

Autism:

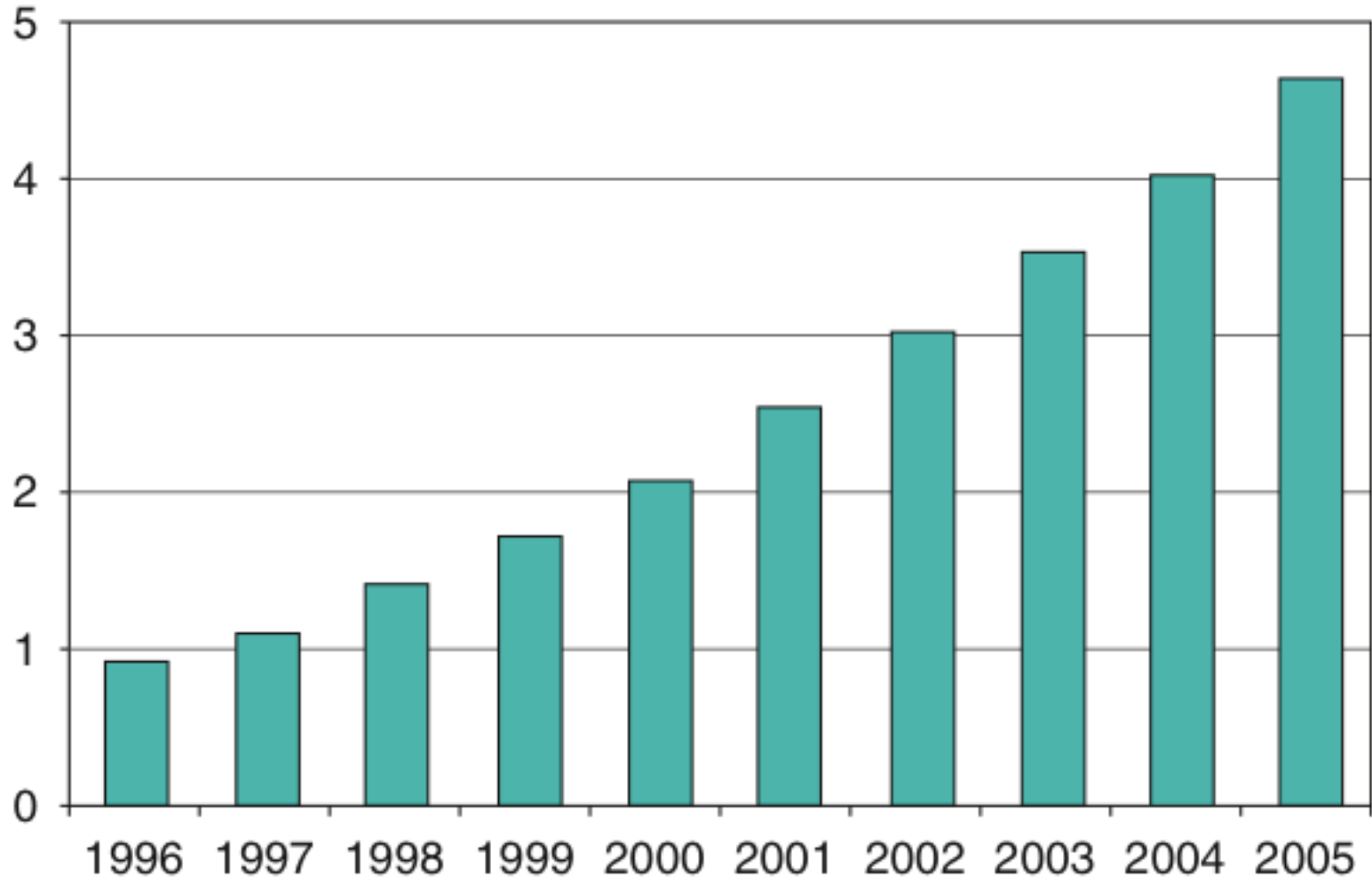
An evolutionary perspective

Simon Baron-Cohen
Cambridge University,
Autism Research Centre

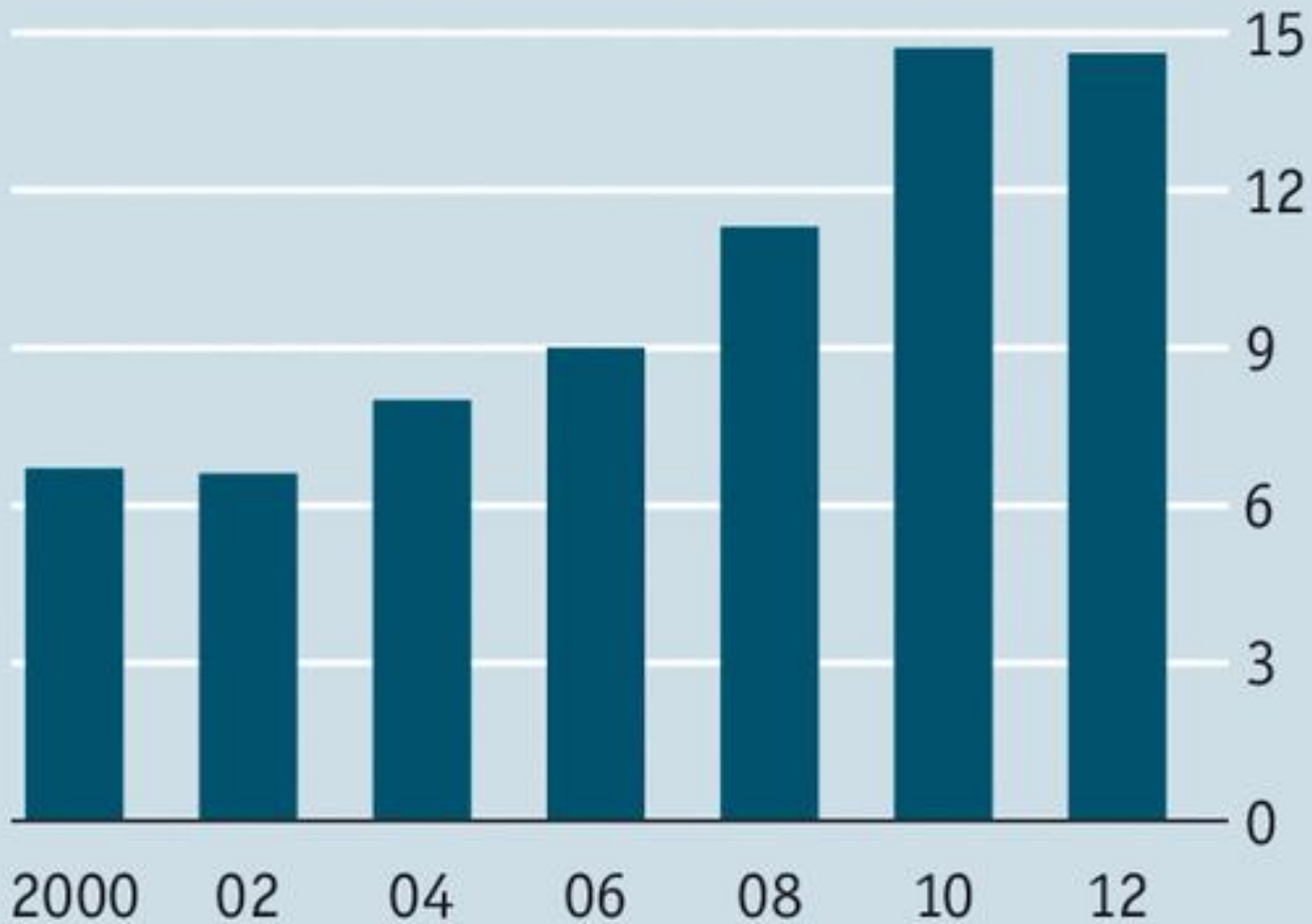




Cases per 1000, year by year



Number of eight-year-olds in America with autism Per 1,000 of age group



Source: US Centres for Disease Control and Prevention

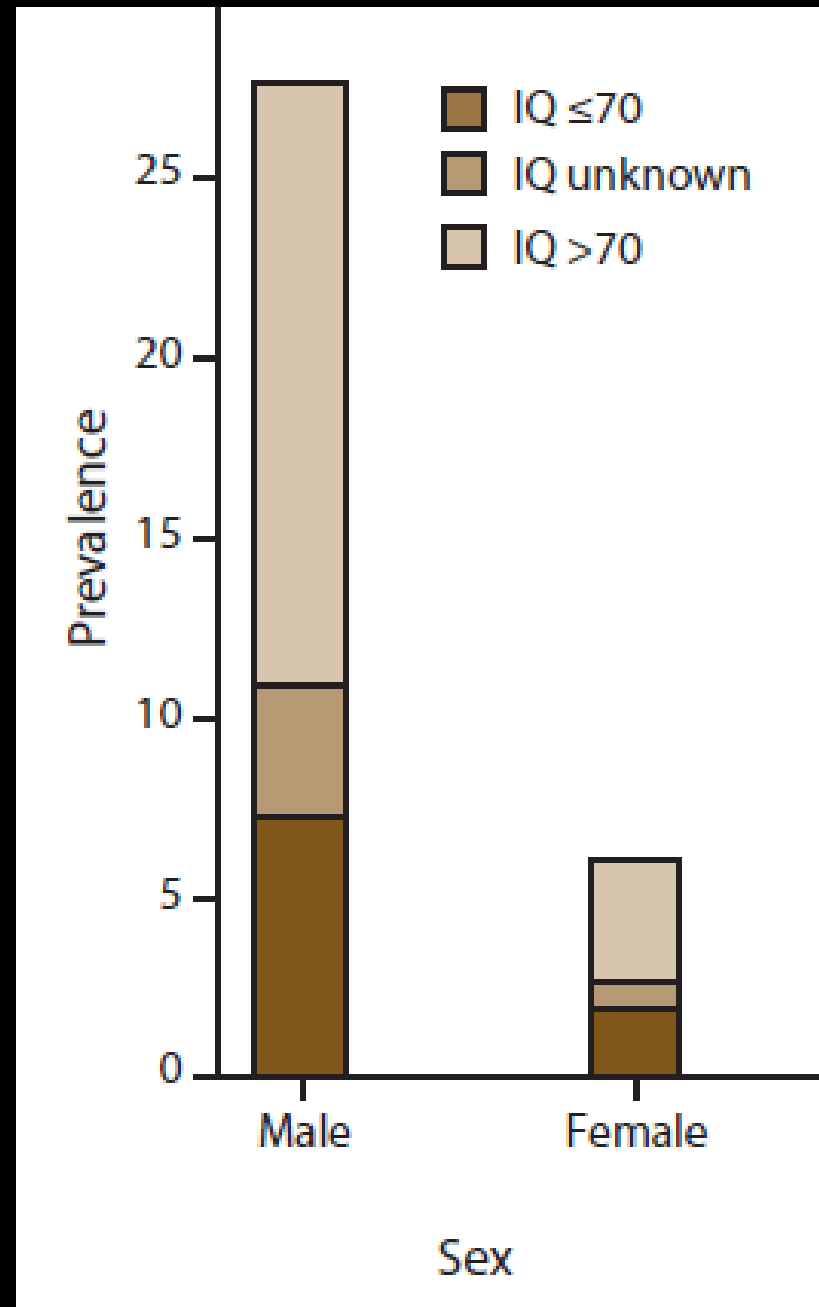
CDC 2014:

