Gender stereotypes in science

Véronique Le Payen Poublan
Labomaths Maryam Mirzakhani – Salon de Provence
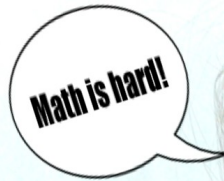**IRES Aix-Marseille**

07/10/2024

Girls suck at maths

Men don't cry

Presentation plan

- What is a gender stereotype?

- Gender stereotypes in science

- Why are gender stereotypes in science a problem?

- How can stereotypes be deconstructed?

- To find out more

What is a gender stereotype?

Stereotype: ready-made expression or opinion without any originality, cliché. *Larousse dictionary*

Social stereotypes: beliefs shared to varying degrees about the attributes, characteristics and skills (or lack thereof) of certain social groups.

What is a gender stereotype?

Men:

competitive, daring, rational, good at maths, but bad at reading, managing interpersonal relationships and emotional situations.

Women:

sensitive, emotional, good at reading, but bad at maths, logic, spatial orientation and leadership.

Based on a functional but simplifying process of social categorisation!

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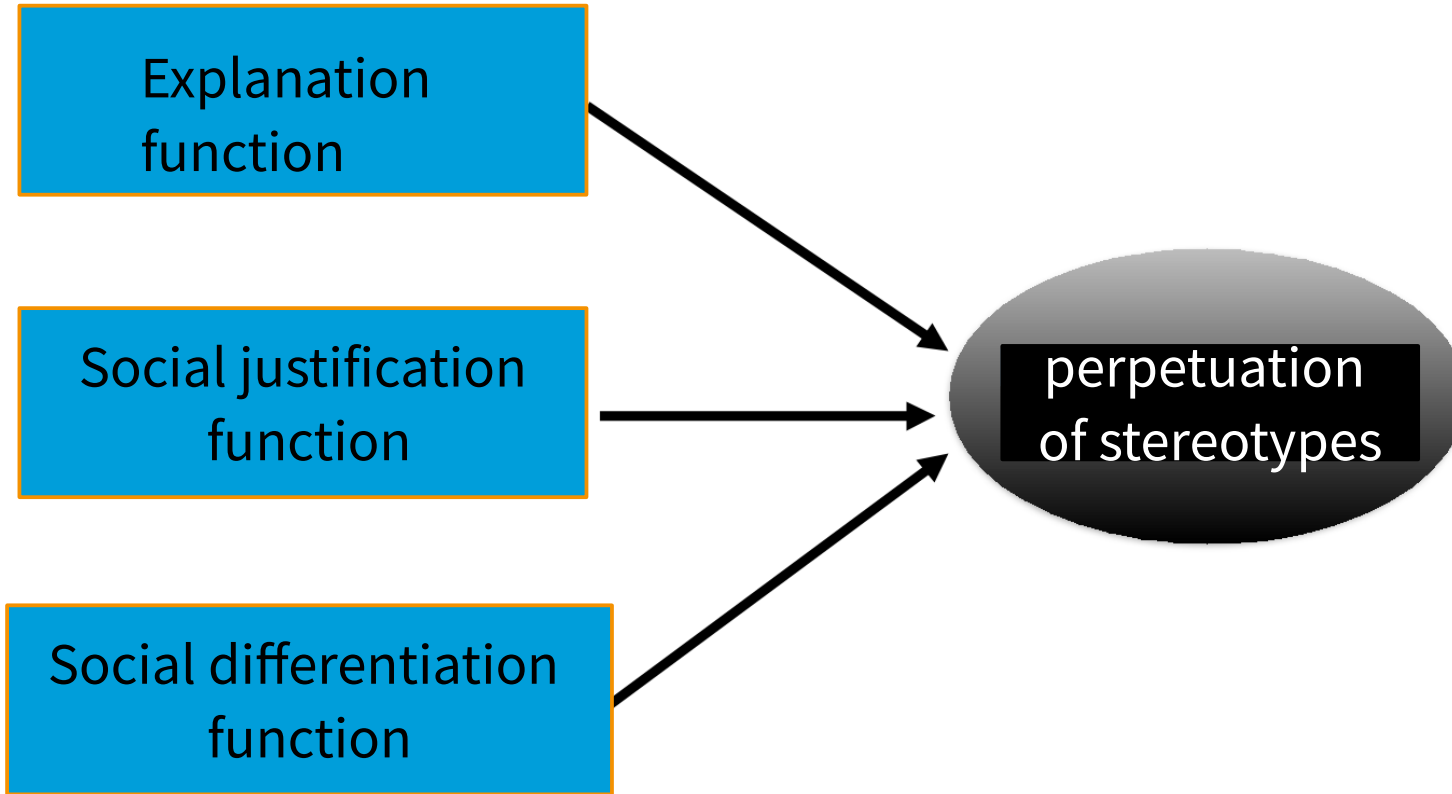
What is a gender stereotype?

- **Assimilation effect:** amplification of similarities (perceived or expected) between members of the same category…

- **Contrast effect:** amplification of differences (perceived or expected) between members of two different categories…

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What is a gender stereotype?

Explanation function

Social justification function

Social differentiation function

perpetuation of stereotypes

Origins of gender stereotypes

Historical division of roles
in society.

Origins of gender stereotypes

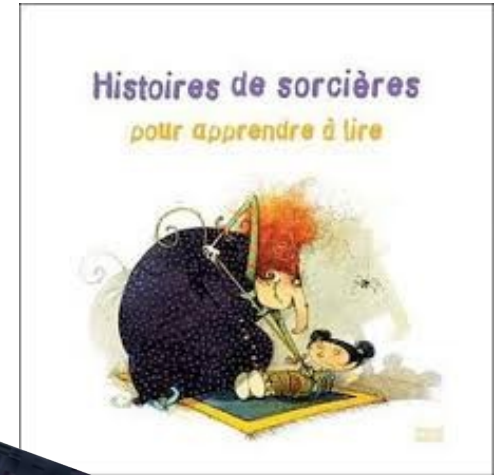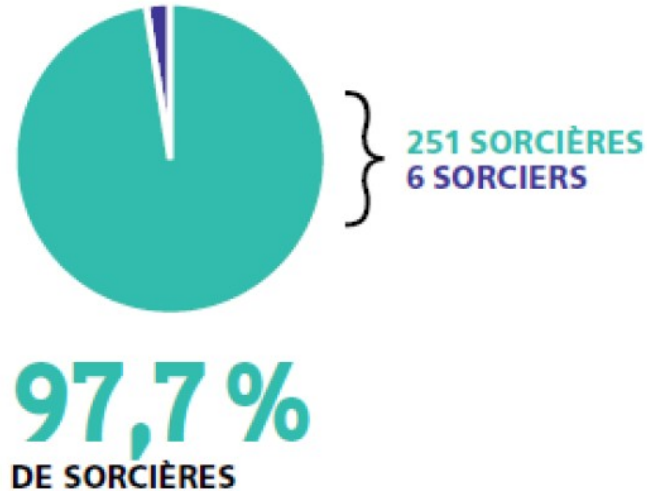## Children's books and toys

Origins of gender stereotypes

Example of CP schoolbooks

Part des femmes dans les catégories professionnelles identifiées

45,5 % DES PERSONNAGES TRAVAILLANT DANS L'ENSEIGNEMENT SONT DES FEMMES.

