



# A Cultural Psychology Approach to Diversity in STEM Participation: Intersectional Forces of Gender and Race

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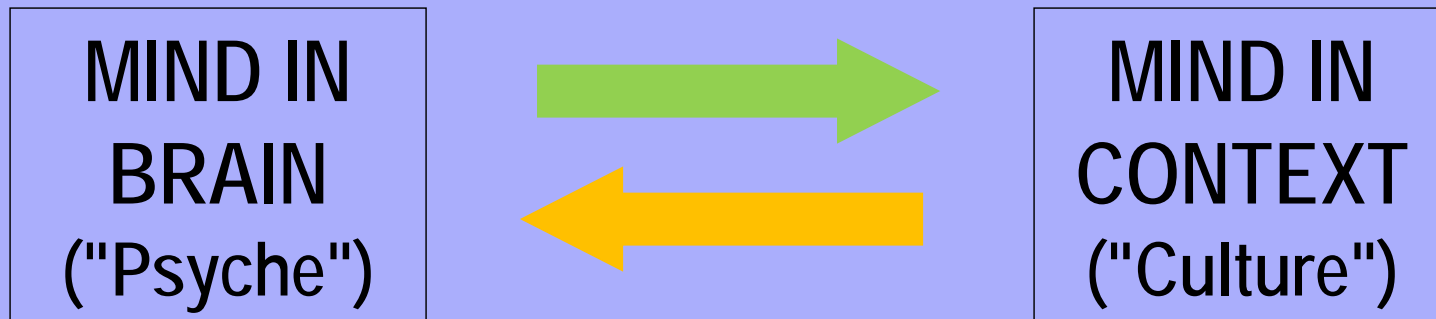
*The National Science Foundation supported this work through awards HRD0936718 and HRD0936722, A cultural-psychological analysis of gender discrimination (and privilege) in STEM fields. Co-Investigators are Laurie T. O'Brien, Tulane University; Donna M. Garcia, California State University at San Bernardino; and Elliott D. Hammer, Xavier University of Louisiana*

# Cultural Psychology: What is it?

- NOT an exercise in documenting diversity or describing characteristic psychological tendencies in "other" settings
- Instead, a fundamental insight about the cultural and historical bases of mind ...
- The structure of mind resides not only in brain architecture, but also is inscribed in the "stuff" of everyday worlds.



# Diversity in STEM: A Cultural Psychology Approach



- Key to a CP approach: the dynamic, mutually constituting relationship between "mind in brain" and "mind in context"
- Rethinking psyche: Locating roots of mind in context
- Rethinking worlds: Illuminating power, privilege



# Locating Mind in Context

Rather than defining individual traits, one can understand psychological tendencies as habitual orientations *continuously tuned* to structures of mind in context.

- Implications for Conceptions of Action

Shifts focus of change from personal dispositions to the cultural ecologies that continually re-shape dispositions.

- Implications for Identity-Based Exclusion

The consequences of power are not limited to differential treatment; instead, apparently neutral constructions of reality that re-present conditions of identity threat can be sufficient to cause harm, even in the absence of differential treatment.



# Identity Threat in STEM Instruction

(Adams, Garcia, Purdie-Vaughns, & Steele, 2006)

## Participants

- Study 1: 30 men and 29 women at Stanford University
- Study 2: 38 men, 39 women at the University of Kansas

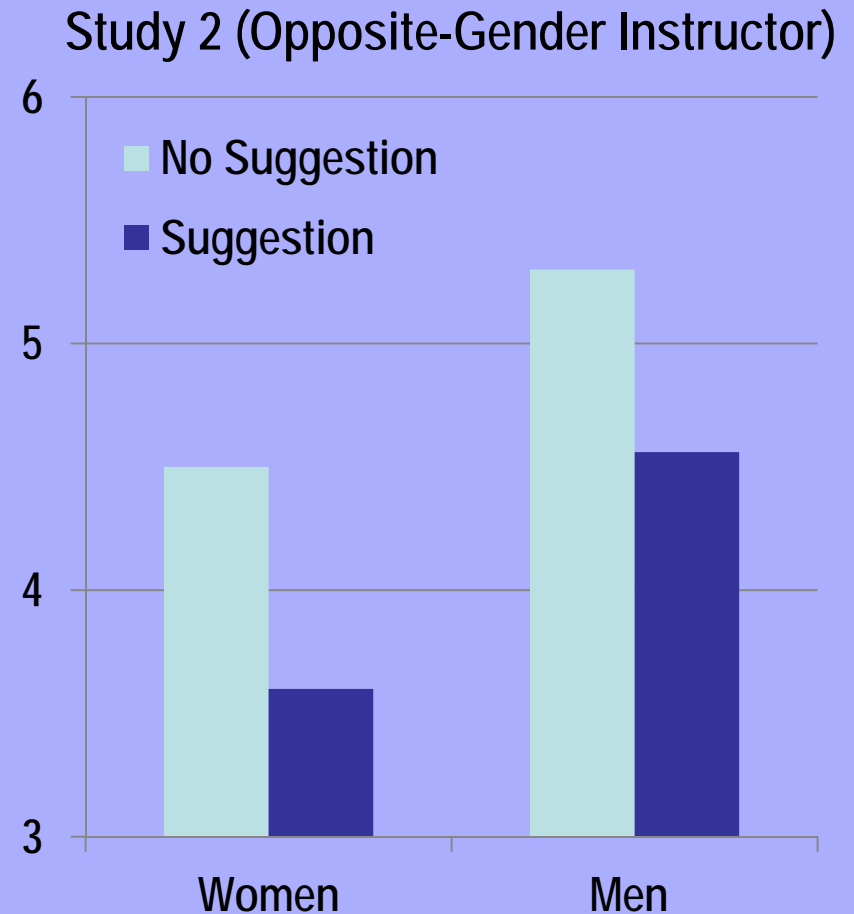
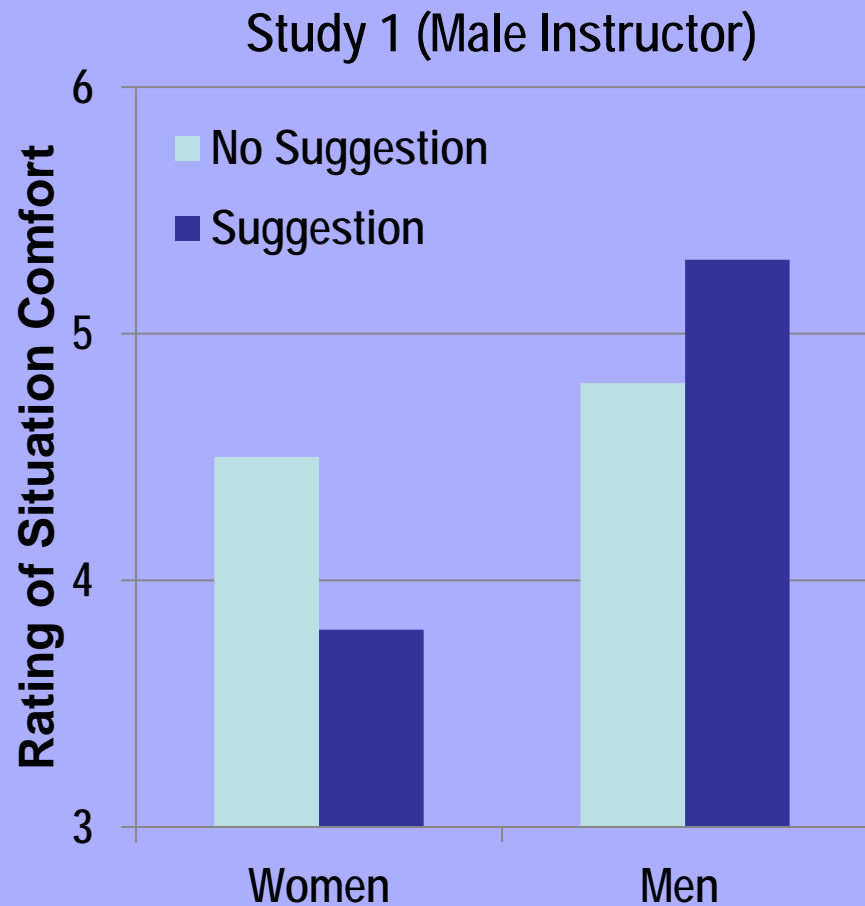
## Procedure