1/48 males

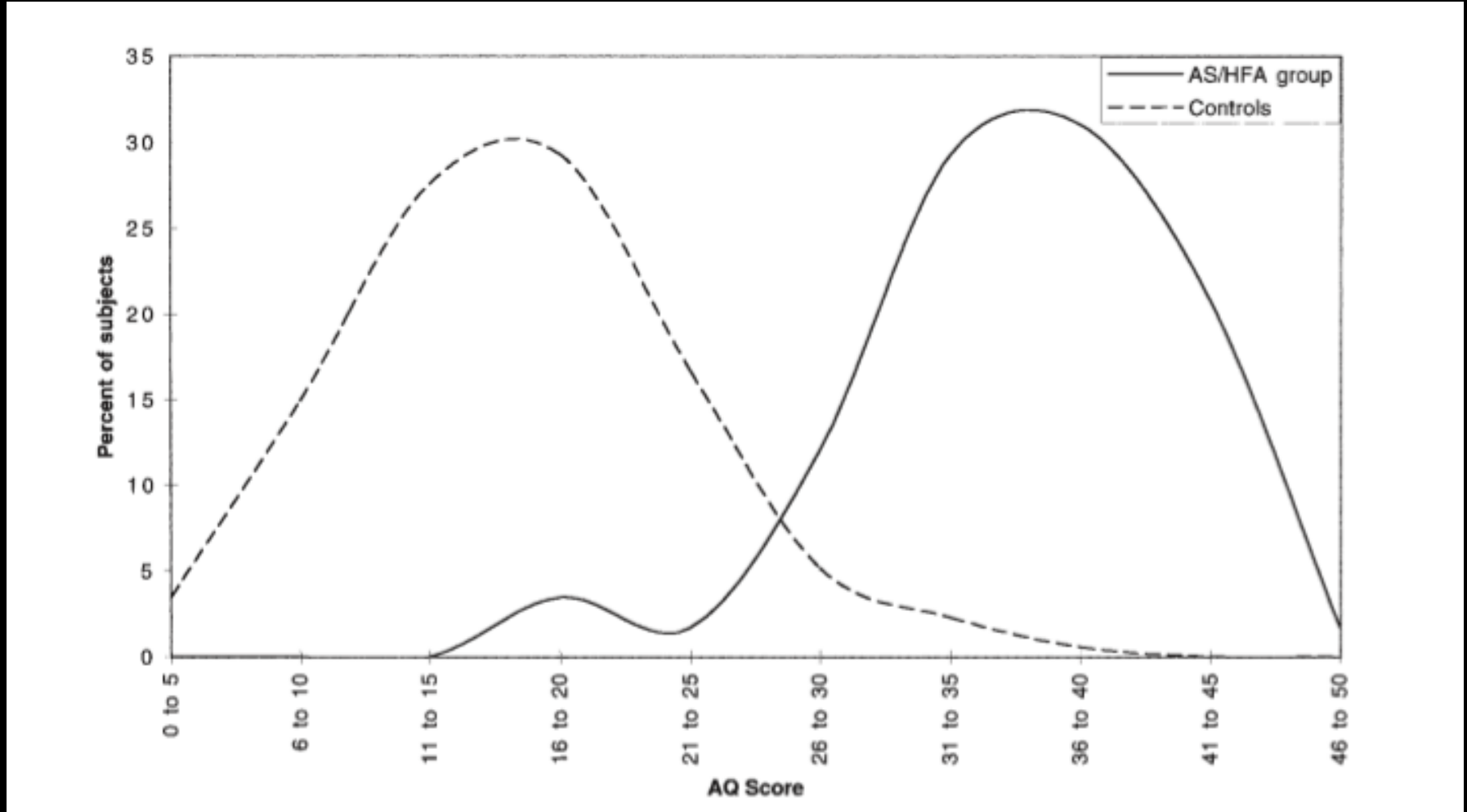
1/189 females

4:1 (m:f)

<http://1.usa.gov/1lpdaDn>



Autism Spectrum Quotient (AQ)

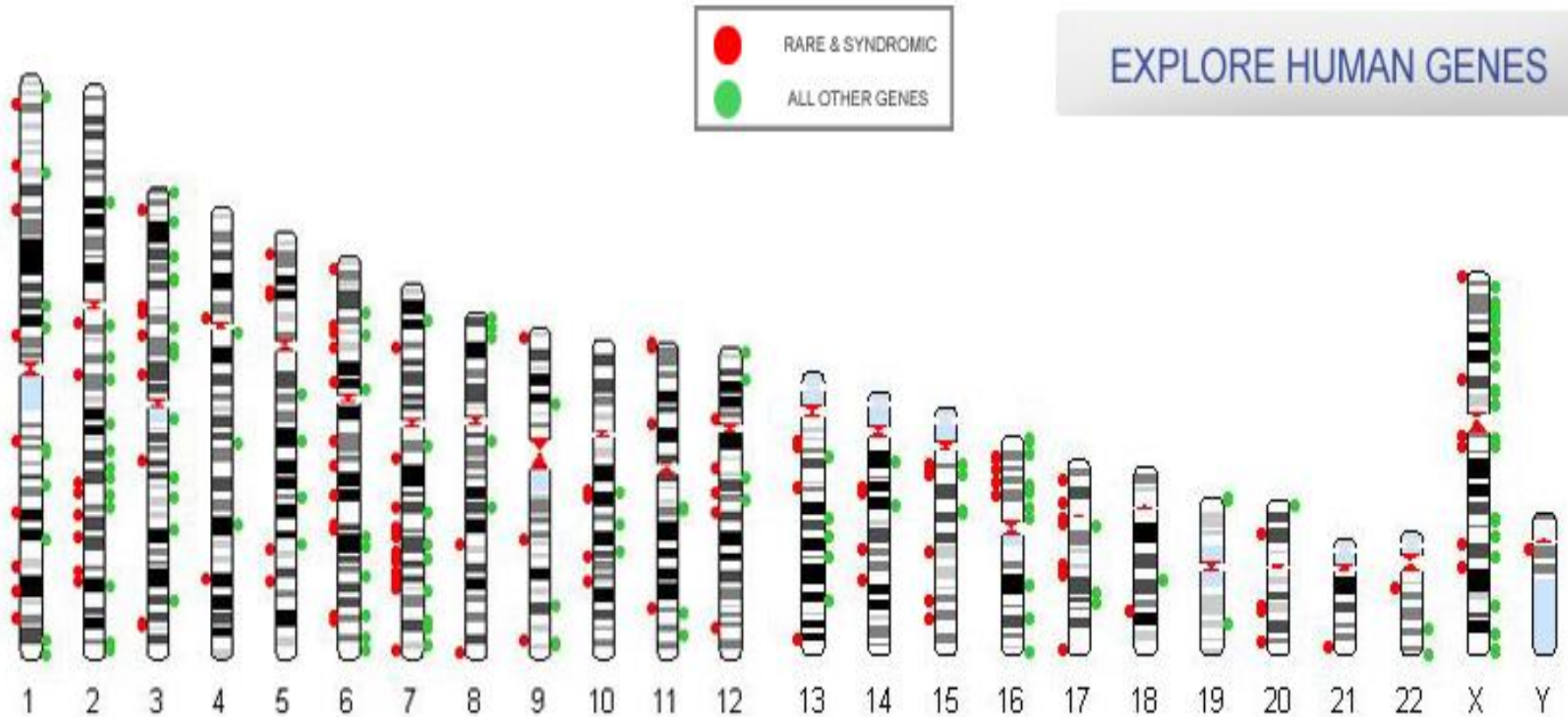


Autism is clearly biomedical



Ozonoff et al (2011) Paediatrics

EXPLORE HUMAN GENES



<http://gene.sfari.org/>

Epigenetics

AUTS2

GABRB3

NLGN3

NRXN1

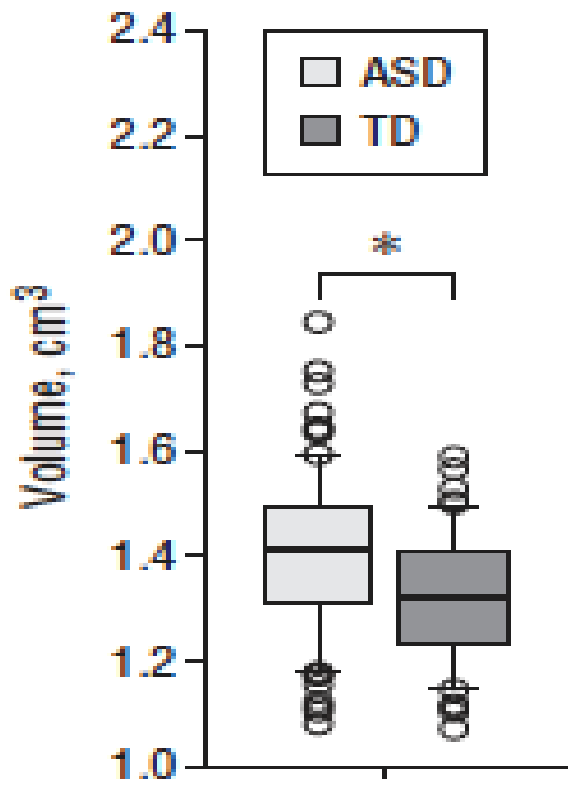
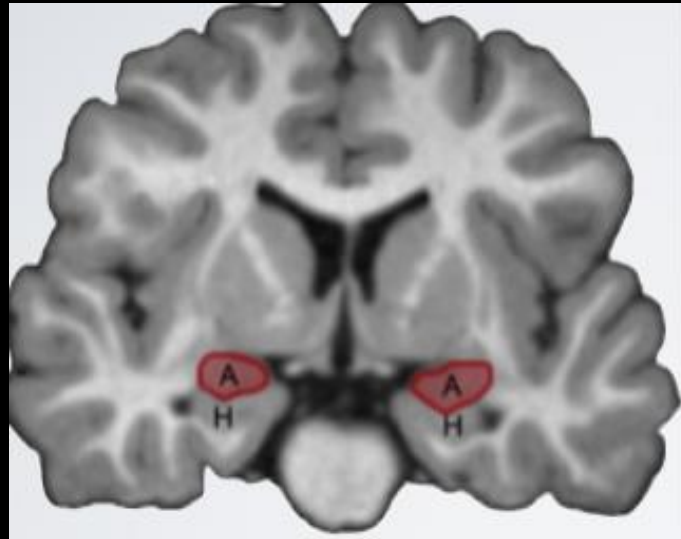
SLC6A4

UBE3A

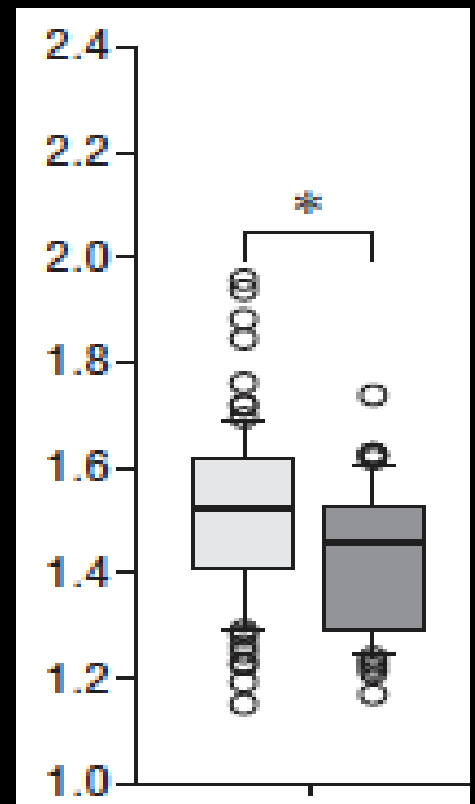
Wong et al
2013
Mol Psych.



