

Hospital relevant humor...

“I am not afraid of death, I just don't want to be there when it happens”



Improving concentration the fun way: A new approach to strengthen the focus of children and adults over the long-term



Background

- Clinical, Forensic, & Consulting Psychologist
- Licensed AZ Psychologist
- Researcher, practitioner, author, presenter
- Expert witness (development, assessment)
- Evidence-based focus
- Specialist in Assessment & Treatment

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Disclaimers

- No sponsorship
- No payment

The ultimate disclaimer



- If you disagree with what I have said, or find offense with any of my opinions, I will deny I was ever here, or ever said that.

Why am I here?

- Deep frustration with lack of methods
- Renowned expert: Dr. Barbara Ingersoll
 - **“Treating ADD/ADHD like trying to walk upstream”**

A brief introduction to...

Characteristics of population of people with ADHD-like behavior



The internal experience of those with ADHD/inattention

- More easily overwhelmed
- Lower frustration tolerance
- More distractible
 - E.g., completed work, but not turned in

Words used to describe the external presentation of those with ADHD

- Forgetful
- Misses details
- “Zones out”
- Lazy
- Noncompliant
- Oppositional



ADHD in adults

- Approximately 4-5%
- Ranges differ
- 30-60% continues from childhood

» CDC website statistics, 2009

ADHD- 3 types

1) Primarily Inattentive

2) Primarily Hyperactive

3) Combined type



How should we think about attention problems?

- Attention vs. concentration
- Categorical (diagnostic) vs. dimensional
- Today: Categorical within dimensional

ADHD-like behavior

- Quiet and masked
- Commonly misunderstood
- Cognitively nuanced



State of science

- Cause unknown; many hypotheses
- No cure as of yet
- Cutting edge: Neuroimaging > wiring roots?
- No diagnostic utility yet
- Hope: elucidate physiological Tx effects

The past, present, and future

Past

-depressing

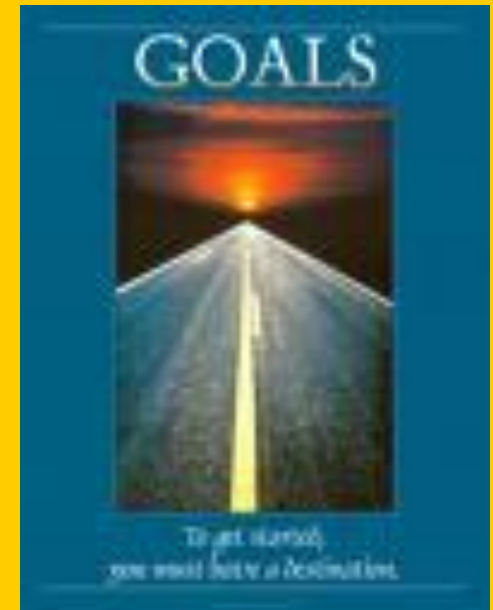
Now

-exciting convergence

Future is bright!



4 goals/steps



- Part 1: Outline CCR “revolution”
- Part 2: WM at heart of attention problems
 - Like the heart, responds to rehabilitation
- Part 3: A CCR example
 - Cogmed Working Memory Training (CWMT)
- Part 4: Safe passage through a research jungle

Bottom line goal!

- Asking better questions
- Know what questions to ask
- More insulated from weak information





Part I:

The CCR revolution

Many names

- Cognitive rehabilitation (CR)
 - Not necessarily w/ computer
- Subtype of CR:
 - Computer-based Cognitive Rehabilitation (CCR)



Similar goal: Exploit...

- Plasticity: “The ability to change; to modify as needed to meet some new situation or repair damage from some insult to a system”

