UNIVERSITY of GUELPH

CHANGING LIVES IMPROVING LIFE

# The Psychology of Gender PSYC*3300

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# Overview

- Intelligence and Cognitive Abilities
  - Meta-Analyses
    - Verbal, Math, Spatial
  - Task stereotyping
  - SAT Scores

# Historical Sex Differences in Intelligence

- Late 1800s and Early 1900s
  - Prevailing view of women's inferior intelligence
  - Sex differences in intelligence are actively researched and shift to maintain male superiority
  - Publishing of "Sex and Personality" by Lewis Terman in 1936
    - No gender difference (after "correction" of Stanford-Binet)

# What is a Meta-Analysis?

- A statistical tool that quantifies the results from a group of studies
- Examines the size of the difference across studies
  - Effect size
  - d statistic
    - The difference between the means of two groups divided by the variability (standard deviations) of the scores

# Do Meta-Analysis Provide the Answer?

- Improvement over narrative review
  - Takes effect size into account
- Methodological problems remain
  - Inclusion criteria can be problematic
  - “File drawer” problem

# Interpreting Effect Size

- "trivial": d =.04 (Hyde, 2005)
- "as close to zero": d < .10
- Small: d = 0.2 (explains 1% of variance)
- Medium: d = 0.5 (explains 6% of variance)
- Large: d = 0.8 (explains 14% of variance)
- Does small = unimportant?
  - Small effects can compound over time
- Does large = important?
  - Still only 14% of variance

