Influence of gender stereotypes on cognitive performances and hiring decisions

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Vice-President of Aix-Marseille Université for gender equality

Toward Gender Equality in Science: Perspectives from Psychology
— June, 13th, 2022 —
International Union of Psychological Science & Standing Committee on Gender Equality in Science
Social stereotypes

- Shared beliefs in a society about personality traits and abilities that characterize individuals due to their membership to a specific social group.

- Simplification, overgeneralization, and distortions
Gender stereotypes

Math is hard!

Lawrence H. Summers
Harvard University President
January 2005

Janusz Korwin-Mikke
European Parliament member
March 2017
Influence of social stereotypes

The targets perspective

Effects on cognitive functioning:
→ Self-evaluations
→ Learning
→ Performances

Stereotype threat effect: performing below one’s true potential
Influence of social stereotypes

The targets perspective

Effects on cognitive functioning:
→ Self-evaluations
→ Learning
→ Performances

The perceivers perspective

Effects on how we perceive others:
→ Evaluations
→ Judgments
→ Hiring decisions

Stereotype threat effect: performing below one’s true potential

Discrimination
Stereotype threat (ST) effects

Steele & Aronson (1995):

- ST is a situation-specific threat that occurs in contexts where members of negatively stereotyped groups risk the possibility of confirming the stereotype about their group.

- The fear of confirming the stereotype can interfere with performance in the stereotyped domain, leading to decreased performance in the domain.

Adapted from Schmader, Johns, & Forbes (2008, Psych Review)
If $x$ and $y$ are positive integers, which of the following is equivalent to $(2x)^{3y} - (2x)^y$?

(A) $(2x)^{2y}$
(B) $2^y(x^3 - x^y)$
(C) $(2x)^y(2x)^{2y} - 1$
(D) $(2x)^y(4x^y - 1)$
(E) $(2x)^y(2x)^3 - 1$

OR

**Standard condition**

This is a difficult Math test

**Gender-fair condition**

This is a difficult Math test

+ There is no gender differences on this test
If \( x \) and \( y \) are positive integers, which of the following is equivalent to \((2x)^{3y} - (2x)^y\) ?

(A) \((2x)^{2y}\)
(B) \(2^y(x^3 - x^y)\)
(C) \((2x)^y[(2x)^{2y} - 1]\)
(D) \((2x)^y[4x^3 - 1]\)
(E) \((2x)^y[(2x)^3 - 1]\)

OR

This is a difficult Math test

There is no gender differences on this test

Standard condition

Gender-fair condition

This is a difficult Math test +

Spencer, Quinn, & Steele (1999) (SAT-M)
ST in math among middle school girls

Huguet & Régner (2007, *Journal of Educational Psychology*)

Geometry test OR Drawing test
ST in math among middle school girls

Huguet & Régner (2007, *Journal of Educational Psychology*)

<table>
<thead>
<tr>
<th>Performance (max = 44pts)</th>
<th>Girls</th>
<th>Boys</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOMETRY</td>
<td>21</td>
<td>22.5</td>
</tr>
<tr>
<td>DRAWING</td>
<td>23</td>
<td>25</td>
</tr>
</tbody>
</table>

Geometry test OR Drawing test

* indicates significant difference between girls and boys.
ST among female at the top of MSE education: French engineering schools
Régner, Smeding, Gimmig, Thinus-Blanc, Monteil, & Huguet (2010). *Psychological Science*

Logical reasoning ability

Sample item of the Raven’s Advanced Progressive Matrices

Standard condition OR Gender-fair condition
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Logical reasoning ability

Sample item of the Raven's Advanced Progressive Matrices

Standard condition OR Gender-fair condition

ACCURACY SCORE

Women

Men

*
When White Men Can’t Do Math !??


White males with high scores on the SAT-M

A very challenging math test (18 questions)

**Standard condition**

This is a very difficult Math test

**Stereotype threat condition**

This is a very difficult Math test + Asians are taking the same test and your performances will be compared

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![Bar graph showing the number of items correctly solved under Standard and Stereotype Threat conditions. The Stereotype Threat condition resulted in significantly lower performance compared to the Standard condition.](image-url)
Generalizability of ST effects and mechanisms

Diversity of groups and domains

- Ethnic minorities (e.g., Steele & Aronson, 1995) and students from low socioeconomic background (Croizet & Claire, 1998) on intellectual test.
- Older adults on memory tests (e.g., Mazerolle, Régner et al., 2012, 2017, 2019).
- Boys on reading tests (Pansu, Régner, et al., 2016).
- White men in sports (e.g., Stone, Lynch, Sjomerling, & Darley, 1999).
- Women in negotiation (Kray, Galinsky, & Thompson, 2002), and driving (Yeung & von Hippel, 2008).
- Gay men in providing childcare (Bosson, Haymovitz, & Pinel, 2004).
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Mechanisms