38,5 % DANS LES MÉTIERS D'ANTAN

34,1 % DANS LES SERVICES

28,7 % DANS LE SOIN, LA SANTÉ

27 % DANS LE COMMERCE

20,3 % DANS LES ARTS, LE SPORT

6,2 % DANS LE BÂTIMENT, L'ARTISANAT, L'AGRICULTURE

4,5 % AU CHÔMAGE

3,4 % DANS LES SCIENCES

1,1 % DANS LE MAINTIEN DE L'ORDRE

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Origins of gender stereotypes

Example of CP schoolbooks

251 SORCIÈRES
6 SORCIERS

97,7 %
DE SORCIÈRES

La sorcière de la rue Mouffetard
et autres contes de la rue Broca
Pierre Gripari

Histoires de sorcières
pour apprendre à lire

Cornebidouille

Origins of gender stereotypes

Example of advertising

What is this ad selling?

Origins of gender stereotypes
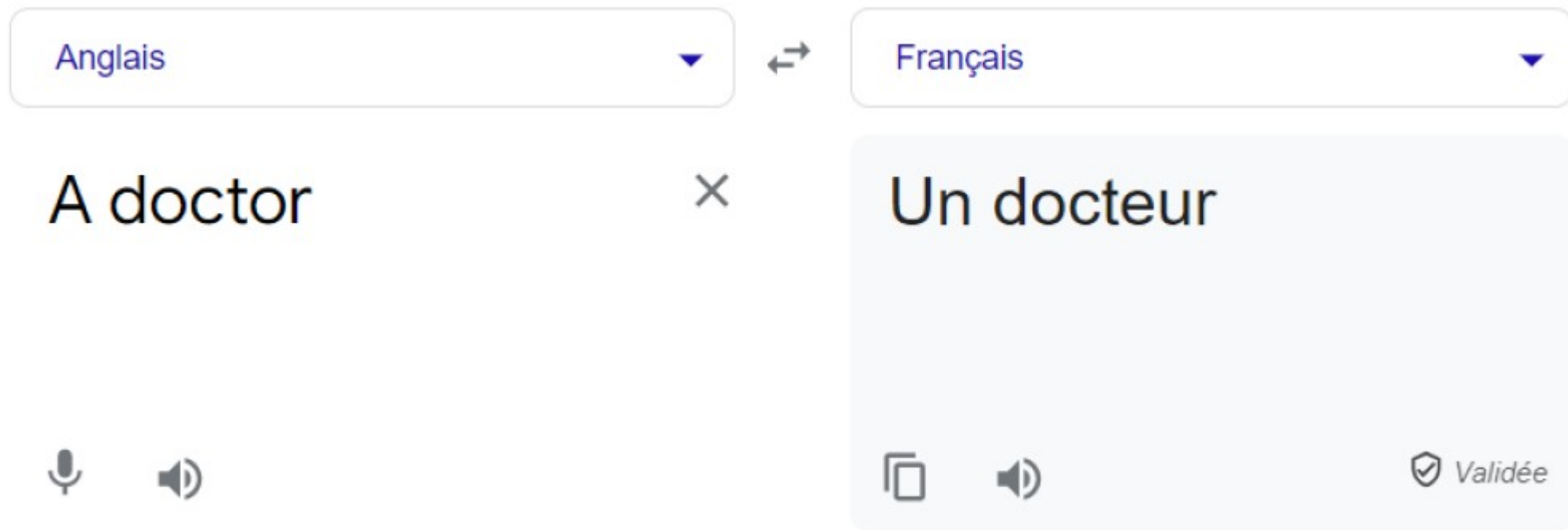
Example of advertising

Glasses

An exercise

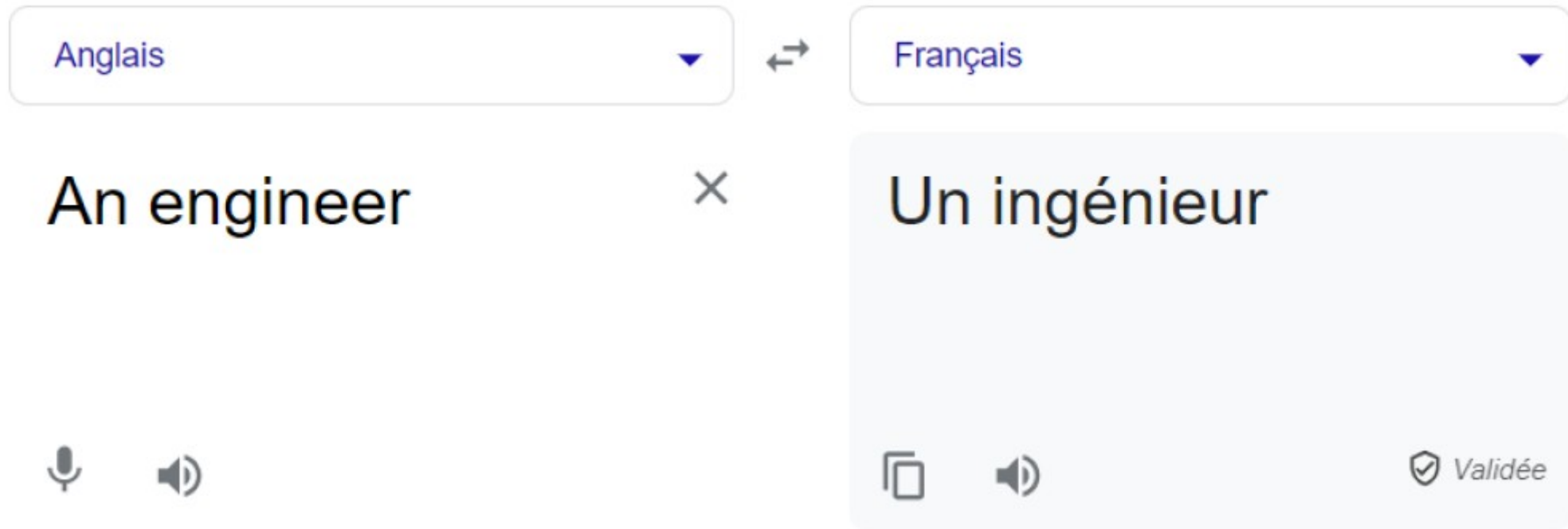I ask you to close your eyes and think of an engineer.
Then a nurse.
Now open your eyes again.
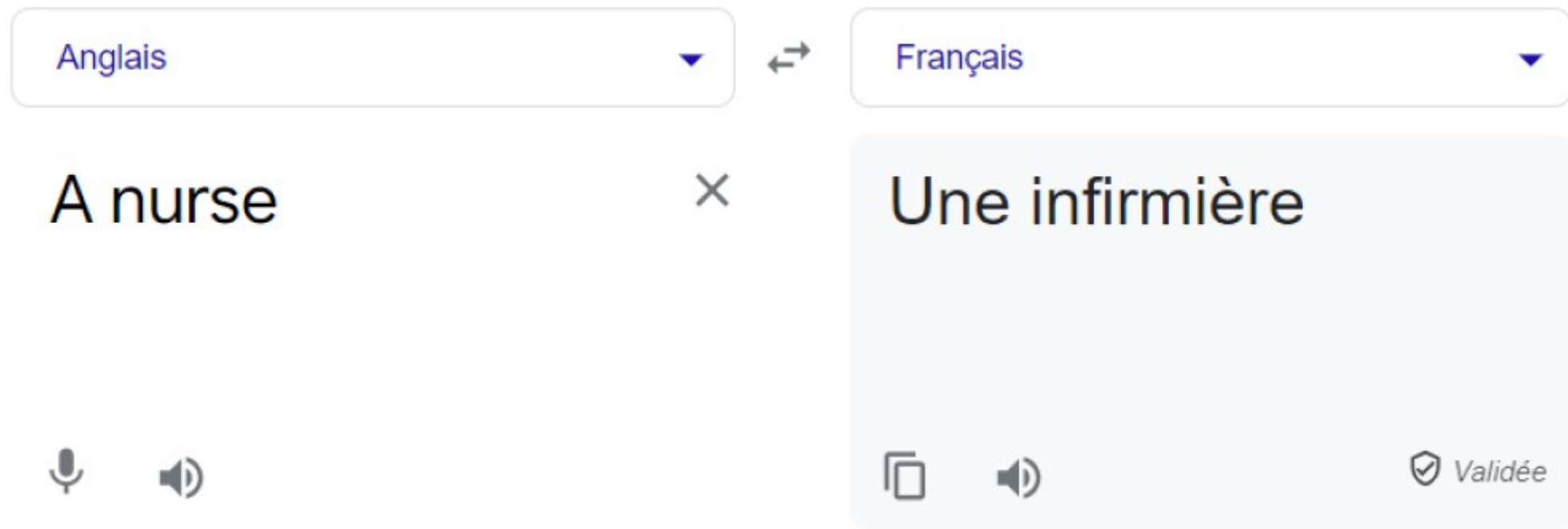How many of you have imagined a male engineer and
a female nurse?
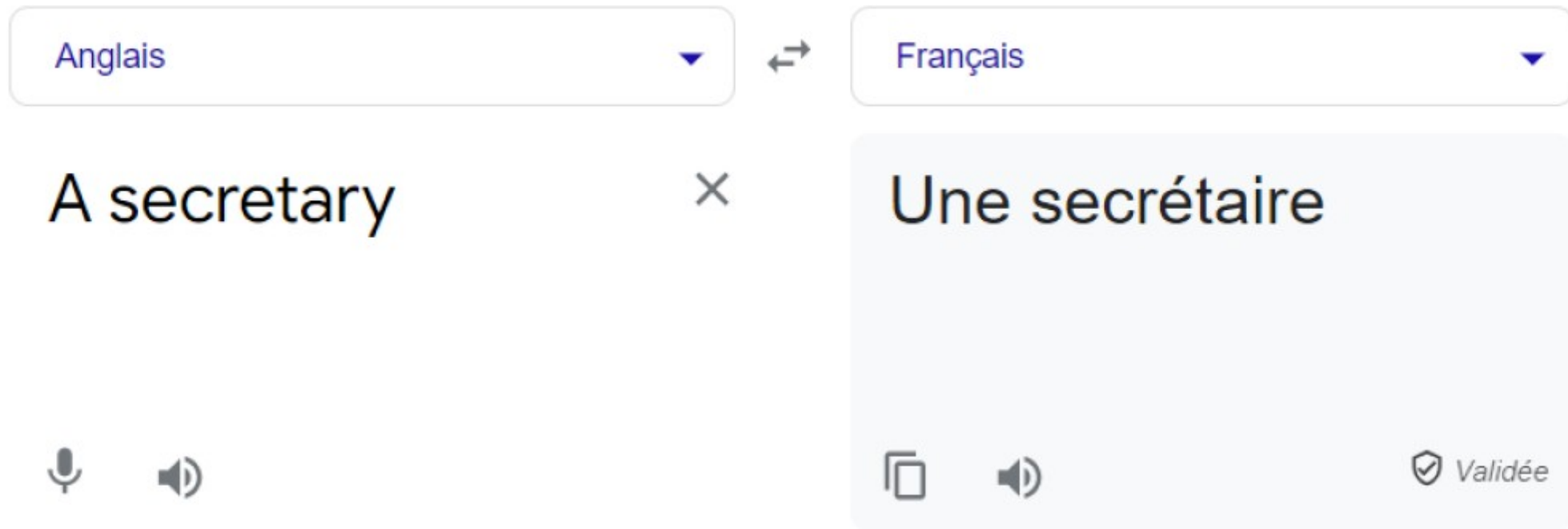
The Google translate example

