# Early predictors of ADHD?
# So what?!?

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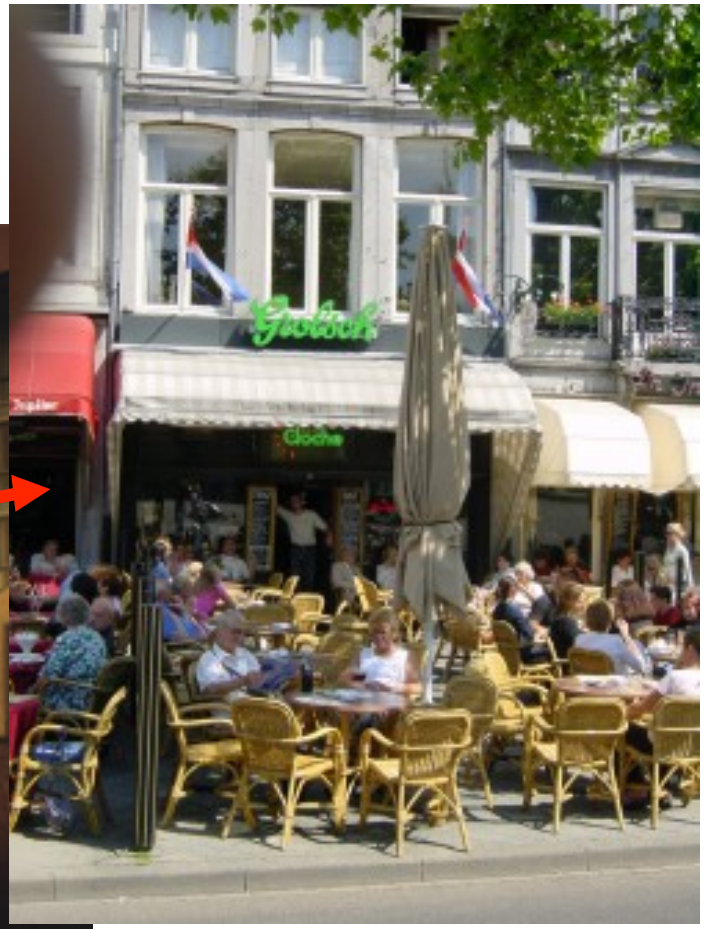
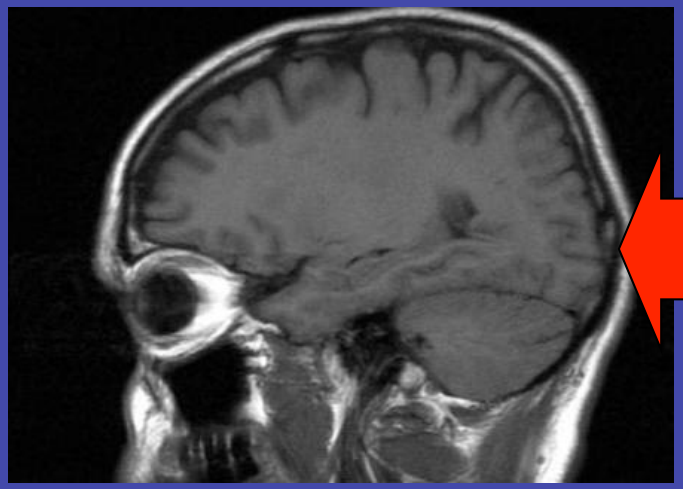
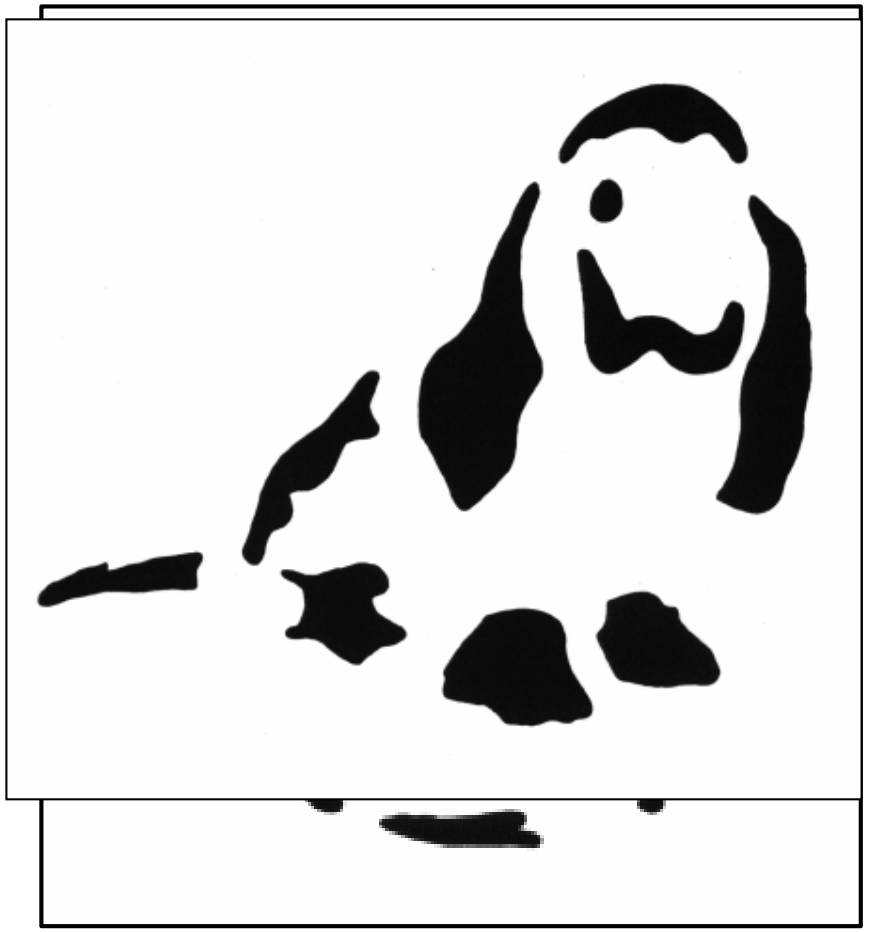
Maastricht University

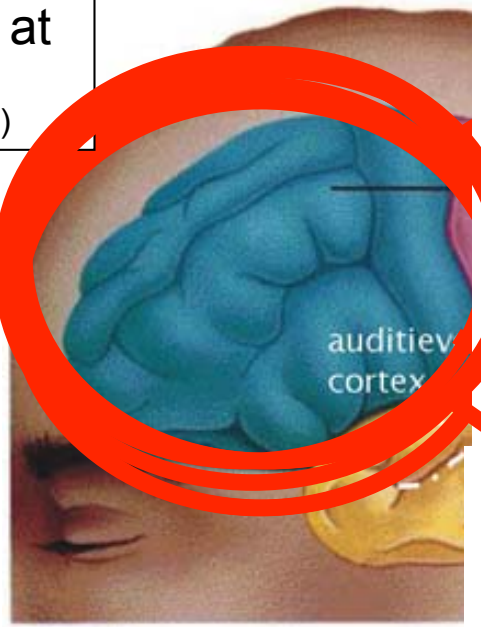
# Studying cognitive abilities in ADHD?