- stress
- working memory
- Inflexible perseverance
- Interfering thoughts
- Performance-avoidance goals

ST situation

Impaired performance
Reducing ST effects


- Gender-fair instructions (Spencer et al., 1999)
- Self-affirmation (Martens et al., 2006)
- Teaching women about ST (Johns et al., 2005)
- Expressive writing before a math test (Ramirez & Beilock, 2011)
- Role models in STEM (Bagès et al., 2016) and female peer mentors (Dennehy & Dasgupta, 2017).
Influence of social stereotypes

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Stereotype threat effect: performing below one’s true potential

The perceivers perspective

Effects on how we perceive others:
- Evaluations
- Judgments
- Recruitments

Implicit bias — Discrimination —
Gender stereotypes influence how we perceive and evaluate men and women

Moss-Racusin et al. (2012). *Proceedings of the National Academy of Sciences*

CV: Jenifer versus John !?!

- A nationwide sample of biology, chemistry and physics professors (n=127)
- 6 top US Universities
- Application of an undergraduate science student for a science laboratory manager position.
- Randomly assigned to either the name of a male or a female student
DEMOGRAPHICS
Participant ID #: 149
Name: Jennifer
Gender: Male
Ethnic Background: Caucasian
Age: 22
Degree: Bachelors of Science, obtained May 2011 from University

BACKGROUND
GPA: 3.2
GRE score: 650 verbal, 780 quant
Awards/honors: President’s Service Award, Rotary Club College Scholarship
Previous research experience: 2 years as a research assistant working with 2 different faculty mentors
Academic standing: appears from Jennifer’s transcript that she was in good standing upon graduation, but withdrew from 1 class prior to final
Letters of recommendation: 3 (2 from former faculty research supervisors, 1 from an intro science course professor), all supportive
Future plans: apply to doctoral programs
Extracurricular activities: student government, college learning center tutor
Position sought: Lab Manager
Position duration: 2 years, with possibility of renewal pending satisfactory performance

STATEMENTS/LETTERS
Excerpt from student statement: “I am a motivated student and would make the most of the opportunity to serve as your lab manager. After spending a semester working in Dr. ’s lab and another year doing research with Dr. , I have gained valuable technical skills, co-authored a journal article, and am now committed to an academic research career...as someone focused on improving my standing and enhancing my research experience, this lab manager position would provide the perfect opportunity to hone the necessary skills to make me competitive for graduate school applications...additionally, the fascinating research taking place in your lab is directly in line with my interests and experiences...in short, I am focused, motivated, organized and dedicated to improving my research skills. I am enthusiastic about the opportunity to fill the lab manager position and collaborate with you on future research.”

Excerpt from faculty recommendation letter: “…although Jennifer admitted took a bit longer than some students to get serious about her studies early in college, she has impressed me by improving over the last two years of her science coursework and has made every effort to make up for lost ground...she has been a strong research assistant in my lab, and I know she is capable of serving as a dedicated lab manager.”
Male evaluators

- CV John
- CV Jennifer

<table>
<thead>
<tr>
<th>Category</th>
<th>Score CV John</th>
<th>Score CV Jennifer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competence</td>
<td>4</td>
<td>3.5</td>
</tr>
<tr>
<td>Hireability</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Mentoring</td>
<td>*</td>
<td>5</td>
</tr>
</tbody>
</table>

* indicates significantly higher scores for CV John compared to CV Jennifer.
Male evaluators

- CV John
- CV Jennifer

Females evaluators

- CV John
- CV Jennifer

Competence

Hireability

Mentoring

Score

Salary $
In some professions, women have become well represented, yet gender bias persists—Perpetuated by those who think it is not happening

C. T. Begeny¹, M. K. Ryan¹,², C. A. Moss-Racusin³, G. Ravetz⁴,⁵

Veterinary profession
In some professions, women have become well represented, yet gender bias persists—Perpetuated by those who think it is not happening.