The Google translate example

The Google translate example

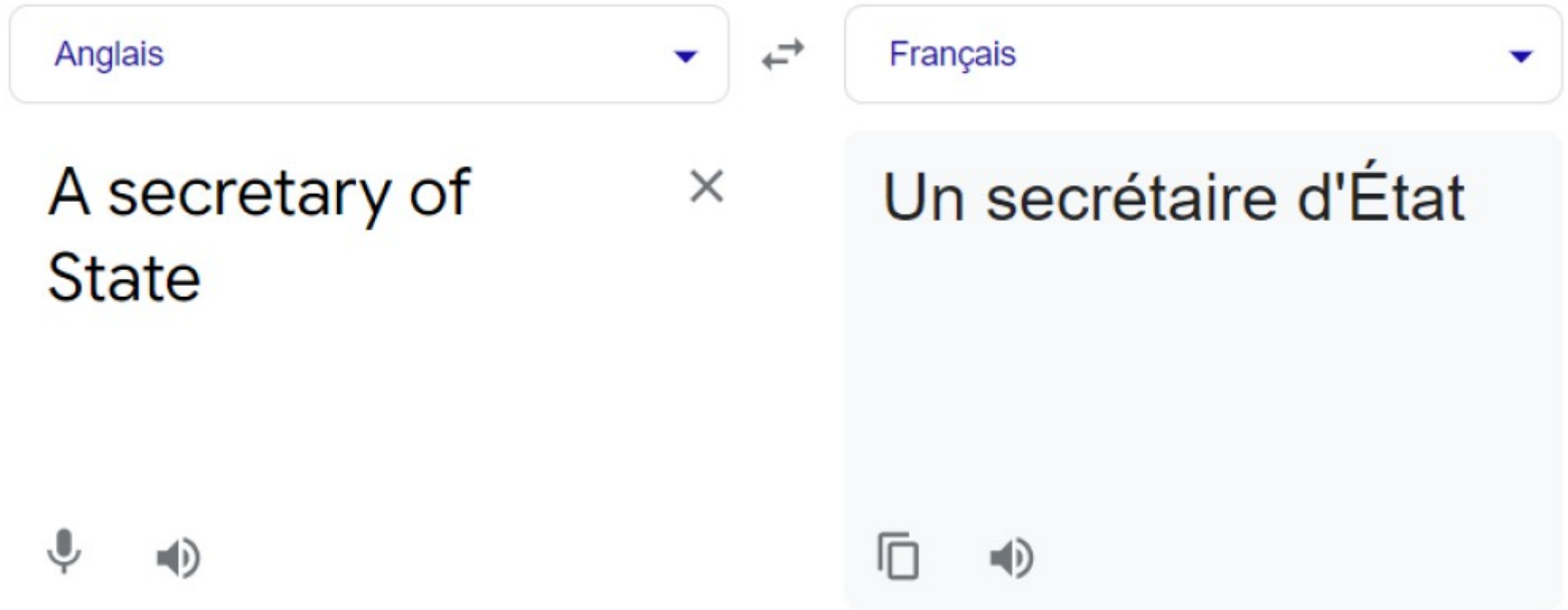| Anglais ▼	⇄	Français ▼

A nurse ✕

Une infirmière

The Google translate example

The google translate example

The Google translate example

Gender stereotypes in science

Pink brain versus blue brain?

Gender stereotypes in science

Can you name 10 male scientists?

Gender stereotypes in science

Can you name 10 female scientists?

