NAPE

# Increasing the Diversity of the STEM Workforce

## Retention Strategies for Teachers

Mimi Lufkin, CEO

National Alliance for Partnerships in Equity

# Why do we care?

- Global competitiveness
- Innovation
- Workforce development
- Economic self-sufficiency
- Career satisfaction



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# Retention Strategies

What can teachers do to support nontraditional student's success in STEM programs of study?

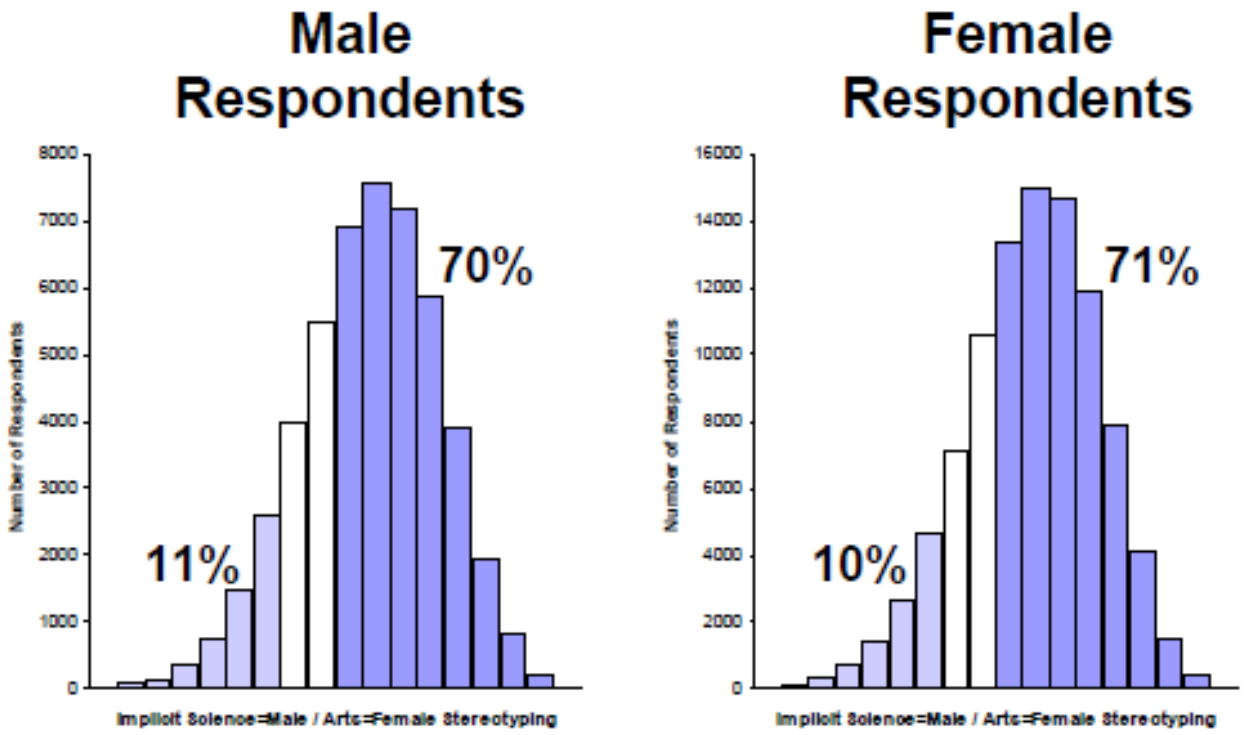
# What are your biases?

Implicit Association Test

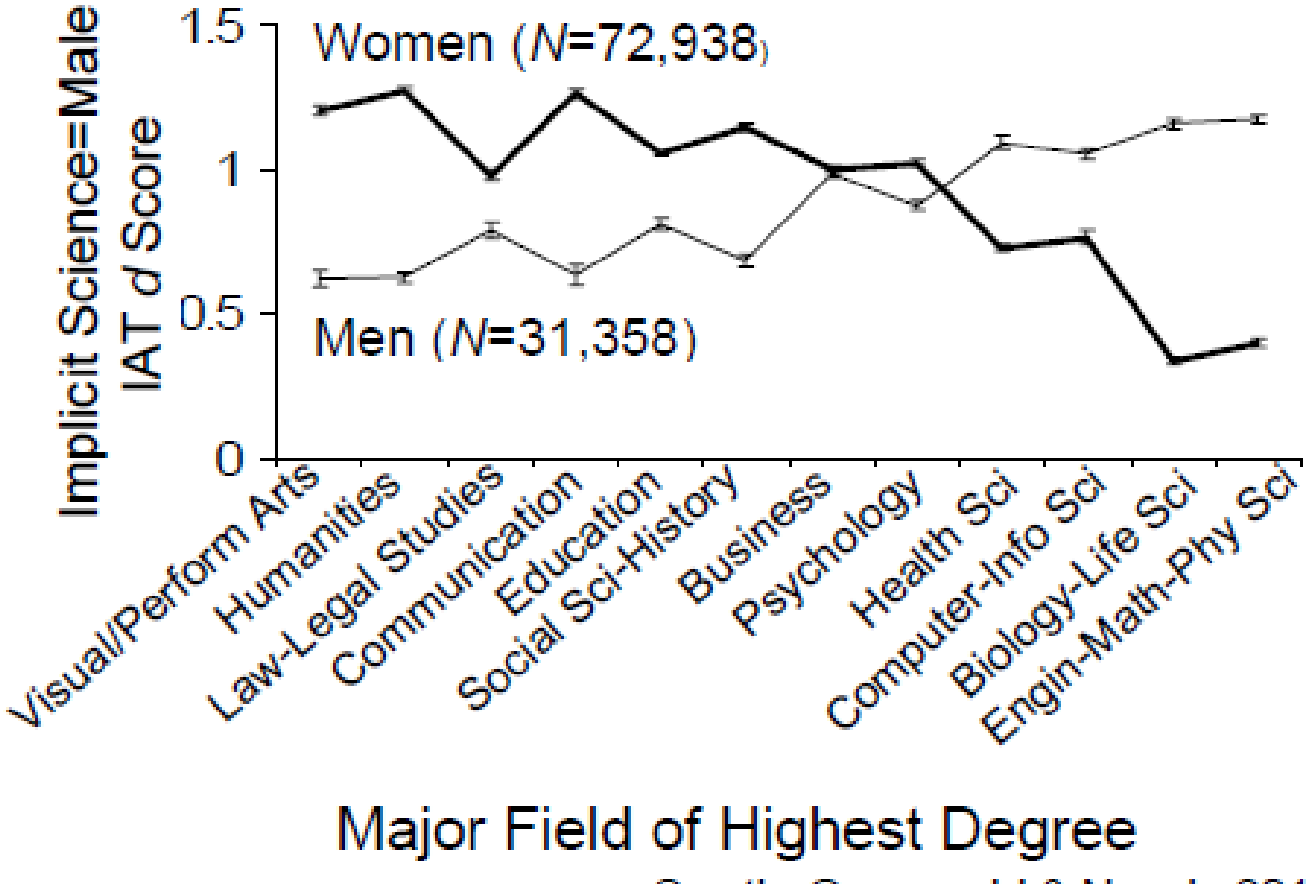
https://implicit.harvard.edu/implicit/

# Science=Male Arts=Female

## Same for Men and Women?



# Implicit Bias Science=Male




Smyth, Greenwald & Nosek, 2010

# Micromessaging

## Micromessages

- Small, subtle, semi-conscious messages we send and receive when we interact with others

## Micro-inequities

- Negative micro-messages we send other people that cause them to feel devalued, slighted, discouraged or excluded

## Micro-affirmations

- Positive micro-messages that cause people to feel valued, included, or encouraged

# Tech Alert October 27, 2011

Dear Members and Readers,

Please accept our sincere apologies for the headline in today's Tech Alert: "With the Arduino, Now Even Your Mom Can Program." The actual title of the article is "The Making of Arduino."