- Experimental Manipulation: Suggestion of Sexism
- Tutorial for GRE logic tests
- Situation Characterization: *friendly, comfortable*
- GRE-type logic test: 24 MC items in 25 minutes

Adams, G., Garcia, D., M., Purdie-Vaughns, V., & Steele, C. M. (2006). The detrimental effects of a suggestion of sexism in an instruction situation. *Journal of Experimental Social Psychology*, 42, 602-615.



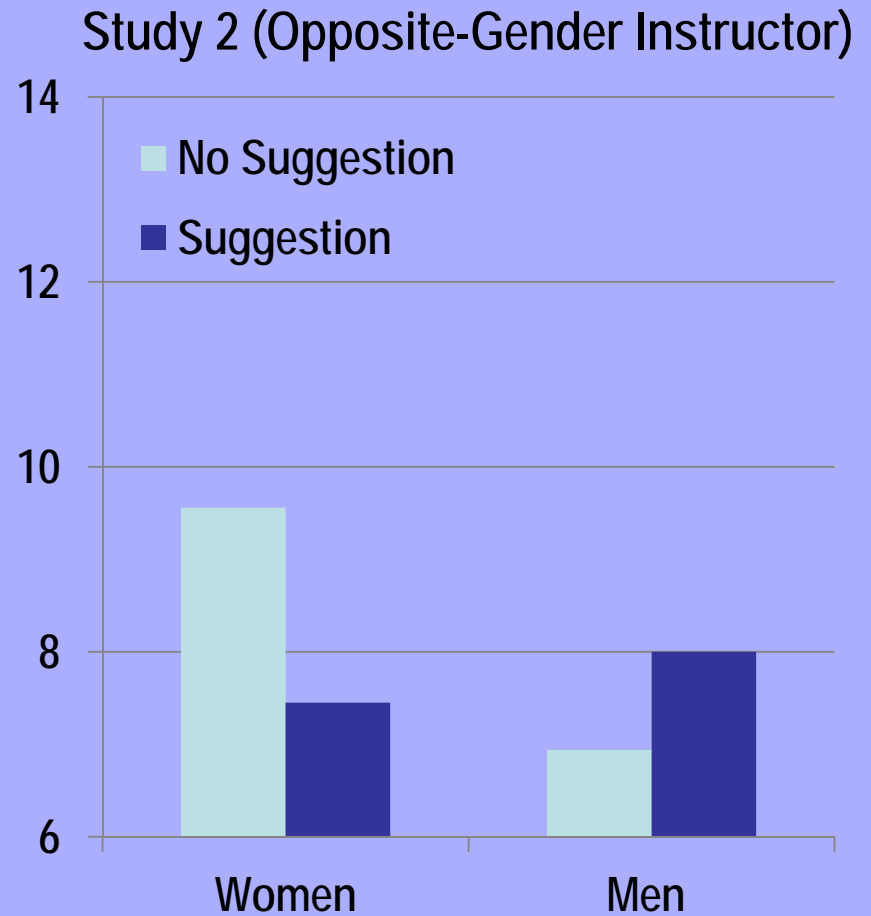
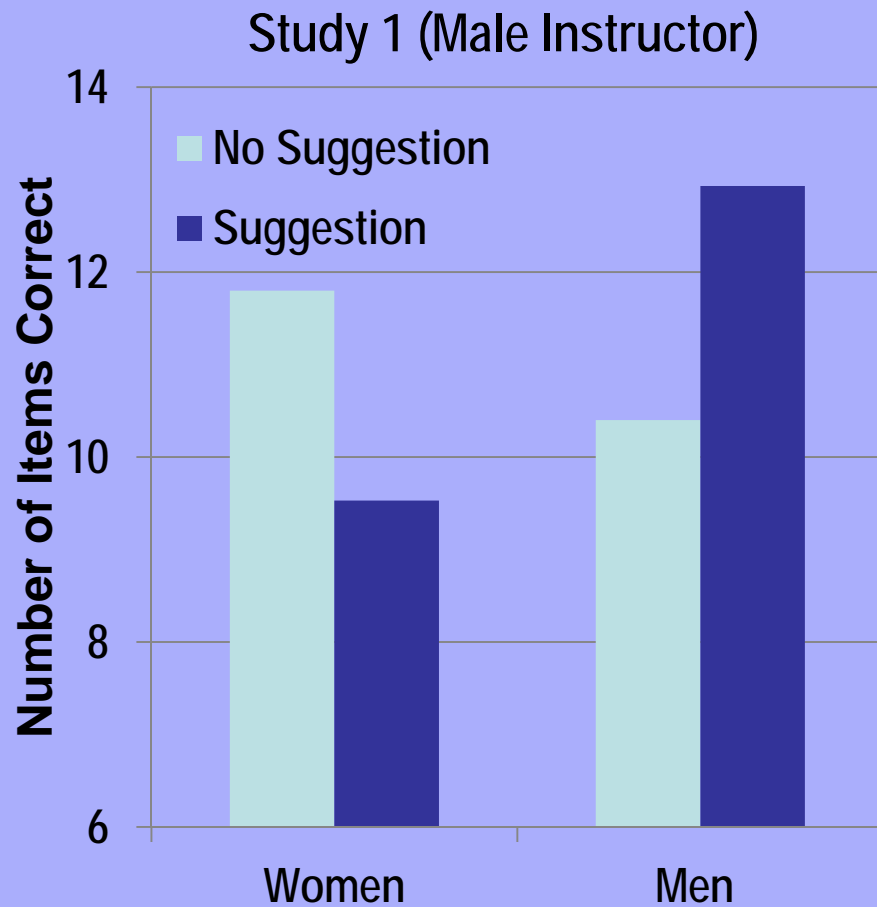
# Comfort with Testing Situation



