



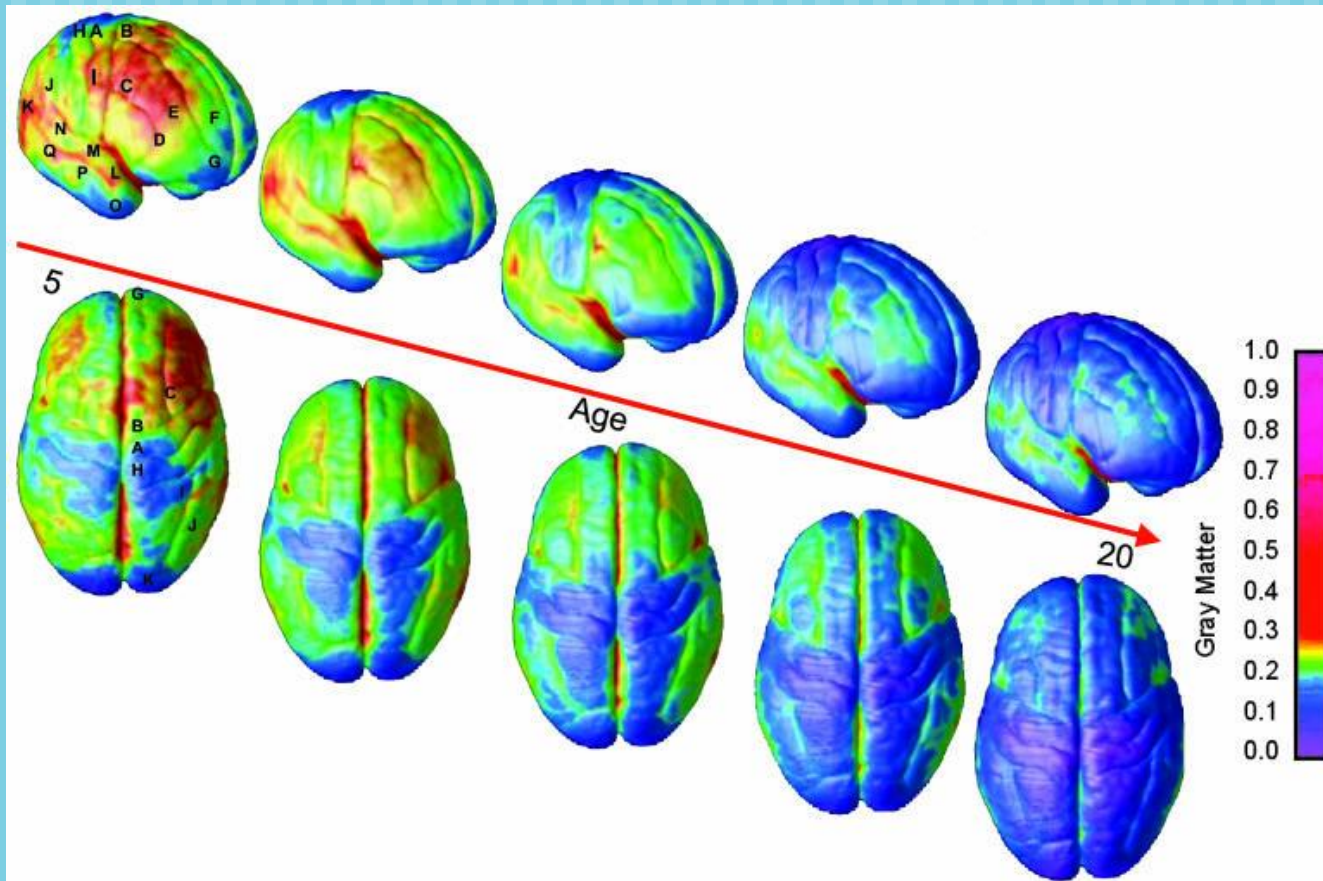
Neuropsychology.

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Center for Lysosomal and Metabolic Diseases

Definition neuropsychology?

