

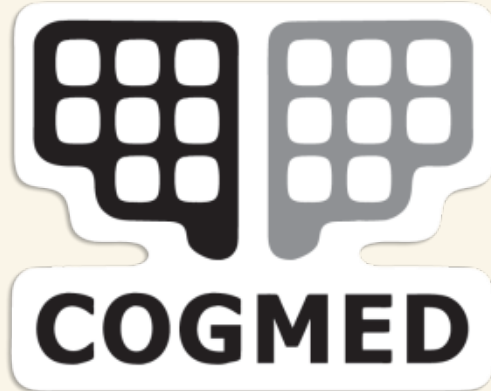
# **Lexercise: How Cogmed trains Working Memory**

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# **How Cogmed trains Working Memory: Informational Webinar**

- Thank you for coming to today's webinar**



**Working Memory Training**



## Cogmed

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# **The Cogmed story**

**What is Cogmed?**

**What is working memory?**

**What does the research say?**

**Who is Cogmed for?**

**The Cogmed products**

**Cogmed Training – the steps**

**The Cogmed Network**



# Cogmed combines three different fields into one simple and powerful program

*Neuroscience, Game Development & Psychology*

Founded in 2001 by brain researchers at the **Karolinska Institute**

Dedicated to developing and marketing only **evidence-based products**

Offices in **Northern New Jersey** and **Stockholm**

**First paying client** in 2003 (Sweden), introduced to the **US** in 2006

**Jonas Jendi** is GM; **Torkel Klingberg**, MD, Ph.D, is Chief Scientific Advisor

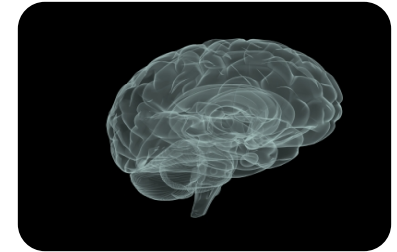


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# Cogmed Working Memory Training is a proven intervention

## Research

- Cogmed is backed by peer reviewed, published, and fully independent studies



## Network

- The Cogmed Network is made up of highly qualified, PhDs, Licensed Psychologists and Psychiatrists, M.D.s

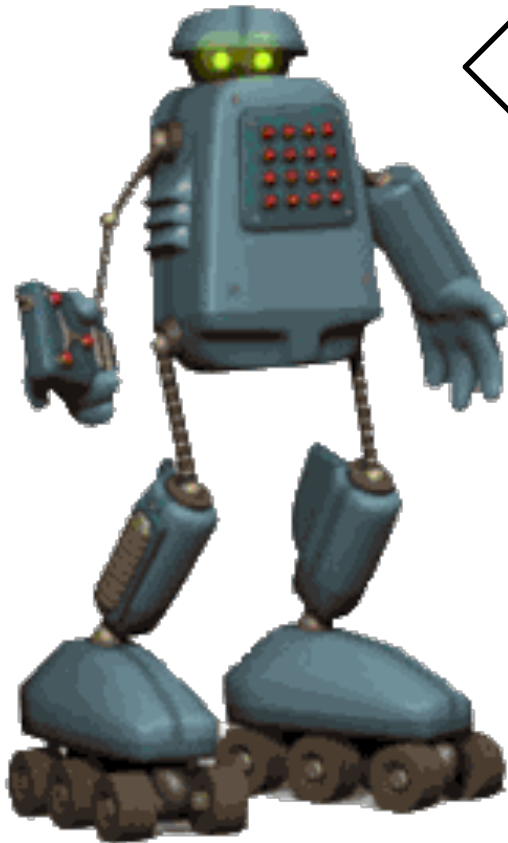


## Track Record

- Cogmed training has a very high compliance rate to go along with its proven results



# What makes Cogmed work?



1. **Scientific** – designed by leading neuroscientists

2. **Adaptive** - in real time

3. **Intensive** – hard work

4. **Sustained** – 25 sessions

5. **Supported** – your coach will be there

6. **Targeted** – wm only

# What is working memory?



The ability to **keep information in your mind for a short period of time** (seconds) and be able to use the information in your thinking

A system for **temporary storage** and **manipulation** of **information**, necessary for wide range of cognitive tasks

**Working memory is the search engine of the brain**



# Working memory is an essential function in every day life



Manipulates **information**

**Delegates** task relevant responses

Allows us to **block** out unnecessary information

It keeps us updated on what's happening – and keeps us **focused** on what matters

