

Brain, Sex/Gender and Prejudice

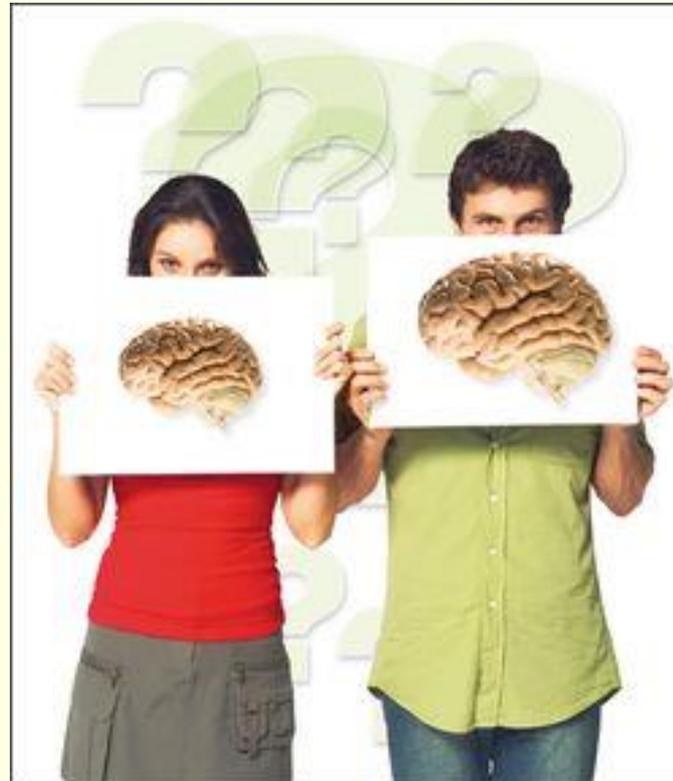


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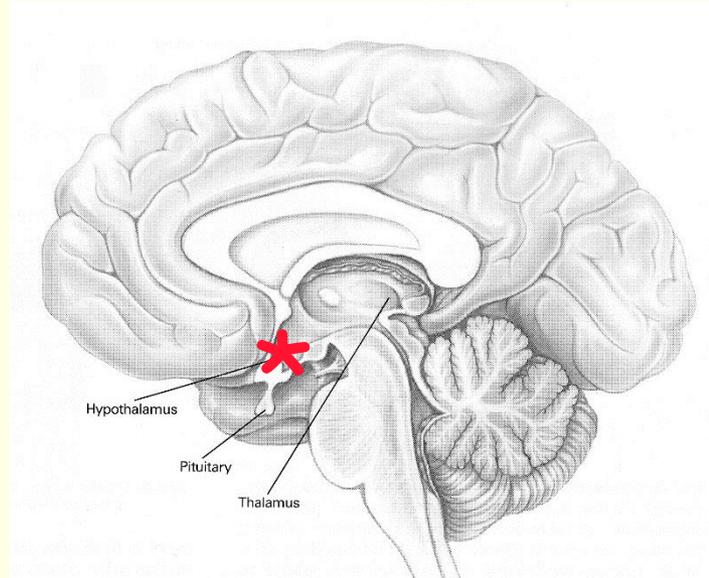
Do women have a brain like men ?



Do women have a brain like men ?

NO : Sex differences in the brain

Regions that control reproductive functions



- Women: **periodic activity of neurons to trigger ovulation**
- Men : no periodic activity in the hypothalamus

Do women have a brain like men ?

YES : Cognitive functions

Intelligence, reasoning, memory, attention, imagination...

Advances in neurosciences demonstrate that
Women and men share the same cerebral capacities

However....

Prejudices about sex differences in aptitudes
and behaviors are still persistent

- **Women** are « naturally » multitasking and skilled for language
- **Men** are "gifted" for orientation in space, maths and competition

Sex/gender differences in language ?

Myth and reality

Kaiser A. et al., Brain Research Reviews, vol 61, 2009



Magnetic resonance imaging (MRI)

Brain regions involved in language processing

No statistical differences between women and men
in the localization of language brain regions

Development of mathematical skills in children

Elisabeth SPELKE

2005 Sex differences in intrinsic aptitudes for mathematics and science ?
a critical review, American Psychologist, 60 : 950-958.