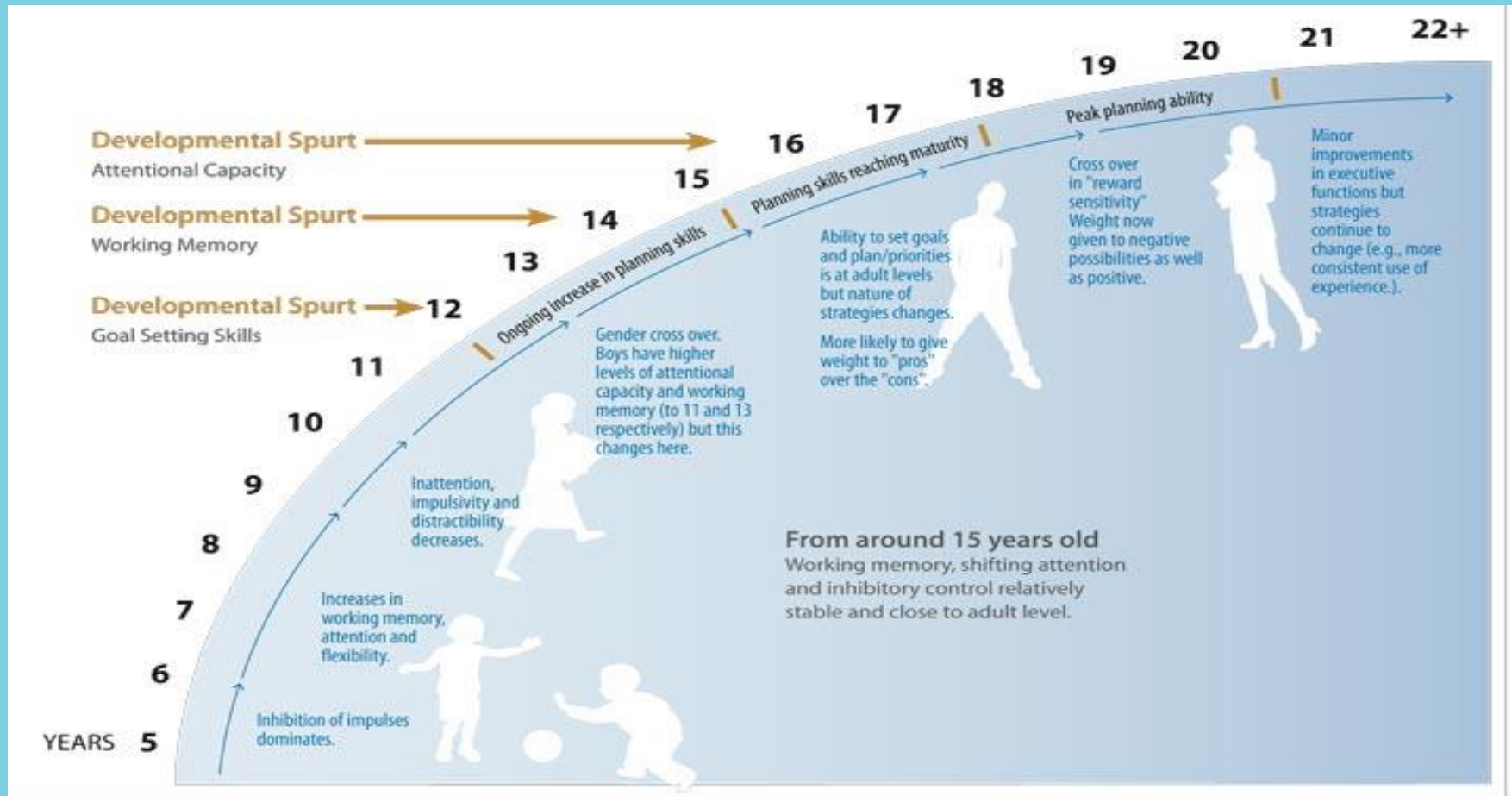
- **Clinical neuropsychology** is a specialty in professional psychology that applies principles of assessment and intervention based upon the scientific study of human behaviour as it relates to normal and abnormal functioning of the central nervous system. The speciality is dedicated to enhancing the understanding of brain-behaviour relationships and the application of such knowledge to human problems. (American Psychology Association).
- **Paediatric Neuropsychology** studies the relationship between behaviour and the functioning of a developing brain in children.

Development of the brain



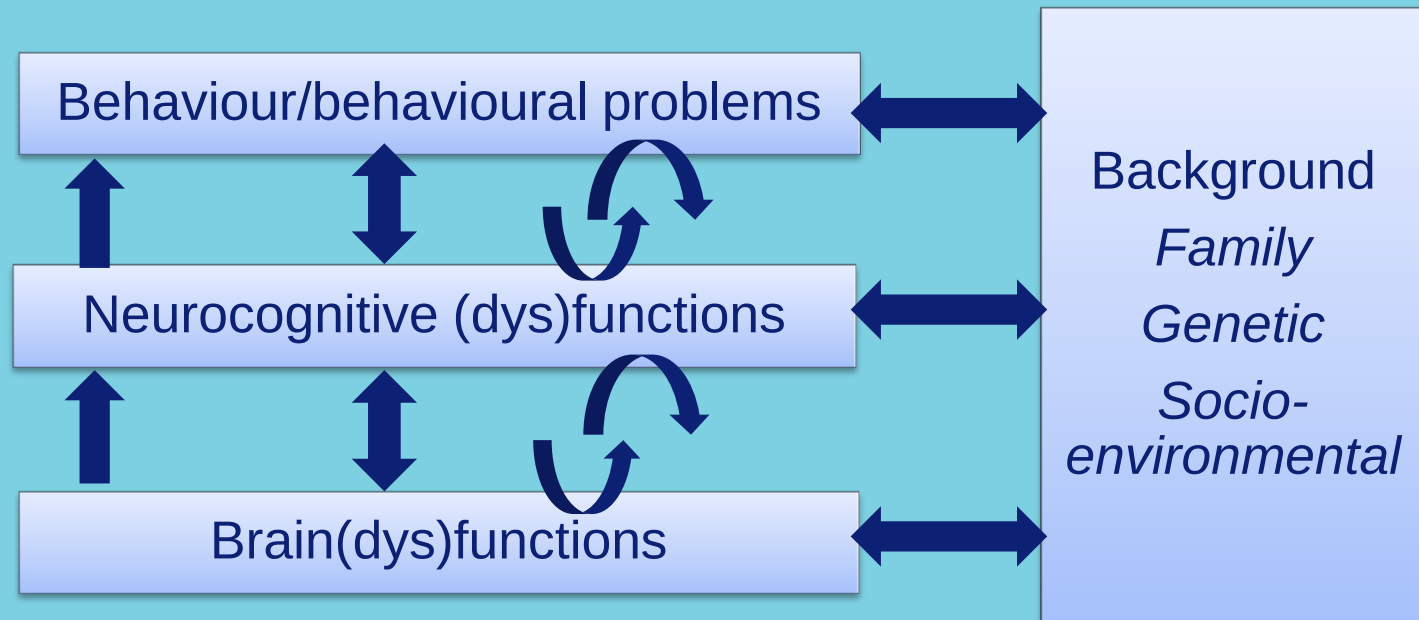
Cogtay, Giedd, Lusk et al (2004)