Larger amygdala

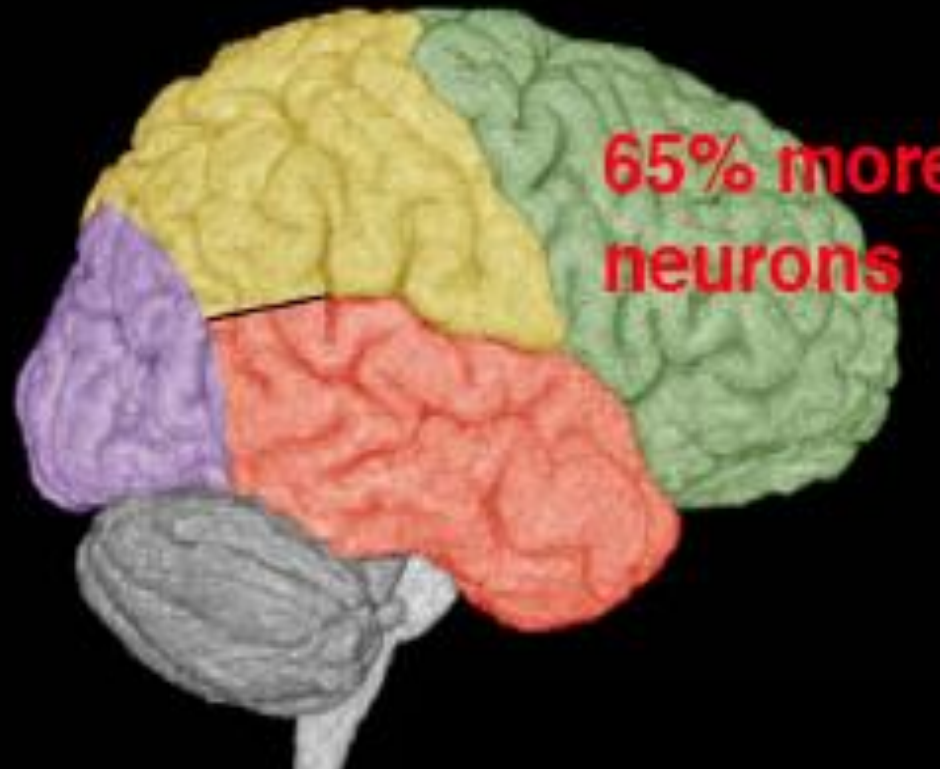
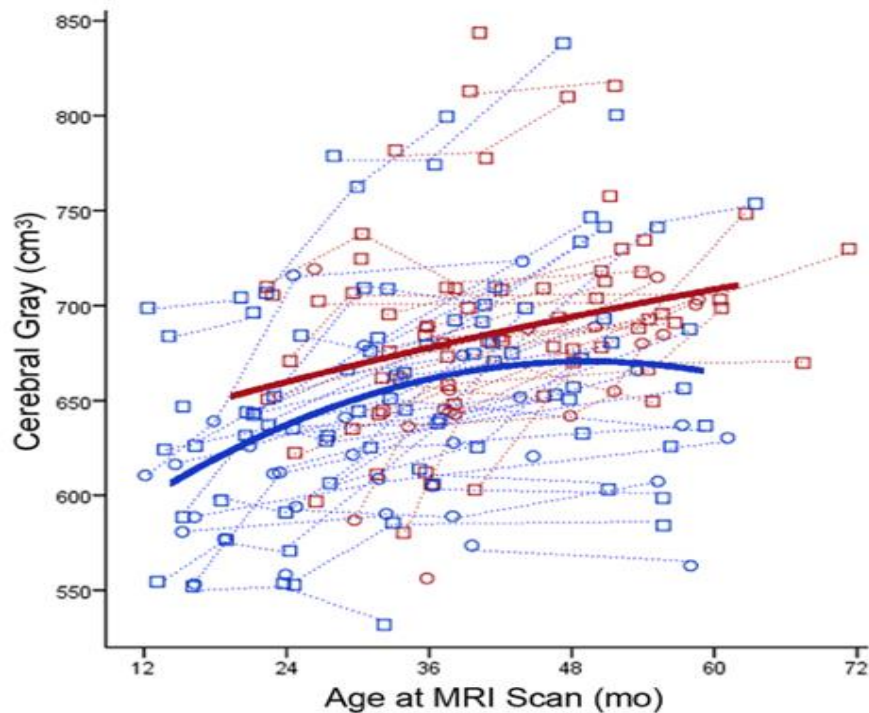


Nordahl et al (2012)
Arch Gen Psych

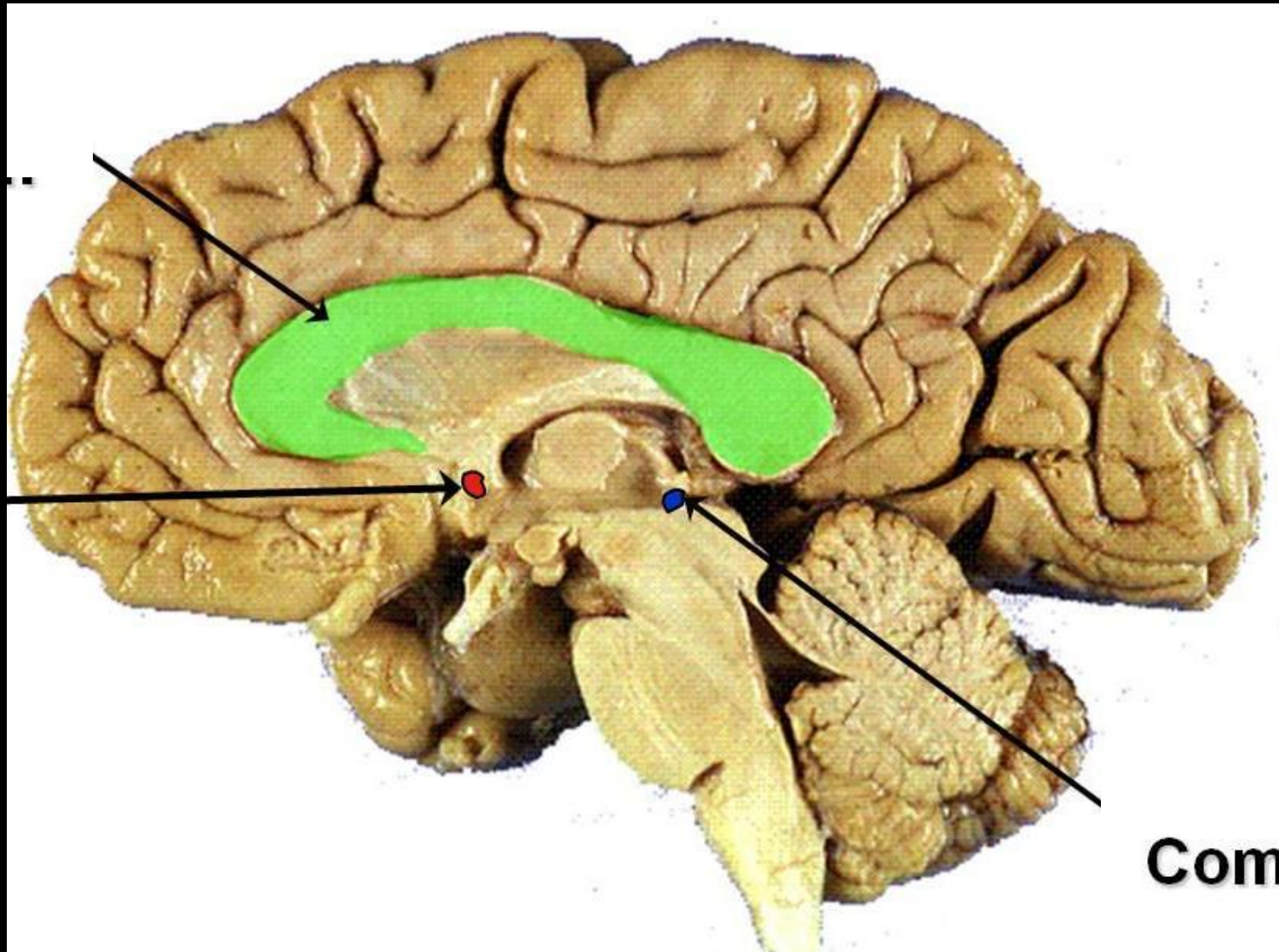


Early brain overgrowth

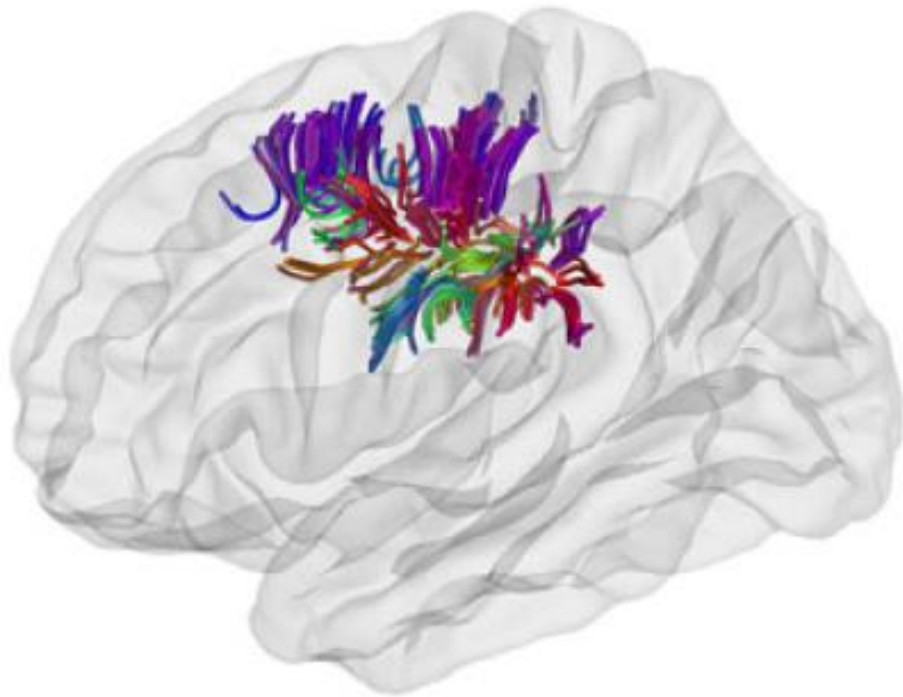
Courchesne et al
2007 *Neuron*, 2011 *JAMA*