Adams, G., Garcia, D., M., Purdie-Vaughns, V., & Steele, C. M. (2006). The detrimental effects of a suggestion of sexism in an instruction situation. *Journal of Experimental Social Psychology, 42*, 602-615.



# Standardized Test Performance



Adams, G., Garcia, D., M., Purdie-Vaughns, V., & Steele, C. M. (2006). The detrimental effects of a suggestion of sexism in an instruction situation. *Journal of Experimental Social Psychology, 42*, 602-615.



# Identity Threat in STEM Instruction: Conclusions

## ■ Social Identity Threat

The mere suggestion of sexism, even in the absence of differential treatment (i.e., direct discrimination) can be sufficient to undermine women's experience in a STEM instruction situation.

## ■ Social Identity Privilege

The same cultural-ecological features that even in the absence of differential treatment (i.e., direct discrimination) can be sufficient to undermine women's experience in a STEM instruction situation.

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# Cultural-Ecological Sources of Identity-Based Exclusion in STEM

## Research Sites

- University of Kansas (PWI)
- Tulane University (PWI)
- California State University, San Bernardino (HSI)
- Xavier University of Louisiana (HBCU)



# Intersections of Gender and Race in STEM

- Identity-Based Exclusion in STEM:

Research suggests that many of the same constructions of STEM fields that harm women's participation also harm participation of African Americans.

- ~~Additive Model of Identity-based Exclusion~~

~~Disadvantage (gender) + Disadvantage (race) = Double Disadvantage~~

- Intersectional Analysis(e.g., Crenshaw, 1991; Mohanty, 1988)

- Implications of identity (and identity-based oppression) are not monolithic, but vary with position along other identity dimensions.
- Gendered dynamics of STEM participation are not natural or inevitable; instead, they vary as a function of cultural setting.
- Standard accounts gender exclusion from STEM may be particularly true of White American spaces and less true of Black American spaces.



# Intersectional Analysis of Gender and STEM

(O'Brien, Blodorn, Adams, Garcia, & Hammer, 2013; Study 1)

## Participants:

Cooperative Institute Research Program Freshman Survey (1990-1999)

(n = 1,456,215)