# The research breakthrough – your working memory capacity is not fixed

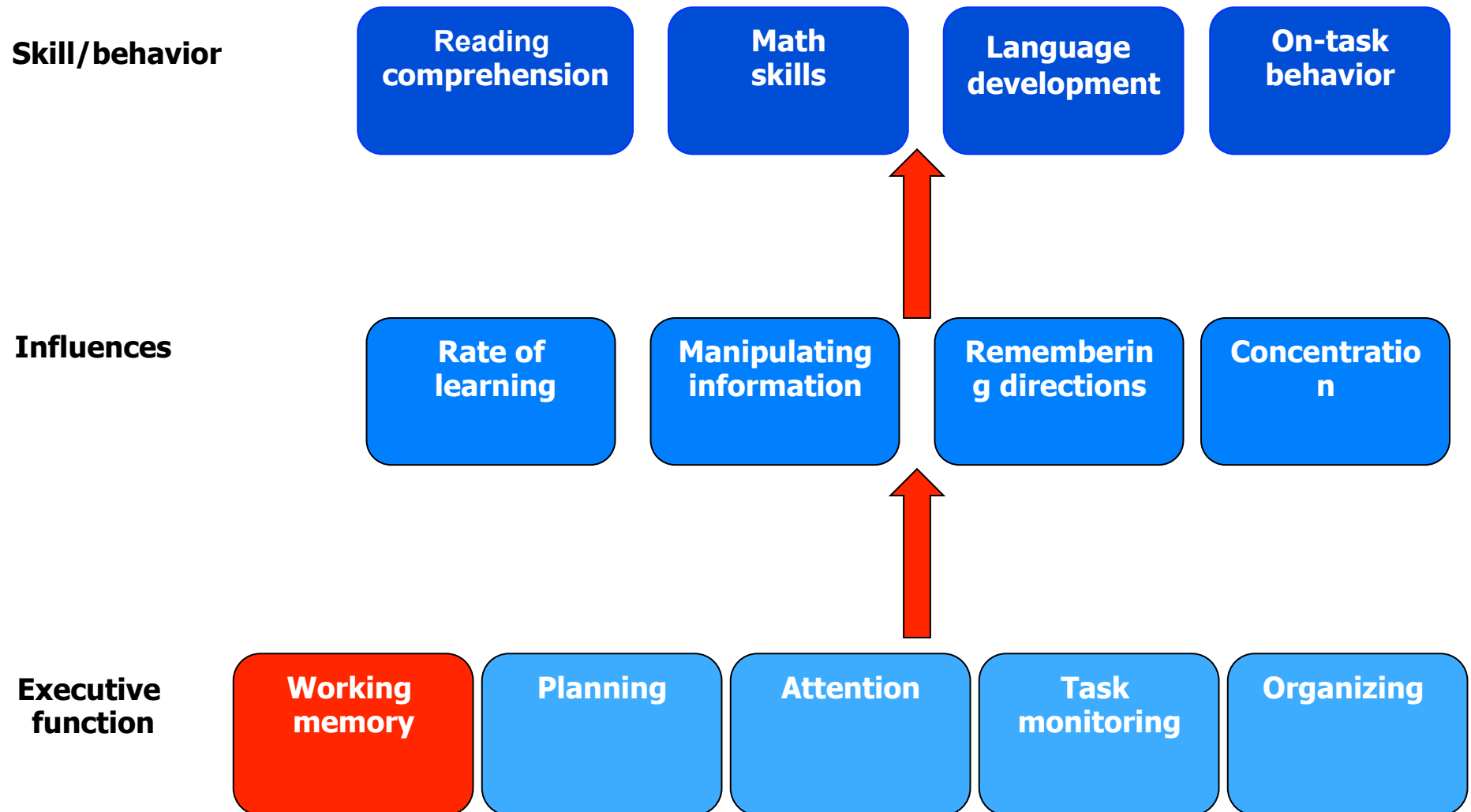
Working memory can be **improved** by **intensive** and **systematic training**

The improvement translates to **improved attention**

The effects are **strong** and **lasting**



# Working memory training acts on underlying levels



# Cogmed products have been tested in rigorous research

The **same products/protocols** used in real life are used in the **research**

The research uses **controlled studies** – eliminating **placebo effects**

The research is done at **leading universities**

- by Cogmed founders
- by **fully independent research teams**



*Read about the research at [cogmed.com/research](http://cogmed.com/research) to learn how our research stands out – and discuss with a professional you trust to get a second opinion.*

# WM training effects on reading in special needs children

*Reading and Writing*

Dahlin, 2011

Population: special needs children, ages 9 – 12 years

N = 57 (n = 42 in treatment group and n = 15 in control group [special needs class])

Design: Active control, Randomized, Blinded, Test-retest

T1 = Baseline, T2 = 5-6 week follow up, T3 = 6-7 month follow up



Treatment group **improved significantly on outcome measures:**

- 1) Visuo-spatial and verbal WM (Span Board; WAIS-NI & Digit Span; WISC III) (T2)
- 2) Reading comprehension (Reading narrative texts & answering questions) (T2 & T3)

Take Home: Cogmed WM training enhanced the WM capacity of special needs children sample and improved performance on reading comprehension task.