Gender stereotypes in science

Maria Gaetana Agnesi (1718-1799) ● Florence Eliza Allen (1876-1960) ● Annie Dale Biddle Andrews (1885-1940) ● Hertha Ayrton (1854-1923) ● Clara Latimer Bacon (1866-1948) ● Grace M. Bareis (1875-1962) ● Nina Karlovna Bari (1901-1961) ● Ruth Aaronsom Bari (1917-2005) ● Mabel Schmeiser Barnes (1905-1993) ● Charlotte Barnum (1860-1934) ● Lida Barrett (1927-2021) ● Agnes Baxter (1870-1917) ● Lulu Hofmann Bechtolsheim (1902-1989) ● Alexandra Bellow (1935-) ● Suzan Rose Benedict (1873-1942) ● Elizabeth R. Bennett (1880-1972) ● Dorothy Lewis Bernstein (1914-1988) ● Joan S. Birman (1927-) ● Gertrude Blanch (1898-1996) ● Lenore Blum (1942-) ● Mary Everest Boole (1832-1916) ● Valentina Mikhailovna Borok (1931-2004) ● Marjorie Lee Browne (1914-1979) ● Josephine E. Burns (1887-1969) ● Mary Lucy Cartwright (1900-1998) ● Sun-Yung Alice Chang (1948-) ● Emilie du Chatelet (1706-1749) ● YoungJu Choie (1959-) ● Yvonne Choquet-Bruhat (1923-) ● Fan Chung (1949-) ● Maria Cinquini-Cibrario (1905-1992) ● Edith Clarke (1883-1959) ● Teresa Cohen (1892-1992) ● Anna Julia Cooper (1858-1964) ● Elizabeth Morgan Cooper (1891-1967) ● Elizabeth Buchanan Cowley (1874-1945) ● Gertrude Mary Cox (1900-1978) ● Louise Duffield Cummings (1870-1947) ● Susan Jane Cunningham (1842-1921) ● Ingrid Daubechies (1954-) ● Florence Nightingale David (1909-1993) ● Elizabeth Dickerman (1872-1954) ● Caren Diefenderfer (1952-2017) ● Agnes Meyer Driscoll (1889-1971) ● Annie Jean Easley (1933-2011) ● Etta Falconer (1933-2002) ● Sister Mary Celine Fasenmyer (1906-1996) ● Philippa Garrett Fawcett (1868-1948)
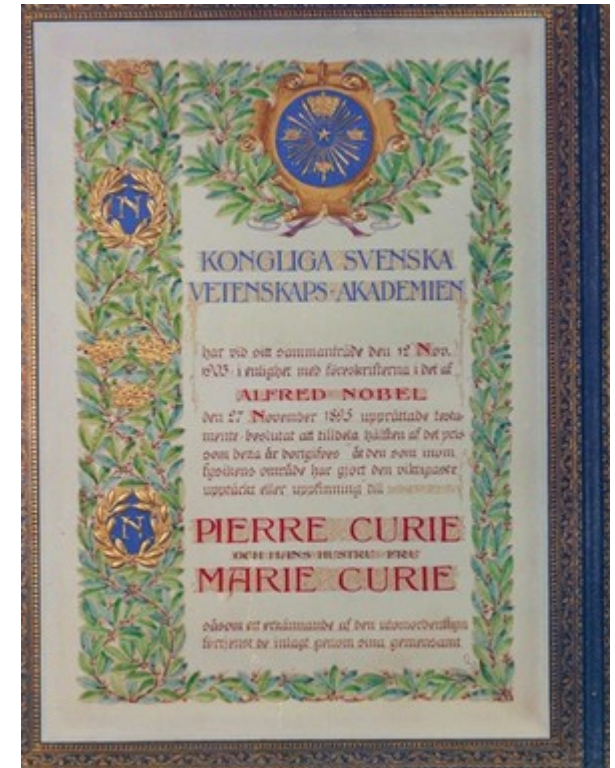
Gender stereotypes in science

Kate Fenchel (1905-1983) ● Jacqueline Ferrand (1918-2014) ● Annie MacKinnon Fitch (1868-1940) ● Irmgard Flugge-Lotz (1903-1974) ● Anne Bosworth Focke (1868-1907) ● Irene Fonseca (1956-) ● Herta Taussig Freitag (1908-2000) ● Hilda Geiringer von Mises (1893-1973) ● Ruth Gentry (1862-1917) ● Sophie Germain (1776-1831) ● Nadeschda Gernet (1877-1943) ● Sister Mary Gervase (1888-1926) ● Gloria Gilmer ● Ruth Gonzalez ● Evelyn Boyd Granville (1924-) ● Mary Gray (1938-) ● Margaret Jarman Hagood (1908-1963) ● Deborah Tepper Haimo (1921-2007) ● Louise Hay (1935-1989) ● Ellen Amanda Hayes (1851-1930) ● Euphemia Lofton Haynes (1890-1980) ● Nola Haynes (1897-1996) ● Olive Clio Hazlett (1890-1974) ● Cora Barbara Hennel (1886-1947) ● Anna Stafford Henriques (1905-2004) ● Caroline Herschel (1750-1848) ● Hu Hesheng (1928-) ● Gloria Hewitt (1935-) ● Grace Brewster Murray Hopper (1906-1992) ● Goldie Printis Horton (1887-1972) ● Hilda Phoebe Hudson (1881-1965) ● Irene Hueter (1965-) ● Hypatia (370 ?-415) ● Mary Jackson (1921-2005) ● Sof'ja Aleksandrovna Janovskaja (1896-1966) ● Svenlana Jitomirskaya (1966-) ● Katherine Johnson (1918-2020) ● Hermine Kalutsyan ● Carol Karp (1926-1972) ● Linda Keen (1940-) ● Claribel Kendall (1889-1965) ● Frances Clare Kirwan (1959-) ● Pelageya Yakovlevna Polubarinova Kochina (1899-1999) ● Nancy Kopell (1942-) ● Sofia Kovalevskaya (1850-1891) ● Cecilia Krieger (1894-1974) ● Krystyna Kuperberg (1944-) ● Christine Ladd-Franklin (1847-1930) ● Olga Alexandrovna Ladyzhenskaya (1922-2004) ● Edna Kramer Lassar (1902-1984)

Gender stereotypes in science

Emma Trotskaia Lehmer (1906–2007) ● Marguerite Lehr (1898–1988) ● Paulette Libermann (1919–2007) ● Elizaveta Fedorovna Litvinova (1845–1919) ● Marie Litzinger (1899–1952) ● Mayme I. Logsdon (1881–1967) ● Ada Byron Lovelace, (1815–1852) ● Edith Hirsch Luchins (1921–2002) ● Sheila Scott Macintyre (1910–1960) ● F. Jessie MacWilliams (1917–1990) ● Isabel Maddison (1869–1950) ● Vivienne Malone-Mayes (1932–1995) ● Emilie Norton Martin (1869–1936) ● Verdiana Grace Masanja (1954–) ● Vera Nikoaevna Maslennikova (1926–2000) ● Dorothy McCoy (1903–2001) ● Dusa McDuff (1945–) ● Sharon Menard (1934–) ● Helen Abbot Merrill (1864–1949) ● Winifred Edgerton Merrill (1862–1951) ● Ida Metcalf (1857–1952) ● Maryam Mirzakhani (1977–2017) ● Cathleen Morawetz (1923–2017) ● Ruth Moufang (1905–1977) ● Anna Margaret Mullikin (1893–1975) ● Evelyn M. Nelson (1943–1987) ● Hanna Neumann (1914–1971) ● Mary Frances Winston Newson (1869–1959) ● Florence Nightingale (1820–1910) ● Emmy Noether (1882–1935) ● Olga Arsen'enva Oleinik (1925–2001) ● Gloria Olive (1923–2006) ● Dame Kathleen Ollerenshaw (1912–2014) ● Helen Brewster Owens (1881–1968) ● Anna Helene Palmie (1863–1946) ● Raman Parimala (1948–) ● Leona May Peirce (1863–1954) ● Charlotte Elvira Pengra (1875–1916) ● Bernadette Perrin-Riou (1955–) ● Rózsa Péter (1905–1977) ● Sophie Piccard (1904–1990) ● Elena Lucrezia Cornaro Piscopia (1646–1684) ● Vera Pless (1931–2020) ● Freda Porter (1957–) ● Cheryl Praeger (1948–) ● Virginia Ragsdale (1870–1945) ● Helena Rasiowa (1917–1994) ● Marina Ratner (1938–2017)