Development of executive functions



Differences Male/Female brain

Theoretical Concept of Neuropsychology



Behaviour and Cognitive functions

Posttraumatic Stress Disorder: DSM-5® Criteria

E. Marked alterations in arousal and reactivity associated with the traumatic event(s), beginning or worsening after the traumatic event(s) occurred, as evidenced by two (or more) of the following:

1. Irritable behavior and angry outbursts (with little or no provocation) typically expressed as verbal or physical aggression toward people or objects.
2. Reckless or self-destructive behavior.
3. Hypervigilance.
4. Exaggerated startle response.
5. Problems with concentration.
6. Sleep disturbance (e.g., difficulty falling or staying asleep or restless sleep).

Prevalence PTSS: I am scared!

▪ Normal population < 19 years old	3% children
▪ Dep. of Paediatrics	0% children, 7% parents
▪ Dep. of Oncology	10% children, 54% mothers
▪ PICU	21% children, 27% parents

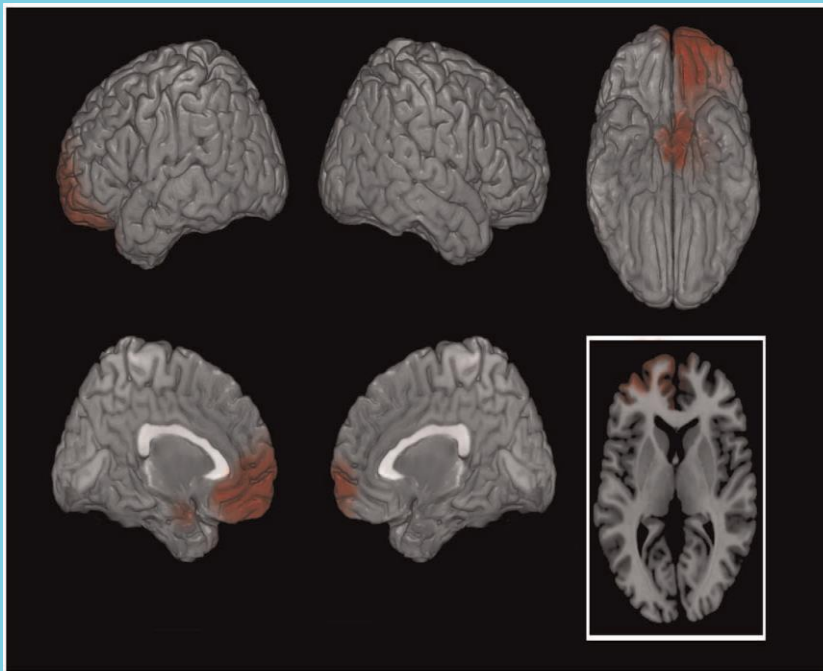
Bronner: *The Psychological Impact of
Pediatric Intensive Care Treatment*, 2009

Pelcovitz, D., et al. (1996).