**Example of behavior/cognition**:



Brain development observed until at least 23 yrs.
(Gogtay etal, 2004)





Gilbert etal, 2008

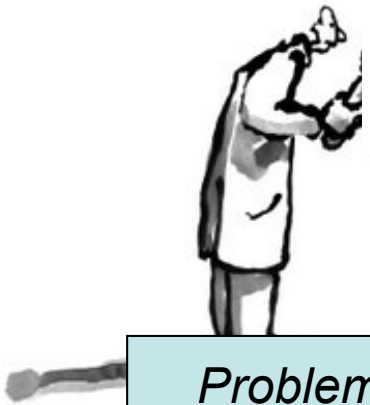
Mainly frontal lobe: function?

Mainly frontal lobe: 1/3 of the cortex. Topmanager of the brain!

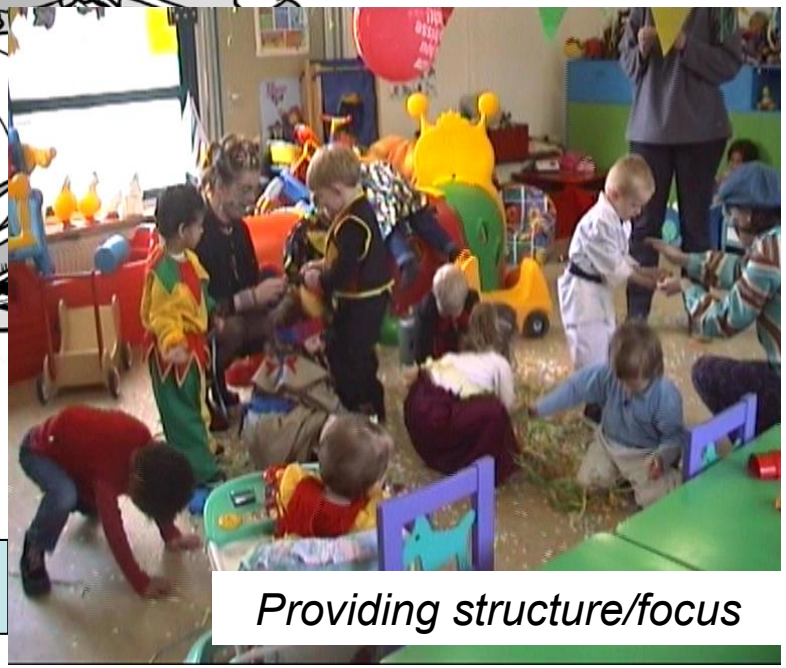
# Topmanager = Executive functioning (EF, Diamond, 2006)


*EF necessary for…*





*Problem solving*



*Providing structure/focus*

# Katja

Time estimation deficts?

Persistance: Low?

Planning deficits?

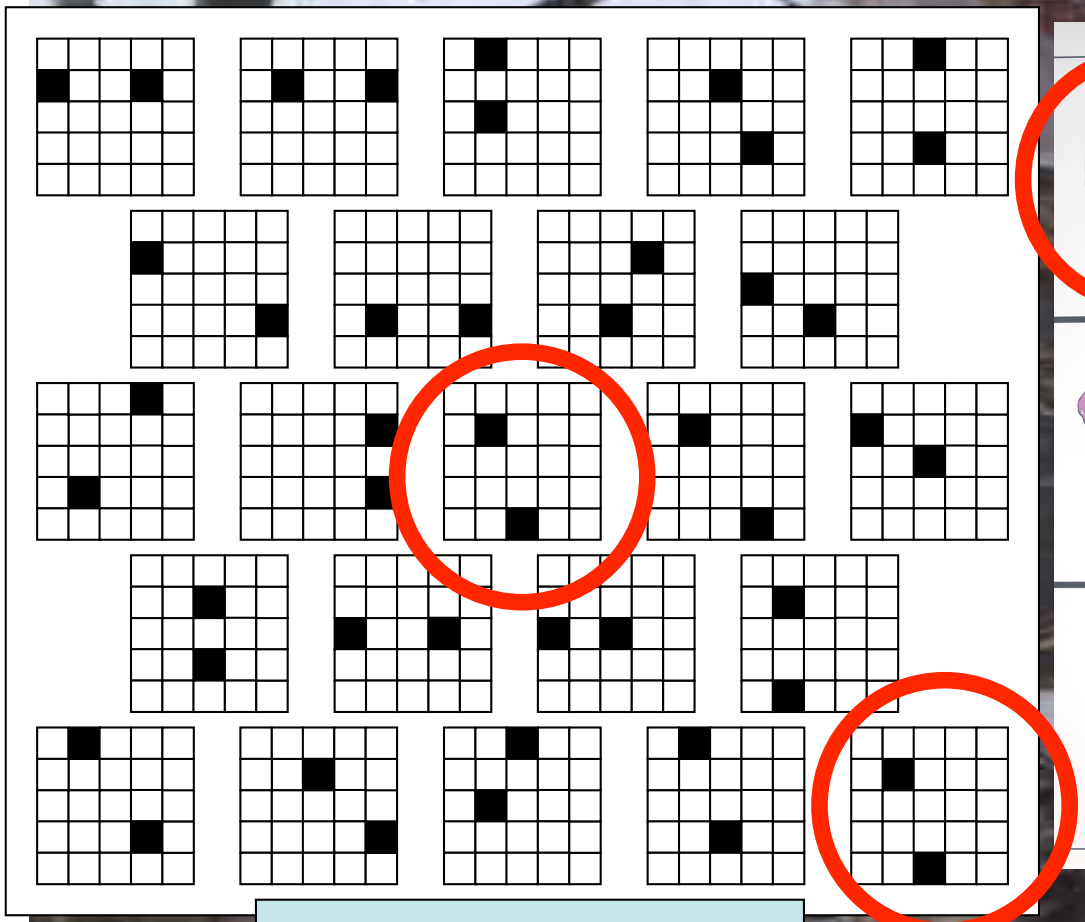
Katja (6 yrs) is “unfocused”

Forgetful?

Attention problems?