IEEE Spectrum

# Gender Bias = Micro-Inequities

Unconscious

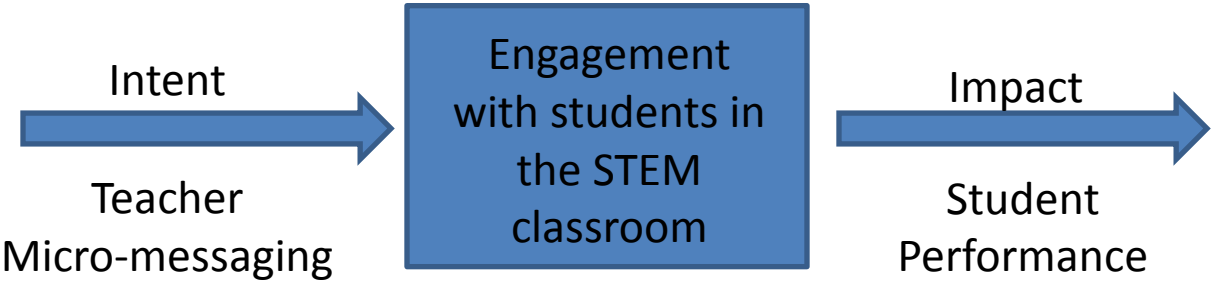
Unintentional

Subtle

PERVASIVE

POWERFUL

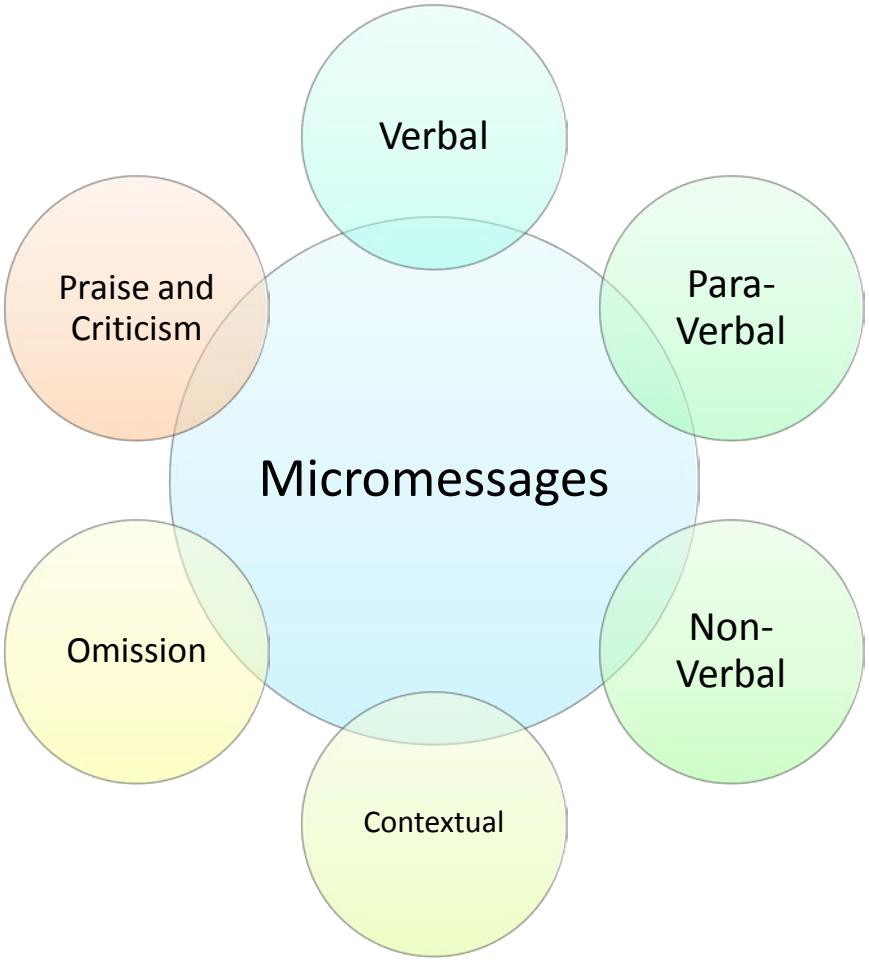
# Why Think About Micromessaging?




Small and seemingly insignificant behaviors may result in unfavorable learning outcomes.

Impact is More Important Than Intent!

# Key Micromessaging Elements



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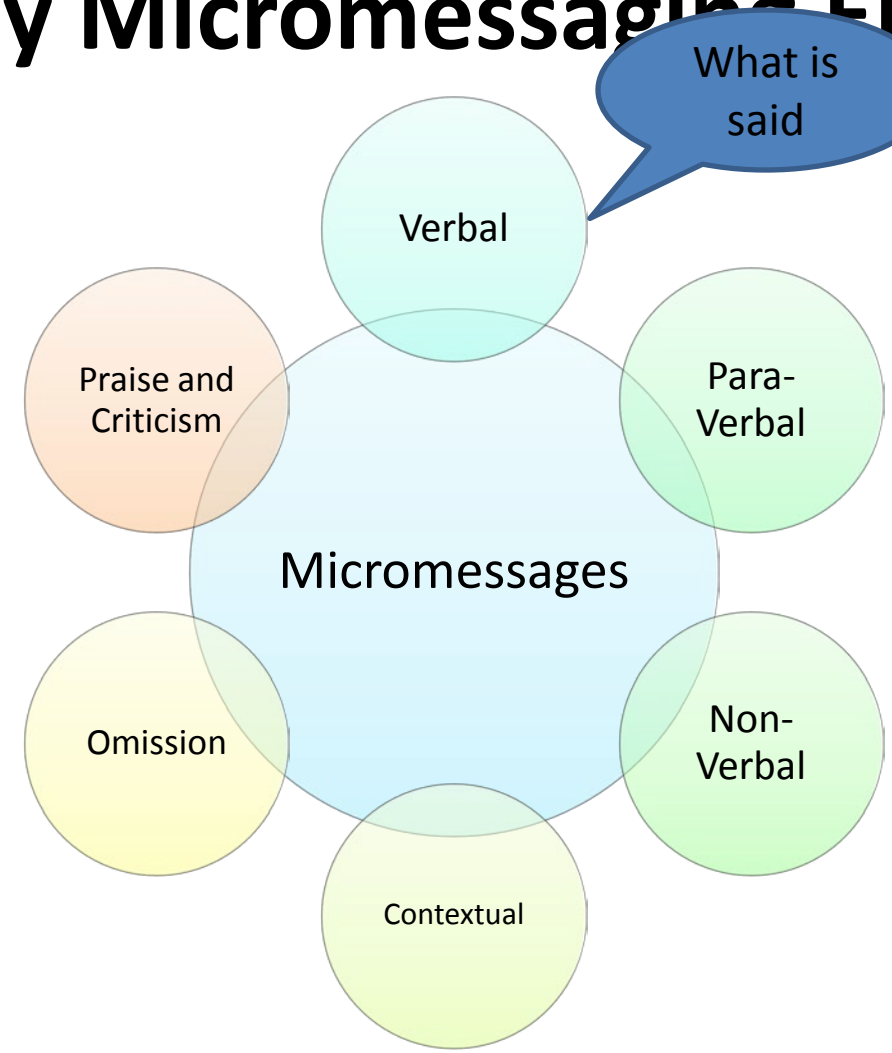