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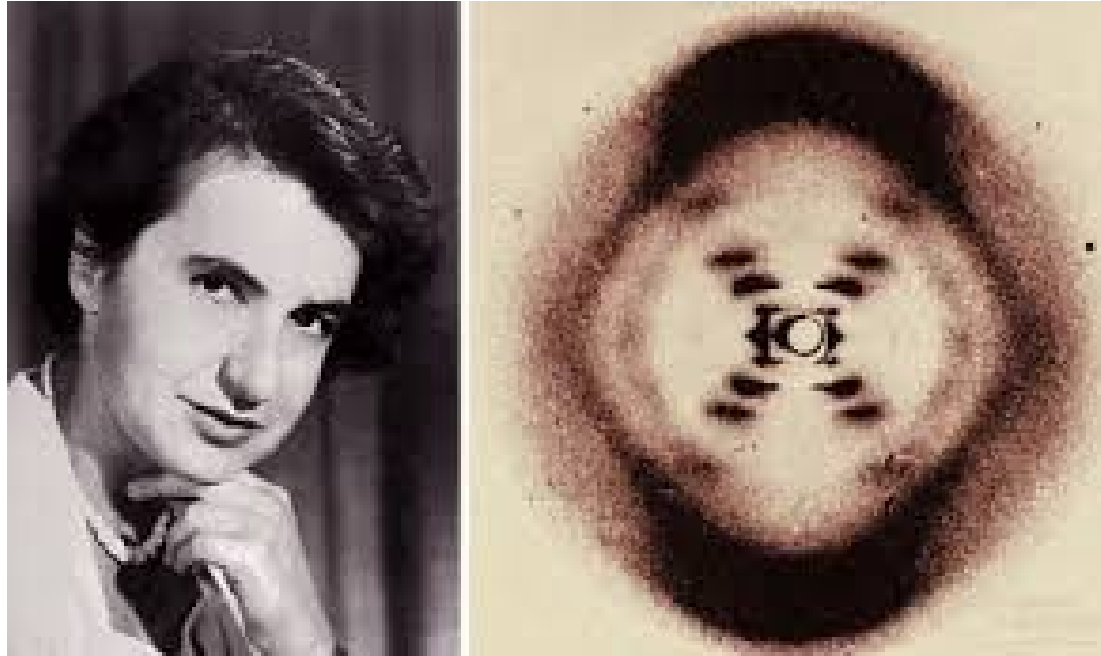
Gender stereotypes in science
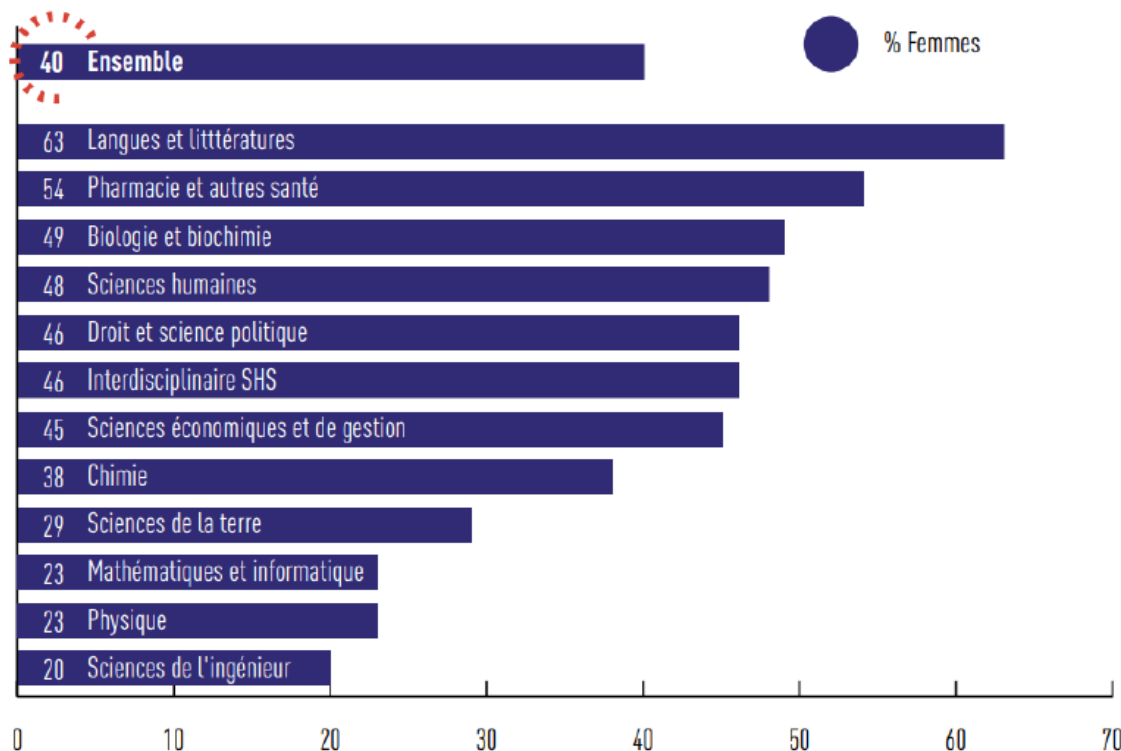
Marie Curie (1867-1934)

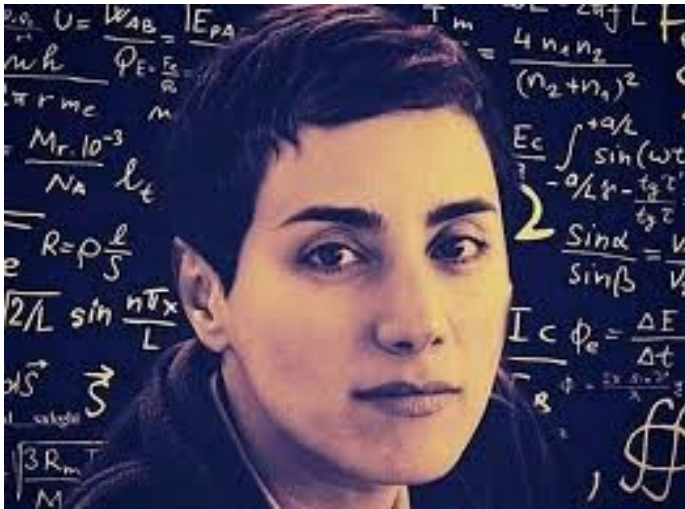# Gender stereotypes in science

Rosalind Franklin (1920-1958)

Gender stereotypes in science

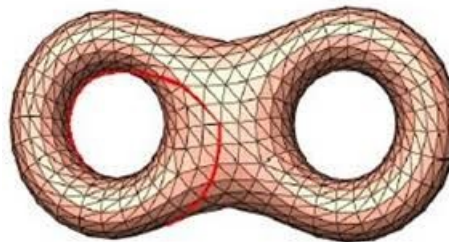Part des femmes enseignantes-chercheuses titulaires dans la filière universitaire par discipline (groupe CNU) en 2020

	% Femmes
40	Ensemble
63	Langues et litttératures
54	Pharmacie et autres santé
49	Biologie et biochimie
48	Sciences humaines
46	Droit et science politique
46	Interdisciplinaire SHS
45	Sciences économiques et de gestion
38	Chimie
29	Sciences de la terre
23	Mathématiques et informatique
23	Physique
20	Sciences de l'ingénieur