**Topmanager deficient?Or normal?**

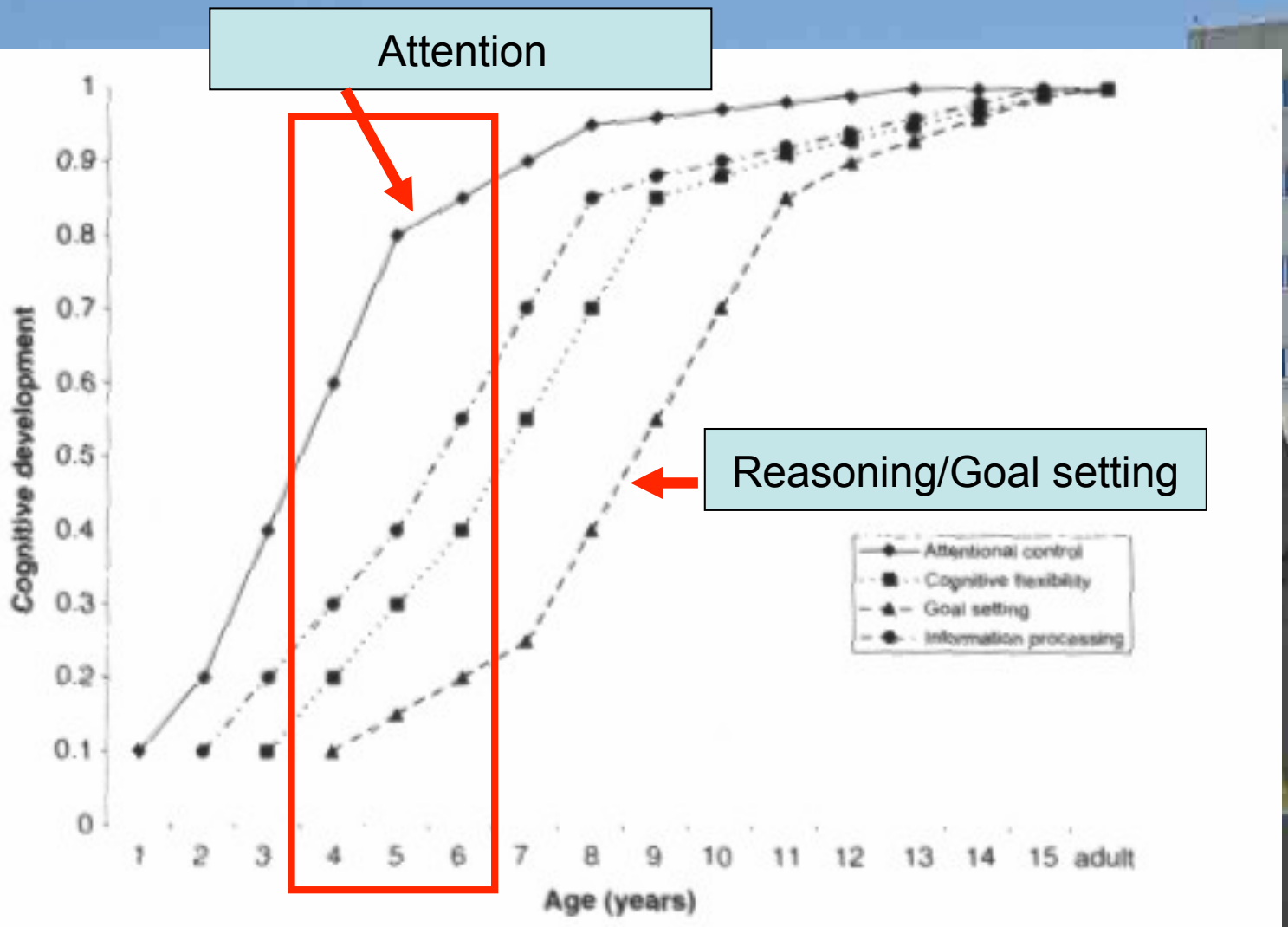
# Examples tests Top manager



Attention


Reasoning/Goal setting

# Top manager: definition normality?




Adjust expectations and education to developmental stage of the child.

(Hurks et al., 2010; Meijs et al., 2009)

Anderson, 2002

# Individuals with ADHD?

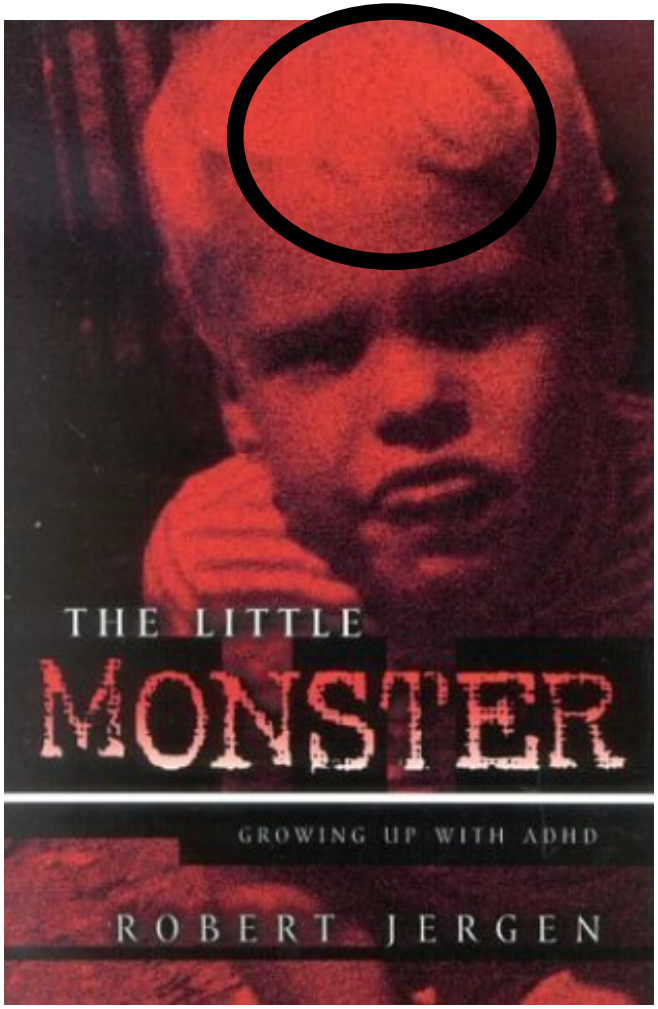


**TABLE 1**

***DSM-IV* CRITERIA FOR ADHD[22]**

I. Either A or B

A. ≥6 of the following symptoms of inattention have been present for ≥6 months to an extent that is disruptive and inappropriate for developmental level:

- Often does not give close attention to details or makes careless mistakes in work or other activities
- Often has trouble keeping attention on tasks or play activities
- Often does not seem to listen when spoken to directly
- Often does not follow instructions and fails to finish duties in the workplace (not due to oppositional behavior or failure to understand instructions)
- Often has trouble organizing activities
- Often avoids, dislikes, or does not want to do things that take a lot of mental effort for a long period of time
- Often loses things needed for tasks and activities
- Is often easily distracted
- Is often forgetful in daily activities

B. ≥6 of the following symptoms of hyperactivity-impulsivity present for ≥6 months to an extent that is disruptive and inappropriate for developmental level:

Hyperactivity

- Often fidgets or squirms in seat
- Often gets up from seat when remaining in seat is expected
- Often feels very restless
- Often has trouble enjoying leisure activities quietly
- Is often "on the go" or often acts as if "driven by a motor"
- Often talks excessively

Impulsivity

- Often blurts out answers before questions have been finished
- Often has trouble waiting one's turn
- Often interrupts or intrudes on others

II. Some symptoms that cause impairment were present before 7 years of age

III. Some impairment from the symptoms is present in ≥2 settings (eg, at school, work, and home)

IV. There must be clear evidence of significant impairment in social, school, or work functioning

V. The symptoms do not happen only during the course of a pervasive developmental disorder, schizophrenia, or other psychotic disorder, and the symptoms are not better accounted for by another mental disorder