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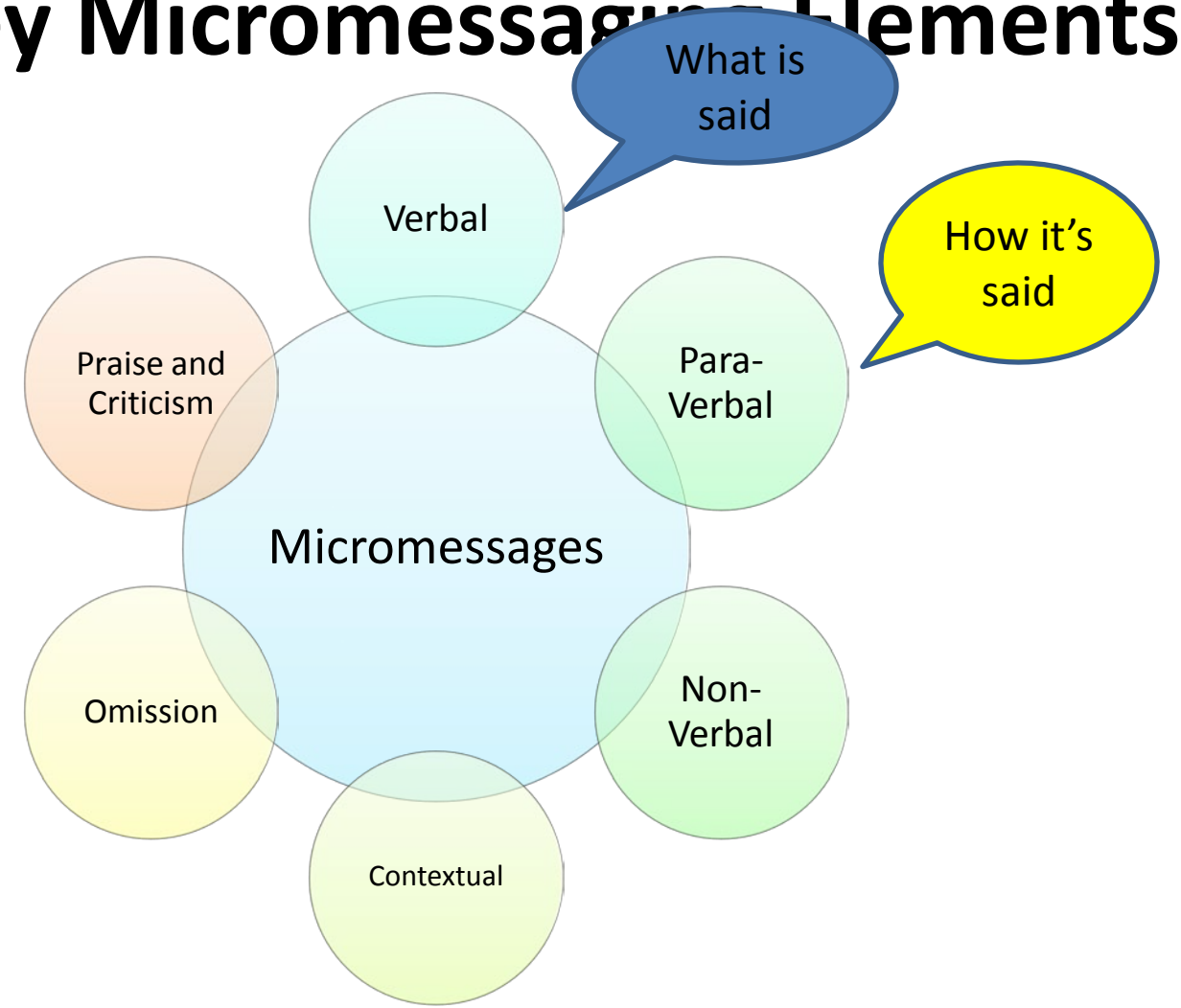