# Effects of working memory training on reading in children with special needs

(Karin I. E. Dahlin, 2010)

Examined the relationship between working memory and reading achievement in 57 school children with special needs.

Special needs: 33% had ADHD diagnosis, 60% rated inattentive by teachers & general learning problems

Significantly improved untrained working memory tasks, nonverbal problem solving & reading comprehension. Effect size for reading comprehension was  $d=.91$ , it was substantial.

**Take home:** Children with attention with special education needs and attention problems improved significantly on untrained working memory tasks, nonverbal problems solving and reading comprehension within the treatment group.

# WM training effects on reading in special needs children (II)

## *Reading and Writing*

### Dahlin, 2011

**Table 1** Descriptive statistics and ES (effect sizes) for cognitive and literacy measures in the treatment group and the control groups

Time	Treatment group						Control group						Effect sizes	
	T1		T2		T3		T1		T2		T3		T2-T1	T3-T1
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Psychological measures														
Span board forward	4.54	0.9	5.68	1.0	5.55	1.0	4.20	0.8	4.36	1.0	4.46	1.0	★ 0.98	0.74
Span board back	3.96	1.1	5.13	1.4	4.99	1.1	3.90	1.1	4.26	0.8	4.22	0.9	★ 0.71	0.62
Digit span forward	4.24	0.7	4.72	0.9	4.63	0.9	4.34	1.0	4.26	0.9	4.46	0.8	★ 0.66	0.33
Digit span back	3.02	0.7	3.71	1.0	3.34	1.1	2.92	0.9	3.04	0.7	2.84	0.8	★ 0.67	0.46
Stroop: time (s)	121.86	34.6	112.39	32.4	103.61	43.0	121.68	27.6	115.08	34.0	107.68	30.8	-0.06	-0.16
Raven; RCPM	27.23	5.0	29.68	4.7	29.90	4.5	24.80	3.7	26.44	4.2	27.84	4.4	0.26	-0.11
Literacy measures														
Word decoding	11.74	3.8	12.88	5.4	13.45	5.2	13.67	6.4	12.73	9.4	14.60	7.5	0.37	0.17
Orthographical verification	17.14	14.5	19.93	15.1	25.03	15.1	21.80	15.4	28.20	19.7	31.07	24.1	-0.39	-0.13
Reading comprehension	8.45	3.7	11.10	3.0	11.10	3.1	10.13	5.0	10.27	4.7	10.13	4.7	★ 0.88	0.91
WM-training measures														
Start scores (T1) and maximum scores (T2)	72.21	12.4	93.11	15.0	-	-	-	-	-	-	-	-	-	-

Control group, psychological measure = the Klingberg, et al. control group (2005) ( $n = 25$ ); control group, literacy measures = children in small groups in the present study ( $n = 15$ ); Treatment group ( $n = 41$ ); Dashes = no results completed

# Key research findings to date

1. Working memory is key to **attention**, executive function
2. Working memory can be **improved** by training, using right tool/protocol
3. Working memory can be improved at **all age levels**
4. The improvement can be tracked by on **three levels**: fMRI/PET, neuropsych testing, and by rating scales
5. Improved working memory **generalizes** to behavioral improvement
6. The behavioral improvement is **sustained**
7. Training effects are pronounced in **populations with a WM constraint**, effects not limited to ADHD



# Summary of key research

Study	Key learning
<u>Klingberg</u> , 2002	Children with ADHD improve on <u>neuropsych</u> tests after WM training
<u>Westerberg</u> , 2004	Working memory core deficit in ADHD
<u>Olesen</u> , 2004 (Nature Neuroscience)	Increased activity in brain, following training (instead of less)
<u>Klingberg</u> , 2005 (JAACAP)	2002 data validated, larger, multi-site, adding three months follow-up and rating scale data
<u>Westerberg</u> , 2007 (Brain Injury)	Adult victims of stroke improve in daily life and show far transfer after WM training
<u>Thorell</u> , 2008 (Developmental Science)	Pre-schoolers improve WM w/ near and far transfer, to better attention; inhibitory control training shows no result transfer/ generalization
<u>McNab</u> , 2009 (Science)	Healthy adults show that training changes dopamine D1 binding
<u>Holmes</u> , 2009 (Developmental Science)	Children with low WM improve attention and math, six months after training
(Holmes, 2009) (Applied Cognitive Psychology)	Six months lasting effects on WM in children with ADHD, wider effect on EF than stimulant medication