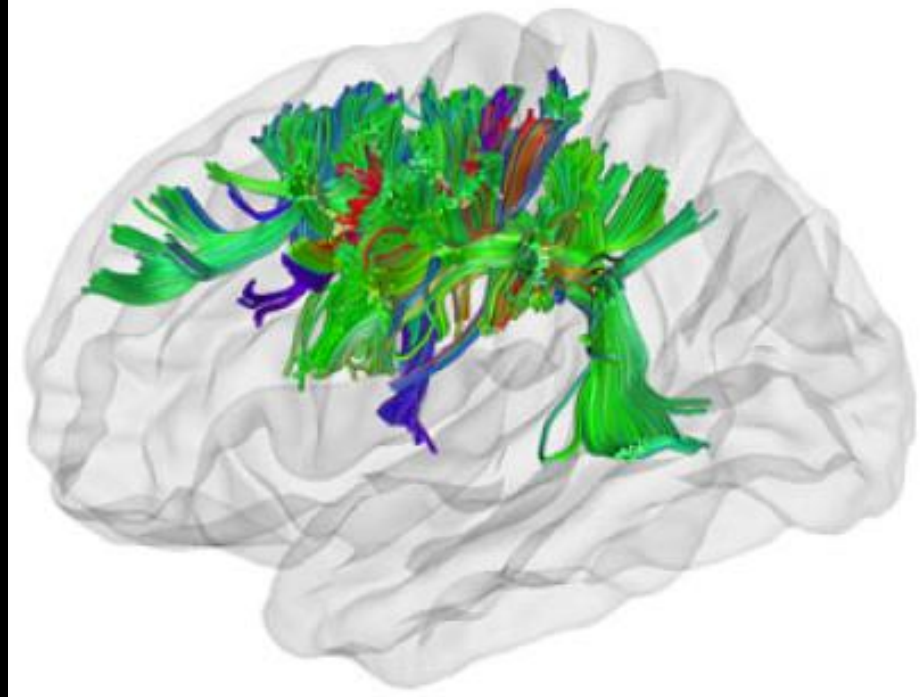
Smaller corpus callosum



Short segments



Long segments

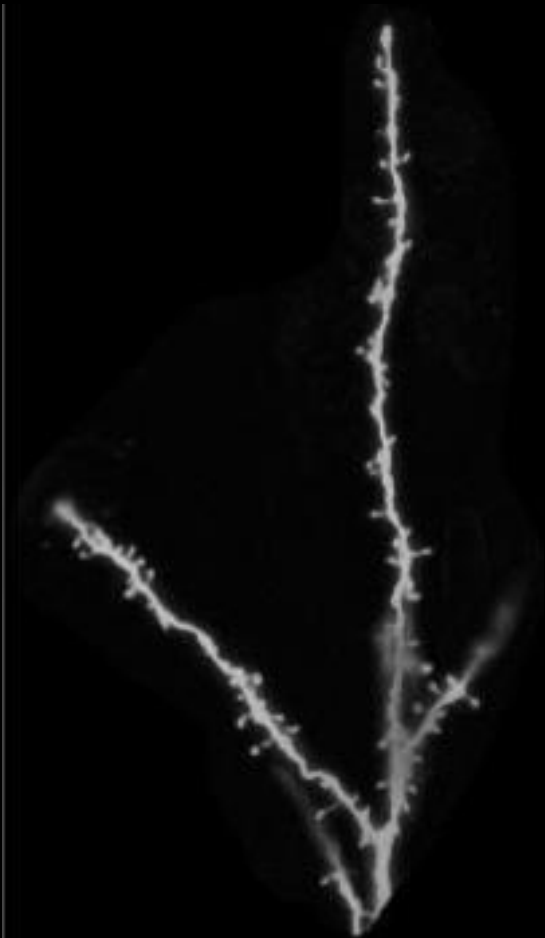


Ecker et al, Cerebral Cortex 2016

Reduced neural pruning

Typical

Autism

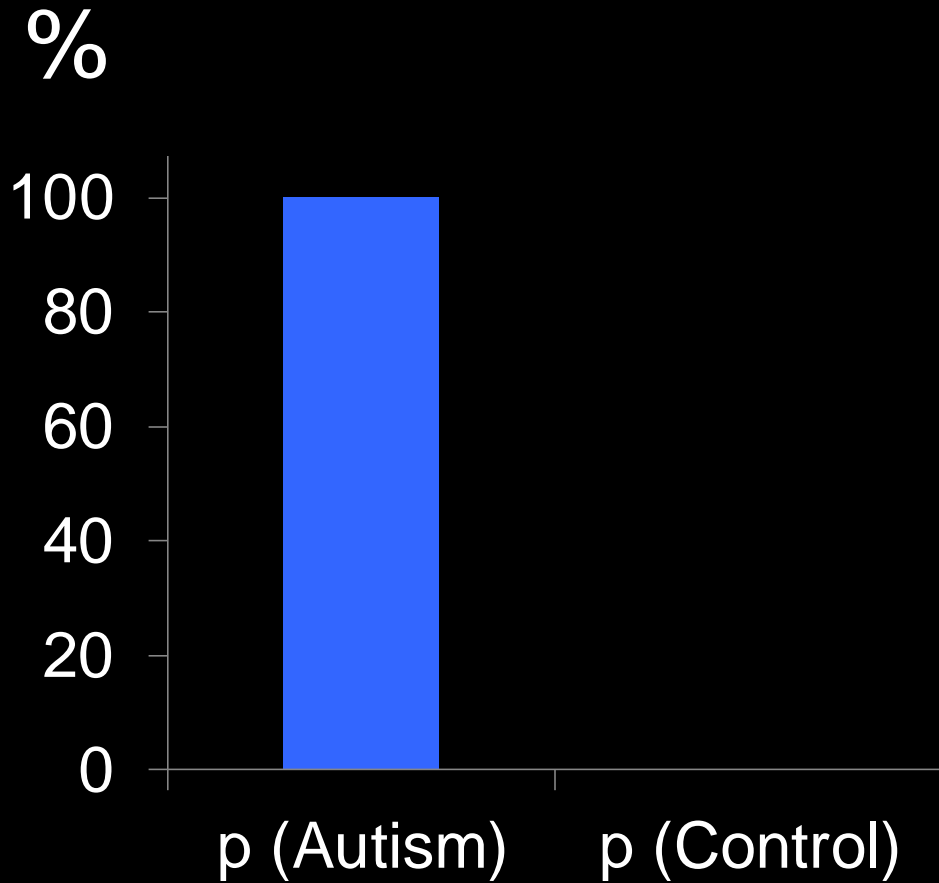


Tang et al (2014)
Neuron

Dendritic spines =
location of synapses

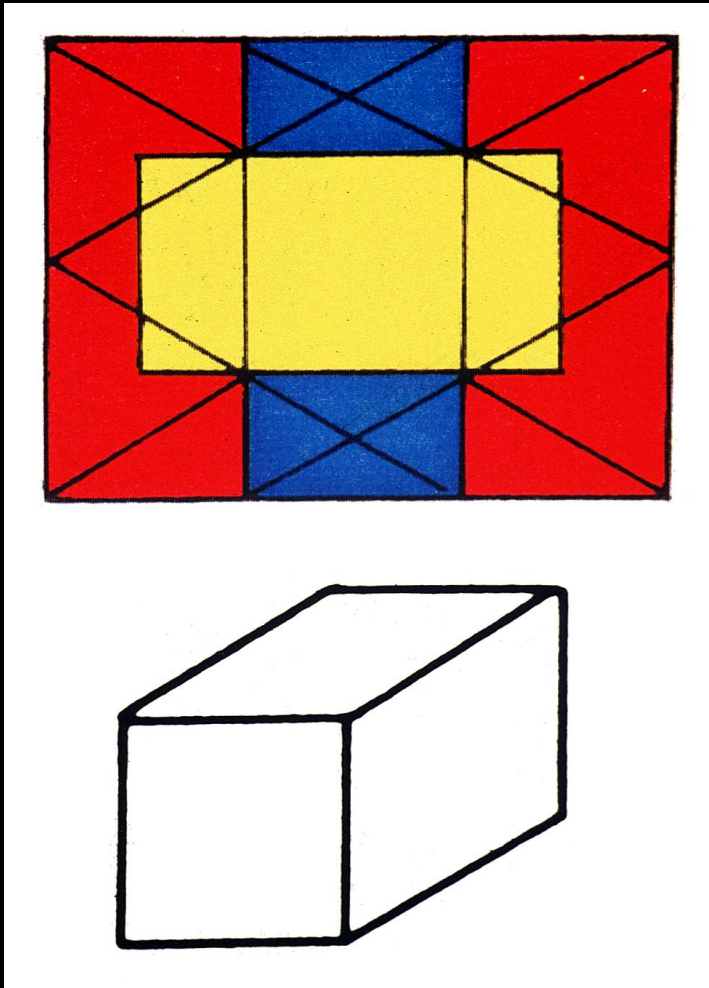


Early detection: > 70% of viewing time



Pierce et al 2010
Arch Gen Psychiatry

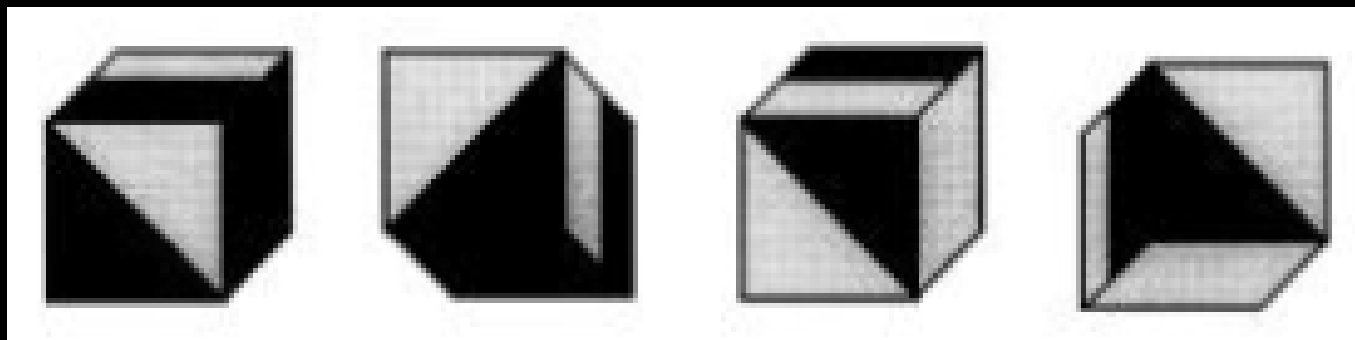
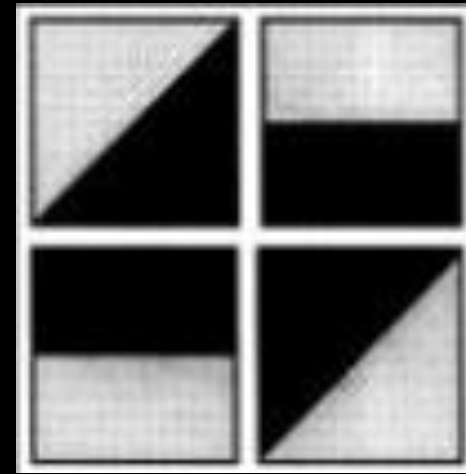
Detail vs. Big Picture



