that govern the learning process. If only teachers would know this, they would teach better and kids would love school, engage more, etc.

Partly True
The only difference between school and prison is to get into prison, you have to commit a crime, but they put you in school just because of your age. In other respects school and prison are the same. In both places you are stripped of your freedom and dignity. You are told exactly what you must do, and you are punished for failing to comply. Actually, in school you must spend more time doing exactly what you are told to do than is true in adult prisons, so in that sense school is worse than prison.

– Peter Gray
Conclusion

Bell-Curving:

With Charles Murray (Bad Students)
With Michelle Rhee (Bad Teachers)
With Social Psychology (Non-optimal Situations)
Thank You!

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