Cognitive and behavioral tests :

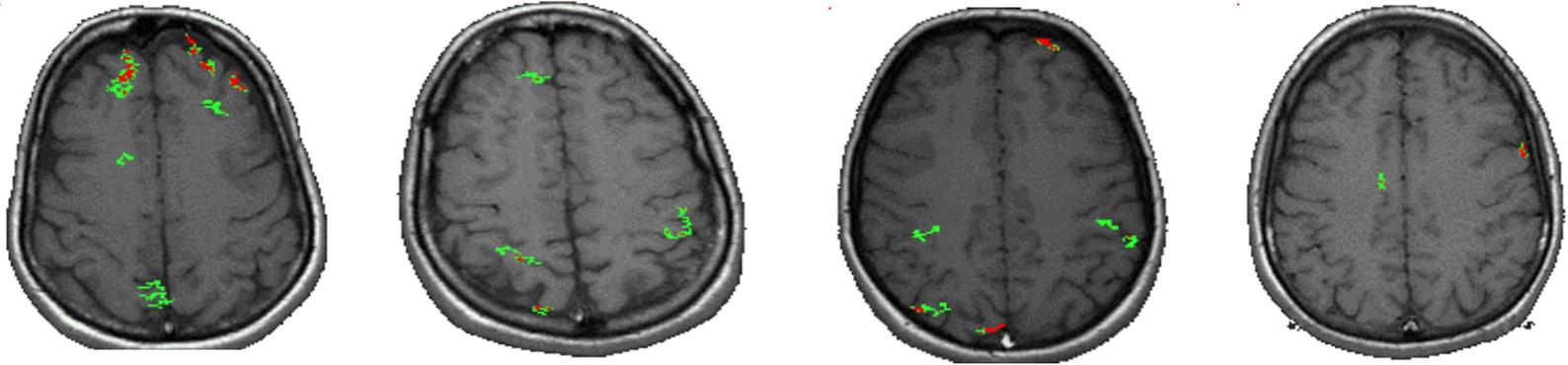
Ability to manipulate numbers and spatial cues

3 months - 5 years

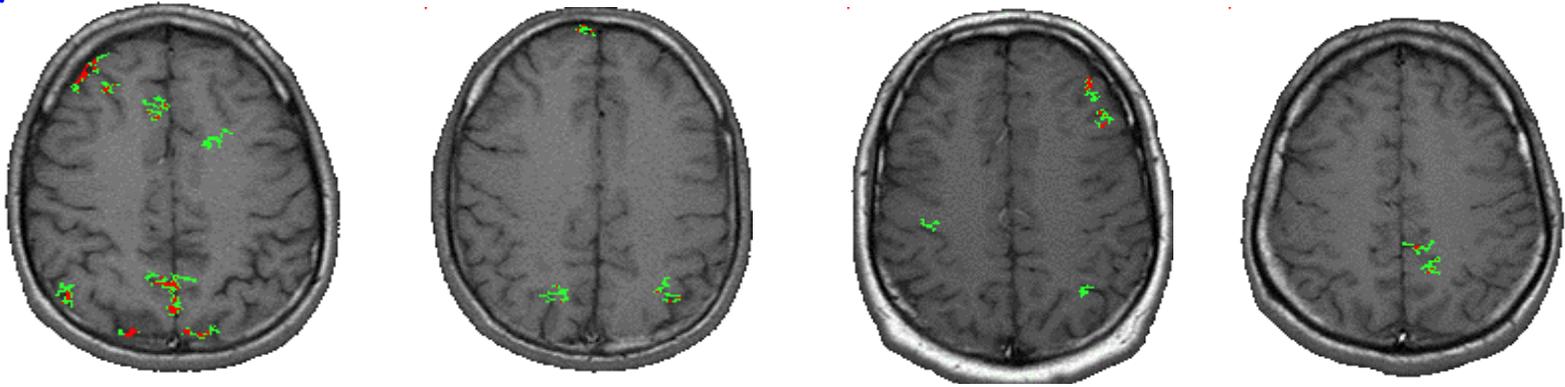
**No differences between boys and girls
in mathematical abilities**

