

Autism(s)

More and more autism in the population?

Document 1: Evolution of prevalence of autism since 1975 in the United States

Year	Prevalence
1975	1/5000
1985	1/2500
1995	1/500
2001	1/250
2004	1/166
2007	1/150
2009	1/110
2015	1/68

Source: <https://gamp.be/2021/04/02/une-epidemie-dautisme/>

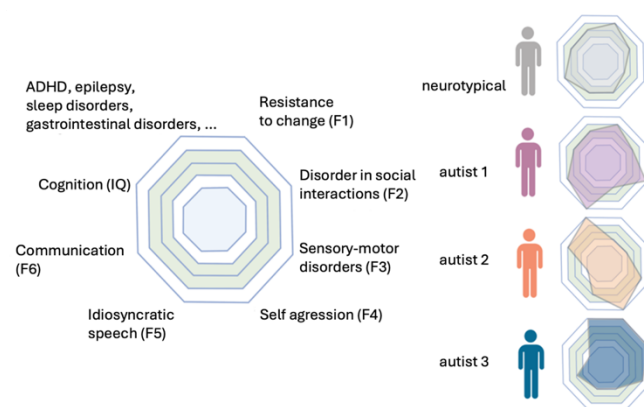
Note: In epidemiology prevalence is defined as the ratio of the cases of an event or a disease over the total population exposed to this event or disease.

1. Draw the graph of the evolution of prevalence of autism since 1975 in the United States over time.
Describe this evolution.
2. Suggest at least 2 hypotheses to explain this evolution since 1975.

From Autism to ASDs

Document 2: Different types of autism

Lorna Wing defines the “autistic triad” as follows: communication and language disorders, social interaction disorders, repetitive behaviour and restricted interests.



Each autistic person is a special case, with his or her own skills and difficulties. However, common traits can be identified, and autistic people can be grouped into more homogeneous subgroups, which are useful for research and for the development of more appropriate support. The figure on the left shows the main facets (F) of autism. A dozen have been selected, but there are many more. The most frequent medical co-occurrences and sensory particularities must be taken into account to improve quality of life. The figures on the right

represent three cases. Autistic 1 has no intellectual impairment, and her social interactions and communication skills are little affected, but she has significant sensorimotor disorders. Autistic 2, who has no intellectual disability, is self-aggressive and suffers from several major comorbidities. Autistic 3 has a very low intelligence quotient (IQ), a very strong resistance to change and impaired social interaction. These characteristics can evolve over time, particularly with appropriate support.

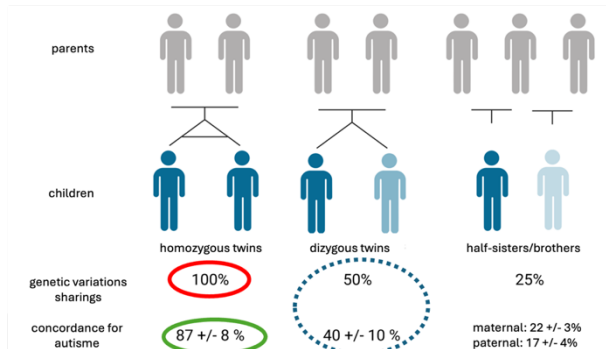
Source: Thomas BOURGERON, « Des gènes, des synapses, des autismes », Odile Jacob, 2023

3. Look for the definition of “Asperger syndrome” on internet.
4. Explain why ASDs (Autism Spectrum Disorders) are preferred to the term “Autism”.

Where could ASDs come from?

Document 3a: Genetic proximity in autistic twins

The statistics in figure below are taken from the latest study by SANDIN et al. published in 2017, which involved 37,570 twin pairs, 2,642,064 sibling pairs, as well as 432,281 maternal and 445,531 paternal half-sibling pairs. Of these, 14,516 children had been diagnosed with autism.

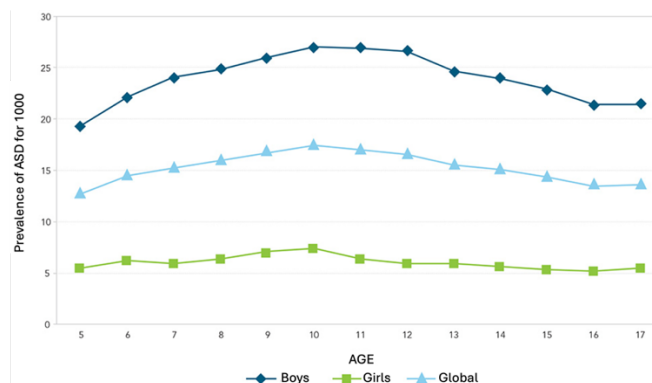


The number circled in red means that 2 monozygotic twins (from the same egg and sperm) share 100% of their genome (= 100% of their DNA sequences are identical).