- 1,344,242 European American, 53% women
- 111,973 African American, 60% women

## Measures

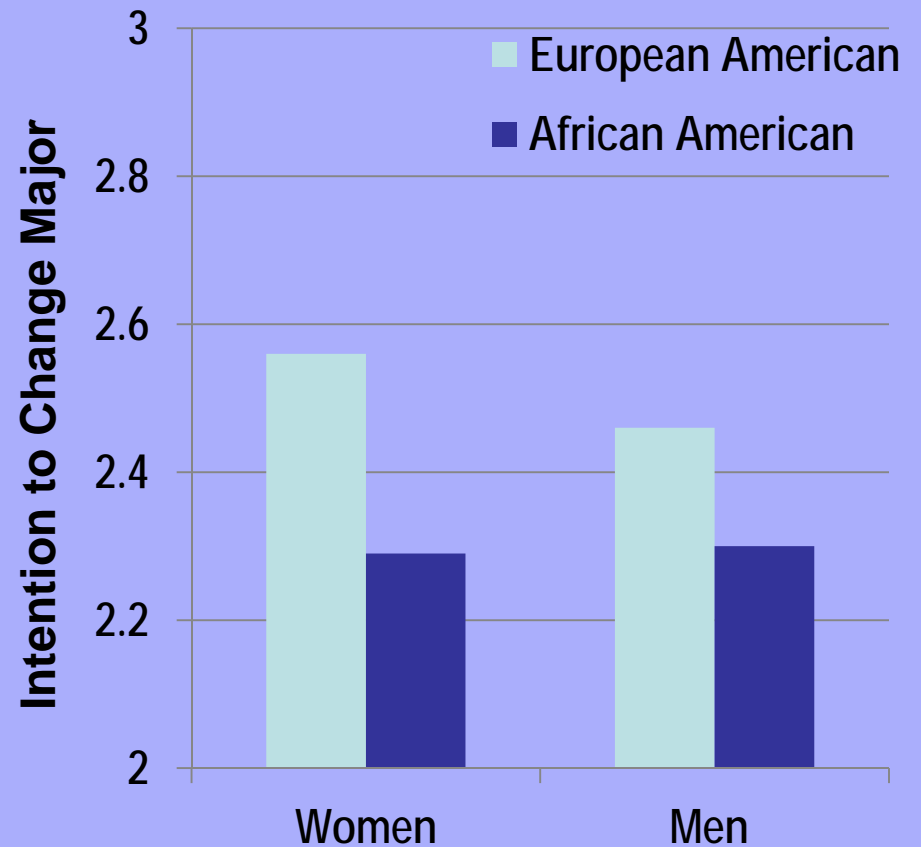
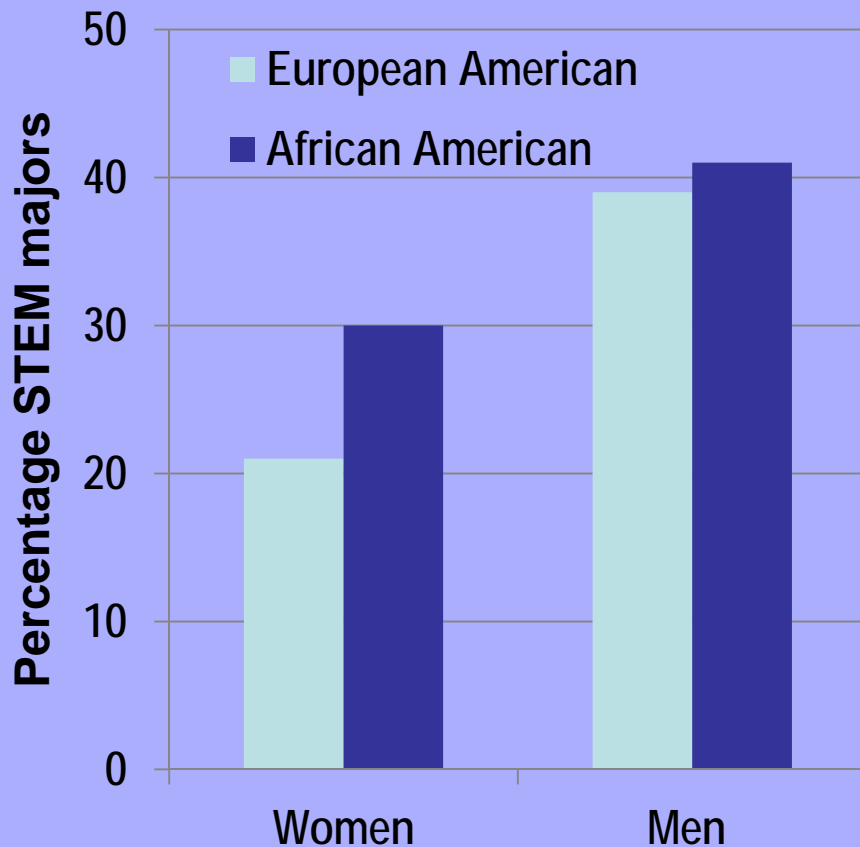
- College Major: STEM (e.g., Physics) or non-STEM (e.g., English)
- Intention to Change Major: '1' (No Chance) to '4' (Very Good Chance)

O'Brien, L.T., Blodorn, A., Adams, G., Garcia, D.M., & Hammer, E.D. (2013). *Gender stereotypes and STEM participation. An intersectional analysis*. Manuscript in preparation.



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# Intersections of Gender and Race in STEM

What can account for both ...

- (a) "Standard" pattern of gender exclusion in STEM observed in "mainstream" US settings
- (b) Different dynamics of gender and STEM in African American communities
  - Traits associated with *Feminine* (Goff, Thomas, & Jackson, 2008)
  - Romantic Ideology (Holland & Eisenhart, 1990; Park, Young, Troisi, & Pinkus, 2011)
  - Implicit associations of *Men and Science*
  - Meritocracy Ideology
    - (Essentialist) Attributions for gender differences in STEM
    - (Entity) Conceptions of Intelligence



# Intersections of Gender and Nation

(Nosek et al., 2009)

## Male Advantage in *TIMMS* Performance

Country	Sci	Math
Chile	29	15
Australia	20	12
Israel	19	8
United States	17	5
Netherlands	15	7
Bulgaria	17	1
Korea	12	6
Italy	10	5
Japan	9	2
Indonesia	11	-1
Russian Fed	11	-3
Hong Kong SAR	9	-2
Sweden	7	0
United Kingdom	11	-5
South Africa	2	2
Malaysia	10	-7
Chinese Taipei	1	-7
Singapore	3	-10
Iran	-1	-9
Philippines	-6	-13