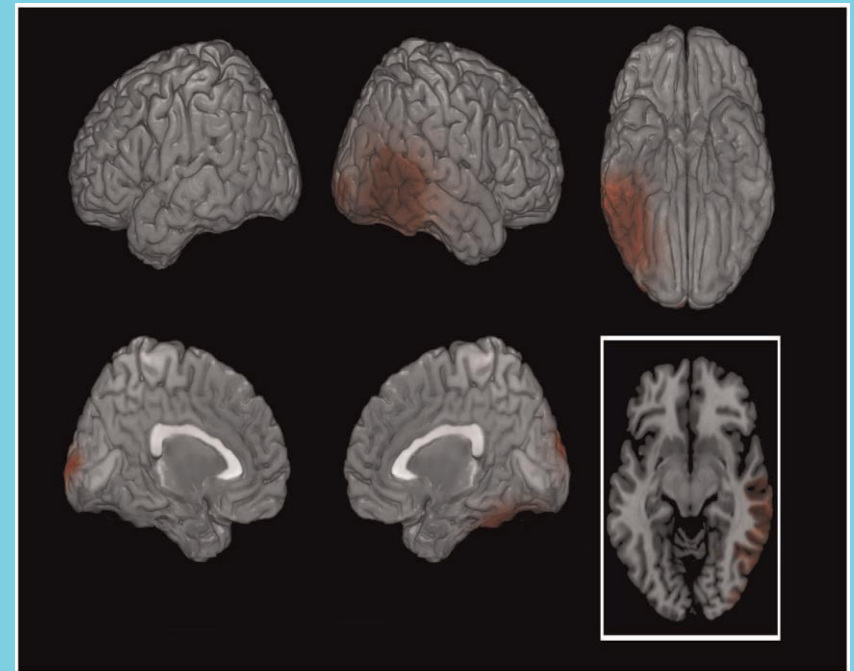
Rees et al., 2004

Eye Movement Desensitization Reprocessing (EMDR)

- Before PTSS treatment



- After PTSS treatment



- Pagani et al, PLoS ONE, 2012

Brain dysfunction and cognitive functions

5 years after diagnosis of juvenile MS

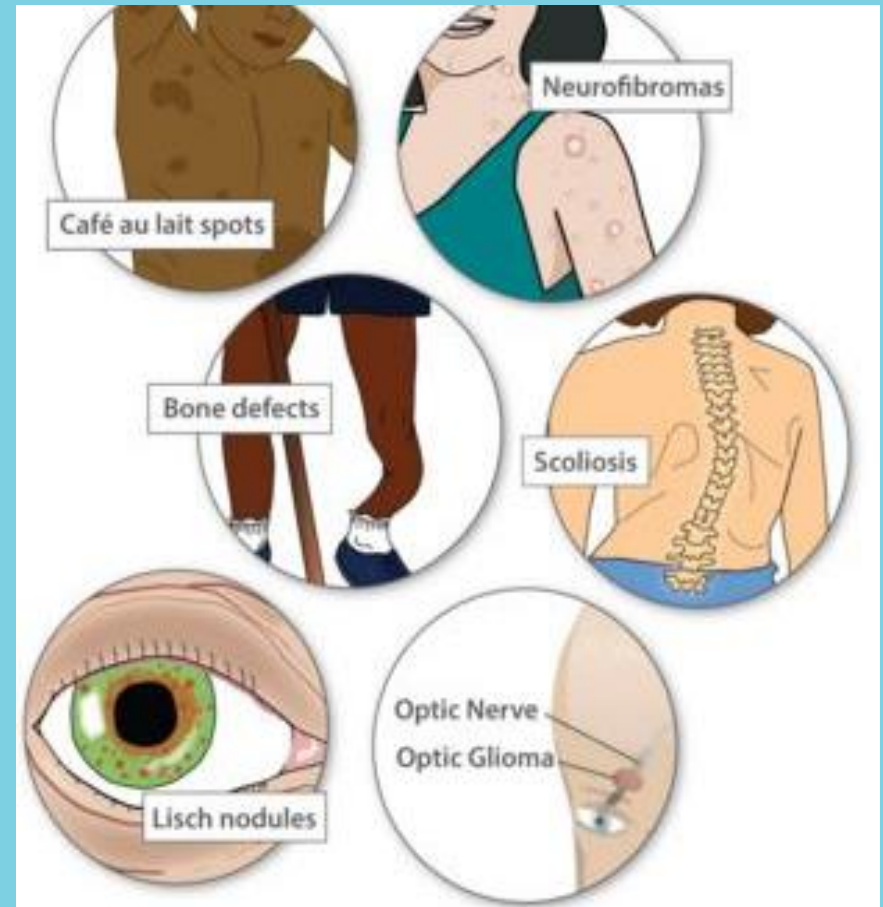
Executive function problems

Normal score for 17 years old:

49.8 sec $\pm$ 15.2

Genetic and neuropsychology

- Neurofibromatosis type 1 (NF1)
- Incidence 1/3000
- Autosomal dominant disorder
- Chromosome region 17q11.2
- Encodes a protein known as neurofibromin (RAS pathway)