*Based on these criteria, 3 types of ADHD are identified:*

- ADHD, Combined Type: if both criteria 1A and 1B are met for the previous 6 months
- ADHD, Predominantly Inattentive Type: if criterion 1A is met but criterion 1B is not met for the previous 6 months
- ADHD, Predominantly Hyperactive-Impulsive Type: if criterion 1B is met but criterion 1A is not met for the previous 6 months

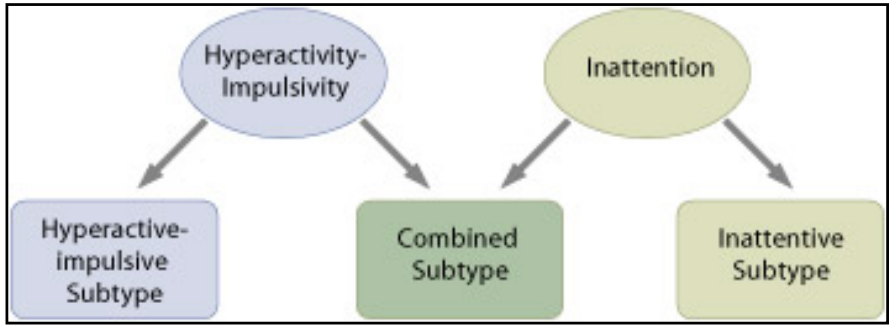
*DSM-IV=Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition; ADHD=attention-deficit/hyperactivity disorder.

Weisler R, Goodman DW. *Primary Psychiatry.* Vol 15, No 11. 2008.

**INATTENTION**

**HYPERACTIVE/**

**IMPULSIVE**



# Underconsideration DSM-V (May, 2013)

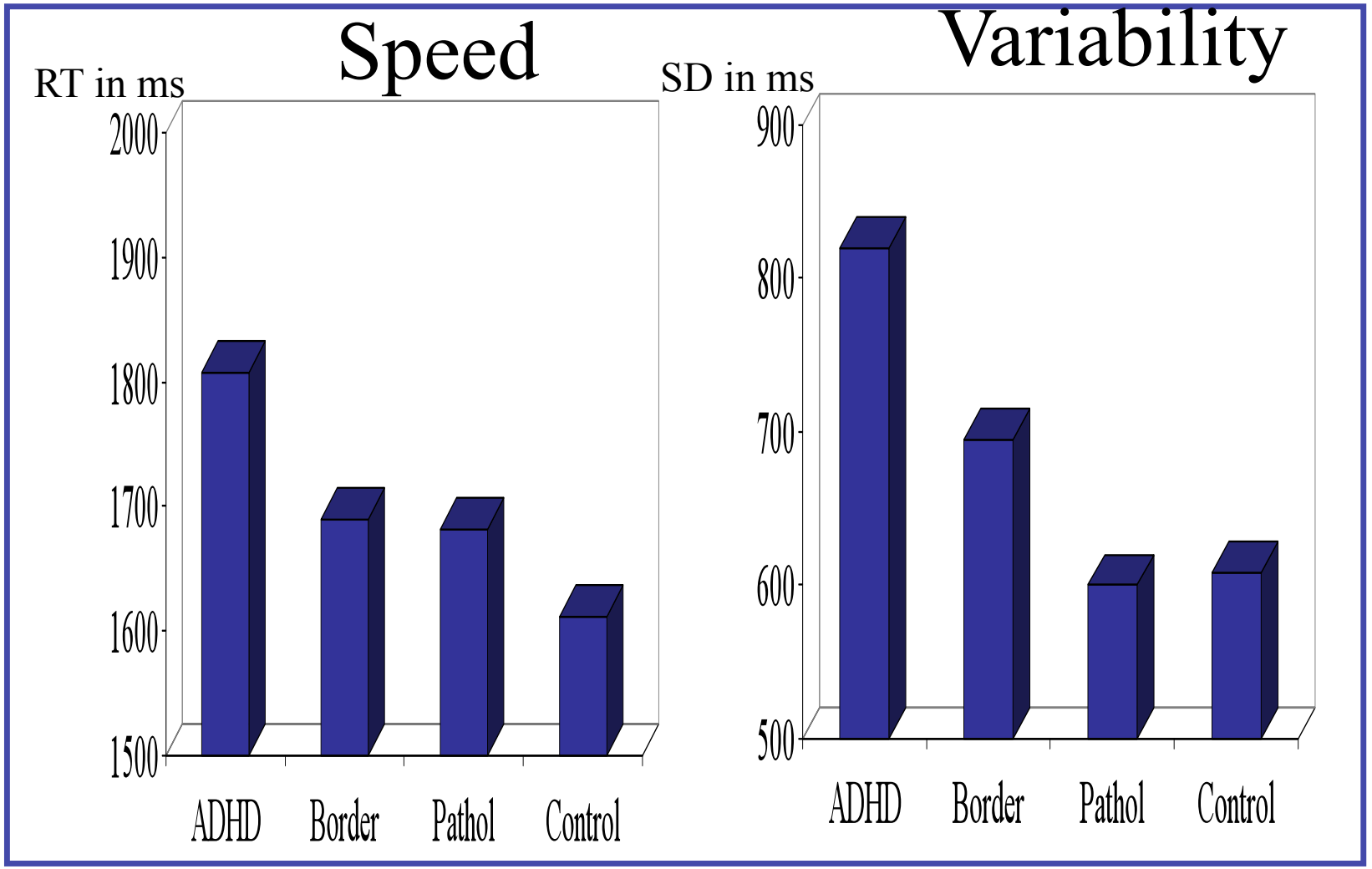
- Increase number of criteria impulsivity (13 criteria HI, 7 criteria Impulsivity).
- Inattentive presentation (restrictive) (no more than 2 symptoms HI).
- Predominantly inattentive presentation (3 or more symptoms HI).
- No predominantly HI.
- Exclusion criteria: No longer PDD as excluders.
- Specification of the disorder for adults: 3 criteria instead of 6.