## Implicit Association of *STEM* with *male*

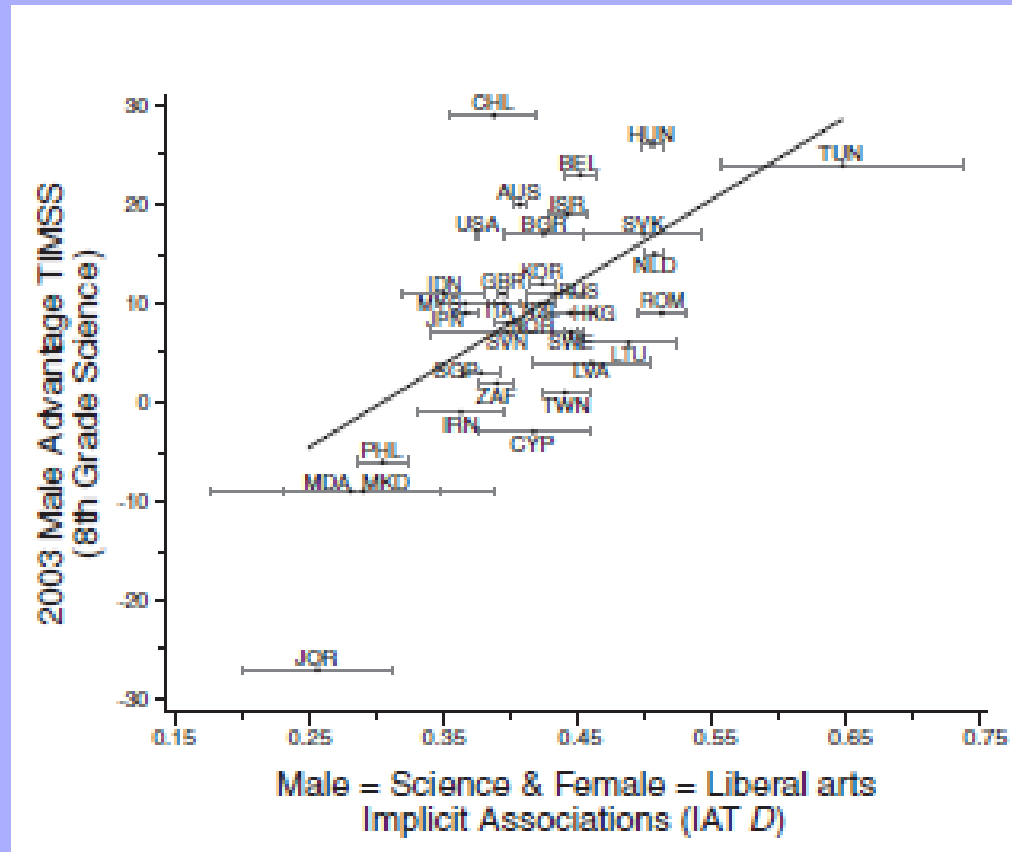
Country	IAT N	Mean
Netherlands	3110	0.51
Hong Kong SAR	457	0.45
Sweden	5649	0.45
Israel	924	0.44
Chinese Taipei	425	0.44
Bulgaria	210	0.43
Russian Fed	317	0.43
Korea	1449	0.42
Australia	8194	0.41
Italy	1164	0.4
United Kingdom	15471	0.4
Chile	163	0.39
South Africa	849	0.39
United States	248306	0.38
Singapore	822	0.38
Japan	2476	0.37
Malaysia	322	0.37
Iran	152	0.36
Indonesia	152	0.35
Philippines	541	0.31

Adapted from Nosek, B., Smyth, F., Sriram, N., Lindner, N., Devos, T., Ayala, A., et al. (2009). National differences in gender-science stereotypes predict national sex differences in science and math achievement. *PNAS*, *106*, 10593-10597.



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# Intersectional Analysis of Gender and STEM

(O'Brien, Blodorn, Adams, Garcia, & Hammer, 2013; Study 2)

Participants: 152 women from Tulane and Xavier (43 Afr Am, 109 Eur Am)

## Procedure

- **Implicit gender-STEM stereotypes** (Nosek et al., 2009)
  - LA: *Art, English, History, Humanities, Literature, Music, Philosophy*
  - STEM: *Astronomy, Biology, Chemistry, Engineering, Geology, Math, Physics*
  - Female: *Aunt, Daughter, Female, Girl, Grandma, Mother, Wife, Woman*
  - Male: *Uncle, Son, Male, Boy, Grandpa, Father, Husband, Man*
  
- **STEM outcomes:**
  - Enjoyment of STEM courses (7-point scale: 1 = *not at all*; 7 = *very much*)
  - STEM major