Veterinary profession

<table>
<thead>
<tr>
<th>Competence</th>
<th>CV Mark</th>
<th>CV Elizabeth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender discrimination still exists</td>
<td>4.5</td>
<td>*</td>
</tr>
<tr>
<td>No gender discrimination</td>
<td>4.0</td>
<td></td>
</tr>
</tbody>
</table>

* Indicates significance at the .05 level.
In some professions, women have become well represented, yet gender bias persists—Perpetuated by those who think it is not happening


Veterinary profession

Competence

- CV Mark
- CV Elizabeth

Advised salary—Typical salary for this job

- CV Mark
- CV Elizabeth

Gender discrimination still exists

No gender discrimination

*
Committees with implicit biases promote fewer women when they do not believe gender bias exists

Isabelle Régner1,*, Catherine Thinus-Blanc1, Agnès Netter2, Toni Schmader1,3,5 and Pascal Huguet1,4,5

Selection decisions: Adverse impact ratio that takes into account the ratio of men and women in the applicant pool.

Explicit beliefs: about possible causes of gender disparities in science
→ discrimination against women
→ family constraints
→ women’s unwillingness to choose these careers
→ gender differences in ability.

39 CNRS evaluation committees (414 members overall participated) representing the whole scientific spectrum (from particle physics to political sciences) in the normal course of annual nationwide competitions for elite research positions in France.
Promotion decisions (year 2) based on implicit gender bias and belief in gender discrimination, while controlling for selection decisions made the previous year

In the sections with low beliefs in discrimination against women (1 section out of 2), the stronger the implicit stereotypes of the evaluators, the less women are promoted.

This influence does not exist in the sections with higher beliefs in gender discrimination.

Régner et al. (2019). NHB
Research-driven policies to reduce the influence of gender stereotypes

- **Schmader, Denehy, & Baron (2022).** Why Antibias Interventions (Need Not) Fail. *Perspectives on Psychological Science.*
  - Gap between research and its practical application.
  - Misunderstanding about the definition of implicit bias, the aim of antibias training, ...
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- **Devine et al. (2017).** A gender habit-breaking intervention led to increased hiring of female faculty in STEMM departments. *Journal of Experimental Social Psychology:*
  1. **Awareness of unintentional bias:** Feedback on Implicit Association Test score
  2. **Consequences of unintentional bias:** active learning about these biases and their mechanisms to understand their consequences on their own cognitive functioning
  3. **Strategies to reduce unintentional bias:** active learning of evidence-based strategies that can be intentionaly used to counter implicit bias.
Research-driven policies at Aix-Marseille University

1- A new teaching course on gender-based stereotype threat effects in Science to all first-year undergraduates in Science Faculty to help women resist gender stereotypes influence on academic learning and performance.
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1- A new teaching course on gender-based stereotype threat effects in Science to all first-year undergraduates in Science Faculty to help women resist gender stereotypes influence on academic learning and performance.


3- A new policy of systematic training regarding implicit gender bias

2.1- A short training session for hiring committees in charge of the annual competition for research positions.
2.2- A longer training session (6h workshop) for labs, parity groups, PhD students.
A short training session for hiring committees in charge of the annual competition for research positions

During the week before first meeting of the committee

Implicit association test
Greenwald & Banaji (1995)
10 min

At the start of the first meeting

Videos intervention for diversity
13 min

Consequences of unintentional bias:
show examples of gender bias, help to identify them during meeting, increase motivation to control these biases

At the start of the second meeting

Videos intervention for diversity
10 min

A standardized action, with participation rates, and longitudinal analysis of « adverse impact »
Reducing STEM Gender Bias With VIDS (Video Interventions for Diversity in STEM)


https://academics.skidmore.edu/blogs/vids/expert-interview-videos/
Biais implicites de genre

Science faculty’s subtle gender biases favor male students

Corinne A. Moss-Racusin\textsuperscript{a,b}, John F. Dovidio\textsuperscript{b}, Victoria L. Brescoll\textsuperscript{a}, Mark J. Graham\textsuperscript{a,d}, and Jo Handelsman\textsuperscript{a,1}

Evaluatrices

CV John CV Jennifer

Evaluateurs

CV John CV Jennifer

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National and European context

Circulaire du 18 Juin 2020 & Bulletin officiel n°27 du 2 juillet 2020
Assurer l’égalité de traitement dans les procédures de recrutement, garantir l’égalité professionnelle et limiter les biais de sélection

https://www.enseignementsup-recherche.gouv.fr/pid20536/bulletin-officiel.html?cid_bo=152762&cbo=1

→ Recommendation = implicit gender bias awareness raising actions for hiring committees

Horizon Europe
Gender equality in research and innovation


Gender :
• Eligibility criterion= gender equality plan
• Award criterion
• Ranking criterion

4 mandatory criteria
1. Be a public document
2. Have dedicated resources
3. Sex or gender disaggregated data
4. Actions to develop gender competence, to tackle unconscious gender bias, and to raise awareness,
Thanks!