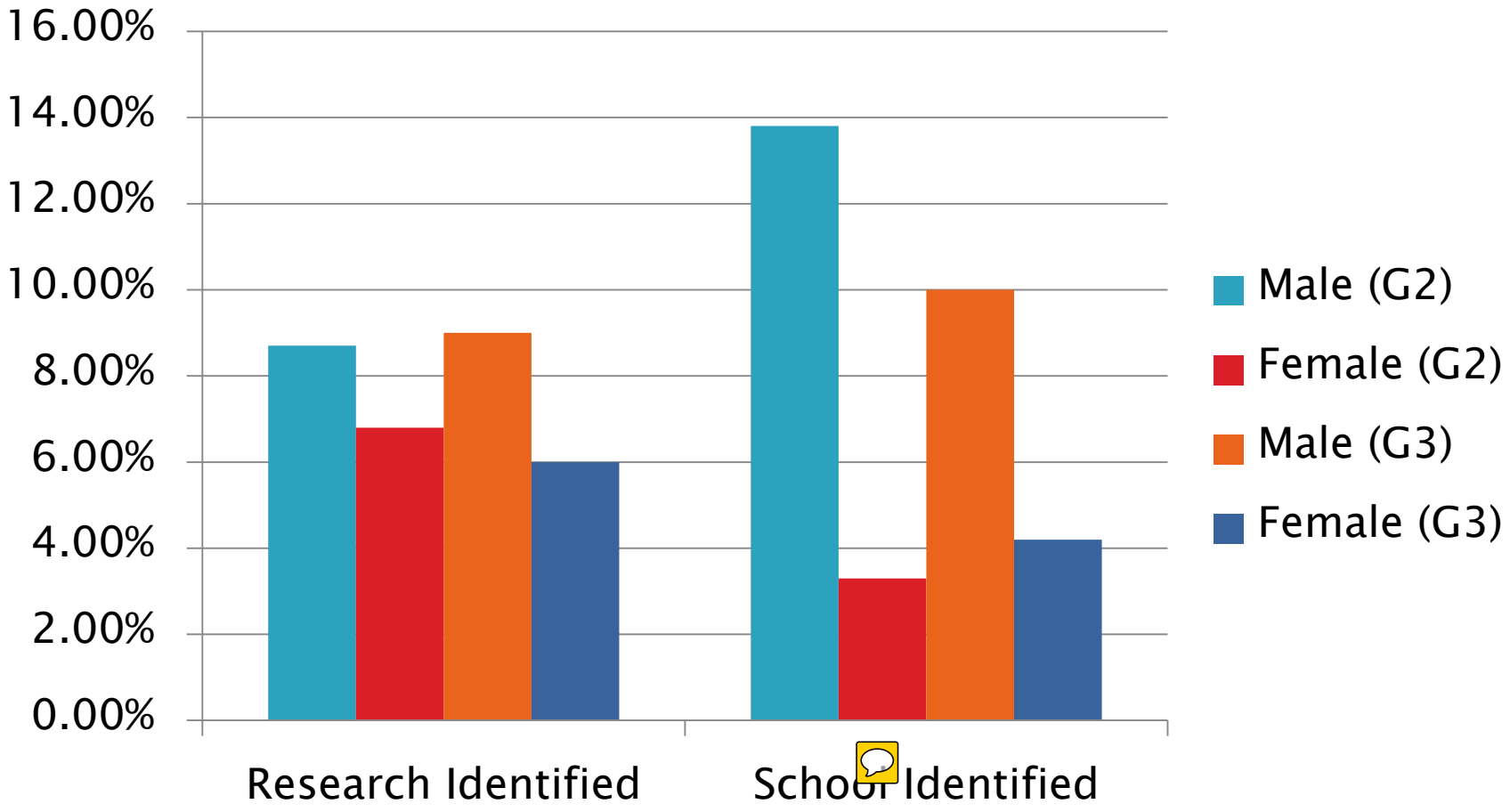
# Cognitive Abilities: Verbal

- Meta-analyses for overall verbal ability (1988)
  - Older studies before 1974: d = -.23
  - After 1974 (to late 1980s): d = -.10
  - Time change or file drawer opened?
- Largest effect sizes:
  - writing and reading speed & fluency
  - d = -.33 for speech production (Hyde and Linn, 1988)
- Cross Country Study (Reilly, 2012)
  - d = -.44 for reading in 65 countries (-.11to -.68)
  - d = -.26 in US and d = -.38 in Canada
- SAT Scores for essay
  - writing advantage for women (but SAT Verbal section shows male advantage)

# Cognitive Abilities: Verbal

- Explanations
  - Passage of time is erasing differences (gender similarities hypothesis) because there are fewer social role differences between men and women (gender stratification hypothesis)
  - Reilly's cross cultural study (2012)
    - As countries "relative status of women" (RSW) scores and "women in research" (WIR) scores increased, reading gap increased favoring women (especially for very high achieving women)
      - Finding less consistent with "gender gap index" (GGI) or "gross national product" (GNP)
  - Possible Biases?
    - Articles first authored by men showed smaller effect sizes than articles first authored by women
    - Boys and reading disability

# Identifying Reading Disability




(Shaywitz et al., 1990)

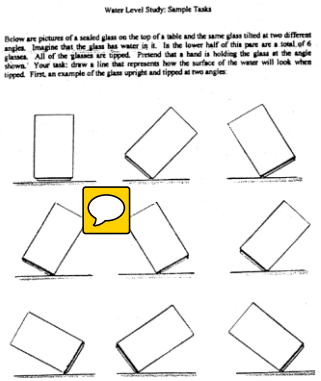
# Cognitive Abilities: Mathematical

- Meta-analysis
  - Older studies before 1974: d = .31
  - After 1974 (to late 1980s): d = .14
  - 2008 – approaching zero (Hyde et al., 2008)
    - -.02 to +.06 for grades 2 to 11
    - 1990-2007 d = +.05
- Cross-country study (Reilly, 2012)
  - d = .13 (OECD nations) and .07 (PISA nations)
  - USA d = .22 and Canada .14
  - Range was -.12 to .43
- SAT Scores
  - Small, but sig differences in math subset persist
- School Scores
  - Girls/women perform better