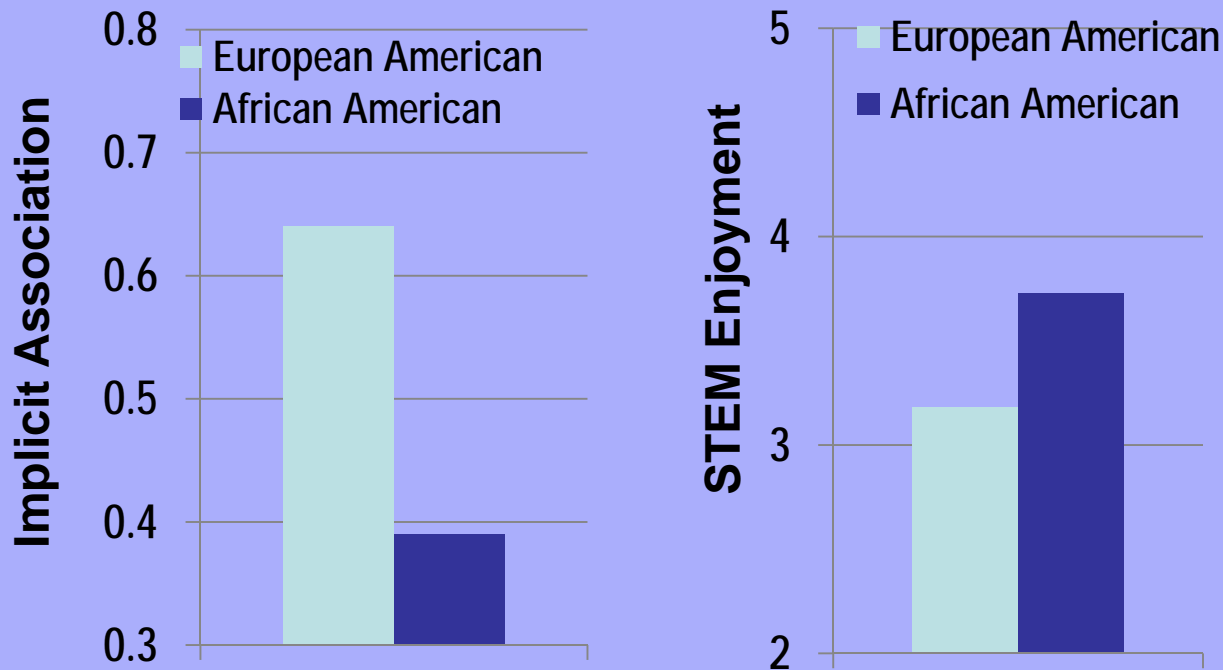
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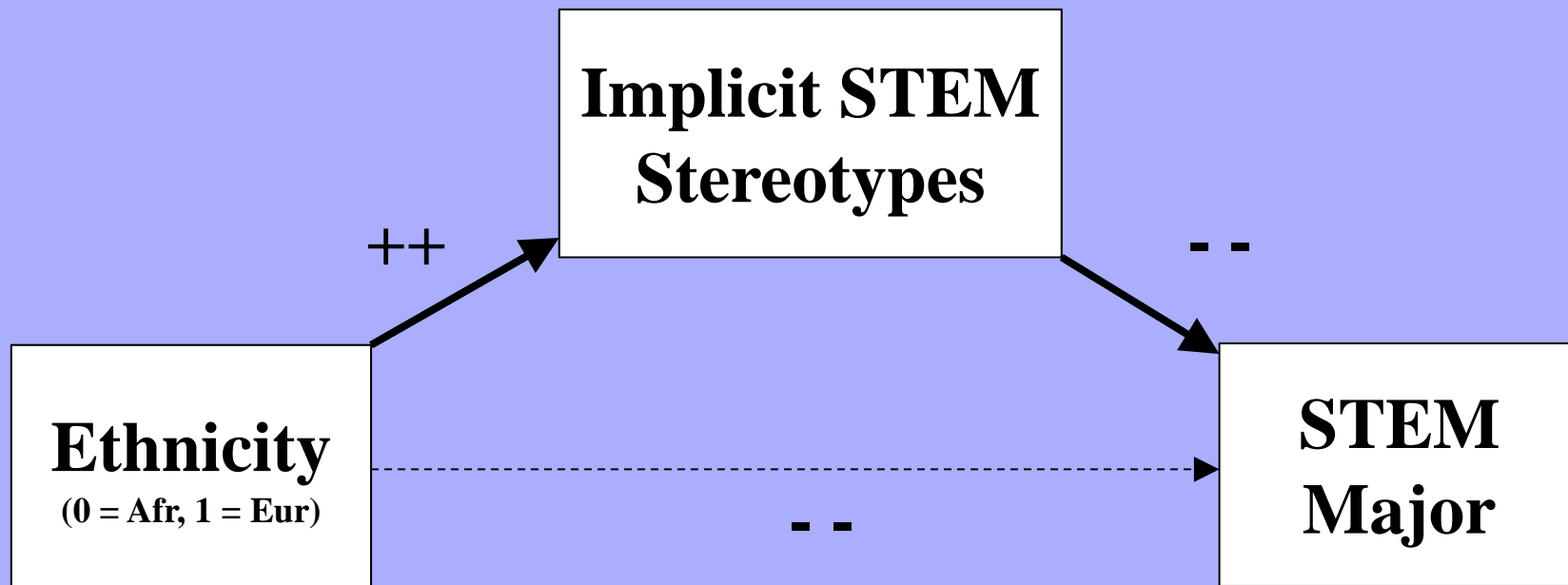
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# Intersections of Gender and Race



# Intersectional Analysis of Gender and STEM

(O'Brien, Blodorn, Adams, Garcia, & Hammer, 2013; Study 3)

Participants: 761 undergraduates from 4 universities in the USA

- 192 African American (80% women)
- 569 European American (69% women)

Procedure

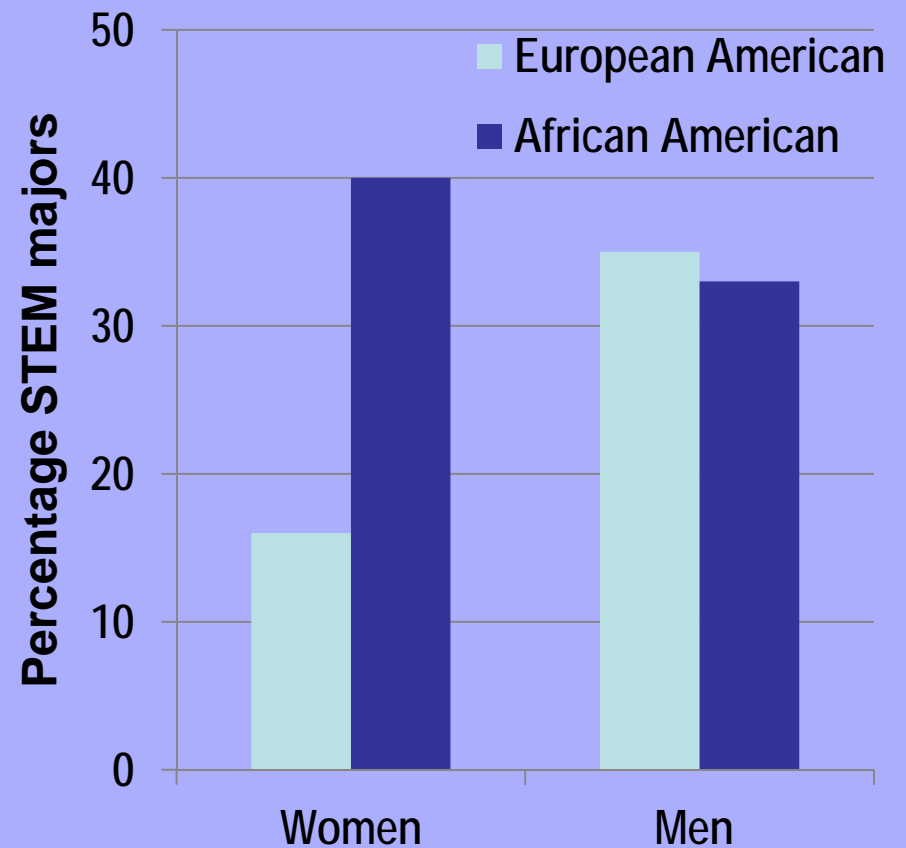
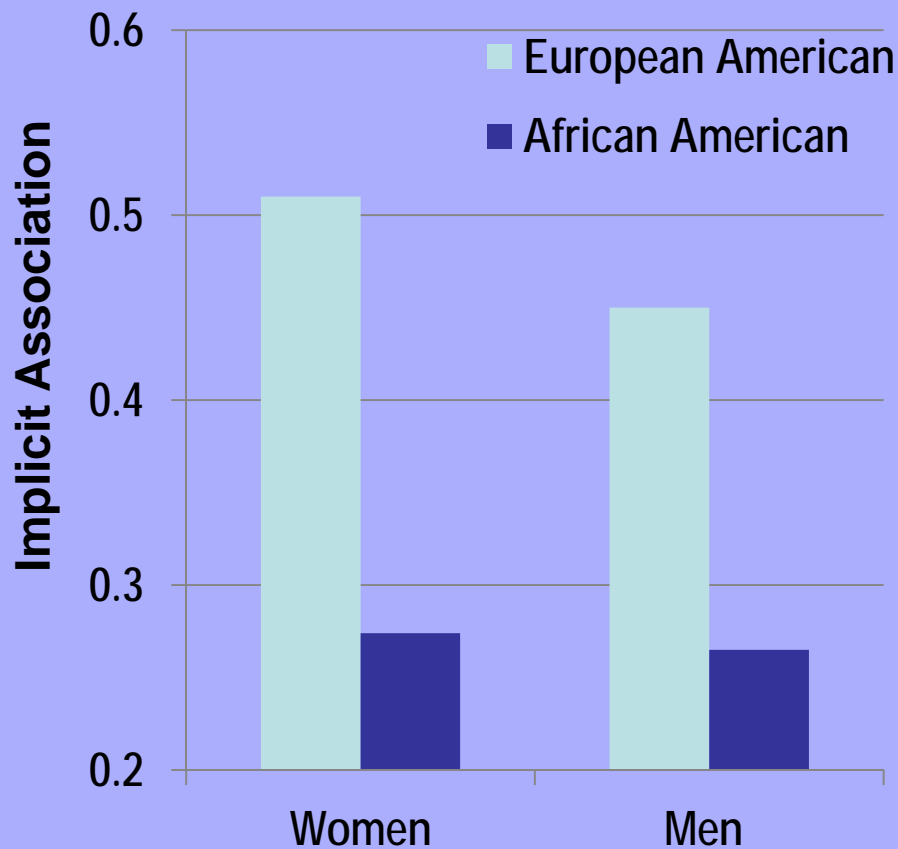
- Implicit gender-STEM stereotypes (Nosek et al., 2009)
- STEM Major