The figure circled in green means that in monozygotic twins, if one is affected by autism, in 87% of cases (+ or - 8%), his monozygotic twin is also affected by autism; and therefore in 13% of cases (+ or - 8%), he is not affected by autism. In other words, when a child is autistic, his monozygotic twin has an average 87% probability of being autistic himself.

Source: Thomas BOURGERON, « Des gènes, des synapses, des autismes », Odile Jacob, 2023

Document 3b : Prevalence of ASD depending on age and gender in 2015 in Canada



Source : <https://www.canada.ca/fr/sante-publique/services/publications/maladies-et-affections/trouble-spectre-autisme-enfants-adolescents-canada-2018.html>

- What would be the concordance results in monozygotic twins if ASD were 100% genetic, i.e. caused by the presence of a certain allele of a gene?
- From doc 3a, compare the concordance for autism in the three situations presented. Using your knowledge of genetics and your answer to the previous question, determine one of the possible origins of autism.
- From doc 3b, compare the prevalence of autism in girls and boys, then formulate at least one hypothesis to explain this finding.

Are tests for ASDs relevant?

Testing via Artificial Intelligence

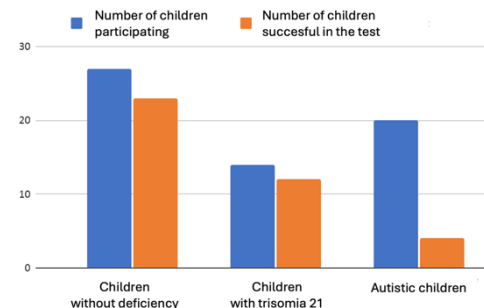
- Read the article “Artificial intelligence at the bedside of autism”
- 8. Describe the principle of this test, then discuss its interest in diagnosing an ASD.

The Sally-Ann test

- Watch the video on the Sally-Ann test.

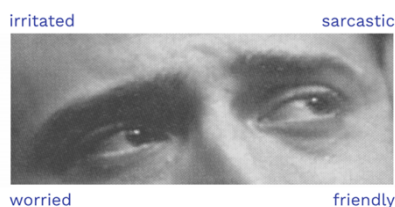
Document 4: Results of a Sally-Anne test performed by BARON-COHEN and al. in 1985

- 9. Describe the principle of this test
- 10. Using the graph of doc 4, compare and interpret the results of the test, then discuss its interest in diagnosing an ASD.



The RMET “Read the Mind in the Eyes Test” (BARON-COHEN)

Document 5a: Principle of the test



The “Reading the Mind in the Eyes” test (or RMET) tests an individual's ability to identify the emotion felt by a third party, using only a photograph of the third party's gaze.

The individual is presented with 36 photographs of pairs of eyes, and asked to choose just one of the 4 proposed emotions, e.g.:

For each of the 36 photographs, when the person recognizes the correct emotion, the score is 1. If not, the score is 0.

Document 5b: Results of a RMET on a large sample of population

Note: AS/HFA adults : adults suffering from Asperger Syndrome or “High Functioning Autism”

N corresponds to the number of people tested in each sample

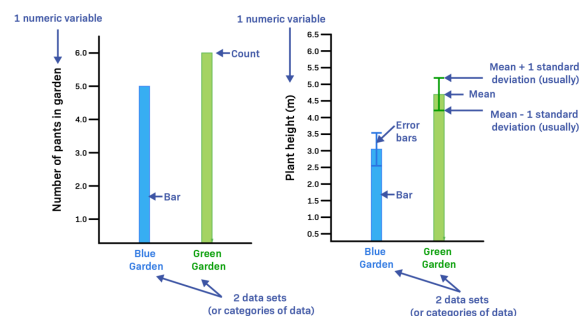
Mean corresponds to the average score reached by the people in the sample

SD is the standard deviation, measuring the dispersion of results around the mean: the lower the standard deviation, the more the population is homogenous.

	<i>N</i>	Eyes Test	
		Mean	<i>SD</i>
Group 1 AS/HFA adults All	15	21.9	6.6
Group 2 General population controls All	122	26.2	3.6
Males	55	26.0	4.2
Females	67	26.4	3.2
Group 3 Students All	103	28.0	3.5
Males	53	27.3	3.7
Females	50	28.6	3.2

Document 5c: Examples of bar-chart (A) and bar-chart with standard deviation (B)

(A) Barplot representing amounts (B) Barplot summarizing data sets



- 11. Describe the principle of this test
- 12. Represent the results of the test of document 5b in a bar-chart with standard deviation.
- 13. Using your graph, compare and interpret the results of the test, then discuss the interest of this test.