Gender stereotypes in science

Maryam Mirzakhani (1977-2017)

Fields Medal
80 winners
2 women

- Impact on study and career choices

    Share of female engineering graduates between 2000 and 2020
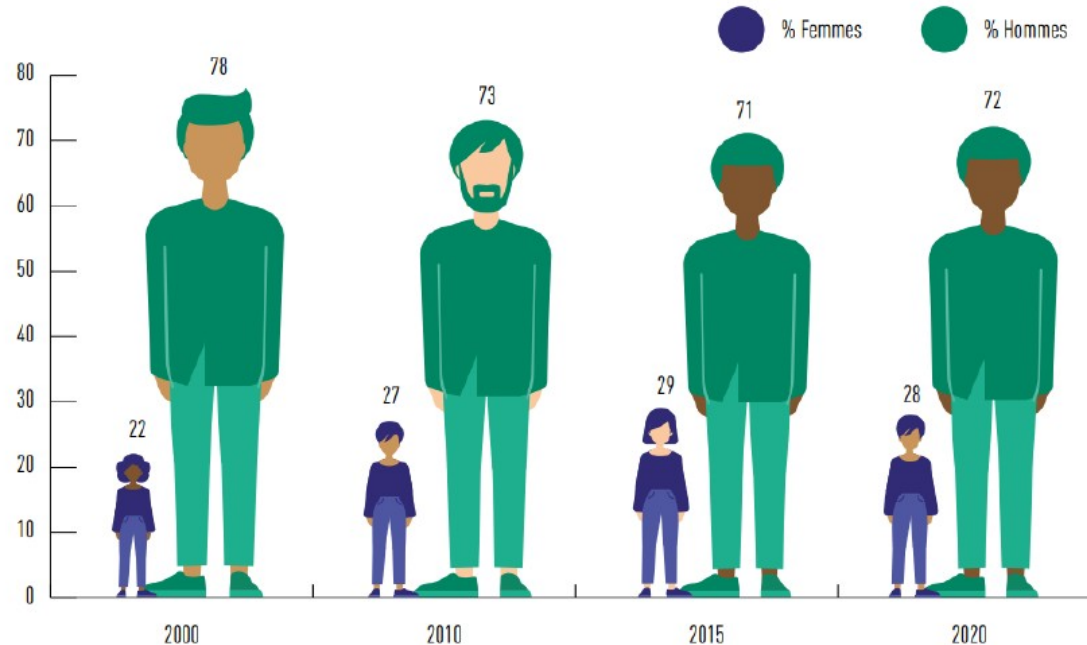
Source : « *Vers l'égalité femmes-hommes ? Chiffres-clés.* », MESRI ESRI, 2022.

- ## Impact on study and career choices

Source: RSU CNRS 2022
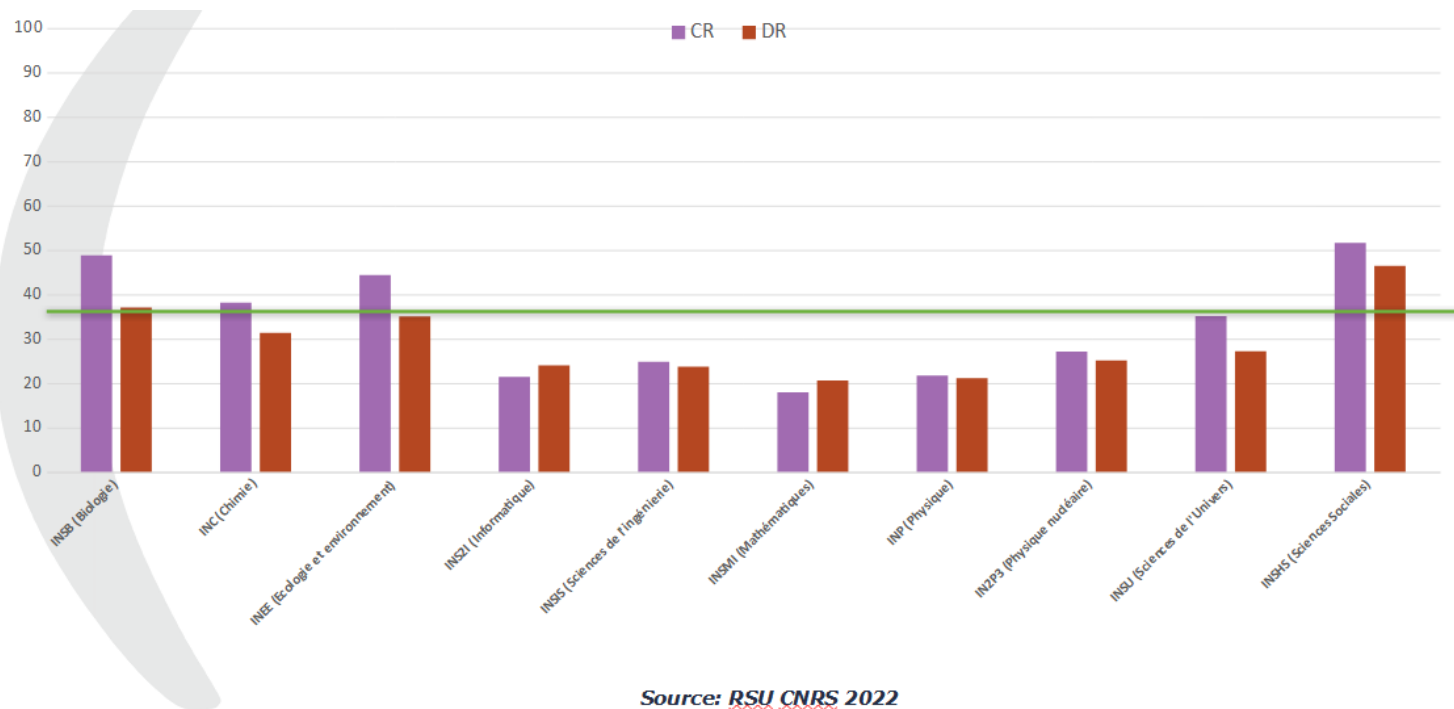
Parity among CNRS researchers in 2022

- Bias in skills assessment: an experiment

- 127 university professors in biology, chemistry or physics;
- men and women.
- 6 American universities
- Application of a student for a management position in the laboratory to help develop mentoring programmes for undergraduate science students.
- Random assignment to a candidate's CV.

DEMOGRAPHICS
Participant ID #: 149
Name: Jennifer ▇▇▇
Gender: Female
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 admittedly 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."

Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman (2012). *PNAS*, 109, 16474-16479

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Why are gender stereotypes in science a problem?