# Early markers ADHD-cognitively?

- Aandacht/Inhibition
- Flexibiliteit/Working memory
- Reasoning

# Attention/Info processing

# Attention/Information

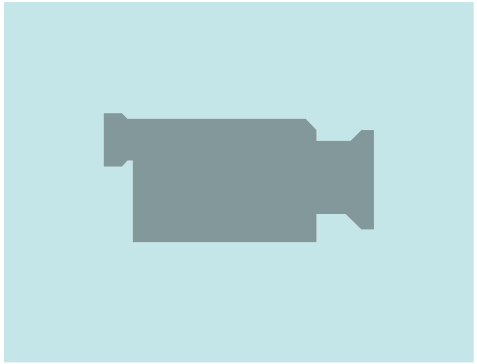


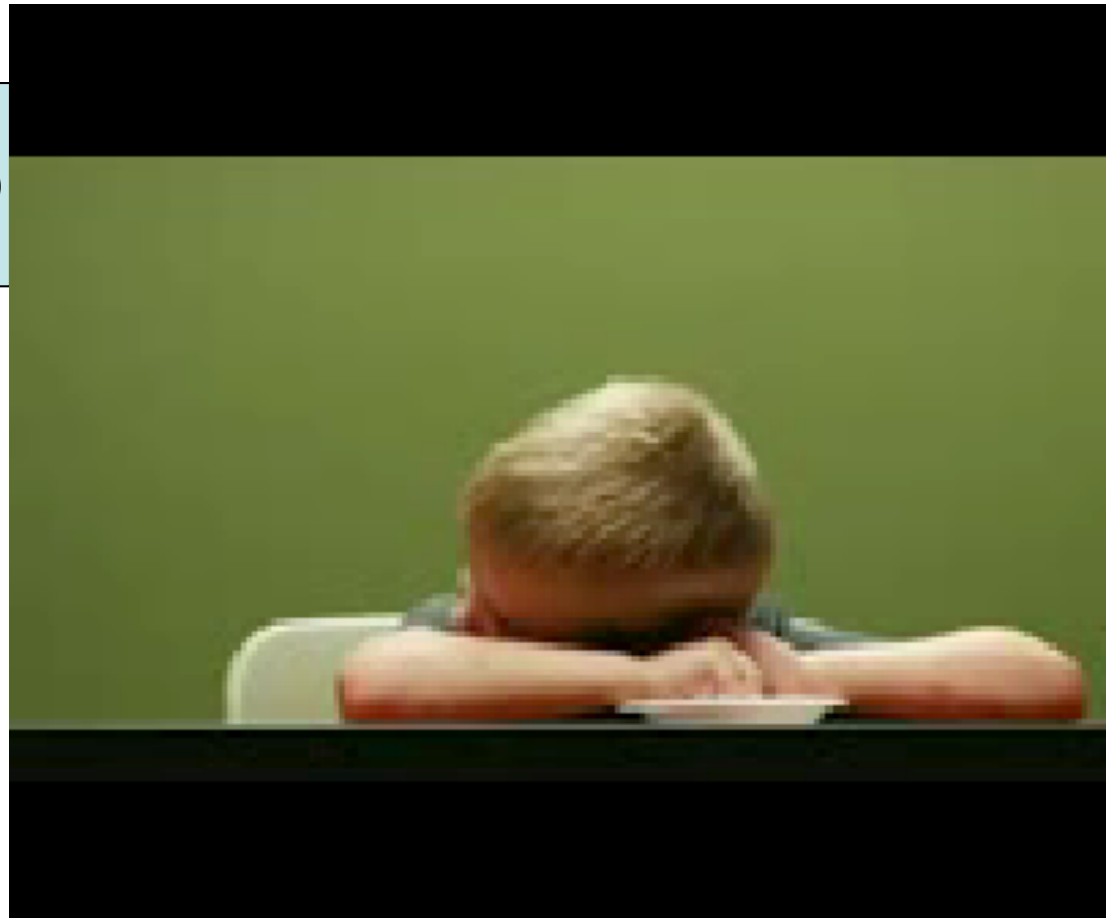

Kalff, De Sonneville, Hurks, et al., 2005

Marchetta, Hurks, et al., 2008

# Cognitive problems in children with ADHD?
# Behavioral inhibition

Predictive for ADHD?
(Campbell, Von Stauffenberg, 2009)



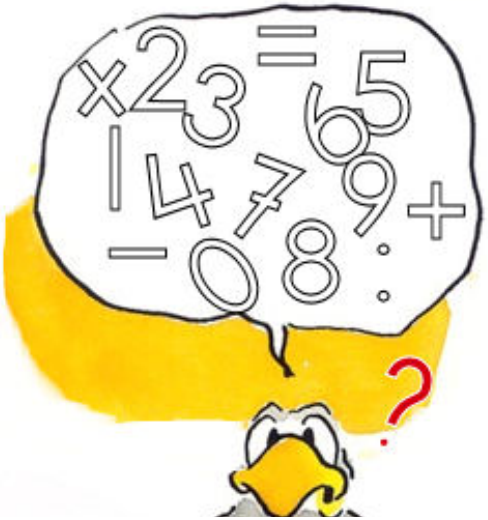


# Working memory

Developmental trajectories show growth until at least middle adolescence (Meijs, Hurks, et al., 2010; under revisie).

# Working memory

The ability to activate and manipulate information while execut
a task.



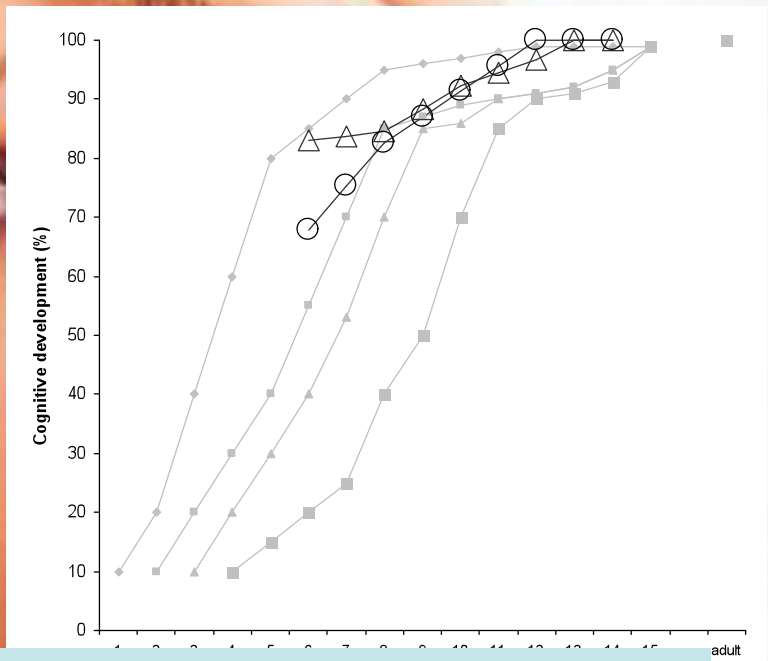



One of the most fundamental cognitive abilities!
Predictive for later success and ADHD