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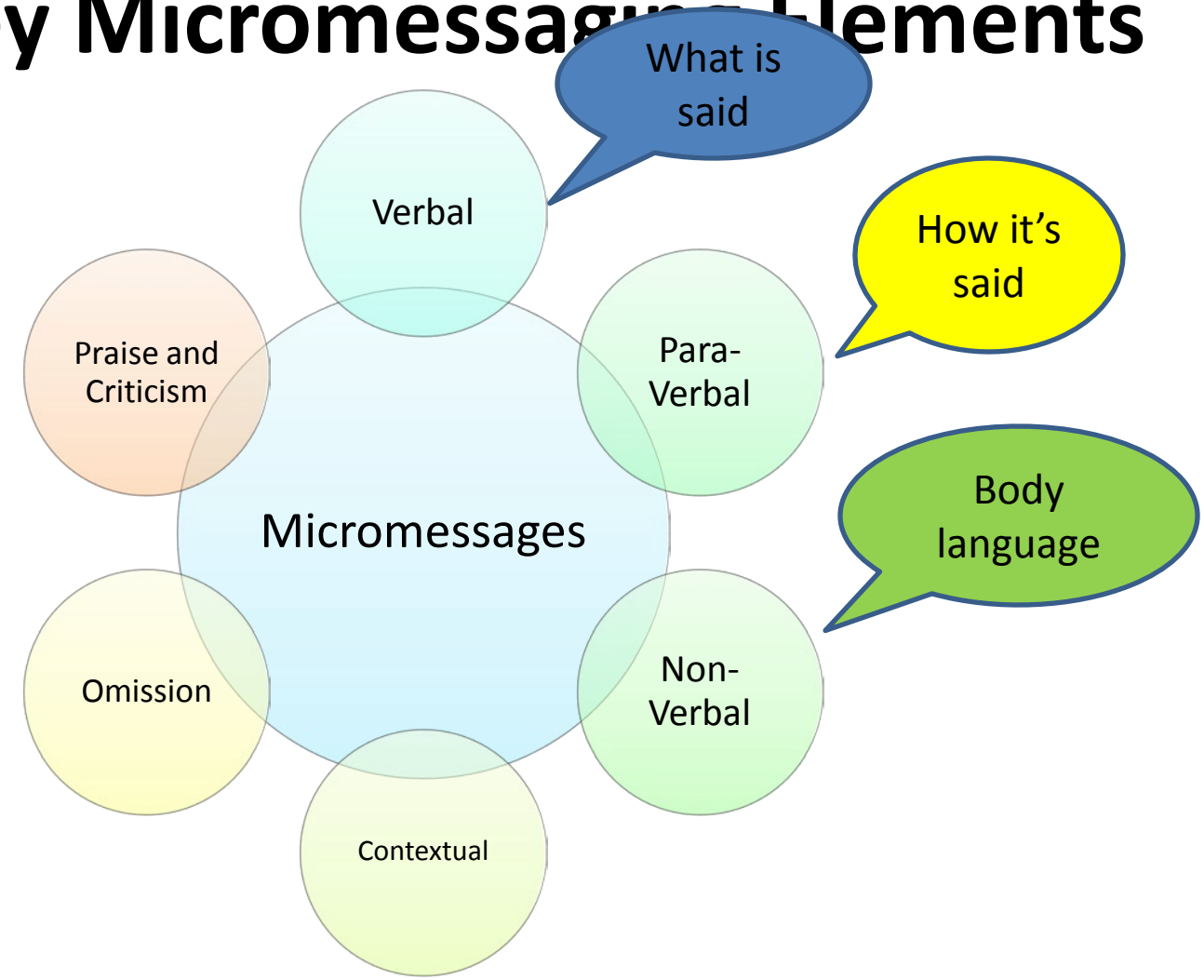

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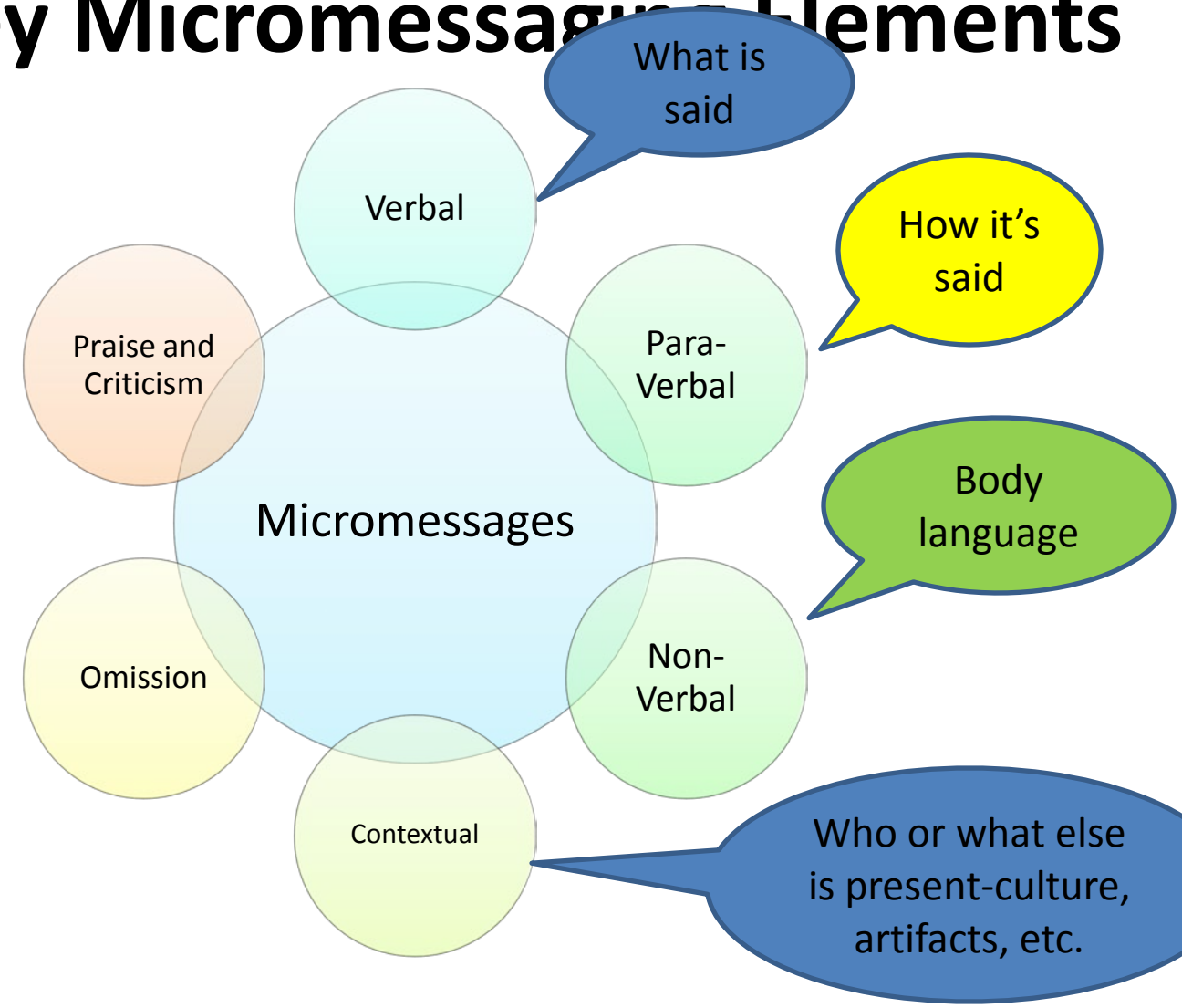

