Multidimensional Assessment of Executive Function Across the Life Span: From Theory to Practice

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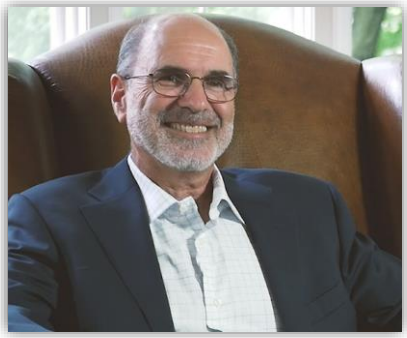

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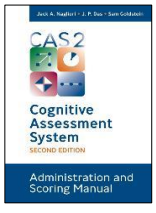
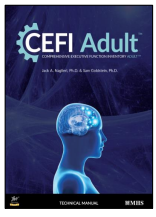
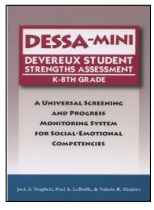
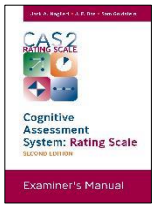
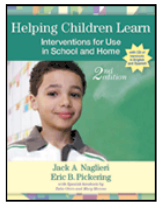
Resources and Disclosures

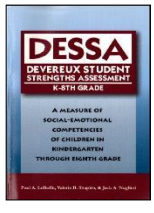












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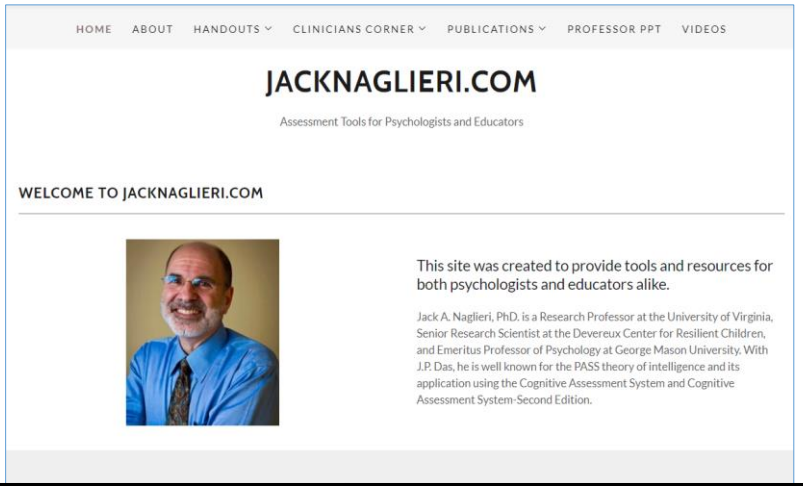
Visit online for more information including:

- General information
- Copies of presentations, research and book chapters
- To ask a question



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Why this session on EF?

- Executive Function (EF) is the most important ability we have, because it provides us a way to decide ***how to do what we choose to do to achieve a goal***
- The best news is that EF **can be taught**
- Instruction that improves EF will affect a person's ability to learn, their behavior, and their social skills.
- Improving EF will change an individual's life

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Goal of this presentation

Describe a comprehensive approach to understanding and assessing EF

Behaviors related to Cognition	Behaviors related to Social-Emotional Skills	Academic and job skills
Neurocognitive Ability is the foundation		

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Presentation Outline

- Introduction to Executive Function (EF)
- EF Behaviors
- EF and Cognition (intelligence)
- EF and Social Emotional Skills
- EF and Academic/Job Performance
- Research about EF as ability, behavior, and SE
- Conclusions

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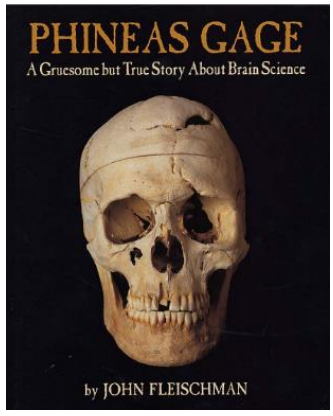
The Curious Story of Phineas Gage

John Fleischman's book "Phineas Gage: A Gruesome but True Story About Brain Science" is an excellent source of information about this person, his life, and how this event impacted our understanding of how the brain works; and particularly the frontal lobes.