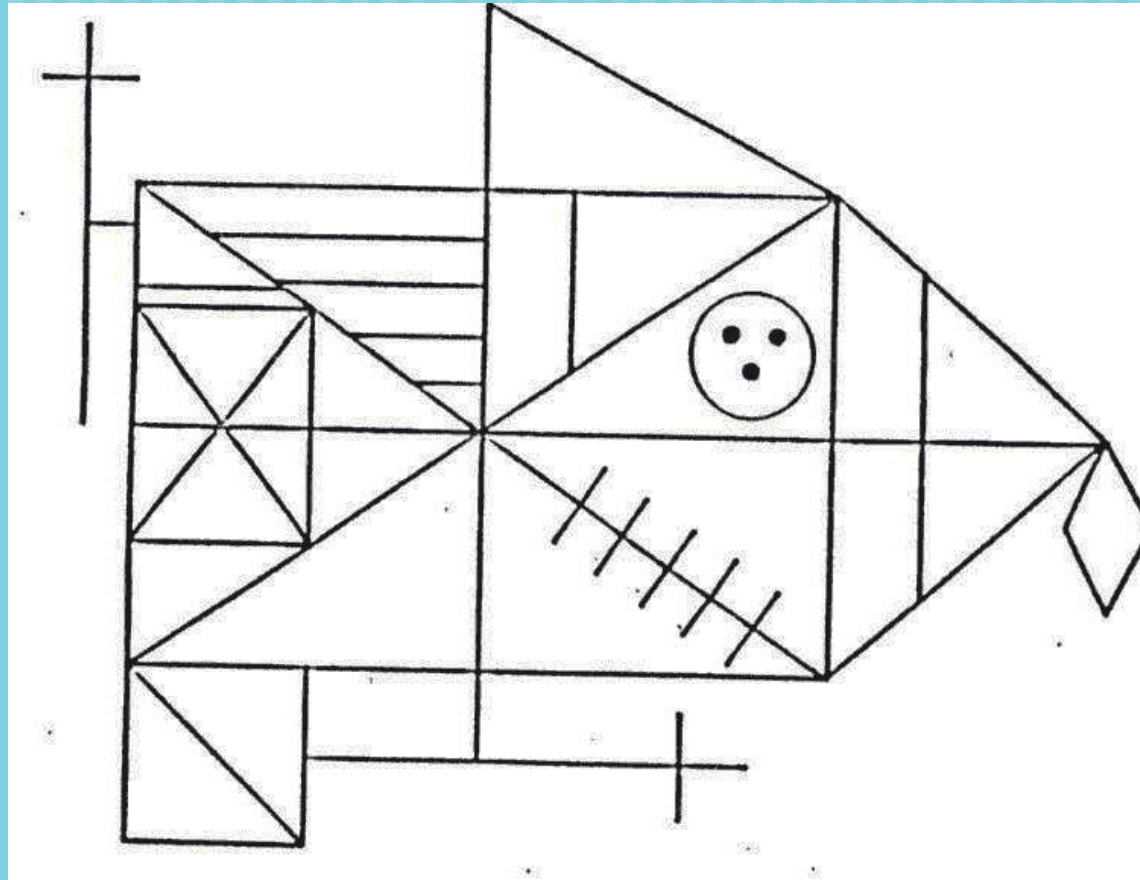


Genetic and neurocognitive functions (NF1)

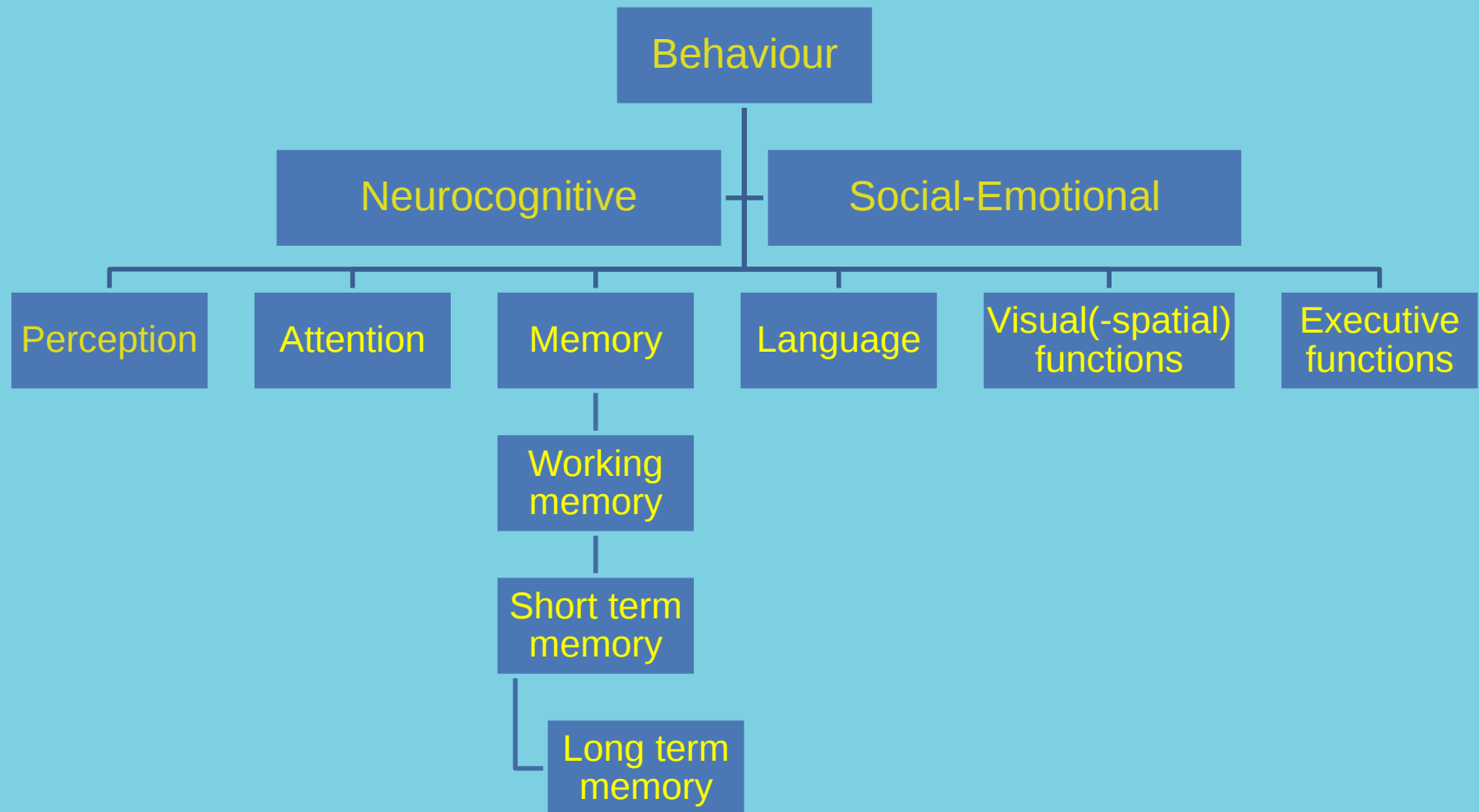
- Intelligence: IQ = 86, range 58-116.
- Intellectual disability 9x higher
- Visual-spatial 77% memory disorder
60% visual-spatial functions
- Attention 77% attention problems (38% ADHD)
- Speech 60% speech problems with nasal voice and articulation problems