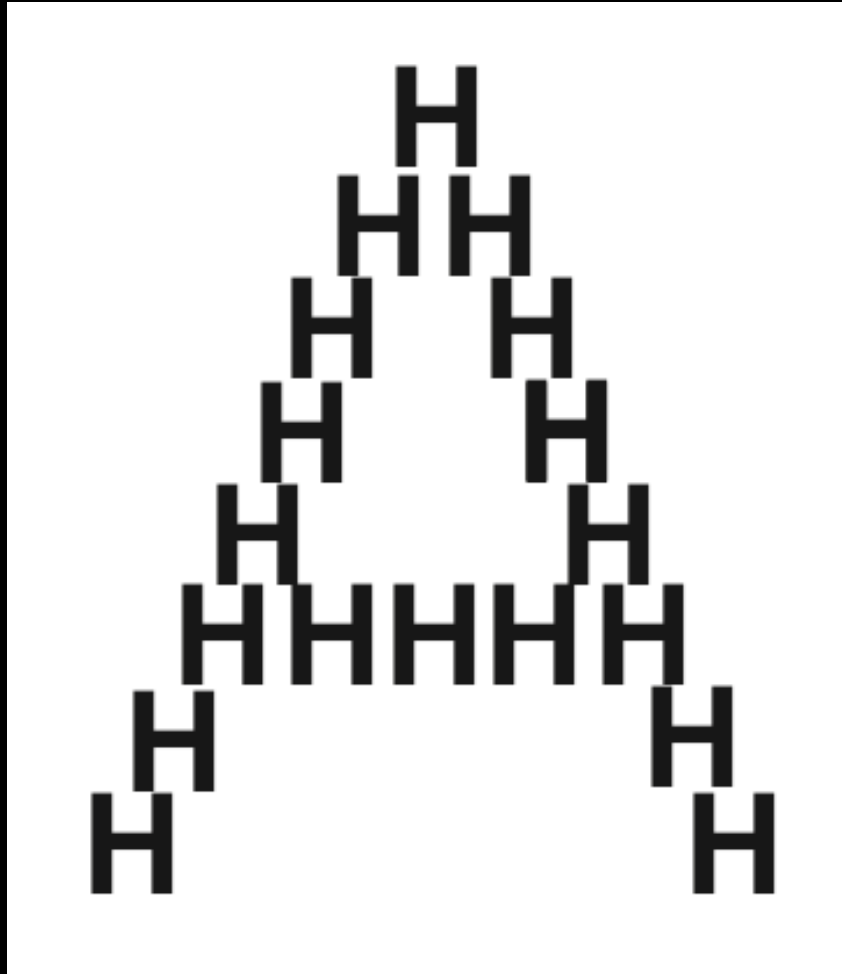
JCN, 1997; Brain and Cog 2006

Posterior parietal cortex

Detail vs. Big Picture

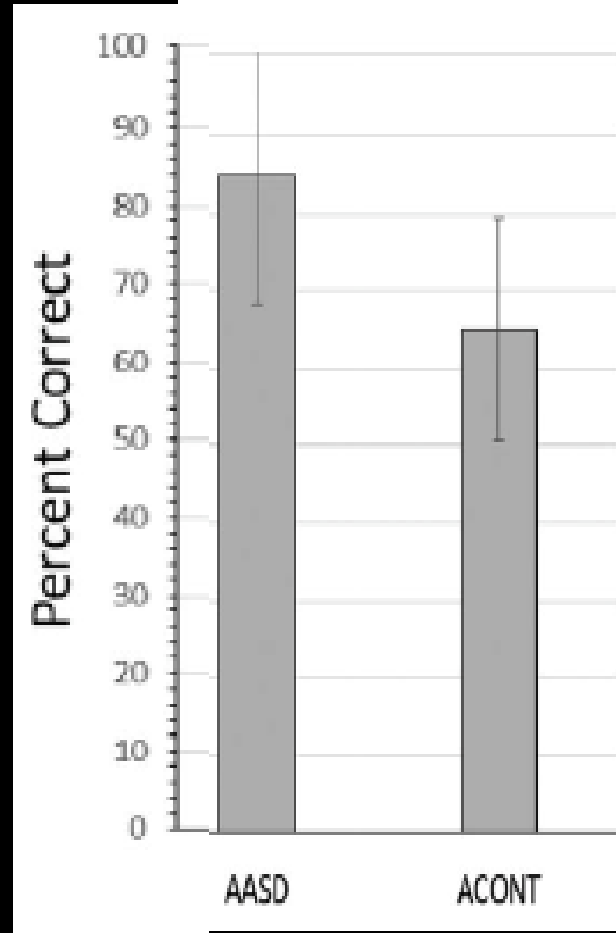
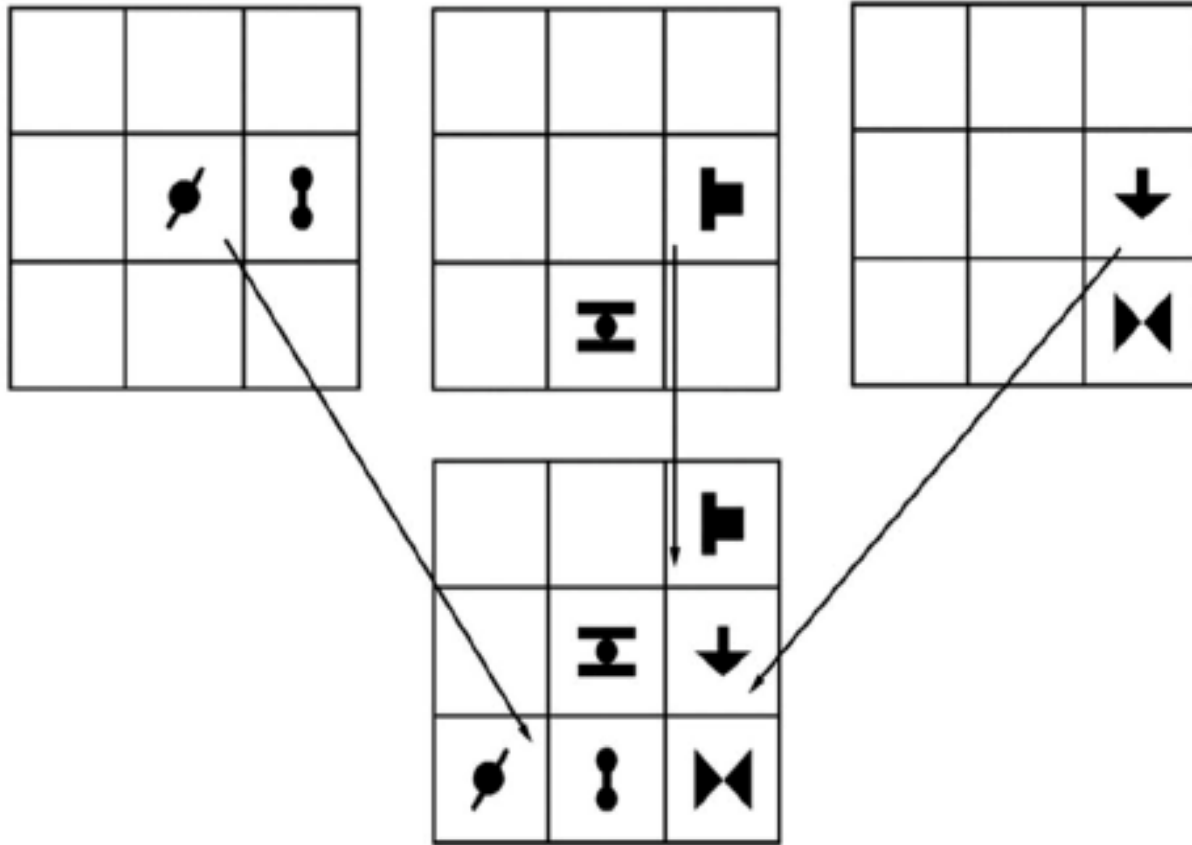


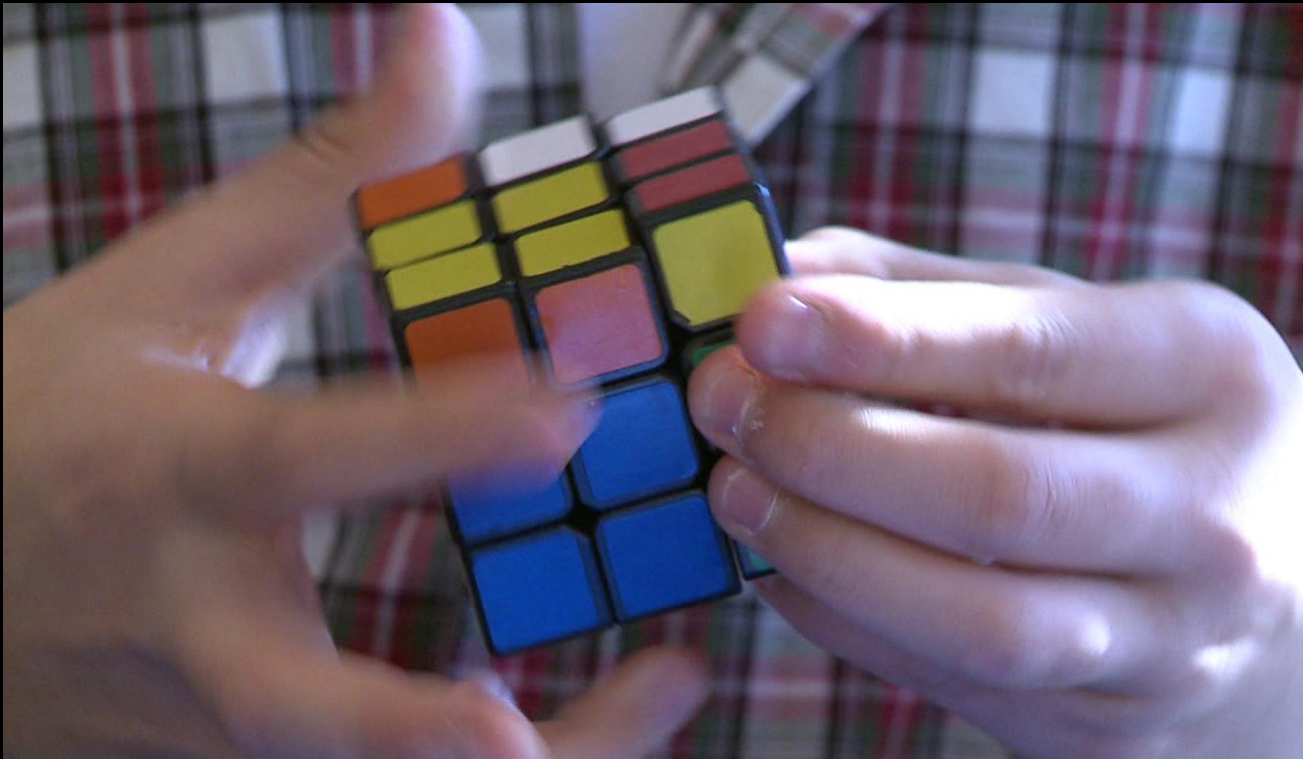
Detail vs. Big Picture



(Mottron and Belville, 1993)

Spotting patterns







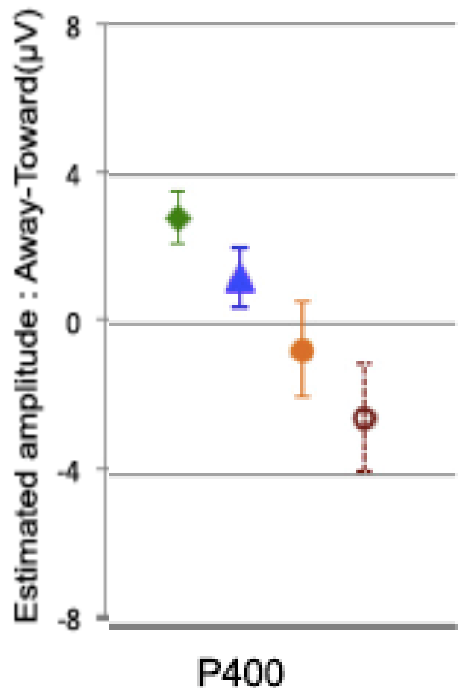
Sensory hyper-sensitivity



Samson et al, (2011) *Neuropsychologia*, 2011

Brain response to gaze

- ◆ Control
- ▲ At-risk No ASD
- At-risk ASD
- At-risk Early ASD





Klin et al 2002 Am J Psychiatry



Theory of mind

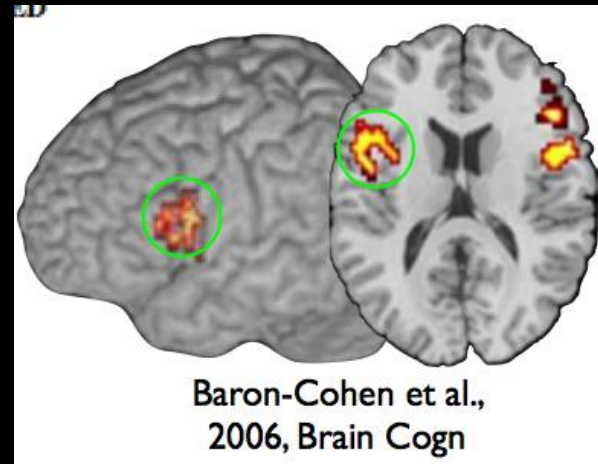
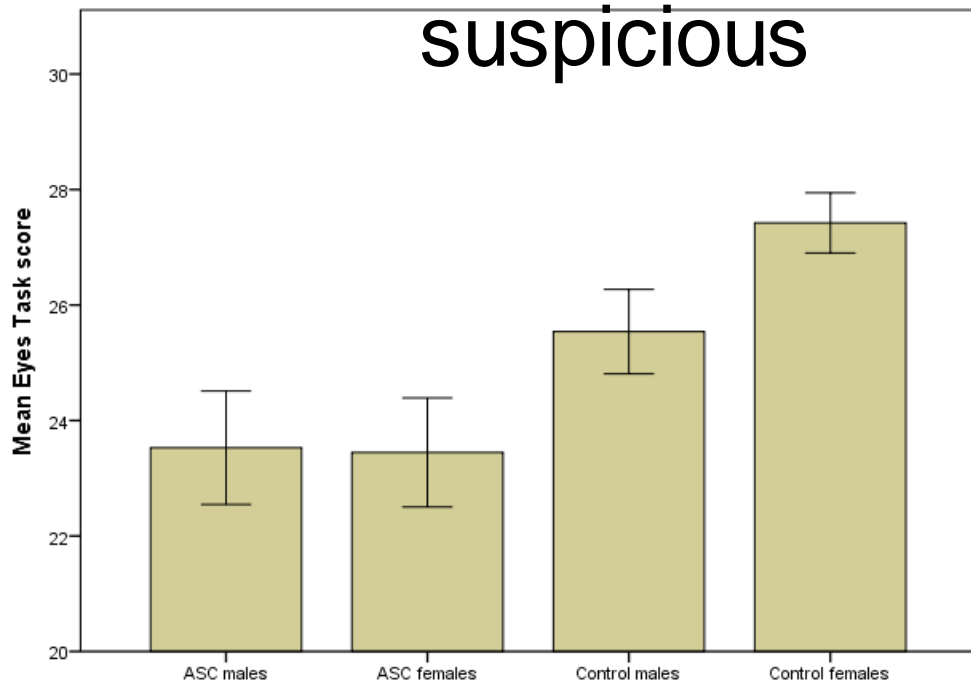
sarcastic