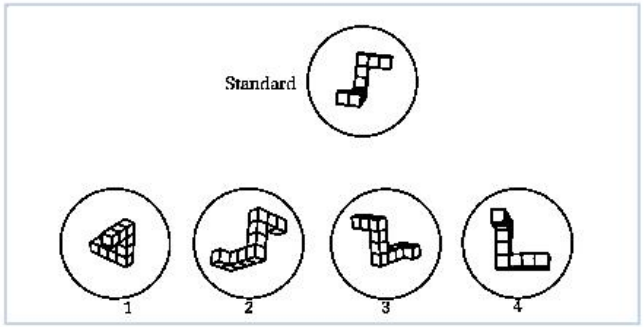
# Cognitive Abilities: Mathematical

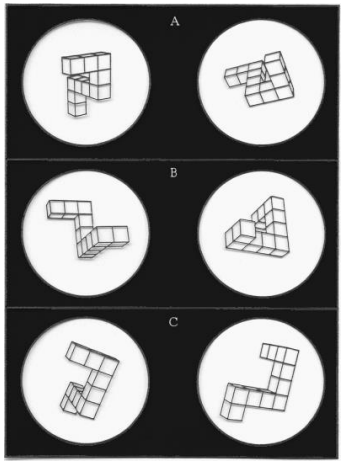
- Explanations
  - Opportunities for women in math have erased differences (gender similarities hypothesis)
  - Differences are largely in the extremes (greater male variability hypothesis)
  - Mediation by cultural factors (Reilly, 2012)
    - As women's opportunities increase (WIR), math gender differences decrease
    - Higher GNP increased gender differences
    - Higher inequality (power distance index) decreased gender differences
  - Attitudes toward math
    - Males are more confident in math (d = .15)
    - Males value math more (d = .10)
  - Stereotypes of math as masculine (e.g., stereotype threat)

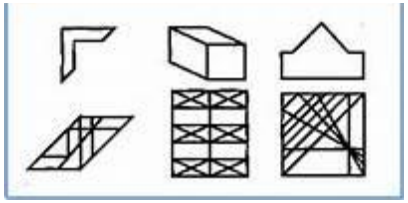
# Cognitive Abilities: Spatial Performance




- Meta-analysis in 1995 (1998) (2007)
  - Spatial perception
    - d = 0.44
  - Mental rotation
    - d = 0.56; 0.85;1.01
  - Spatial visualization
    - d = 0.19; 0.48; 0.42
- Favours men
- Do not appear to be disappearing
- Appear to get larger with age



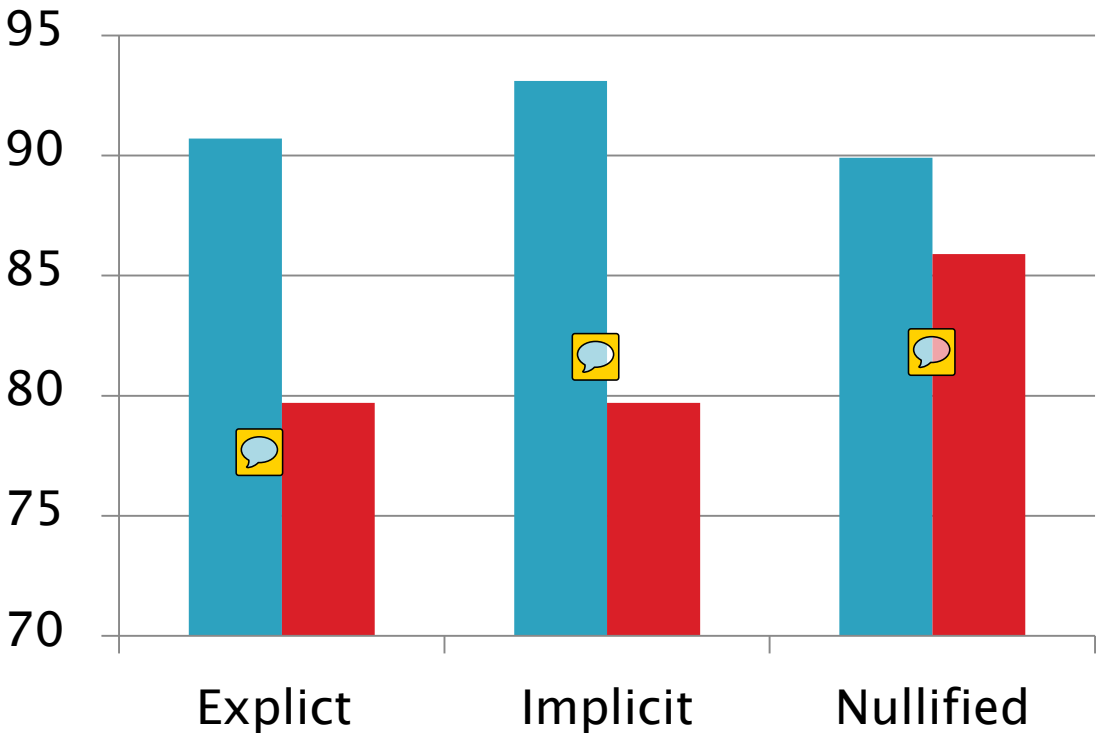
# Cognitive Abilities: Spatial Performance