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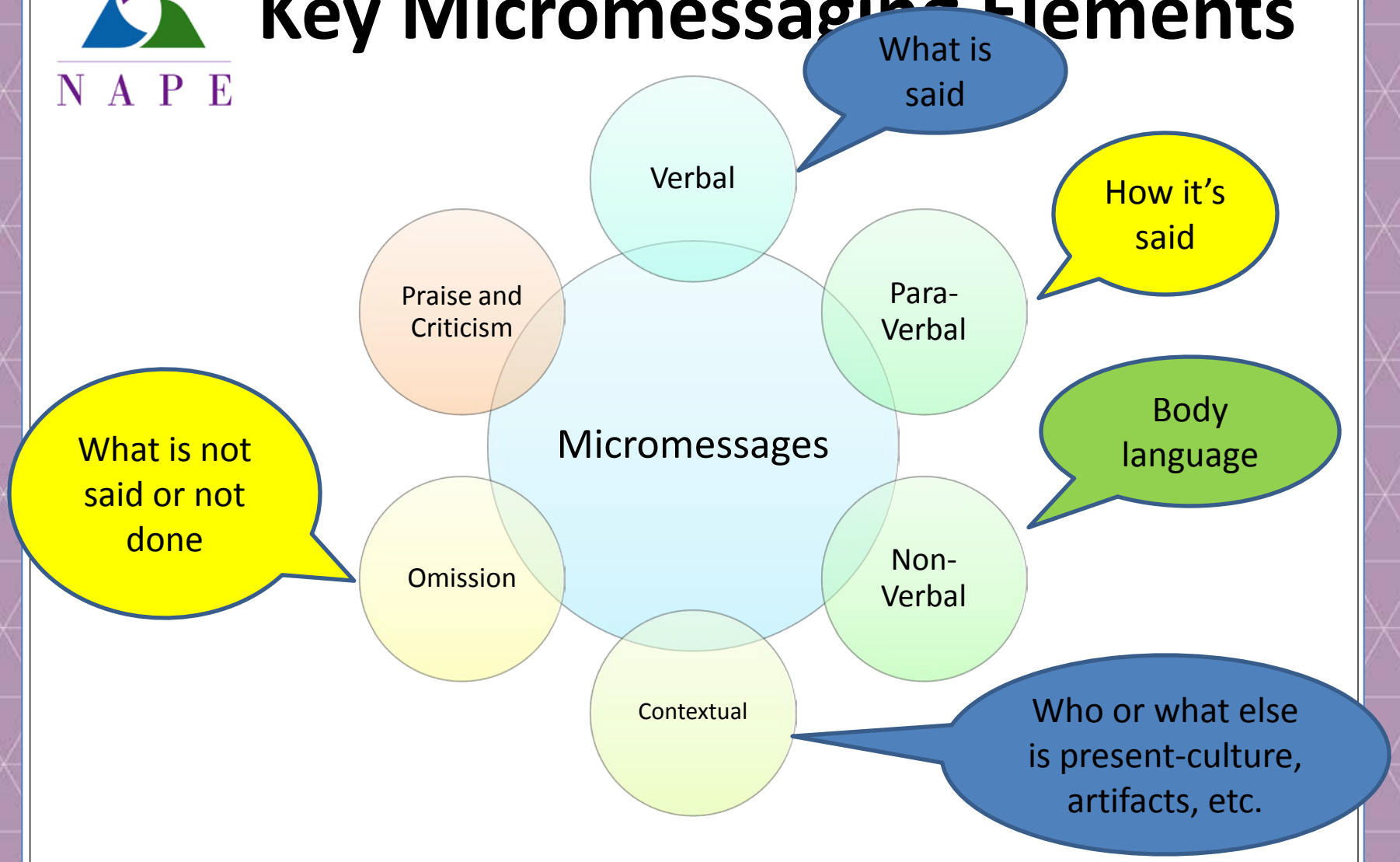

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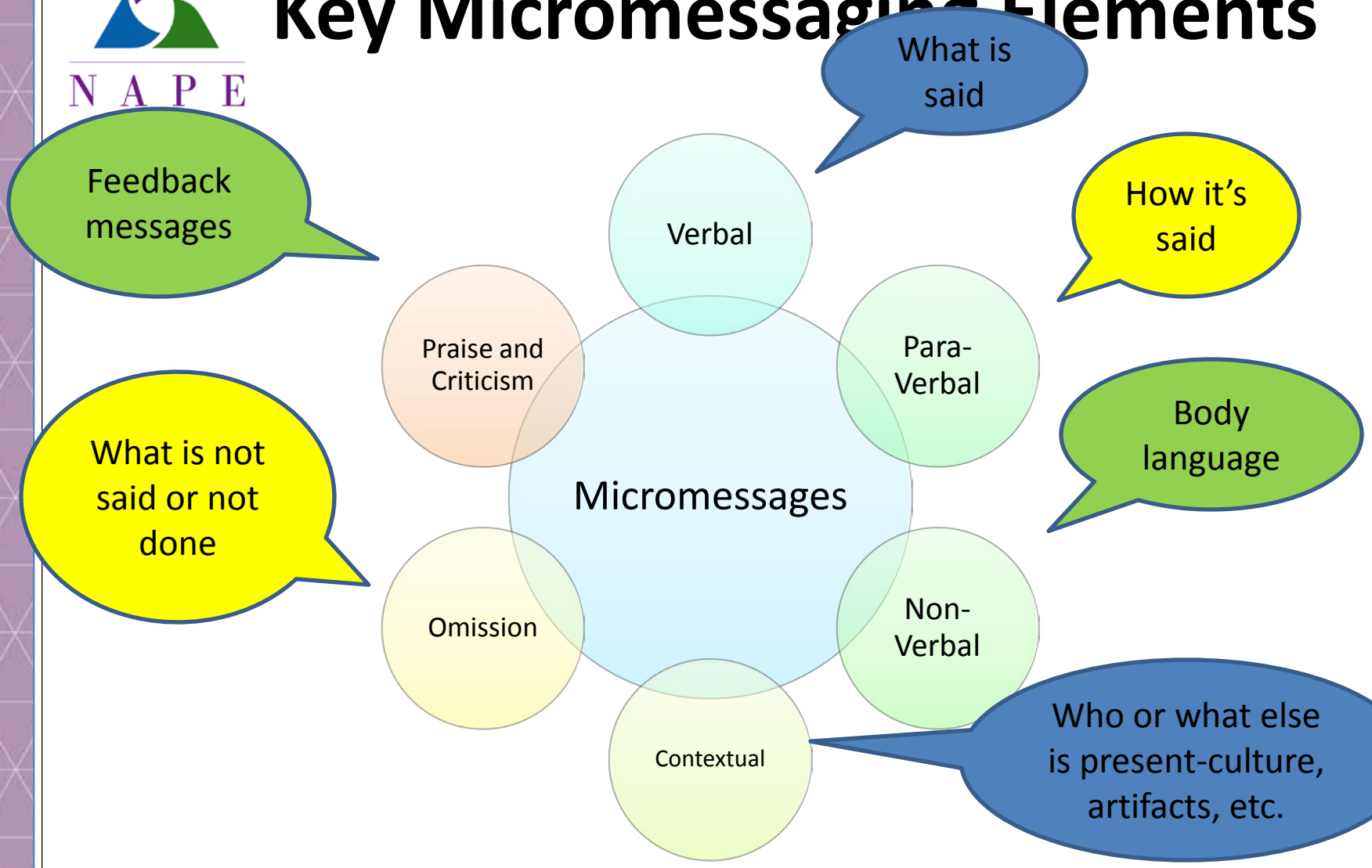