Neurofibromatose type 1: Horse puzzle

**Reproduce the figure
to the best of your ability**

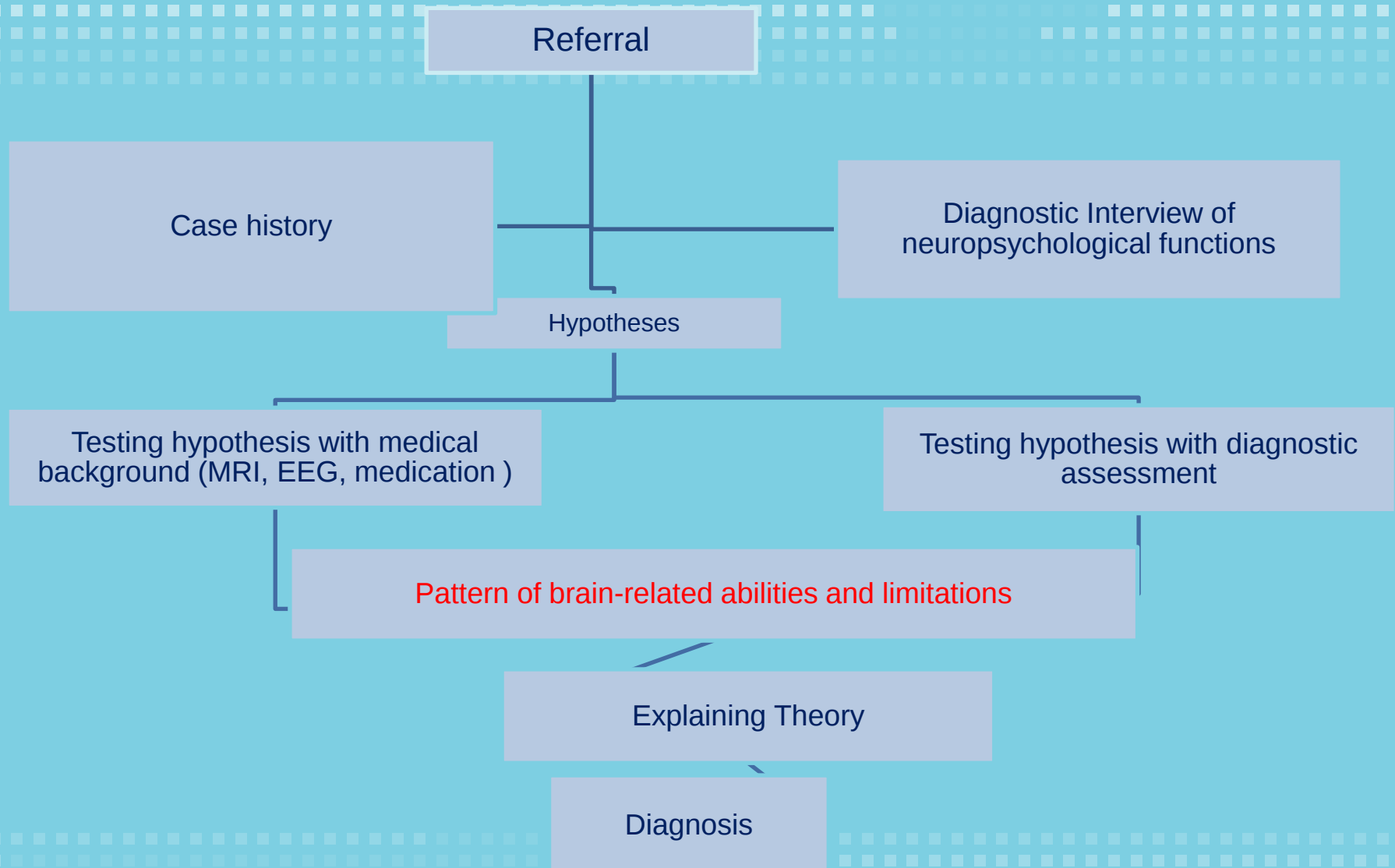


Neuropsychological functions



Sensory Processing Disorder

Diagnostic cycle



Neuropsychological assessment

Clinical neuropsychology is not about test data and the application of statistical rules alone but about a much underused process called thinking.

Walsh, 1992

Intelligence

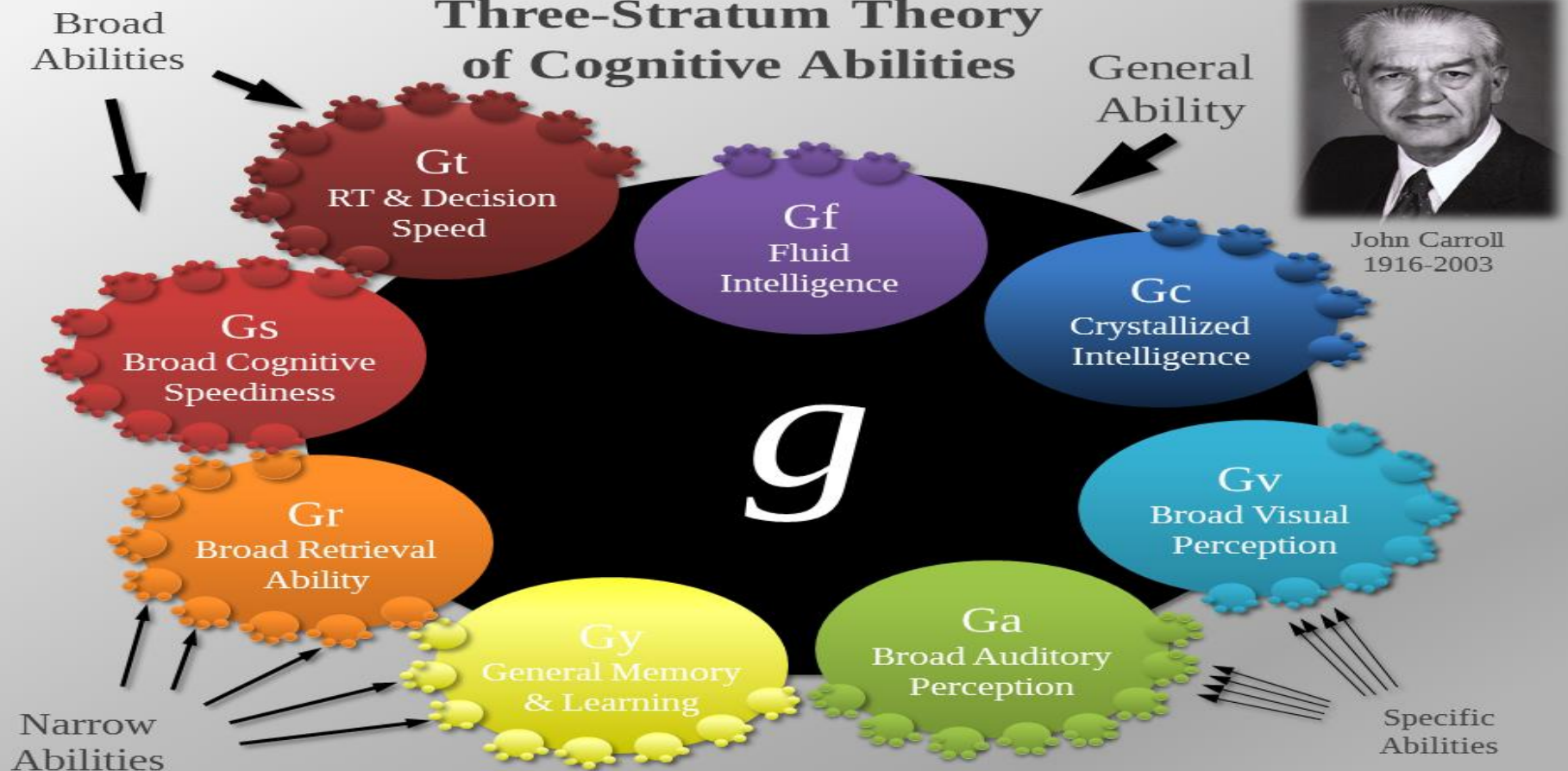
- **Intelligence** has been defined in many different ways including one's capacity for logic, abstract thought, understanding, self-awareness, communication, learning, emotional knowledge, memory, planning, creativity and problem solving. It can be more generally described as the ability to perceive information, and retain it as knowledge to be applied towards adaptive behaviours within an environment.
- The aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment (Wechsler)