stern



suspicious

dispirited



PLoS ONE 2014

Left
inferior
frontal
gyrus

Henry Cavendish 1731-1810

NeuroTribes

The Legacy of **Autism**
and the Future of Neurodiversity



STEVE SILBERMAN

Foreword by Oliver Sacks

Wellcome Library, London



Neurodiversity

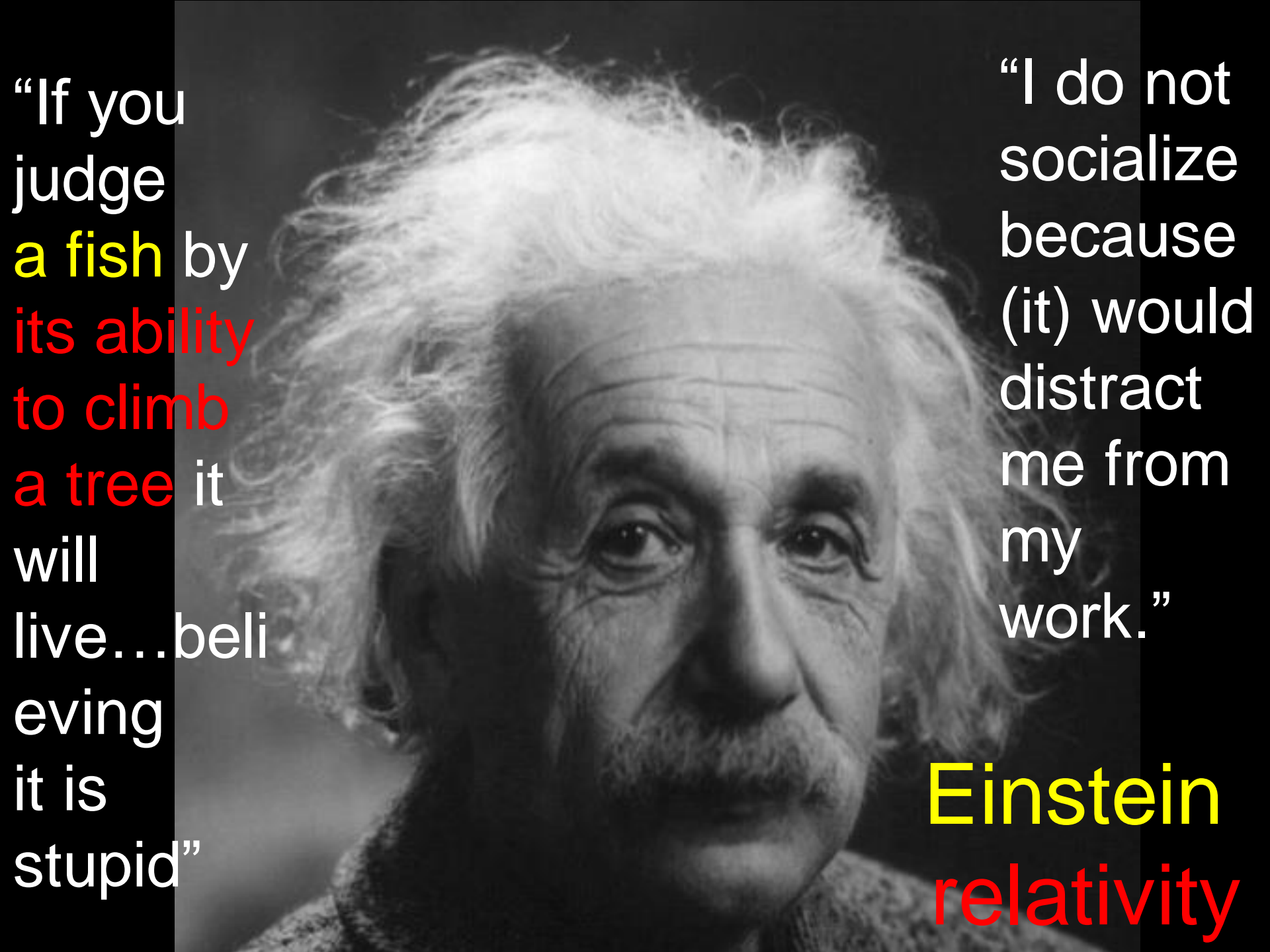
- The term is attributed to Judy Singer, an Australian social scientist on the autism spectrum
- First appeared in print in an article by journalist Harvey Blume in *The Atlantic*, September 30, 1998

different...



not less.

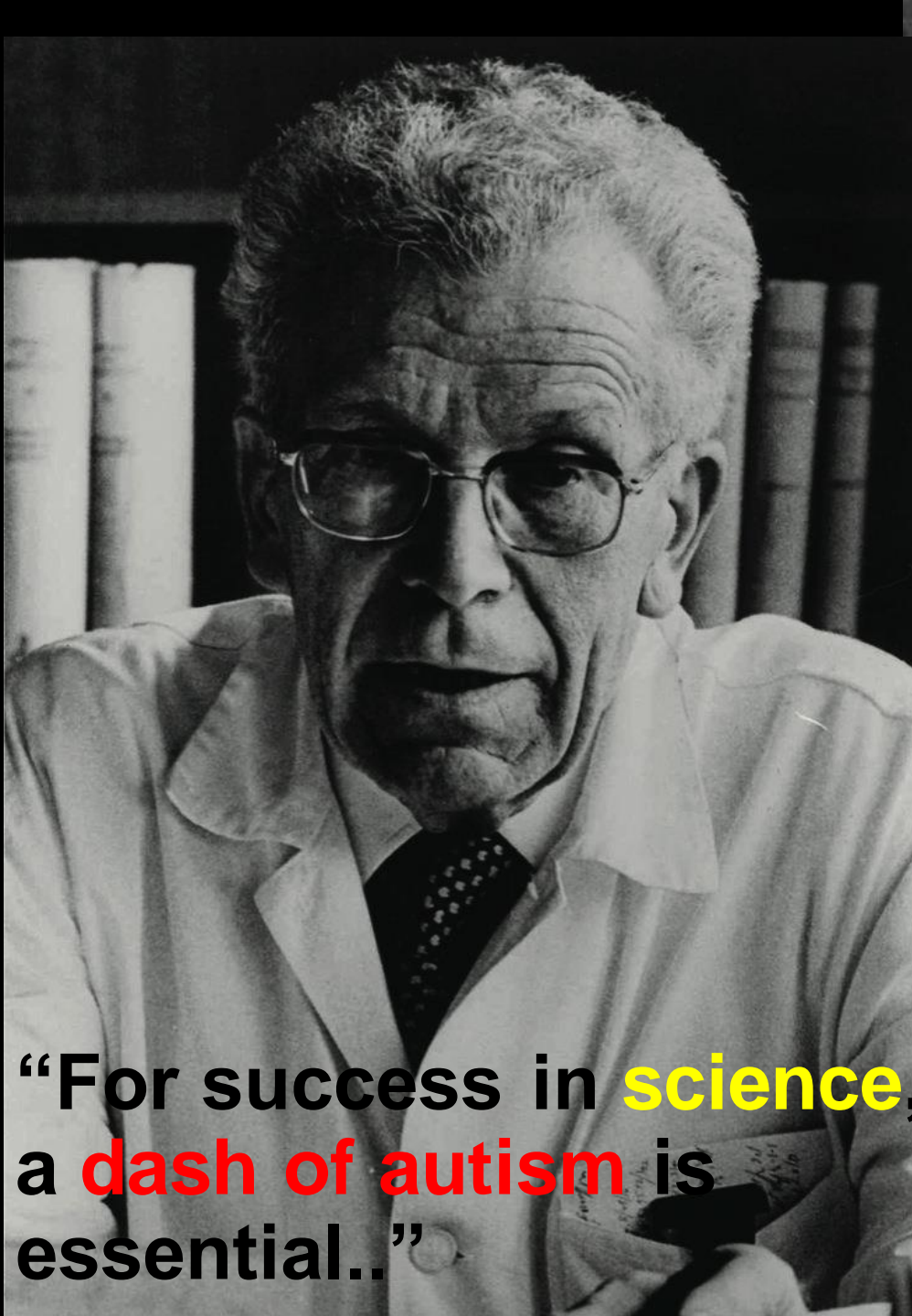
autism acceptance



“If you judge a fish by its ability to climb a tree it will live...believing it is stupid”

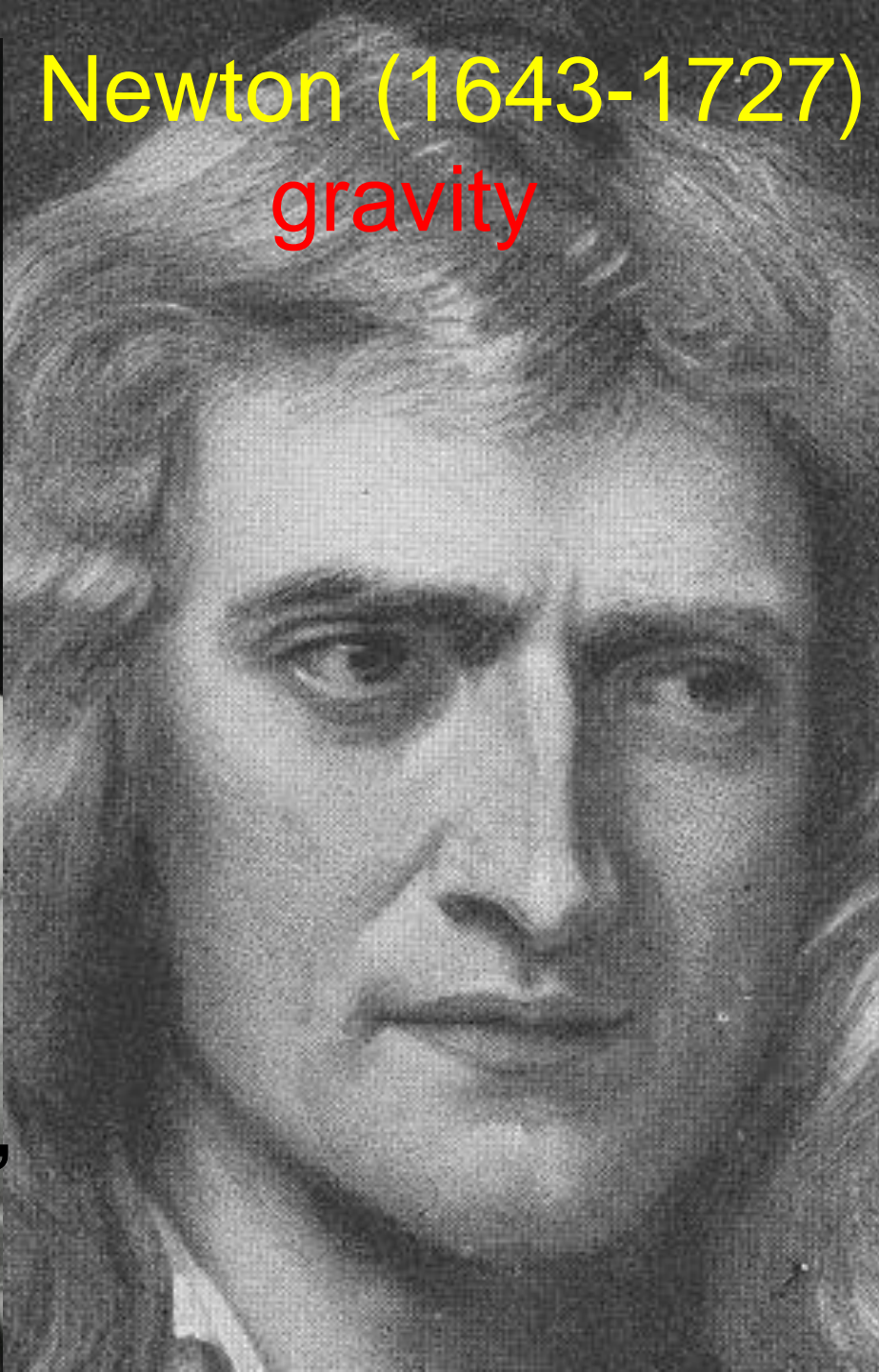
“I do not socialize because (it) would distract me from my work.”

Einstein
relativity



“For success in **science**,
a **dash of autism** is
essential..”