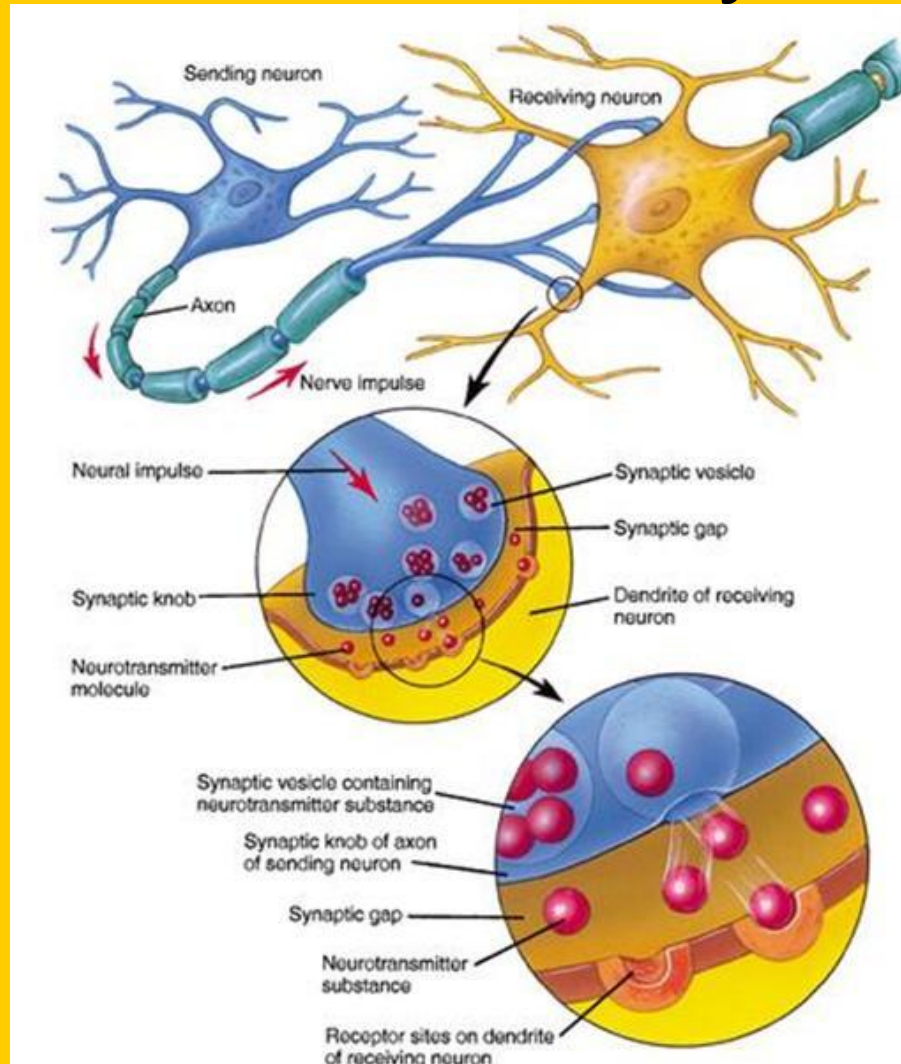
» Undsen, Brant, and Arias, 2009

&

- Neuroplasticity: “The brain’s ability to re-organize itself by forming new neural connections throughout life”

» Medicinenet.com, 2009

Microscopic view of neural connectivity



NeuroPlasticity: what we know

- 3 decades of research
 - Early 1980's cochlear implants
 - Early 1990s software programs for language and learning disabilities

...Heating up as I speak



- Michael Merzenich, PhD
- Co-founder and Chief Scientific Officer of Posit Science

What is so exciting?



Simple and extraordinarily complex: brain is not frozen or a closed system

-How and why? Scientific shovels digging

-Brain plasticity is a physical process (bridge) supporting behavior

-Gray matter can actually shrink or thicken, neural connections can be forged and refined or (conversely) weakened and severed.

-Changes in the physical brain manifest as changes in our abilities

e.g., New dance step=a change in our physical brains:

New “wires” (neural pathways) instruct bodies on how to perform

Forget name, brain change via degraded “wires”

Exciting (part 2)

- **Under the right circumstances older brain may be able to grow**
- **Key: identify brain mechanisms to target, and know how to exercise effectively.**
- **Identified relationship between sensory perception, memory and cognition, drive brain exercises**

CCR: Technology integration

- **Learning models**
 - E.g., Repeated trials
- &
- **Computer science**
 - E.g., video and learning games
- &
- **Brain Imaging techniques**
 - E.g., fMRI, PET scans



CCR: Variety

- Medical field
 - Stroke
 - Alzheimer's
- Psychological field
 - Autism/Asperger's (autismresearchcentre.com)
 - **ADD/ADHD**
- Public safety
 - Driving reaction time (e.g., Posit Science)

CCR: Relevance

- Parents/Adults/Seniors:
 - Treatment: Improve focus
 - Prevention: Way to prevent problems (e.g., Alzheimer's)
- Schools/Hospitals/Organizations:
 - Screen, train, or accelerate cognitive performance
- Treatment professionals:
 - Additional evidence-based approach

CCR-My Perspective...

- CCR is here to stay for awhile
- EBT's are coming if not already here
- Be a savvy critic



Door to a very large house

The Big Question...



- Can CCR's do something significant beyond what current treatments do for patients/students?
- Are any CCR's evidence-based methods?