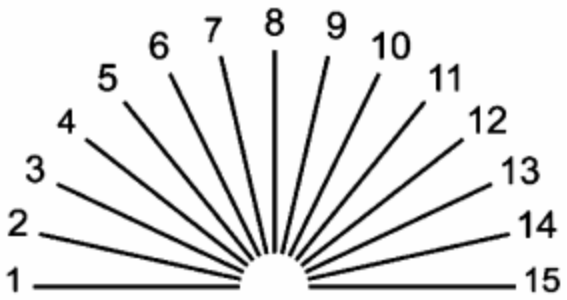
- Object location memory (generally favours women)
  - Object identity: d = -0.23
    - Which objects are new
  - Object location d = -0.27
    - Which objects have moved

# Cognitive Abilities: Spatial Performance

- Explanations
  - Men and women may use different strategies
    - Giving directions (Lawton, 2001)
      - Men use distance and North, South, East, West
      - Women use landmarks
    - Doing mental rotation
      - Men compare until find a match (leaping)
      - Women compare all responses for best match (conservative)
  - Impact of education and experience
  - Impact of stereotypes and stereotype threat

# Stereotype Threat and Visual Spatial Task (Campbell and Collaer, 2009)



# Task Stereotyping

How tests are framed impact the results:

- Men's object finding is better than women's when objects are masculine vs (feminine or neutral)
- Describing a task as "spatial" vs "empathy"
- Describing mental rotation task as testing navigation skill vs handicrafts
- Mental rotation task stressing accuracy or accuracy not mentioned

# SAT Performance: Explaining Gender Differences

| Effect size | SAT – V | SAT –M | Overall SAT |
|---|---|---|---|
| Initial | .016* | .032* | .029* |
| After removing cognitive/learning factors | .014* | .029* | .028* |
| After removing social/personality factors | .000 | .008 | .003 |
| After removing test anxiety | .001 | .012* | .006 |
| After removing performance avoidance | .003 | .012* | .009 |

Large effects: 0.14
Medium effects: 0.06 – 0.139
Small effects: .011 – .059

Hannon, 2012

# Discussion Questions

a. How are some stereotypes about men/boys and women/girls maintained if they are, for the most part, based on no (or very little) real differences? Do you think gender stereotypes will be reduced if our society becomes more open to multiple genders (i.e., trans* identities)? Why or why not?

# Discussion Questions

b. What is the largest sex difference in spatial ability? Is this something we should be concerned about and trying to change? Consider the way the test is measured, the size and significance of the difference, and the possible application to real word tasks and job prospects. Would your answer be different if it were girls and women that outperformed boys and men (everything else being the same), why of why not?

# Discussion Questions

c. How does the experience of a transgender man in science contribute to our understanding of people's perceptions of gender differences in cognitive abilities? If we changed people's perceptions about the extent and importance of gender differences in cognitive abilities, could we decrease (or eliminate) the real world impact of those differences? Could we decrease (or eliminate) the differences themselves?

# Discussion Questions

d. Consider the sex difference research on empathy. What are some of the possible moderators? Consider those in the textbook, but see if you can think of a few others. How might you test for those moderators?