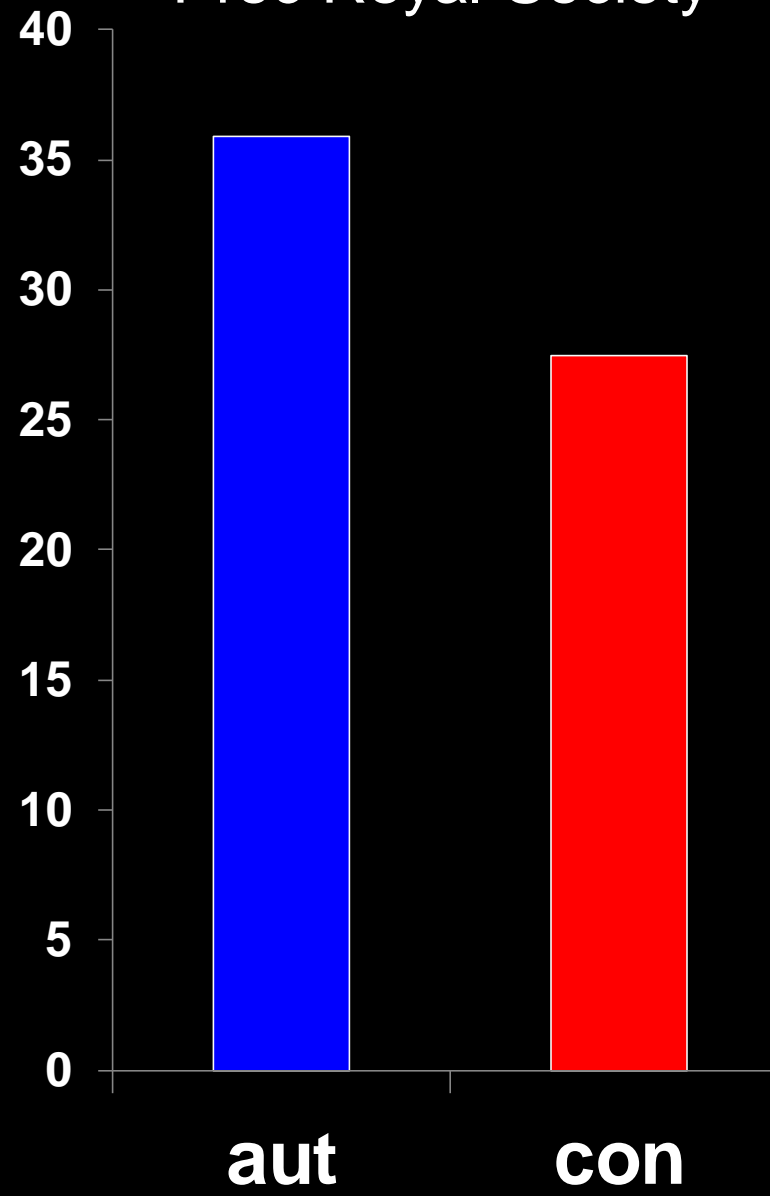
Newton (1643-1727)
gravity

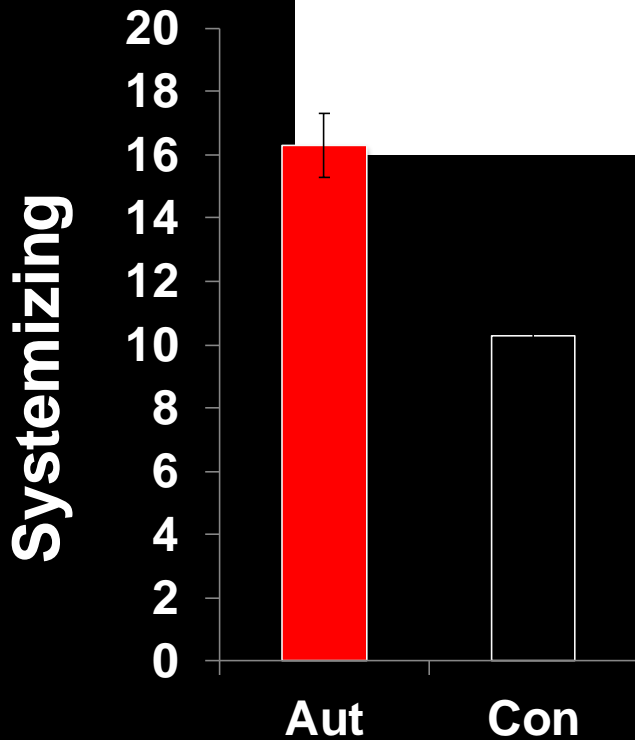
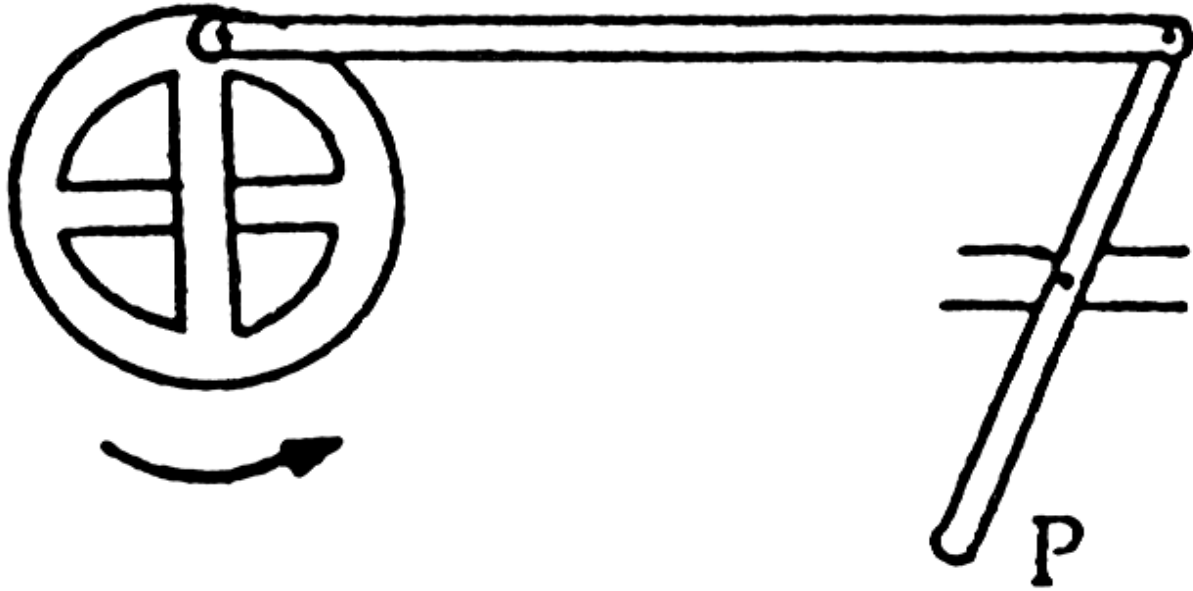




Systemizing

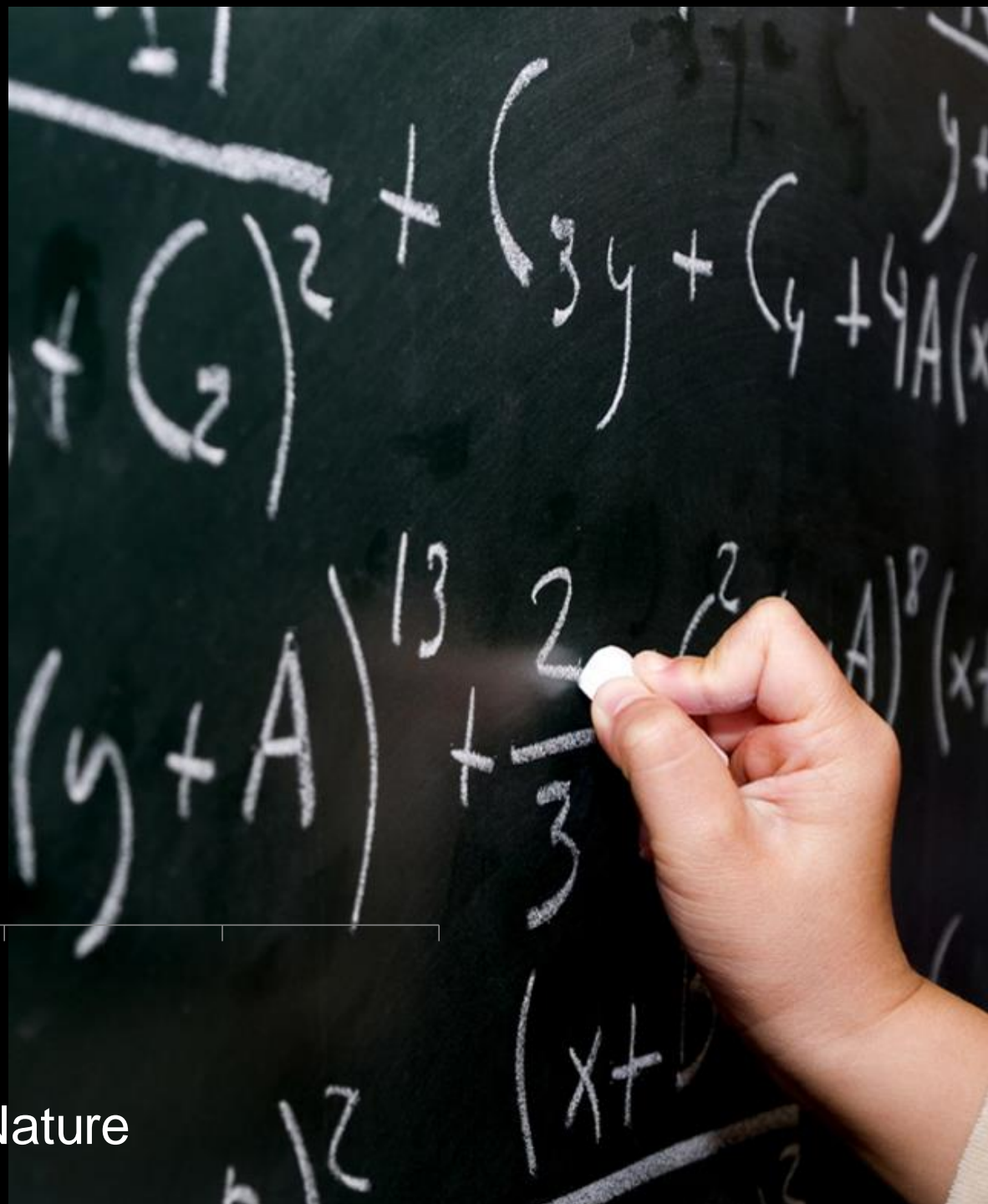
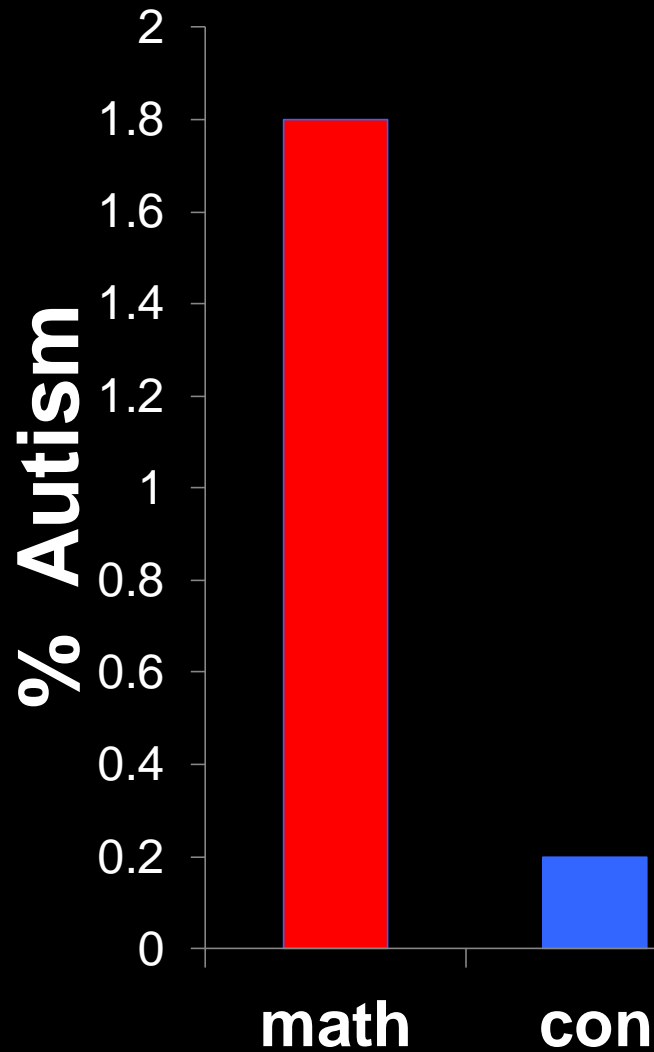
BC et al, 2003
Proc Royal Society