- Bias in skills assessment: an experiment
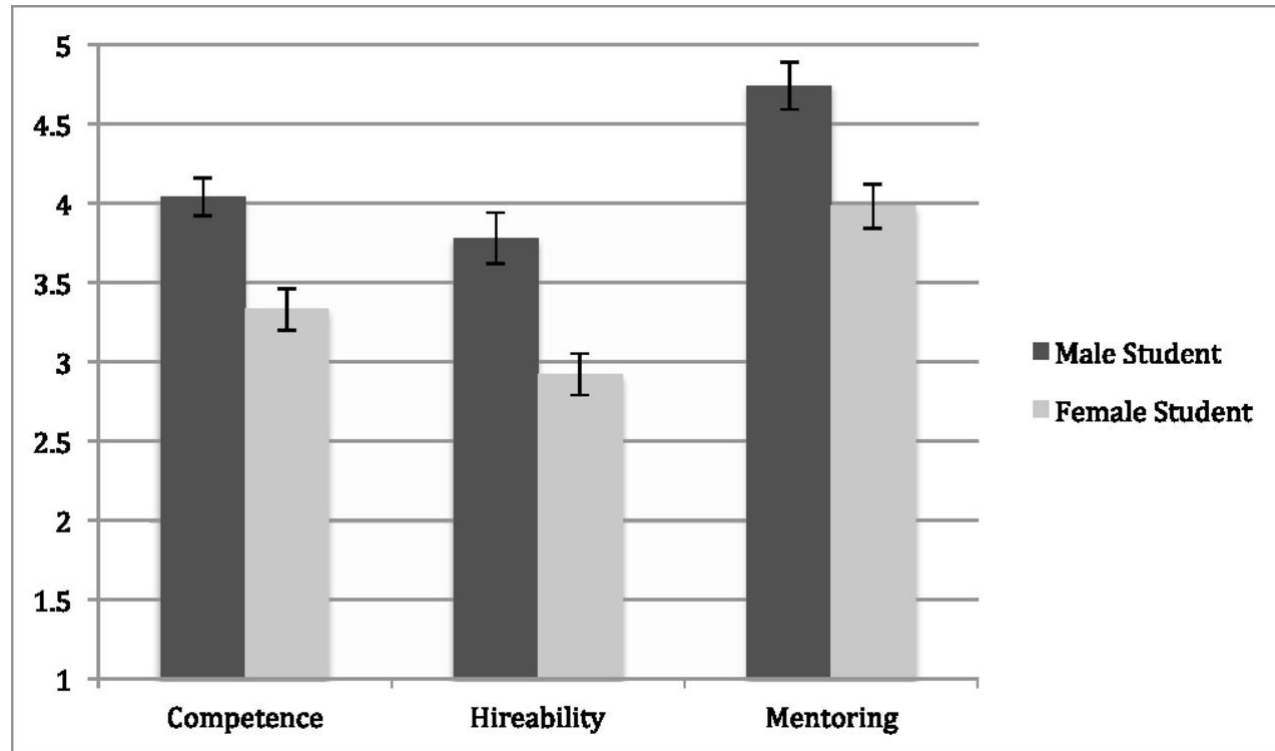
**The stereotype threat**

(1995)

Reduced performance of individuals in a situation where they fear confirming - in their own eyes or in the eyes of others - a negative stereotype targeting their group in a given area of ability.

Claude M Steele

Joshua Aronson

A test: the Stroop test

Give the colour of the ink used to write the stimulus.

You have to answer quickly.

A test: the Stroop test

Give the colour of the ink used to write the stimulus.

You have to answer quickly.

Example :

A test: the Stroop test

Give the colour of the ink used to write the stimulus.

You have to answer quickly.

Example : XXXX

A test: the Stroop test

A test: the Stroop test

A test: the Stroop test

GREEN

The stereotype threat

(1995)

Reduced performance of individuals in a situation where they fear confirming - in their own eyes or in the eyes of others - a negative stereotype targeting their group in a given area of ability.
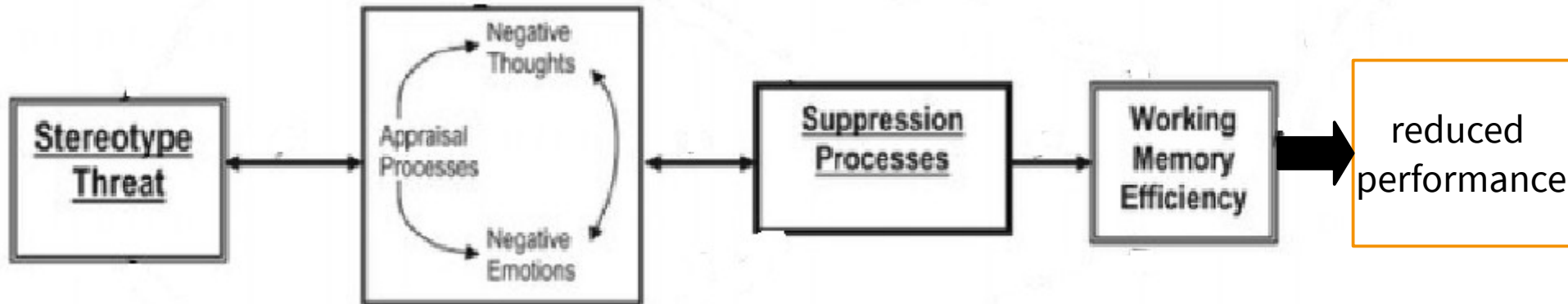
Schmader, Johns, & Forbes (2008), *Psych Review*

How does stereotype threat work?
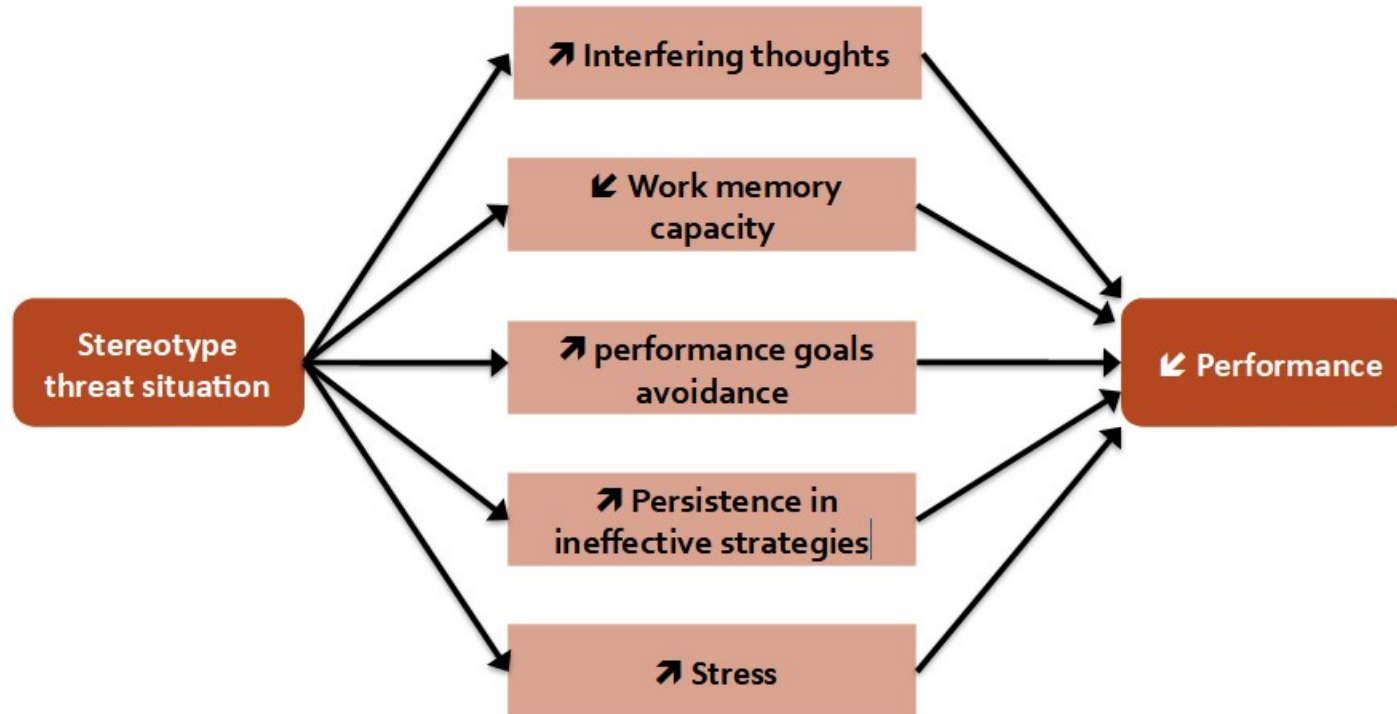
Example: Rey-Osterrieth complex figure
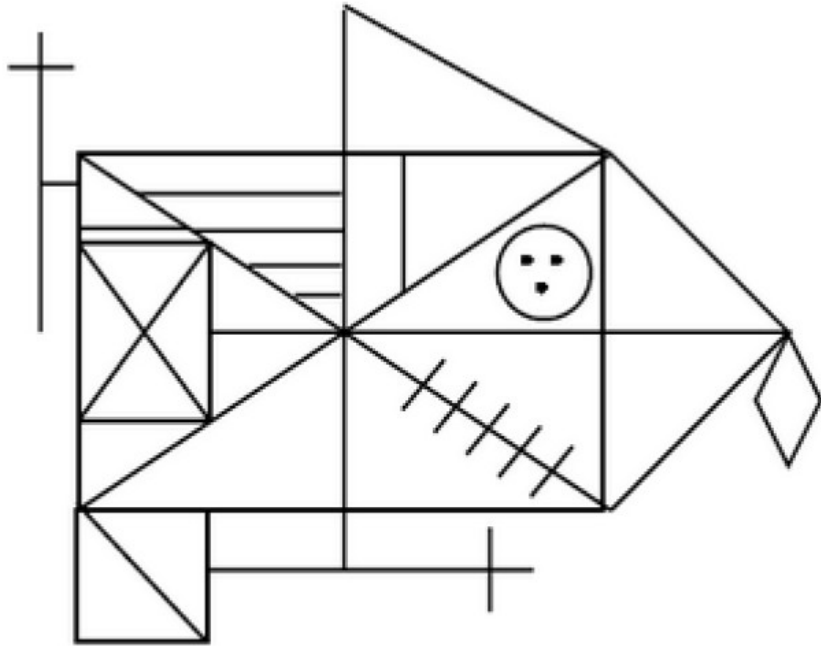
<u>Experience with pupils in 6ème and 5ème</u>