# Reasoning?

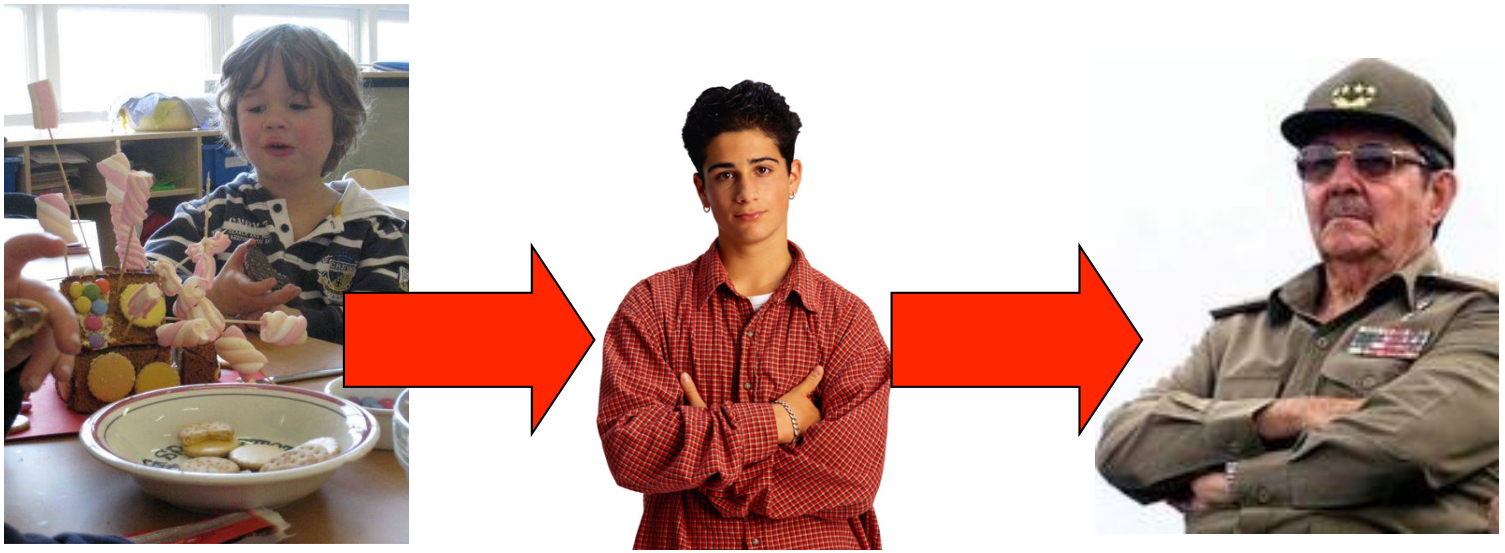
- Which girl is most blonde when Pamela if Pamela is more blonde than Els but darker than Saskia?
- Accomplish these arithmetic

language assignments?




Children with ADHD perform sign. Slower than children, but comprehension is equally well. Understanding the message takes longer. This is stable over development (Wassenberg, Hendriksen, Hurks et al., 2010)

# EF deficits last into adulthood



Eg., 60-80% of main ADHD symptoms last over time…
(Nyden et al., 2001; Marchetta et al., 2009;2010)

# EF deficits: how specific for ADHD?

- Dyslexia
- Speech-/Language disabilities
- Autism Spectrum Disorders
- ADHD
- Intellectual disability
- Giftedness
- Developmental Coordination Disorder
- Mathematics Disorder
- Nonverbal Learning Disabilities

# EF: how specific for ADHD?

- Geurts (2008): 56% correctly assigned on results EF battery to ADHD, high functioning PDD, and healthy controls.

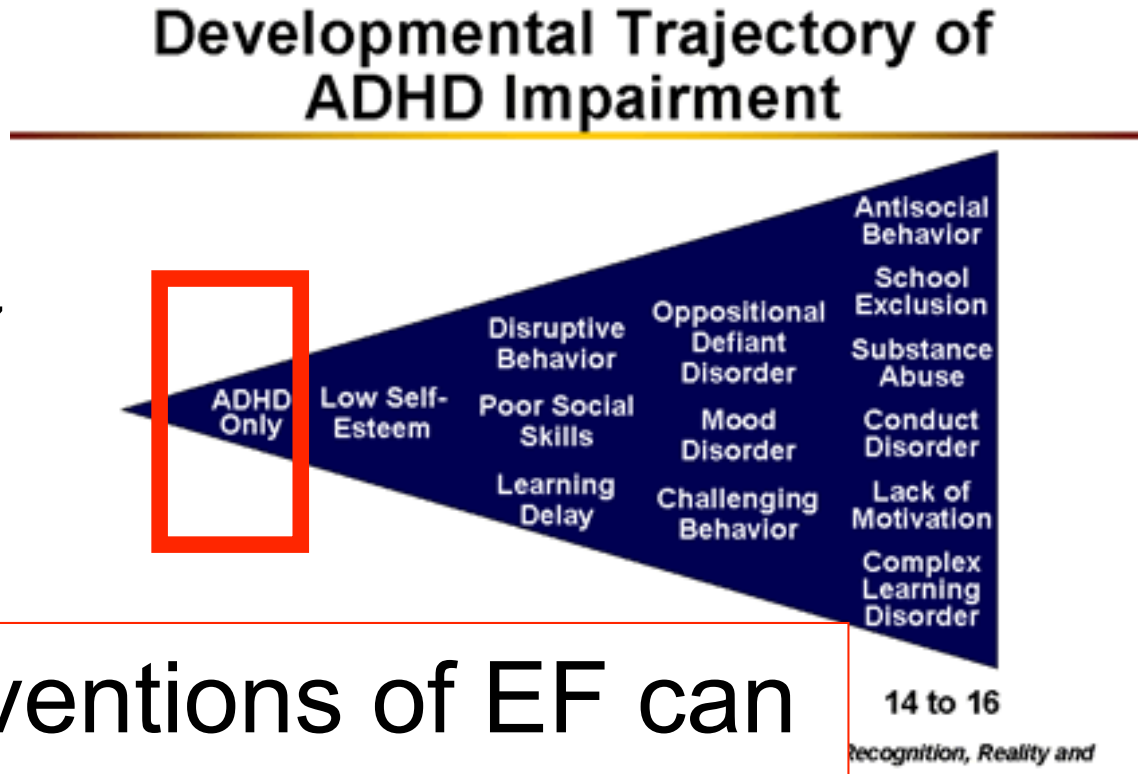
- Specificity: Only 50% of the healthy children were correctly classified by use of EF battery.

But…ADHD with EF deficits was associated with an increased risk for grade retention and a decrease in academic achievement EF deficits

(Biederman et al., 2004)