# Activity: Guess the Element

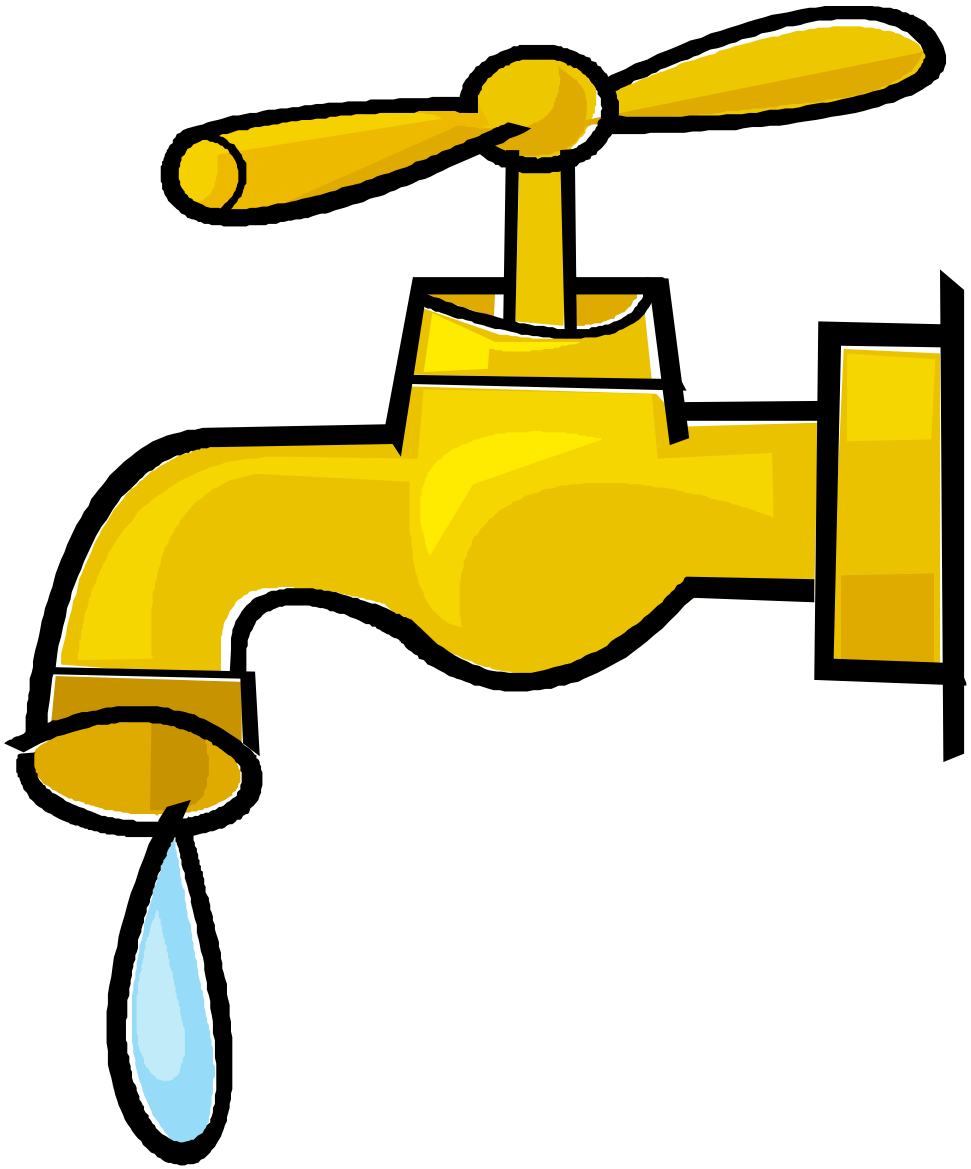
| Cue | Type |
|---|---|
| Wait longer for boys' answers than those of girls | |
| Discipline boys more than girls for similar behavior | |
| Avoid eye contact with female/male student; only look at male/female students | |
| Consistent use of generic "he" or "man" to represent both men and women | |
| Only use males as examples of scientists | |
| Do not tolerate girls calling out answers but tolerates that behavior from boys | |

# Examining the Small

On a piece of paper write a specific incident when you were being…

- unintentionally discouraged or hurt by something SMALL someone said or did
- deeply valued by your colleague or family member in a SMALL yet powerful way.

*- How did you know? What did that person do to communicate your value?*



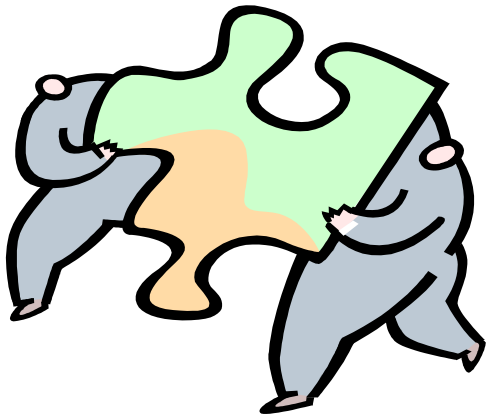
# Positive Micromessages

Micro-affirmations are micromessages we send that validate and recognize other people in positive and supportive ways.

# Be Affirmative!

Make a concerted over-effort to become affirmative:

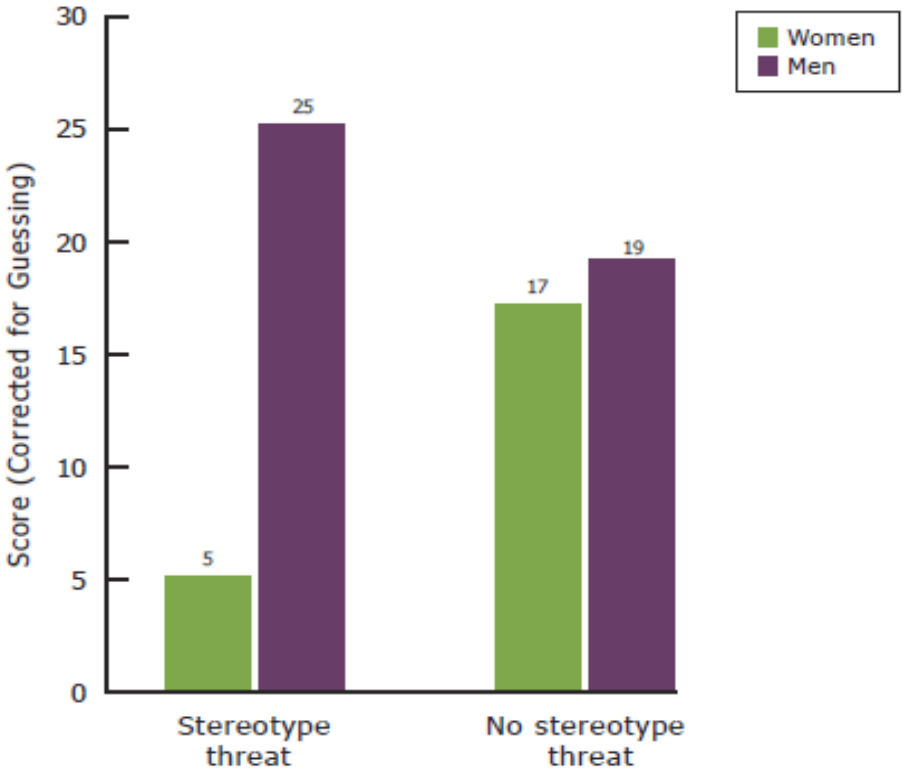
- It takes time (a year or more!)
- It takes effort (a conscious plan)
- It takes support (peers and a learning community)



Negative stereotypes about and women's and other underrepresented groups abilities in math and science persist despite considerable gains in these areas in the last few decades.