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The Curious Story of Phineas Gage

- September 13, 1848 26 year old Phineas Gage was in charge of a railroad track construction crew blasting granite bedrock near Cavendish, Vermont
- The job Phineas has is to use a "tamping iron" to set explosives
- The tamping iron is a rod about 3 ½ feet long weighing 13 ½ lbs pointed at one end

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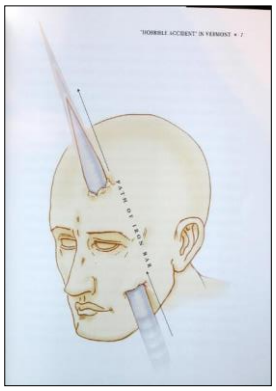
Fleishman (2002, p 70)

- From Damasio (1994) article in *Science*
- The rod passed through the left frontal lobe, between the two hemispheres, then to left hemisphere
- The damage was to the front of the frontal cortex more than the back, and the underside more than the top



Fleishman (2002)

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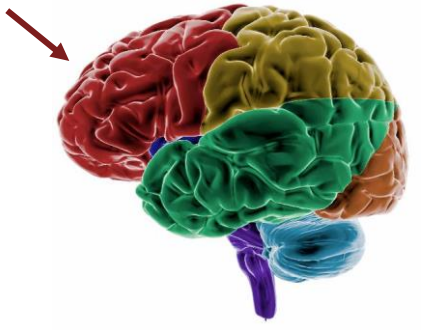
A Bit of EF Neuroanatomy

- The case of Phineas Gage led to a better understanding of the frontal lobes; in particular the pre-frontal cortex.
- Rich cortical, sub-cortical and brain stem connections.



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More Specifically

- The dorsolateral prefrontal cortex is involved with the ability to plan, shift set, organize remember and solve novel problems.
- That is: planning and decision making, self monitoring, self correction, especially when responses are not well-rehearsed or contain novel sequences of actions.

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Before . . . & . . . After

Before the accident 'he possessed a well-balanced mind, was seen as a shrewd, smart business man, very energetic and persistent in executing all his plans of operation' (p 59)

After the accident his ability to direct others was gone, he had considerable trouble with:

- Thinking
- Behaviors
- Work
- Social-emotional

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Frontal Lobes and Executive Function(s)

What do we mean by the term Executive Function(s)?

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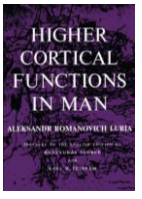
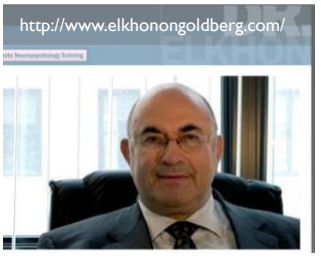
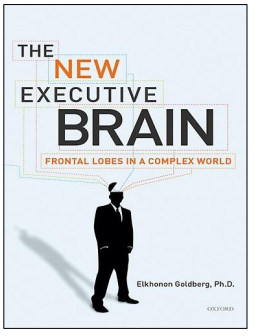
Executive Functions

- In 1966 Luria first wrote and defined the concept of Executive Function (EF)
  - Elkhonon Goldberg provides a valuable review of what the frontal lobes do
  - Describes EF as the orchestra leader







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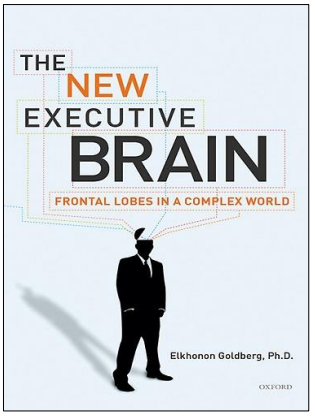
Goldberg (2009, p. 4)

- "The frontal lobes … are linked to intentionality, purposefulness, and complex decision making."
- They make us human, and as Luria stated, are "the organ of civilization"
- Frontal lobes are about …"leadership, motivation, drive, vision, self-awareness, and awareness of others, success, creativity, sex differences, social maturity, cognitive development and learning…"