# Measuring EF in young children: Why relevant?

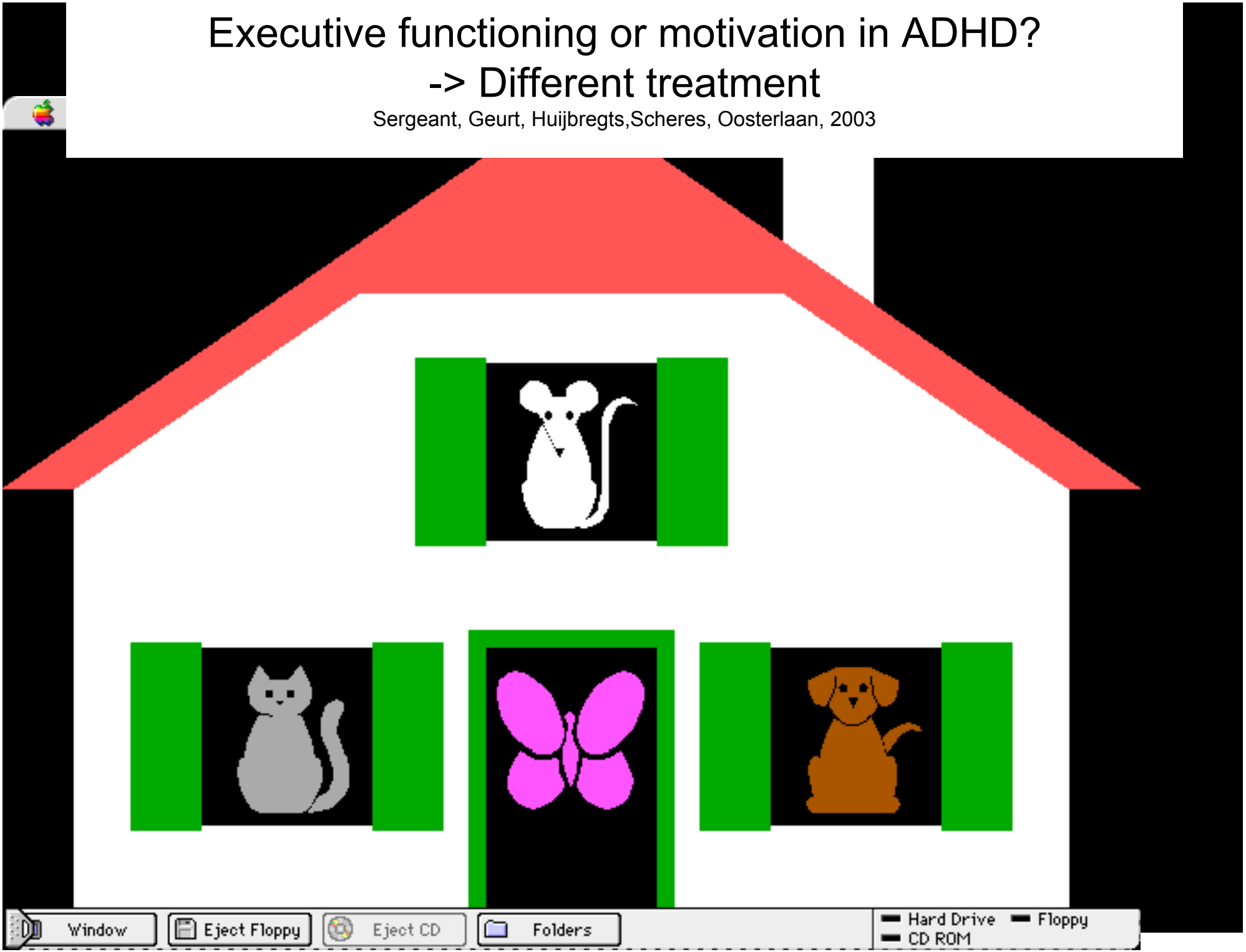
- Children with ADHD and EF problems early in development, are at risk of learning and behavioural deficits -> 4-7 years shift.
- Snowball-effect




Idea: early interventions of EF can establish long-term effects

# Executive functioning or motivation in ADHD?
# -> Different treatment

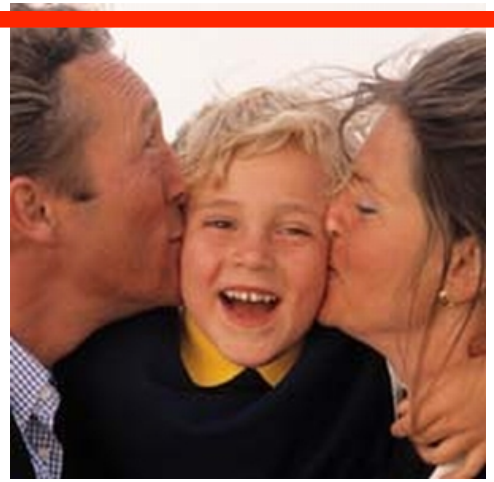
Sergeant, Geurt, Huijbregts,Scheres, Oosterlaan, 2003



# Effect training?

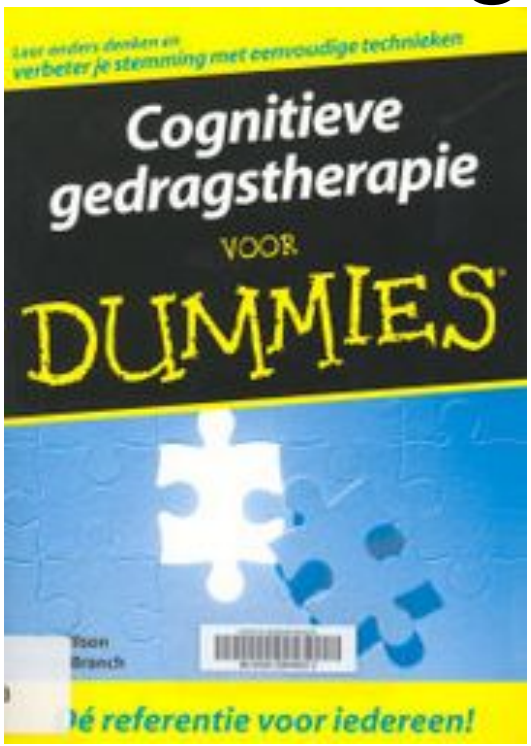
TRAINING

Direct met het kind



Via ouders

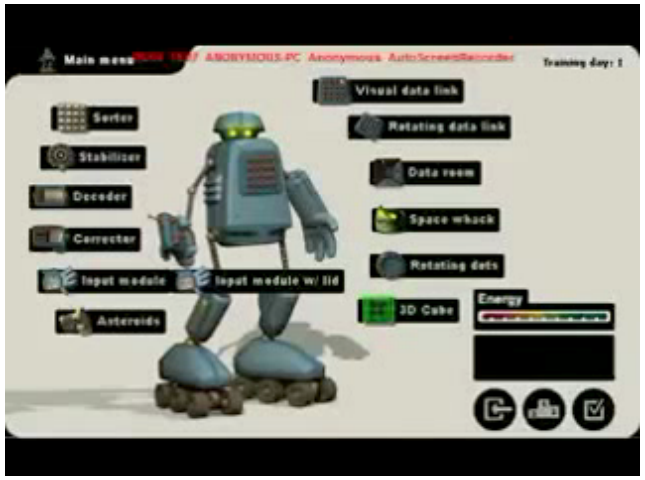
# Training Working memory?

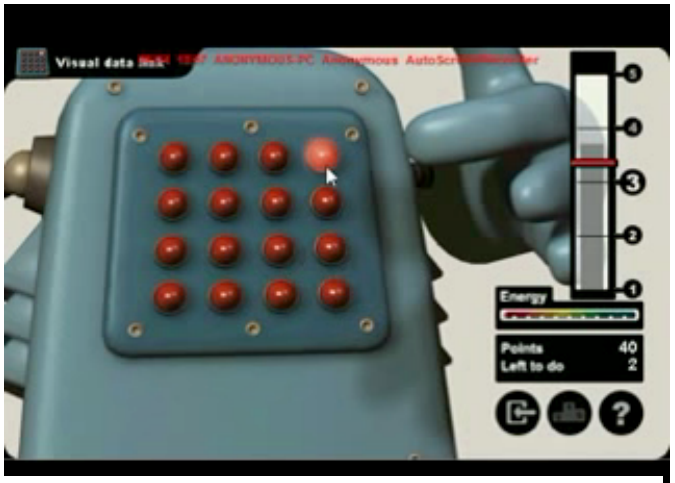



Cognitive behavioural therapy

Indirect – through computer training?