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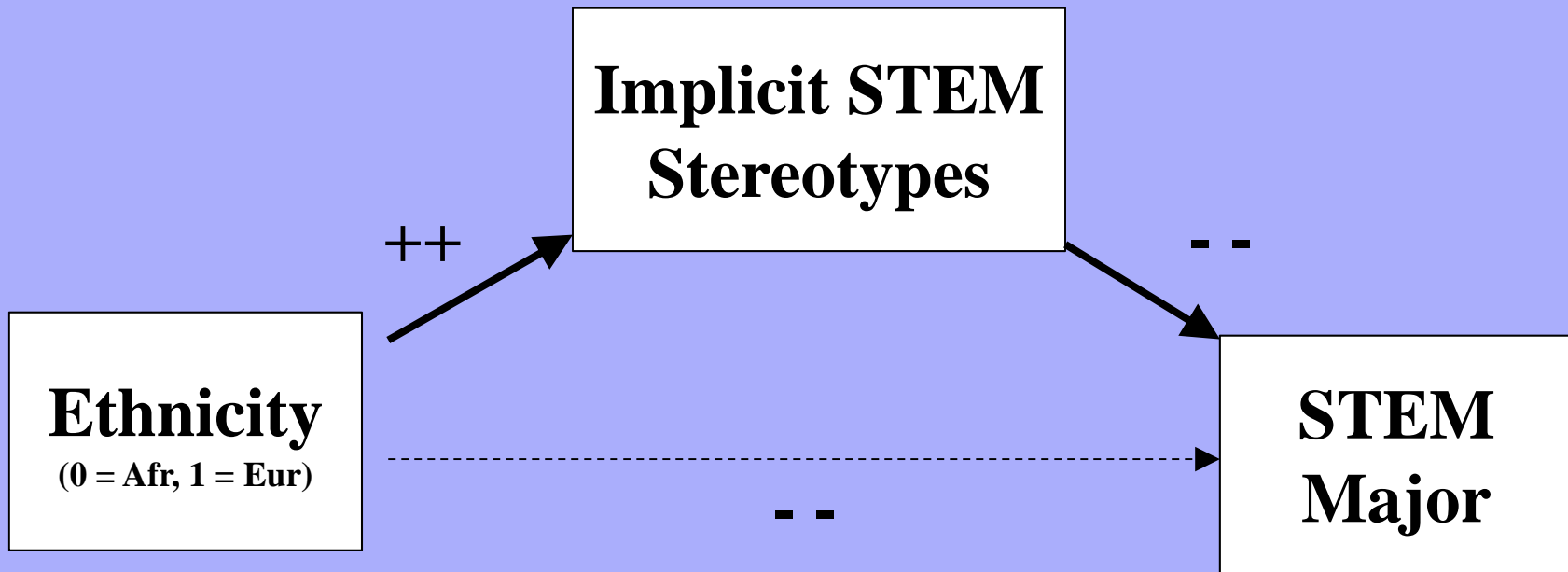


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# Intersectional Analysis of Gender and STEM

(O'Brien, Blodorn, Adams, Garcia, & Hammer, 2013; Study 4)