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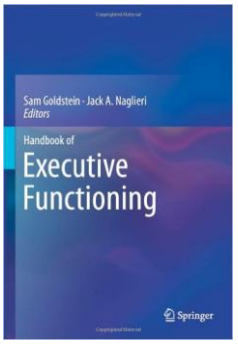
What is Executive Function(s)

There is no formal accepted definition of EF

- We typically find a vague general statement of EF (e.g., goal-directed action, cognitive control, top-down inhibition, effortful processing, etc.).
- Or a listing of the constructs such as
  - Inhibition, Working Memory,
  - Planning, Problem-Solving,
  - Goal-Directed Activity, Strategy Development and Execution,
  - Emotional Self-Regulation, Self-Motivation
- Goldstein, Naglieri, Princiotta, & Otero (2013)
  - Found more than 30 definitions of EF!



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Executive Function

- EF is a **unitary** construct (Duncan & Miller, 2002; Duncan & Owen, 2000).
- EF is **unidimensional** in early childhood not adulthood.
- Both views are supported by some research (Miyake et al., 2000) EF is a **unitary construct … but with partially different components**.

Executive Functions

- EF has **three components**: *inhibitory control, set shifting (flexibility), and working memory* (e.g., Davidson, et al., 2006).
- Executive Function**s** is a **multidimensional** model (Friedman et al., 2006) with independent **abilities** (Wiebe, Espy, & Charak, 2008).

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Executive Function(s)

- Given all these definitions of EF(s) we wanted to address the question…

  Executive Function***s …*** or

  Executive Function?
- One way to answer the question is to research the factor structure of EF behaviors
- Factor structure of the Comprehensive Executive Function Inventory (CEFI), and the Comprehensive Executive Function Inventory Adult (CEFI Adult)

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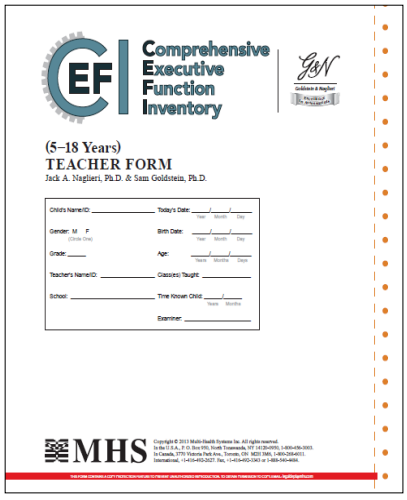
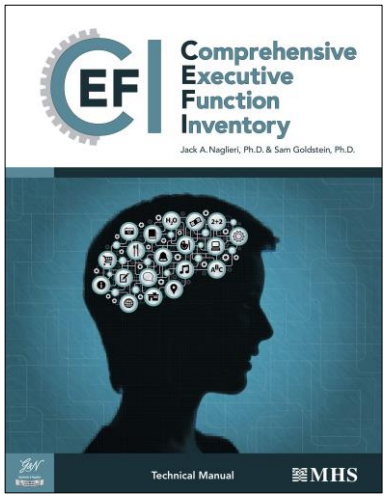
CEFI (Naglieri & Goldstein, 2012)





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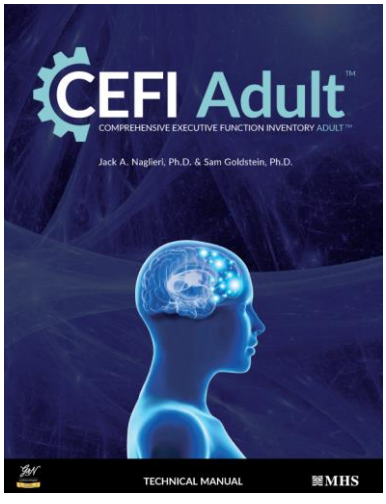
CEFI Adult (Naglieri & Goldstein, 2017)



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Exploratory Factor Analysis

- The normative samples for parent, teacher, and self ratings were randomly split into two samples and EFA conducted using
  - the item raw scores
  - nine scales' raw scores
- The sample …

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CEFI Standardization Samples