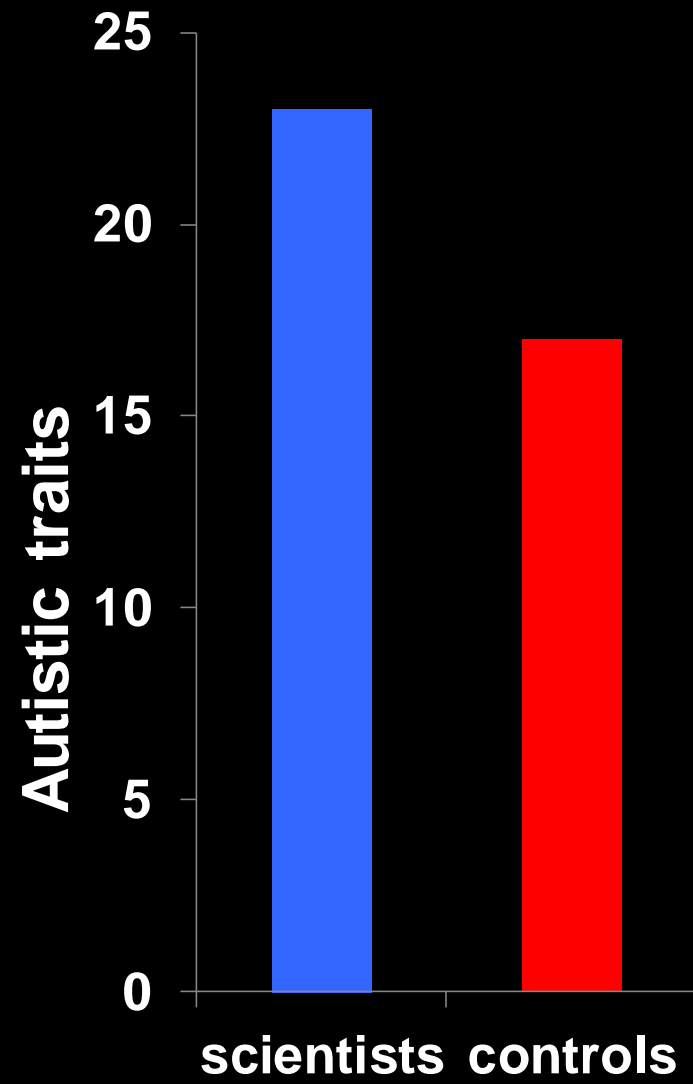


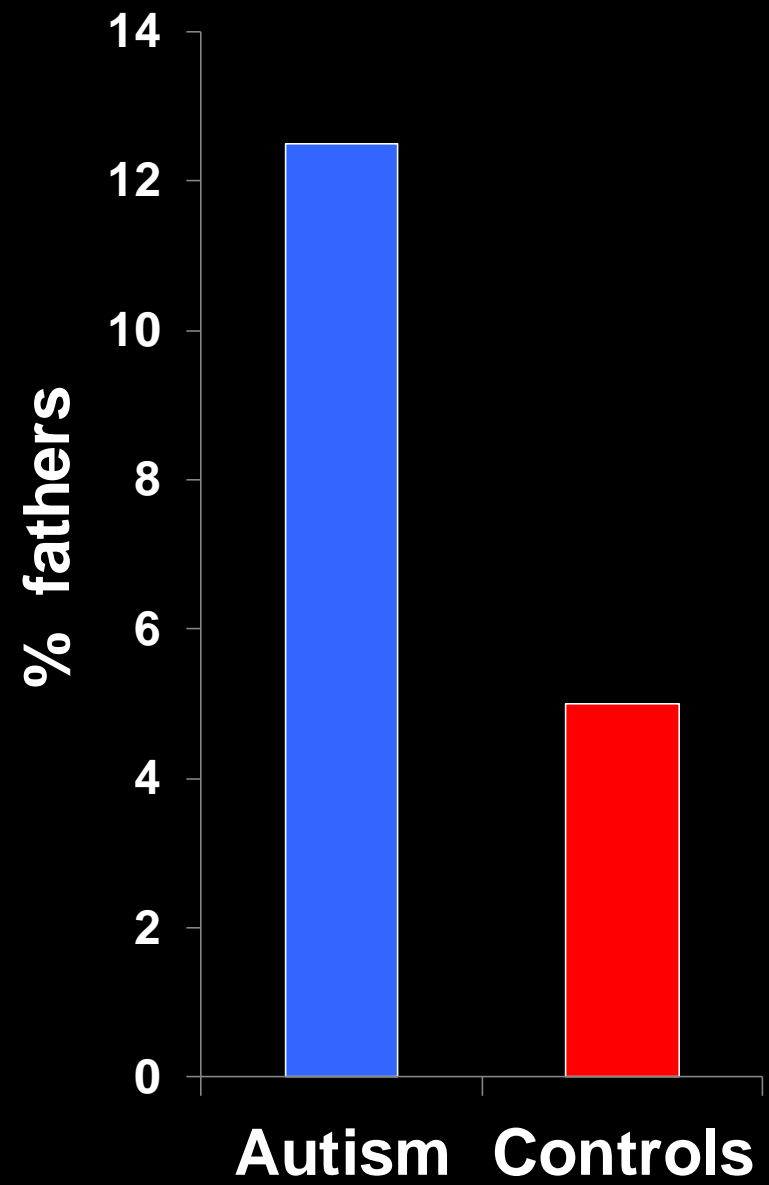
If the wheel rotates as shown, P will

- (a) move to the right and stop
- (b) move to the left and stop
- (c) move to and fro
- (d) none of these



BC et al, 2007 Human Nature



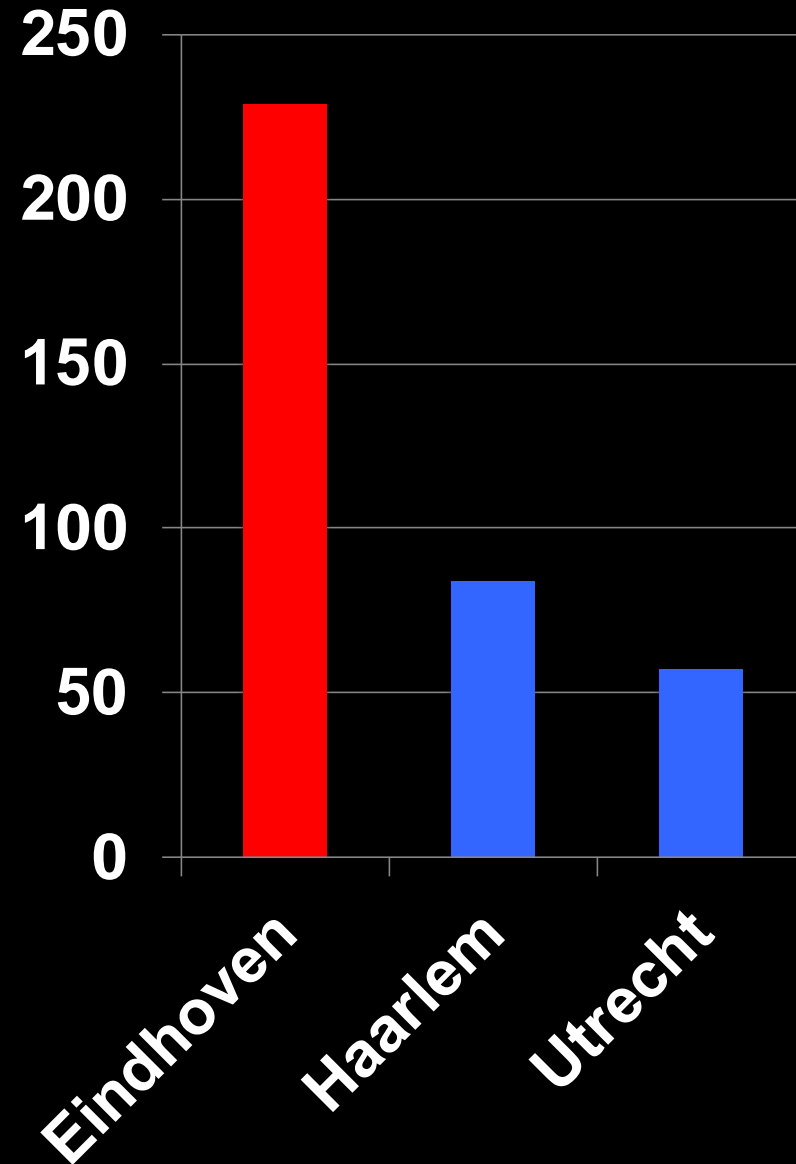




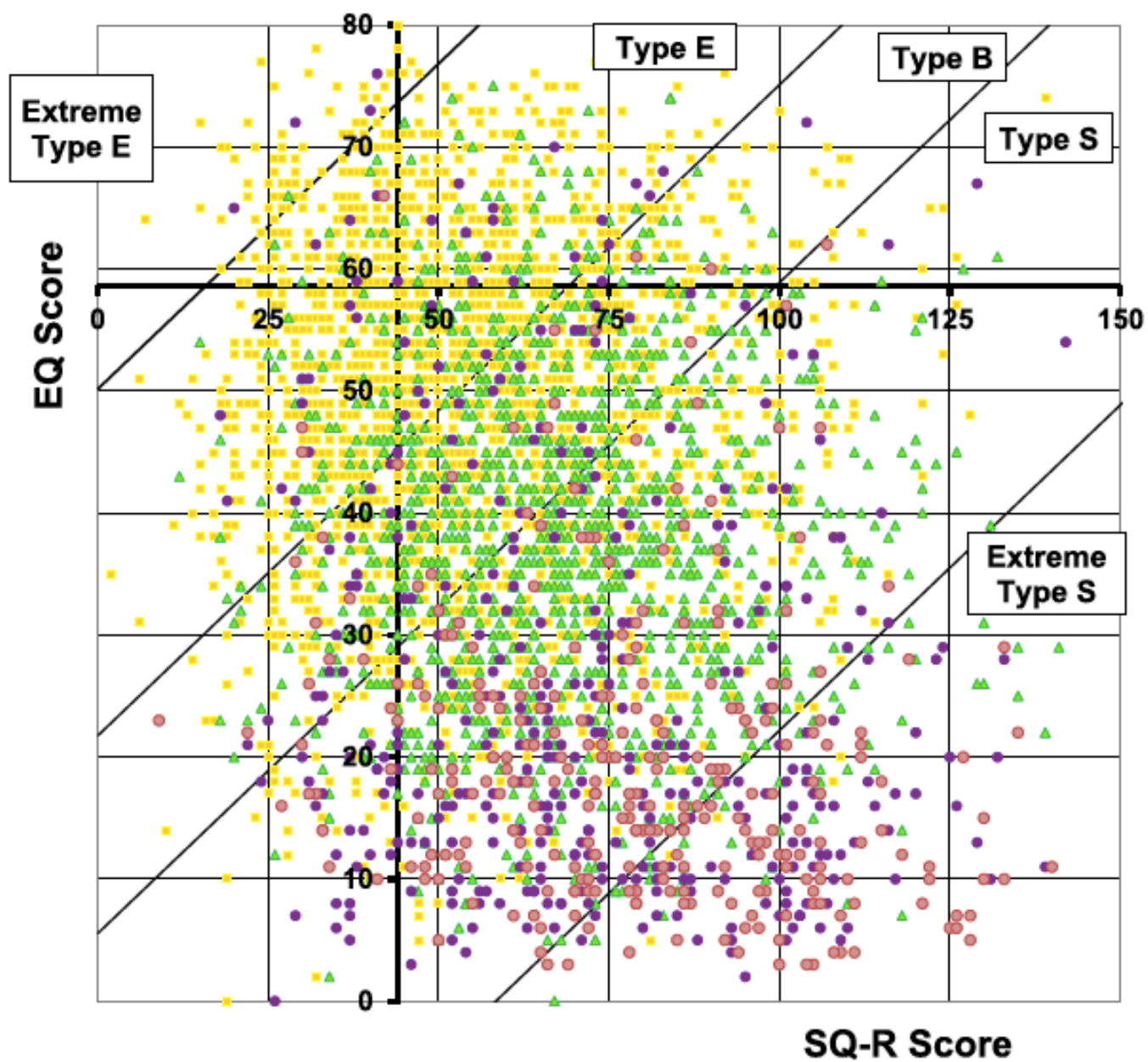
Is autism
more
common in
Silicon
Valley?



Cases per 10,000



Roelfsema et al, 2011, JADD



- Control Females
- ▲ Control Males
- ASC Females
- ASC Males

Women

Men

AS

$E \gg S$

3.7

0.3

0

$E > S$

43.1

12.9

0

$E = S$

30.6

28.4

6.4

$S > E$

21.3

53.7

32

$S \gg E$

1.4

4.7

61.6

Thanks to the Autism Research Trust

www.autismresearchtrust.org



Medical Research Council

Wellcome Trust

NIHR and Autistica

www.autismresearchcentre.com