MRI of mental calculation test

WOMEN



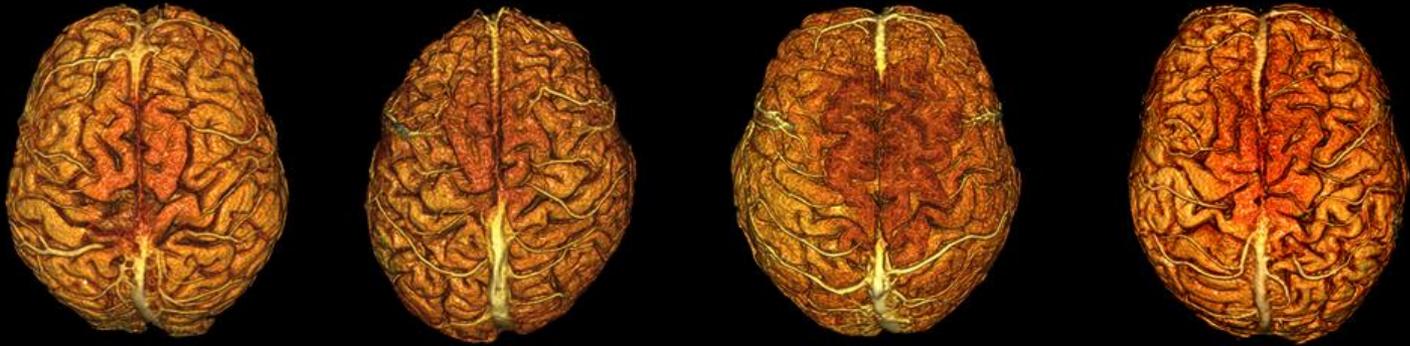
MEN



The differences in brain activation between individuals of the same gender match or exceed the differences between men and women

MRI of the anatomy of cerebral cortex

WOMEN

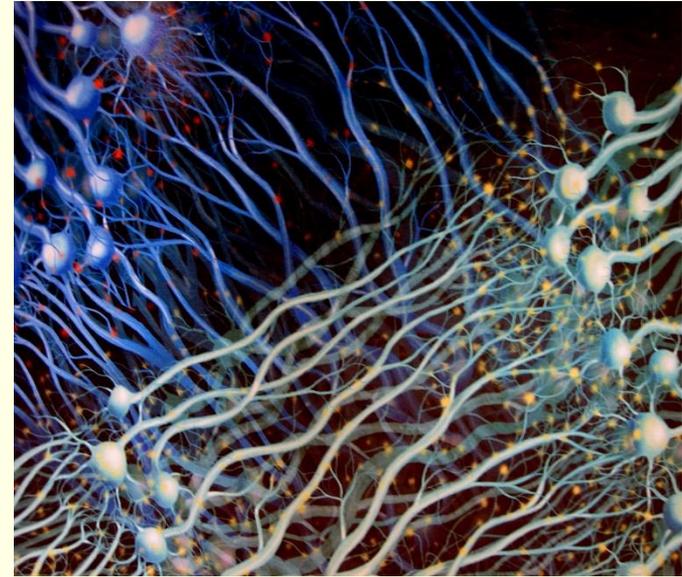
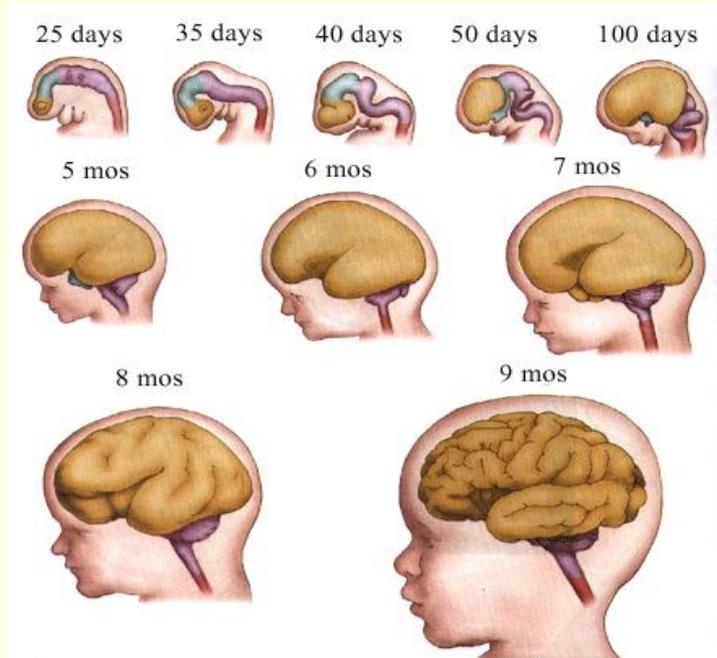