# Negative stereotypes about girls' and women's abilities in math and science adversely affect their performance in these fields.

Performance on a Challenging Math Test,
by Stereotype Threat Condition and Gender




- Expose girls to successful female role models in math and science.
- Teach students about stereotype threat.

Source: Spencer, S. J., Steele, C. M., & Quinn, D. M., 1999, "Stereotype threat and women's math performance," *Journal of Experimental Social Psychology*, 35(1), p. 13.

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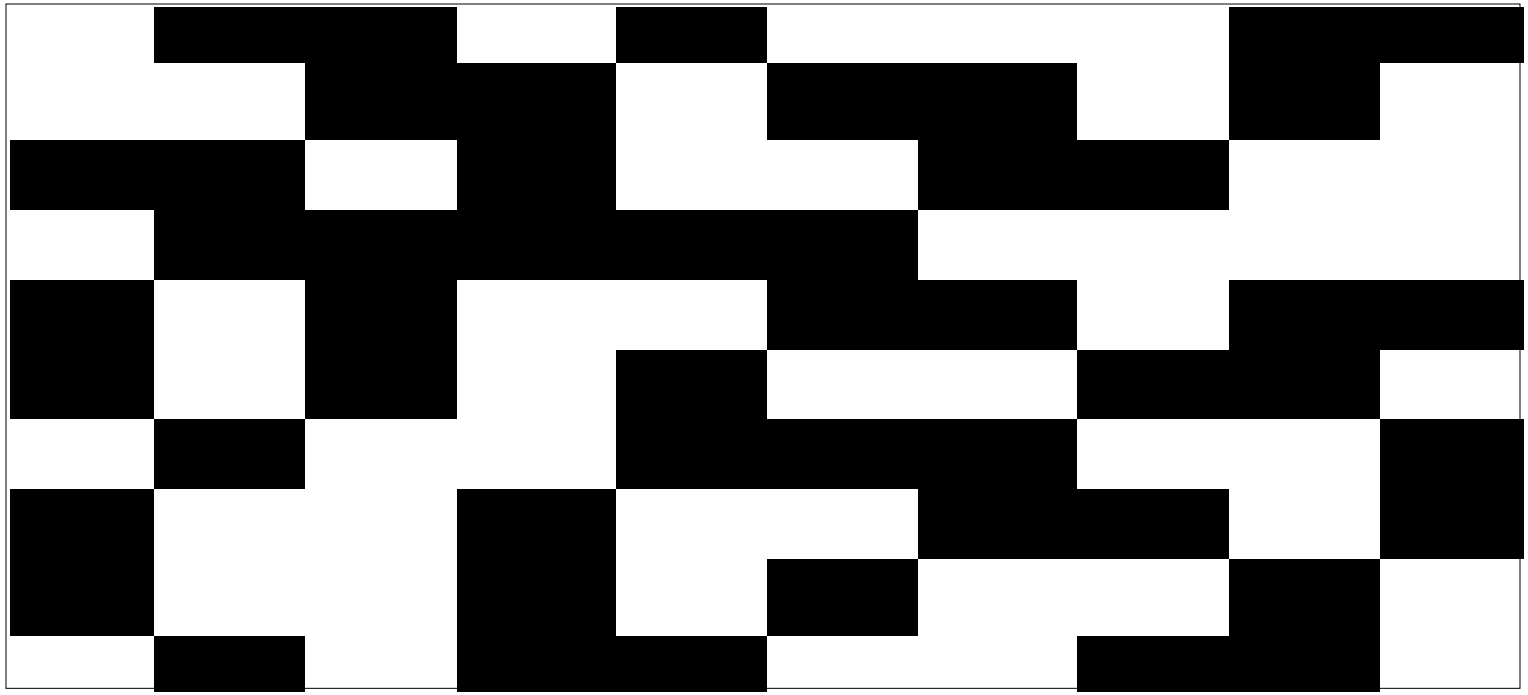
"Boys do not pursue mathematical activities at a higher rate than girls do because they are better at math. They do so, at least partially, because they *think* they are better."

—Shelley Correll, Professor
Stanford University

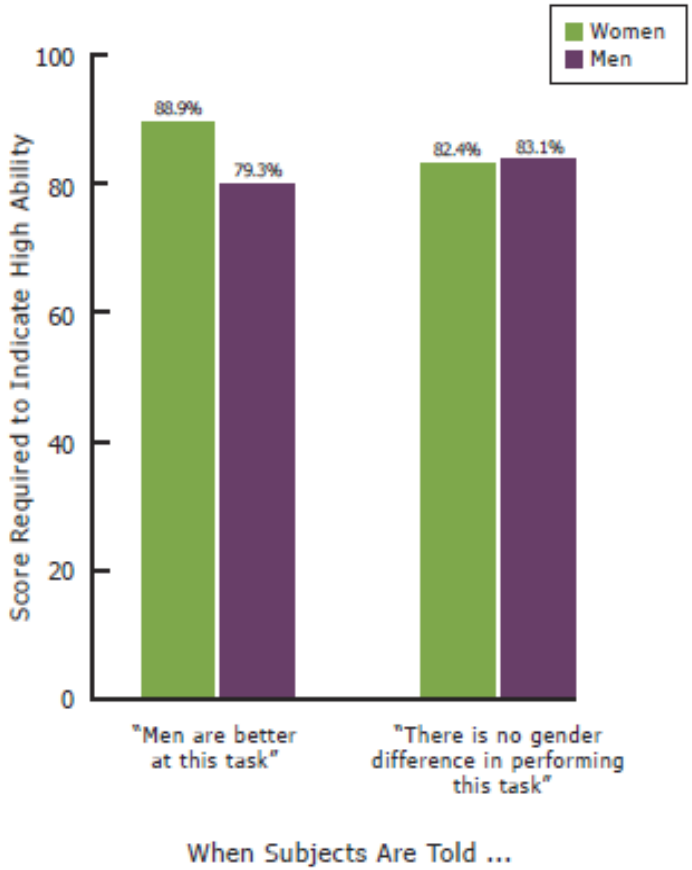
Women are “harder on themselves” when assessing their abilities in “male” fields like math and science.



Does this rectangle have more black or more white?

# Women hold themselves to a higher standard compared with men in “masculine” fields.

Students’ Standards for Their Own Performance, by Gender




- Set clear performance standards and high expectations
- Encourage girls to attribute their success to their own skills
- Help girls recognize their career-relevant skills.