The evidence-based movement in Psychology

- No one set of criteria!
(UGH!)
- Called many names:
 - Evidence-based
 - Empirically supported
 - Etc.



Machete needed!

The evidence-based movement in Psychology

- [Introduction](#)
 - [Anxiety Disorders & Stress](#)
 - [Borderline Personality Disorder](#)
 - [Childhood Disorders](#)
 - [Depression](#)
 - [Drug & Alcohol Abuse](#)
 - [Eating Disorders](#)
 - [Hair Pulling](#)
 - [Health-Related Problems](#)
 - [Marital Distress](#)
 - [Schizophrenia & Other Severe Mental Illnesses](#)
 - [Sexual Dysfunction](#)
 - [Disclaimer](#)
- Stringent scientific criteria
 - Tx's Pts better results vs. Non-Tx'd
 - Or, = to Pts w/ alternative Tx
 - Must be group of studies
 - Multiple scientists
 - Standardized procedures

http://www.apa.org/divisions/div12/rev_est/

Current EST's for ADHD



- Very limited
 - Compensatory, not invasive (ADHD coaching)
 - If invasive, effects may wane (medication)
- Bellweather for state of research
 - MTA by NIMH

The MTA Landmark



- www.nimh.nih.gov/.../nimh-research-treatment-adhd-study.shtml
- Largest study: Meds vs. behavioral
- 18 experts; 6 medical centers; 600 elementary: 7-9yo
- Uniqueness: large, mixed sample, state-of-the-art treatment, lengthy treatment period, the extensive documentation of treatment manuals, and treatment fidelity and adherence.
- Limitations: outcome was measured 4-6 months after the intensive phase of behavior treatment **but while** medication treatment was active and in its most intensive phase (methodological flaw).

MTA findings (12/99)

- ▼ Symptoms:
 - LT CMBD & Meds alone superior
- ▼ Collateral damage (e.g., oppositional)
 - CMBD superior
 - Lower doses with = effect
- Replicable across all six data sites

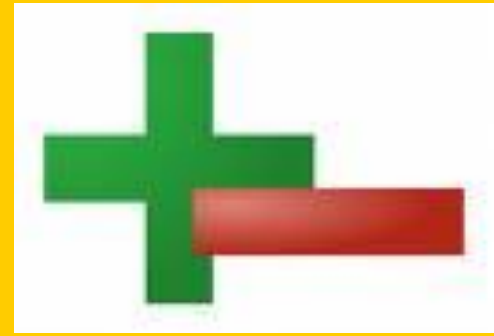


Medication review-MTA study

- Generally significant across age groups
- Effects waned over time (body “accommodates”)
- Effects on growth?
- 60% stopped taking within 8 years



Medication review-General



- Multiple positives
 - Stimulants do often improve WM (Mehta, 2004)
 - Addresses the nervous system (invasive)
 - Helps stabilize
 - Can help other methods “take” by providing a floor
 - Behavioral modification
- Problems
 - No carry over if stop taking (e.g., MTA study)
 - Body accomodates (e.g., MTA)
 - Switching common/side effects
 - Different reactions (MTA: immediate, gradual, none)

Bottom Line

High “Integrative Quality” or High IQ



Evidence-based (EB) approaches used by practitioners

Sound data

- Medication
- Behavioral modification (Positive Parenting)

Collateral/Common sense

- Organizational tactics (ADHD coaches)
- Psychoeducation - 504 or IEP?
- Exercise
- Better sleep
 - up to 25% misdiagnosed, did not have ADHD

Experimental approaches

- Neurofeedback (EEG feedback)
- Meditation
- Diet

What's missing?



3 reasons to see long shelf-life for CCR for ADHD-like problems



Reason #1: Direct assault

- A fundamental, skill-building focus on root
-automatic “hard-wired” tendency



Reason #2:



- Closer approximation to “real-world” learning environment –but quicker learning loops
 - Combine visual/spatial and auditory
 - Allow for precise measurement of responses
 - Perfectly standardized presentations
 - Automatic recording/analysis of data
 - You can’t cheat/bribe/slack off!!