MEN



All human beings have different brains,
whatever the sex/gender

The development of the brain in utero



Birth :

100 billion neurons

Neurons stop multiplying

10 % of neurons are connected to each other

Development of the human brain



**90% of the connections between neurons
are built after birth**

---> Influence of environmental factors
Education, Culture, Society

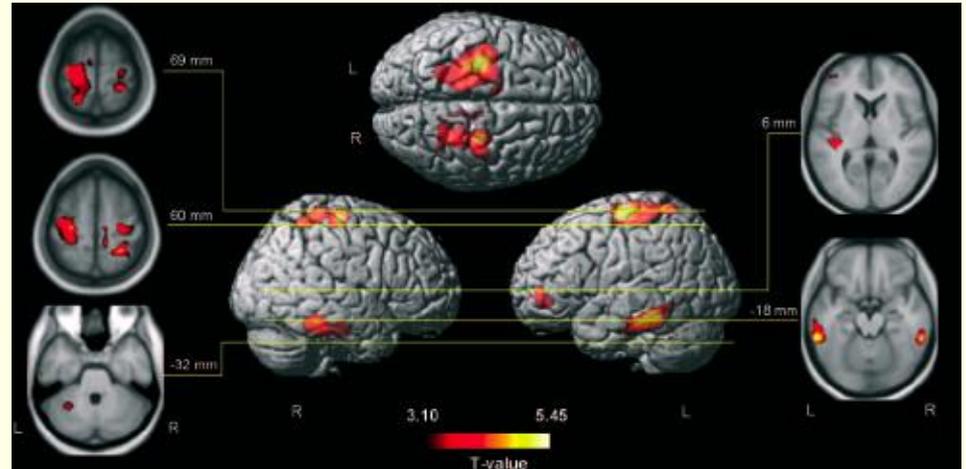
Cerebral plasticity

Capacity of the brain to shape itself
according to learning and life experience

Brain plasticity and learning

The brain of pianists

C. Gaser & G. Schlaug, J. Neuroscience, vol 23, 2003

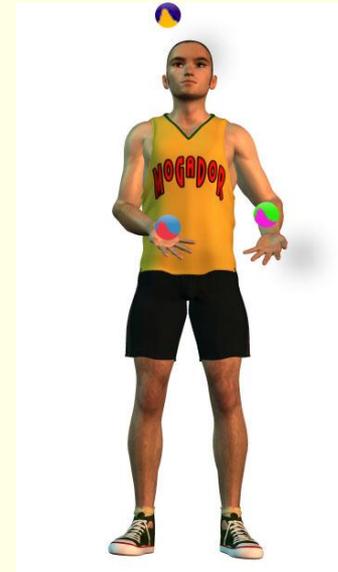
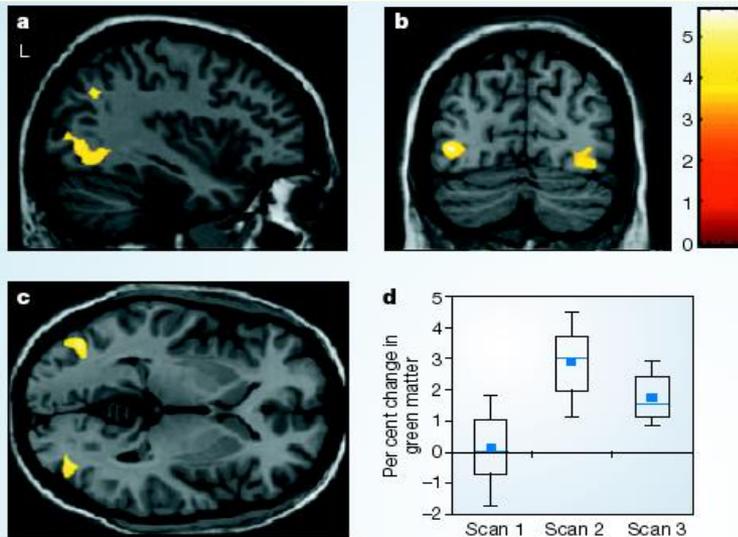