# Summary of key research cont.

Study	Key learning
<u>Mezzacappa</u> , 2010 (School Mental Health)	Children in low SES school setting improve WM and ADHD symptoms
<u>Dahlin</u> 2010 (Reading and Writing)	Special needs children improve reading comprehension
<u>Lundqvist</u> , 2010 (Brain Injury)	TBI/Stroke adults improve WM and performance at work in pre-defined areas of struggle
<u>Beck</u> , 2010 (Journal of Clinical Child & Adolescent Psychology)	ADHD children improve WM, EF, and ADHD symptoms in parent and teacher rating scales
Løhaugen, 2010 (The Journal of Pediatrics)	Children born at extremely low birth weight improve WM with transfer to verbal learning ability

# Who can benefit from Cogmed? Anyone constrained by their working memory



Children



Seniors



Adults

1. **Born** with a deficit

2. Acquired a deficit through brain **injury** or disease

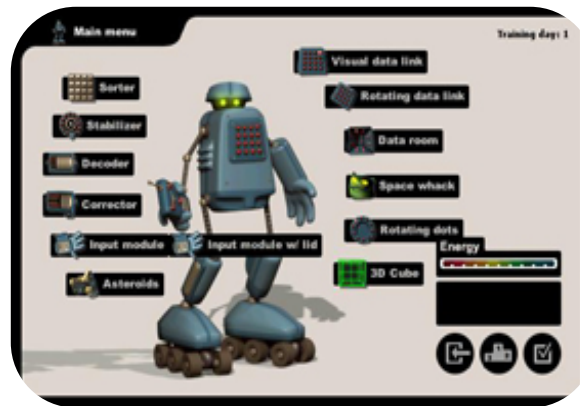
3. Developed a deficit through **natural decline** caused by age

**Experiencing a bottleneck due to wm overload**

# Three products for Cogmed training



Cogmed JM  
preschoolers



Cogmed RM  
school-age children



Cogmed QM  
adults

***All the products share the same underlying design – the only difference is in the user interface***

# Cogmed training – the basics

Training done **at home** on a **PC**

Supported by a **coach** from a **Cogmed practice**

**Five weeks** of training – **five times per week**  
(25 sessions)

Every session is **30-40 minutes**

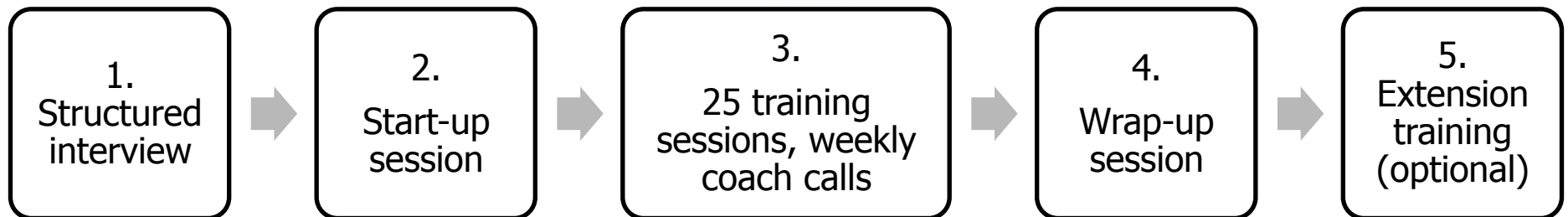
The results tracked online on the **Cogmed Training Web**

After intensive training: **Cogmed Extension Training**

*The Cogmed training method is designed to give all users the best possible chance for maximum training effects. More than 90% complete the training.*



# Cogmed is a highly structured, supportive process



# The Cogmed Network is ready to explain more - and to help you

Cogmed only available through **Cogmed Qualified Practices**

About **300** Cogmed Qualified Practices across **North America**

All practices and Cogmed coaches **trained by Cogmed**

All experienced in **assessing & helping people** with attention problems



*Listing of Cogmed Network  
is at **cogmed.com***