Participants: 162 women from 3 universities in the USA

- 72 African American
- 90 European American

Procedure

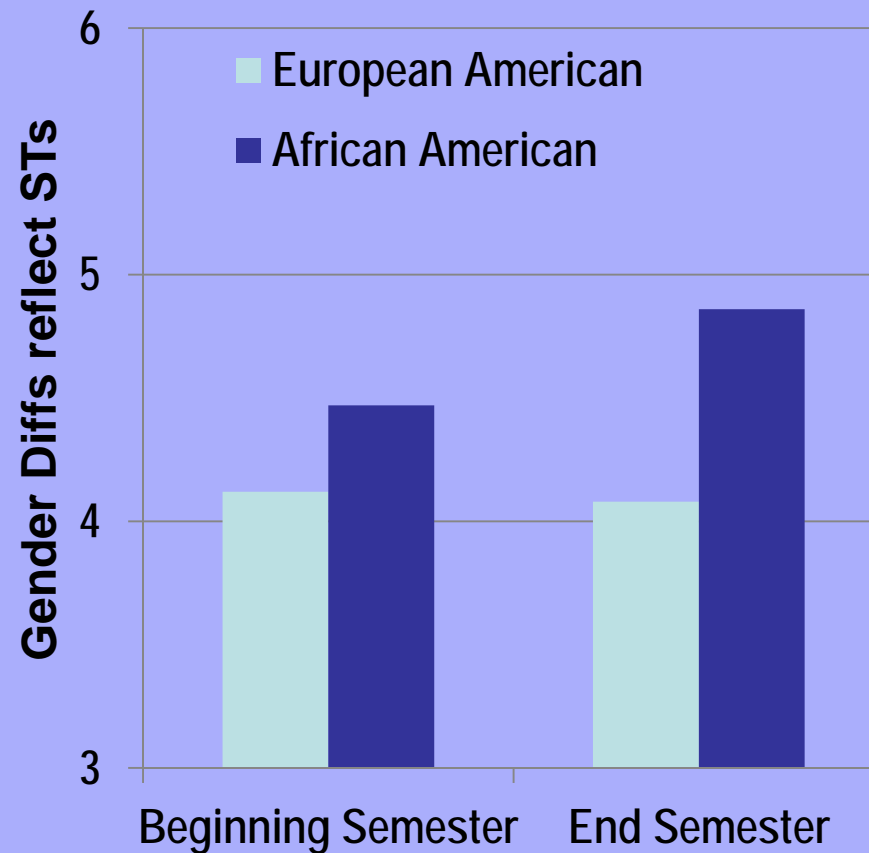
- **Attributions for Gender Differences in STEM**
  - "Gender differences between men and women are due to negative stereotypes."

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Participants: 162 women from 3 universities in the USA

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## Procedure

- **Attributions for Gender Differences in STEM**
  - "Gender differences between men and women are due to negative stereotypes."
- **Beliefs about Intelligence**
  - "You have a certain amount of intelligence and you can't do much to change it."
  - "You can learn new things, but you can't really change your basic intelligence."

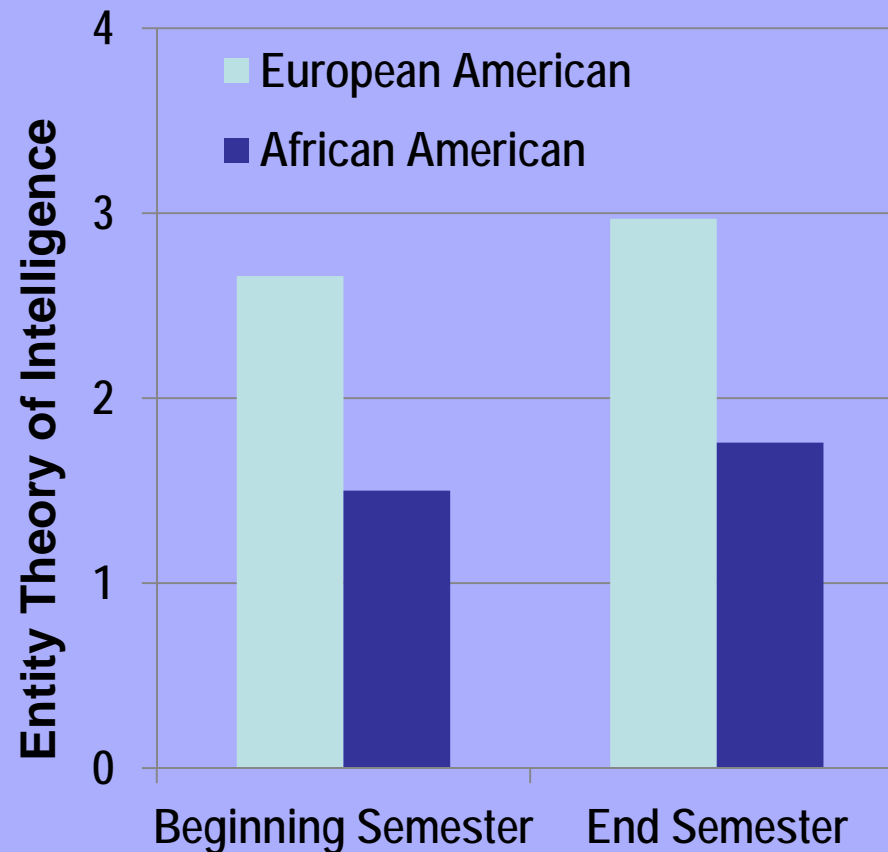
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# Refinements

- Not *race*, but (particular) cultural settings:
  - African American communities? HBCUs? Xavier?
- Beyond the Black/White binary
  - Dynamics of racial identity will vary across communities
- Greater proportions of STEM majors among African American women does not signal advantage.
  - Reflects broad exclusion from all academic fields, not just STEM.
- Lower rate of STEM participation among European American women does not necessarily signal disadvantage.
  - *To some extent*, may reflect privilege to choose something other than STEM.



# Intersectional Conclusions

## Normalizing the Marginalized

- Rather than seeing marginalized communities as sites for outside intervention, we should appreciate them as source of critical consciousness and strategies for broad human liberation.

## De-Naturalizing the (White American) "Standard"

- Intersectionality approaches help illuminate how people can adopt ideas (e.g., meritocracy) in the service of dominant identity positions (e.g., race) that lead to subordination or oppression along other identity positions (e.g., gender).



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Donna M. Garcia



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Elliott D. Hammer



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