Reason #3:

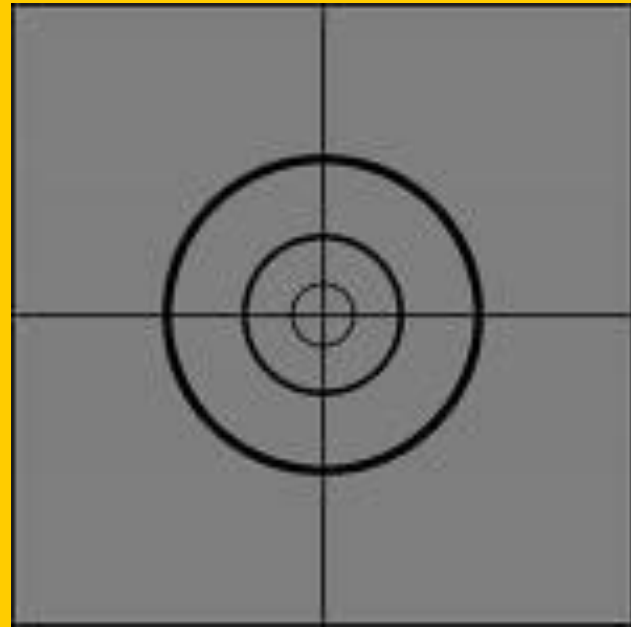
- Intelligent pacing;
calibrated development
 - Step-by-step, but relentless
 - Always pushing the edge
(adaptive algorithms)
 - **E.g. CWMT**



New things come and go, you need
to impress me...

Your additional rejoinder?

- My/Their brain works the way it does and always has, and always will
- We will target that!



Steps 2,3, and 4



- WM: The “heart” of attention (Part 2)
 - Like w/heart, can teach WM to handle more
- Example CCR – Cogmed (Part 3)
- Explosion > Need scientific lens (Part 4)

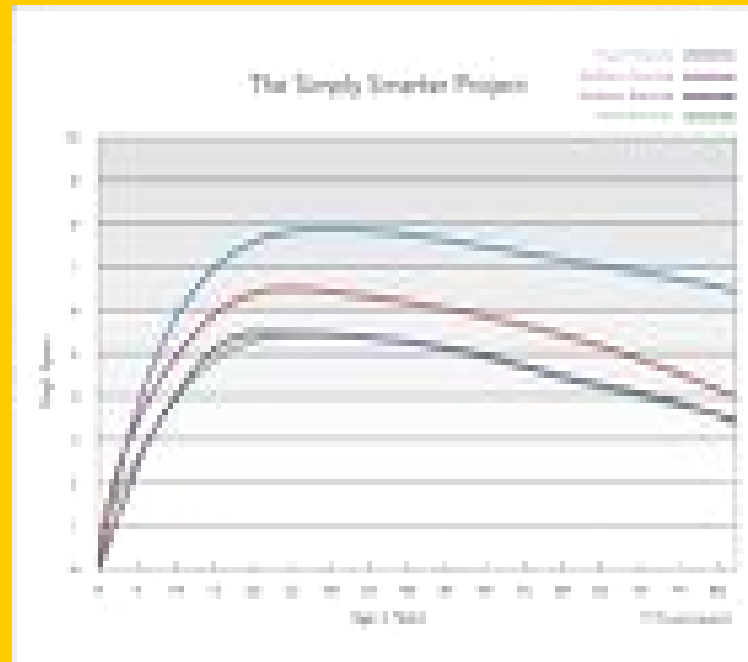
Working memory



- WM & learning link indisputable
- Examples:
 - WM/Reading
 - » Gathercole & Pickering, 2000
 - WM/Math
 - » Geary, et al., 2004
 - WM/future educ. success
 - » Gathercole, Brown, & Pickering, 2003

WM – In real life

- Lifespan ??????



Poor WM > Real world struggles

- Impaired focus and learning
- Lower 10%tile WM
 - Over 80% SIG Rdg/Math problems

(Homes, Gathercole, Dunning, 2009)



WM: At the “heart” of inattentiveness?

- WM is central to attention and concentration
- Review by Martinussen et al. (2005)
 - 46 studies on ADHD
 - 4 components of WM analyzed (C vs Non-C)
 - » Verbal, Spatial storage
 - » Verbal, Spatial C.E.
 - Highly statistically significant differences across all 4 areas



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WM-Attention/ADHD connection

- Convergent data is “piling up”
 - Wilcutt et al, 2005
 - Brocki et al., 2008
 - Marzocchi et al., 2008
 - Martinussen & Tannock, 2006



“WM Model” of ADHD

- Barkley, 1997
- Rapport et al., 2000, 2001, 2008
- Castellanos & Tannock, 2002
- Klingberg, 2005



WM-Concrete examples

- remembering what to do next (i.e. recipe in head while cooking)
- problem-solving (holding pieces of information simultaneously)
- keeping all parts of number in memory while calculate ($34,567 \times 4$)
- reading and remembering what read (longer sentences)
- sequencing a task, steps of a task in a certain order
- focusing without being distracted (cocktail party effect)
- planning, organizing and structuring life





Part 3-

Example of a scientific CCR
approach for treating
WM
problems

Can we “retrain” working memory?