# Cogmed training (Klinkberg et al., 2010)




Feedback (correct/wrong), level adapted to individual, repetition of WM tasks

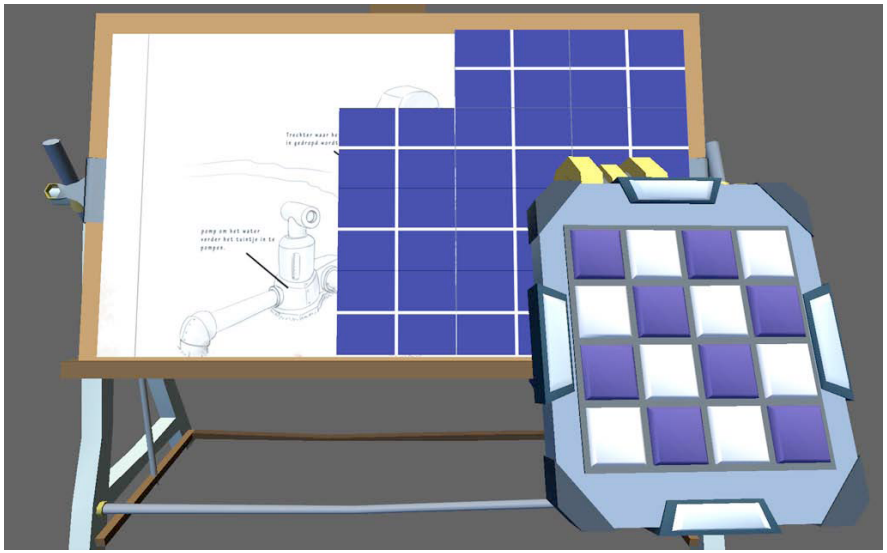
25-45 min/day, 5 day a week, 5 weeks

No EXPLICIT STRATEGY TRAINING

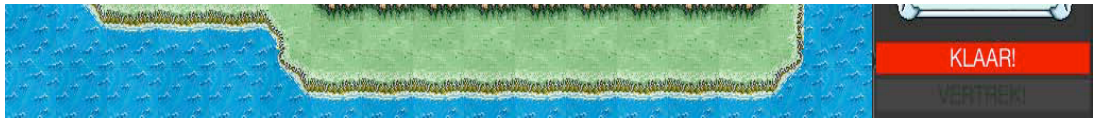
# Is Cogmed in an adventure game (context-related) more efficient?

(Prins et al., 2010)

Story line, rewards, identification, etc

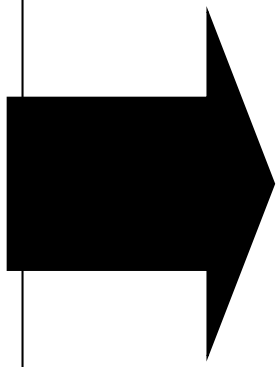



More involved, more motivated, improvements on Working memory more pronounced



# However…

- **Transfer** is limited to untrained tasks (eg., self-regulation, academic)?



What if you train these children explicitly memory strategies? Eg.,

-rehearsal,

-clustering,

-Story telling…

# Explicit training

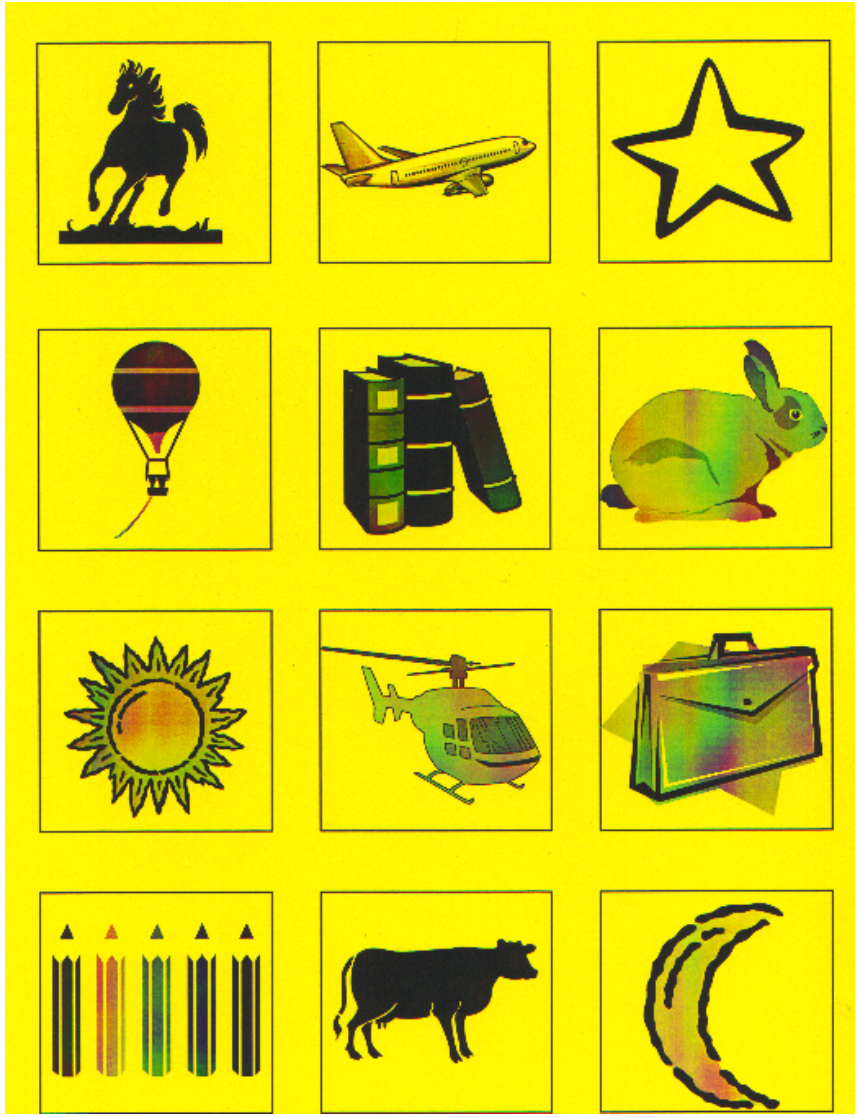
Jonkman & Hurks, 2009; Martens, Hurks et al., submitted, St-Clair Thompson et al., 2011; Diamond, 2009

6 weeks, 1hrs/wk group training, + homework

Positive effects with eg preschoolers (aged 5.3+), children with ADHD

Questions: Optimal duration and frequency? Role of awards and motivation? Target group? Maximal improvement? **But also age effects?**

Age-related increase in Spontaneous use of complex strategies (Meijs, Hurks et al., 2009; Meijs, Hurks et al., under revision)



# Concluding…

Cognitive treatment protocols are scientifically promising. But what about clinical practice or in educational settings?

Many questions are still unanswered…

**Thank you for your attention!**