Higher thickness of the cortex
in the regions which control finger movements and audition
Building of new synapses

Proportional to the time spent in piano training during infancy

Learning how to juggle

Draganski B., *Nature*, vol 427, 2004



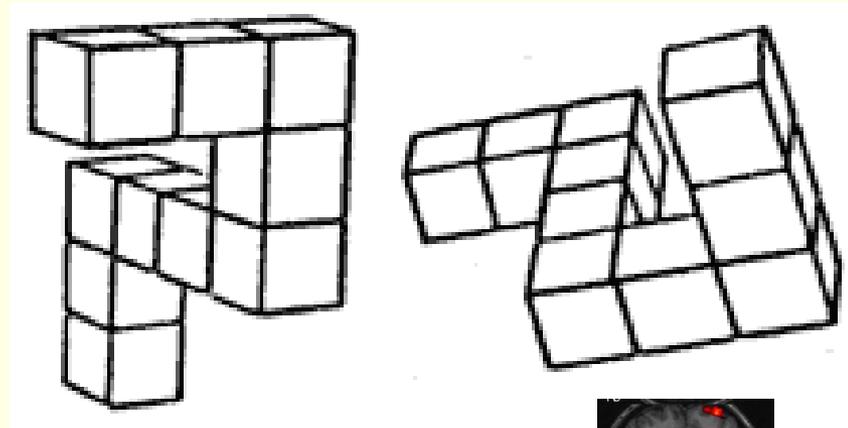
- 3 month training : **Thickening** of brain regions that control hand movements and vision
- Stop practicing : **Shrinking** of the brain regions previously thicker

--> **Changes in cortical thickness might be reversible**

Stereotype threat

Wraga et al. SCAN vol 12, 2006

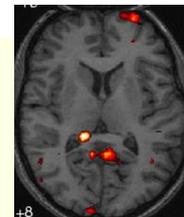
Measure of spatial skills
in teenaged girls
3D mental rotation test



Positive warning:

Girls > Boys → 28% mistakes

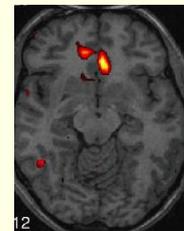
Brain : **memory
attention**



Negative warning:

Boys > Girls → 42% mistakes

Brain: **emotions**



Loss of self-confidence : **Increase in emotional load**
--> interference with cognitive process

Biology and ideology

19th century : **Brain size**

Justification of hierarchy between men and women,
races and social classes

21th century : Brain imaging --> **Cerebral plasticity**

Persistence of the ideology of innate gender differences
in aptitudes and behaviors

Participation of scientists in the education of the general public

- To provide **evidence against archaic beliefs** in the biological determinism of gender differences
- To promote a **positive image of scientific research** through the communication of clear and unbiased information to the public

The NeuroGenderings Network

https://en.wikipedia.org/wiki/The_NeuroGenderings_Network

International (13 countries) and transdisciplinary network :

Neurosciences, brain imaging, social science, humanities, gender studies

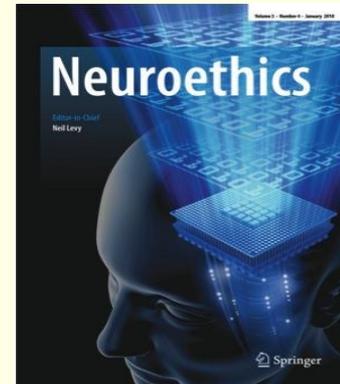
Purpose

- to critically examine the impact and cultural significance of neuroscientific research on society's views about gender
- to develop differentiated approaches for a more gender adequate neuroscientific research

International meetings : Uppsala (Sweden) 2010
Vienna (Austria) 2012
Lausanne (Switzerland), 2014

Publications : Books
Articles in scientific journals and in the media

2012 « Critical Studies of the Sexed Brain », Special issue of Neuroethics, vol 5



ÉGALE À ÉGAL

Catherine Vidal

Nos
cerveaux,
tous
pareils,
tous
différents !

Belin:

alpha

CATHERINE VIDAL
DOROTHÉE BENOIT-BROWAEYS

Cerveau, sexe et pouvoir