- Neuroimaging studies
 - WMT=▲ frontal/parietal activation helps WM
 - WMT=▲ trained tasks & STM tasks
 - w/youth with ADHD + adult stroke patients

» Holmes,
Gathercole,
Dunning, 2009



Cogmed (i.e., CWMT)

- The Story



- Original idea, prototype, funding
 - Karolinska Institute, Stockholm, Sweden
 - Founded by Torkel Klingberg, MD, PhD
 - Funded by Karolinska Development AB
- Research proposals worldwide
- Collaboration style: no payments

Cogmed-Current status

- Breakthrough in basic research (1999)
- Research into clinical reality
- Wide research use

Cogmed-the technique & video

- 30-40 min training/day
- 5 days/week
- 5 weeks long
- Adaptive algorithm
- Internet based feedback



Cogmed - the process

- Used via local practitioner
- Careful screening
- Weekly monitoring
- Summary report
- Follow-up
- Refresher if necessary

Centralized database



CWMT-scientific literature

- XX peer-reviewed journal articles

http://cogmedresearch.com/?page_id=51

- XX ongoing research projects

http://cogmedresearch.com/?page_id=56

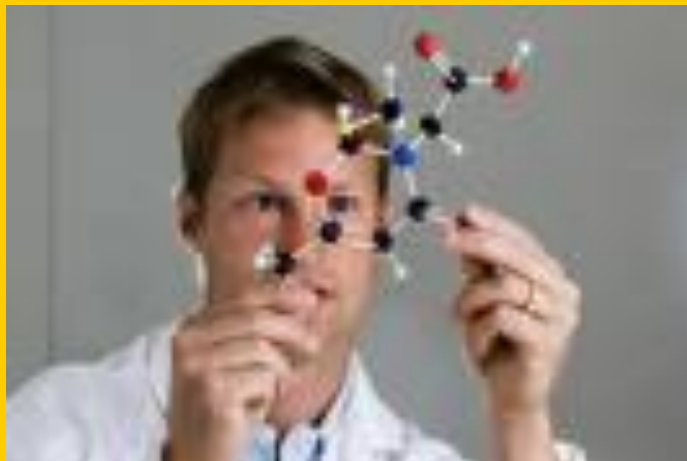
- Few funded by Cogmed company

Training Curve N=450

105					
100					
95					
90					
85					
80					
75					
70					
65					
60					
	0-4	5-9	10-14	15-19	20-24

Days of Training

CWMT-Stature of researchers



- **International** (Sweden+European+US)
- Harvard, Duke, NYU, Stanford, ND

CWMT-Dr. Barbara Ingersoll's report on her patients

- Of > 150 children/adults following Cogmed:
 - More organized; room neater; better personal grooming routine
 - Remembers directions, routines (e.g. takes medication without reminders; maintains assignment book, turns in homework)
 - Improved frustration tolerance
 - better focus, can re-focus if attention starts to wander
 - Self-initiates chores and tasks, without nagging or reminders
 - Better reading comprehension, retention, and retrieval, with resulting improvement in test performance
 - Able to master math facts more easily
 - Greater self-confidence, more responsible, improved social interaction

Do you know how I am known?

- The “Grand Inquisitor”
- A “Doubting Thomas”



Why do I respect the CogMed approach? (A)

- Scientifically derived (placebo controlled, double blind, replicated, peer reviewed)
- Not overselling, no miracle cure
- Systematic, “roll up your sleeves”
- Blooming body of studies
 - 80 ongoing, 40 published
- Constant feedback via measurable progress

Why do I respect the CogMed approach? (B)

- Integrated, tightly woven data system
- 79% sustainable at least 6 months out
- Real world correlations from diverse data
 - school improvement (grades)
 - teacher and parent ratings
- **High** probability: EBT of future

CWMT-Relative place



- Prediction: EBT of future
- Now: Sound floor to consider
- May consider as an adjunct to medication
- Cannot rule out as 1st line of intervention
 - e.g., - minimal attention problem
 - enhance memory

Hmmmm...

So what if there has
been this
revolution?

So what if you
respect cogmed?

I still have lots of
questions...



Part 4: The research jungle

- Internet levels playing field for information access...



- **BUT**: “Consider the internet an enemy weapons system”

-JR Guthrie



Remember...

- Decide for yourself
- Do not rush treatment decisions
- Professionals treat and consult
 - i.e, you can get information w/o committing to any treatment

Where is the

WISDOM

We have Lost in

KNOWLEDGE

?