<u>Huguet and Régner (2007)</u>

454 pupils in 6ème and 5ème (several levels of success or failure);

223 girls and 231 boys.

Drawing test or geometry test

Example: Rey-Osterrieth complex figure

Huguet & Régner (2007). *Journal of Educational Psychology, 99*, 545–560.

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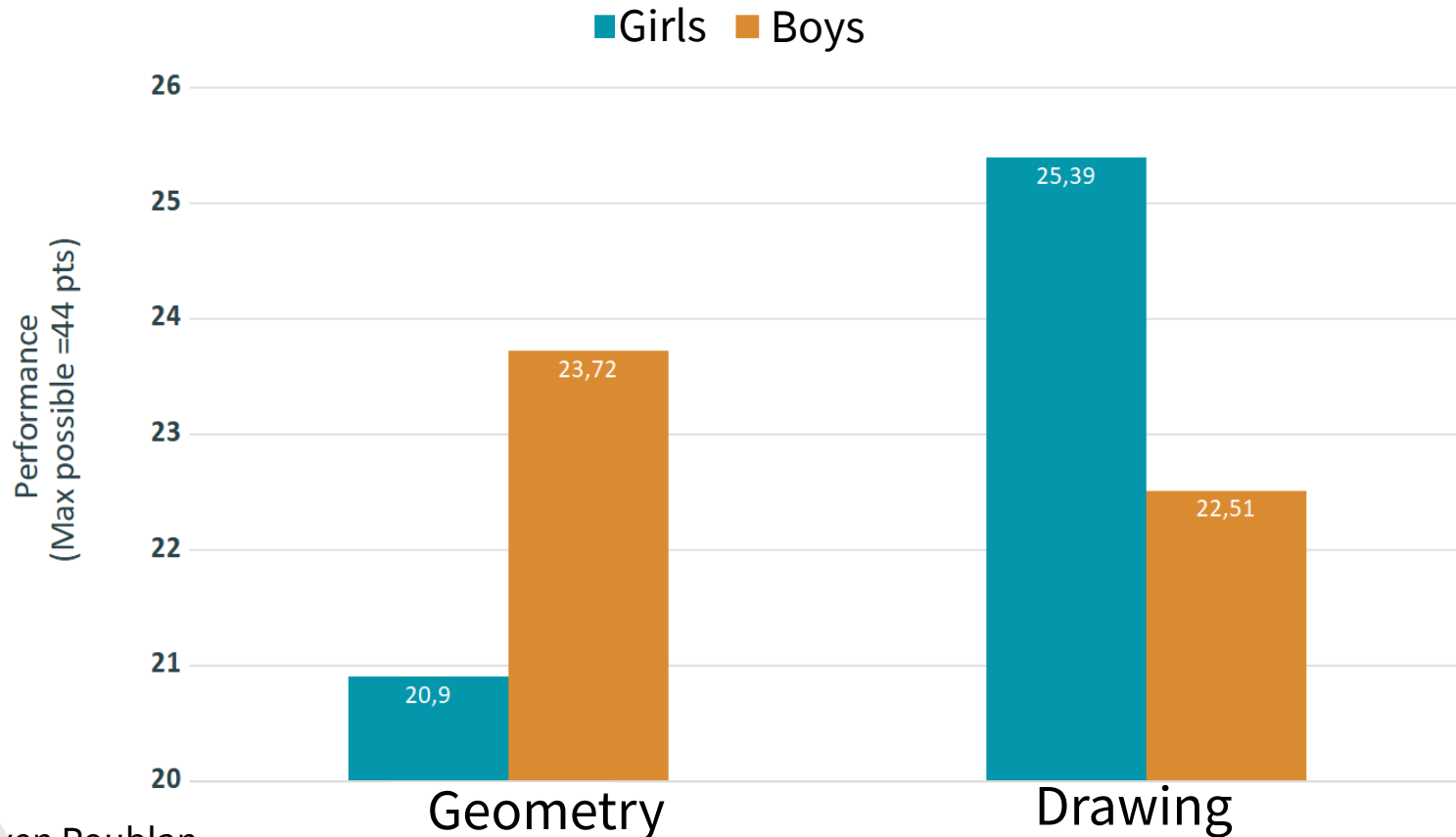
How can stereotypes be deconstructed?

- Measuring to raise awareness of inequalities

- Explain :

  - Identifying the causes of inequality

  - How did we get here?

  - Why do we need more diversity in science?

- Taking action:
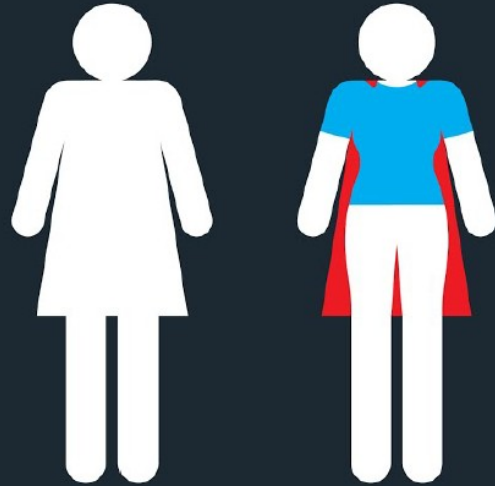
  - Behave respectfully towards everyone

To find out more

Conclusion

Stereotypes don't define who you are or what you can achieve. Science needs diversity, your ideas and your talents, whatever your gender.

Thanks for listenning

It was never a dress.