Note: Respondents were asked, “How high would you have to score to be convinced that you have high ability at this task?”
Source: Correll, S.J., 2004, “Constraints into preferences: Gender, status, and emerging career aspirations,” American Sociological Review, 69, p. 106, Table 2.

# Attribution Theory

- Women are more likely than men to attribute success to hard work or outside help, and failure to their own lack of ability.
- Men are more likely to attribute their success to their abilities and their failures to lack of effort or unfair treatment

Believing in the potential for intellectual growth, in and of itself, improves outcomes.

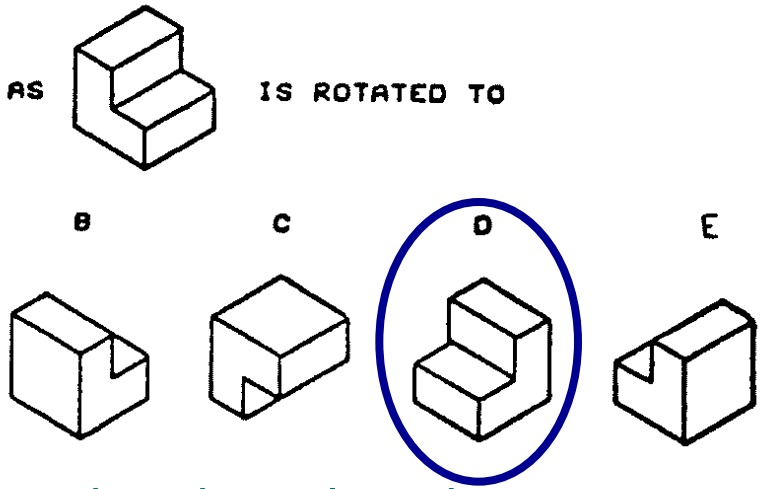
# A growth mindset benefits everyone

| Fixed Mindset | Growth Mindset |
|---|---|
| **Intelligence is static.** | **Intelligence can be developed.** |
| Leads to a desire to *look smart* and therefore a tendency to | Leads to a desire to *learn* and therefore a tendency to |
| • **avoid challenges** | • **embrace challenges** |
| • **give up easily due to obstacles** | • **persist despite obstacles** |
| • **see effort as fruitless** | • **see effort as path to mastery** |
| • **ignore useful feedback** | • **learn from criticism** |
| • **be threatened by others' success** | • **be inspired by others' success** |

- Teach students that intellectual skills can be acquired.
- Praise students for effort.
- Highlight the struggle.
- Send the message that schools value growth and learning.

One of the largest and most persistent gender gaps in cognitive skills is found in spatial skills, where boys consistently outperform girls.

Spatial skills are not innate and can be improved with training.


This is a sample question on mental rotation.

Do you know the right answer?

- Create hands-on learning opportunities

# Student Isolation

- Cohort of underrepresented students in a program are more likely to complete than a single individual
- Individuals more likely to
  - Have trouble integrating effectively in to social structure
  - Suffer decreased performance
  - Drop out
- Schedule students in cohorts when possible
- Create a cohort through support group

# Curriculum Materials

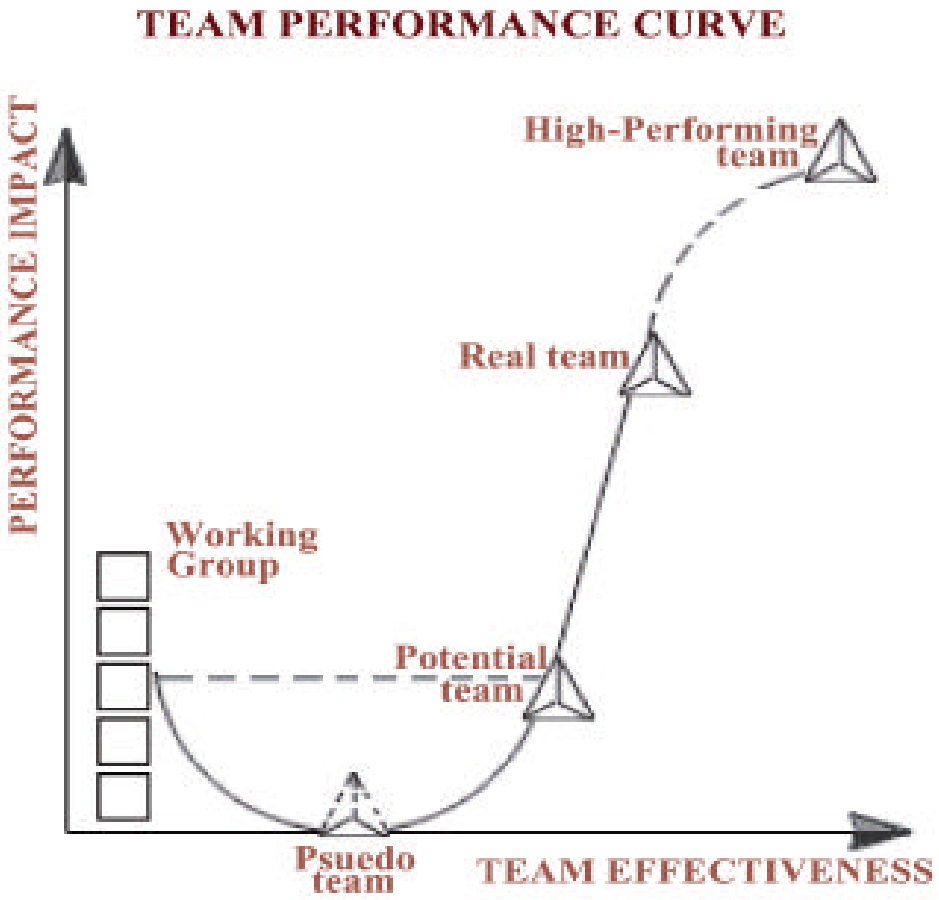
- Invisibility
- Stereotyping
- Imbalance/Selectivity
- Unreality
- Fragmentation/Isolation
- Linguistic Bias
- Cosmetic Bias
- Relevance

# Instructional Strategies

- Questioning level and wait time
- Student/teacher interaction and feedback
- Classroom management
- Cooperative learning design
- Expectations and assessment

# Cooperative Learning

- Assign students to teams
- Develop interpersonal and team skills
- Design exercises for student teams
- Facilitate dysfunctional teams
- Assign individual grades for team projects



# Classroom Climate

- Sexual harassment not tolerated or ignored
- Classroom location on campus
- Supportive learning environment
- Subtle messages
- Physical environment
- Fair treatment

# Nontraditional Role Models

- Strongest evidence in the research
- Need to see someone that looks like them in the career
- Family members are significant
- Teachers
- Mentors

# Nontraditional Role Models

- Career speakers
- Job shadowing
- Field trips
- Mentoring
- Online career exploration
- Print images
- Video selection

# I am an Engineer

Cisco Systems Inc.

Available at
www.stemequitypipeline.org

# Questions?

Mimi Lufkin, CEO

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