Intelligence tests

- Most used Intelligence Test:
- Wechsler Intelligence Test (WPPSI, WISC, WAIS, WASI, WNV)
- Based on **Cattell–Horn–Carroll theory**
- In comparison to other well-known theories of intelligence and cognitive abilities, CHC theory is the most comprehensive and empirically supported psychometric theory of the structure of cognitive and academic abilities.

CHC Theory

Three-Stratum Theory of Cognitive Abilities



Subtest Block Design

Reliability

- **Reliability** in **statistics** and **psychometrics** is the overall consistency of a measure. A measure is said to have a high reliability if it produces similar results under consistent conditions. (Wikipedia)



$r = 0.89$

Fundamentals of Biostatistics 7th ed 2010, Rosner



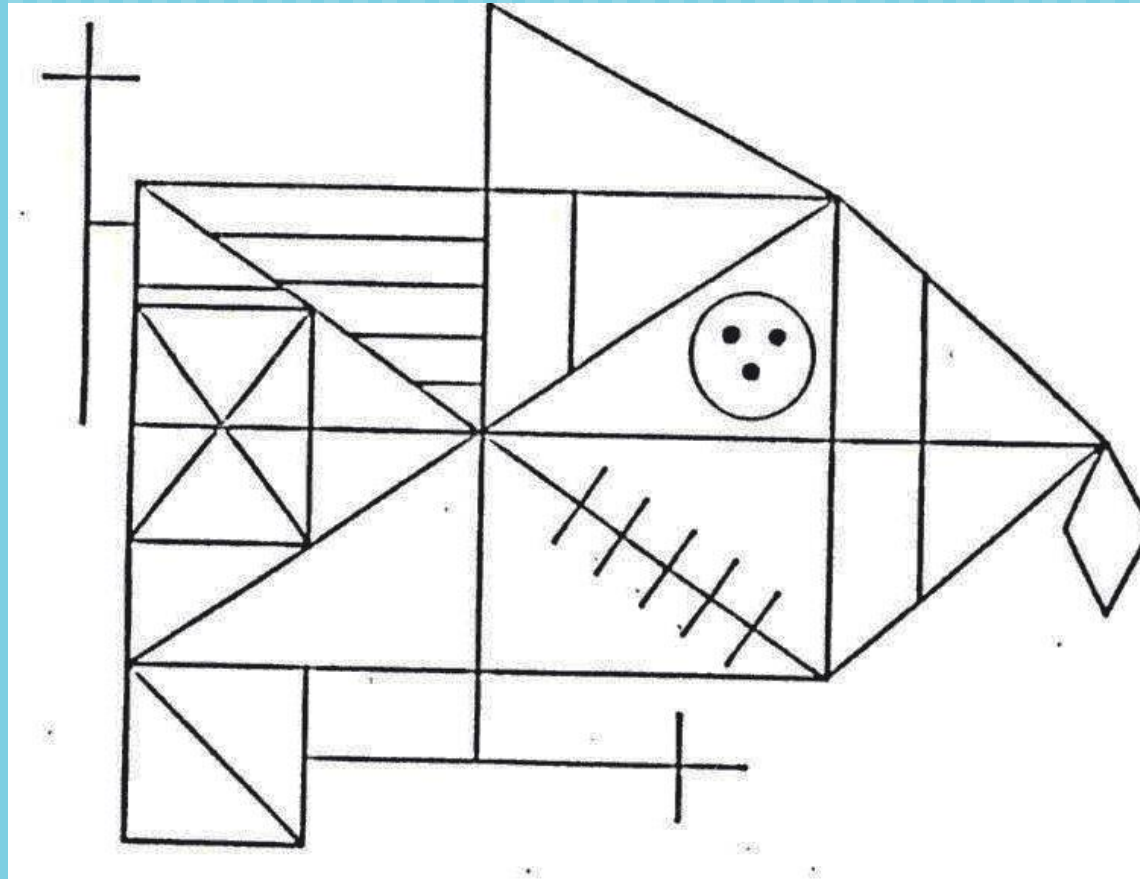
$r=0.94$

WISC-III-Dutch Manual, 2005

Drawing test

- Draw the Rey figure from memory!

Test



Take Home Message

- Neuropsychology is more than the science of neurocognitive functions.
- Not only the test result is important but also the observation during the test!
- Very important is the correction for the mental age of a child.
- When taking a blood pressure, remember an intelligence test is more reliable!

Thank you for your attention!