- Sample was stratified by
  - Sex, age, race/ethnicity, parental education level (PEL; for cases rated by parents), geographic region
  - Race/ethnicity of the child (Asian/Pacific Islander, Black/African American/African Canadian, Hispanic, White/Caucasian, Multi-racial by the rater
  - Parent (N=1,400), Teacher (N=1,400) and Self (N=700) ratings were obtained

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Factor Analysis

Item Level Analysis

- For the ***first half*** of the normative sample (Parent, Teacher and Self ratings') **item scores** (90 items) used in factor analysis

Scale Level Analysis

- Using the ***second half*** of the normative sample EFA was conducted using raw scores for the following scales:
  - Attention
  - Emotion Regulation
  - Flexibility
  - Inhibitory Control
  - Initiation
  - Organization
  - Planning
  - Self-Monitoring
  - Working Memory

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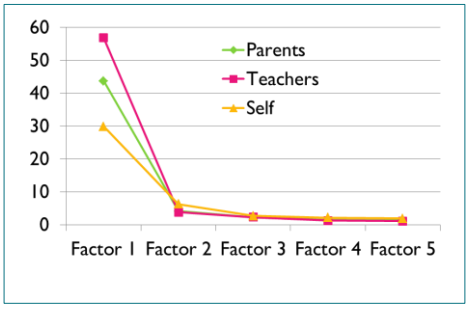
Item Factor Analyses

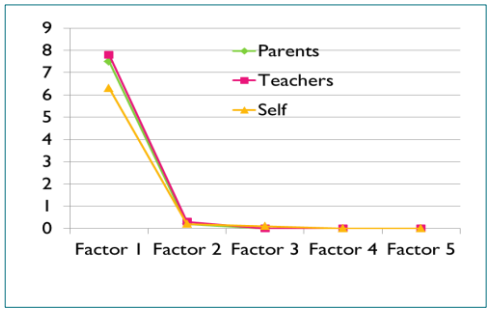


Eigenvalues from the Inter-Item Correlations

Form	Factor						
	1	2	3	4	5	6	7
Parent	43.7	4.1	2.3	1.5	1.3	1.3	1.0
Teacher	56.8	3.8	2.3	1.3	1.1	1.1	0.8
Self-Report	29.9	6.3	2.7	2.1	1.9	1.8	1.5

Note. Extraction method: Principal Axis Factoring. Only the first 10 eigenvalues are presented.

Scale Factor Analyses



Eigenvalues of the CEFI Scales Correlations

Form	Factor						
	1	2	3	4	5	6	7
Parent	7.5	0.2	0.0	0.0	0.0	0.0	0.0
Teacher	7.8	0.3	0.0	0.0	0.0	0.0	0.0
Self-Report	6.3	0.2	0.1	0.0	0.0	0.0	-0.1

Note. Extraction method: Principal Axis Factoring.

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Exploratory Factor Analysis

Consistency of Factor Loadings Across Groups

Grouping Factor	CEFI Form	Coefficient of Congruence
Gender	Parent	.999
	Teacher	.999
	Self-Report	.992
Race/Ethnic Group	Parent	.996
	Teacher	.999
	Self-Report	.995
Age	Parent	.999
	Teacher	.999
	Self-Report	.995
Clinical/ Educational	Parent	.993
	Teacher	.994
	Self-Report	.976

Nearly identical factor solutions (ALL ONE FACTOR) by Gender, Race/Ethnic Group, Age and Clinical/Educational status

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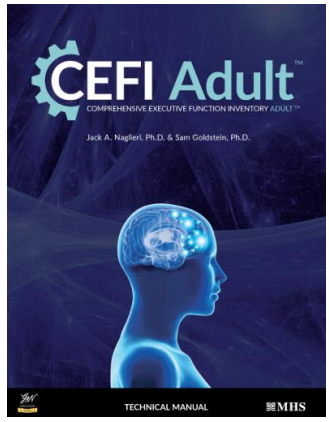
Factor Analysis of the CEFI Adult

- Same scale structure as CEFI
- Full Scale
  - Attention
  - Emotion Regulation
  - Flexibility
  - Inhibitory Control
  - Initiation
  - Organization
  - Planning
  - Self-Monitoring
  - Working Memory



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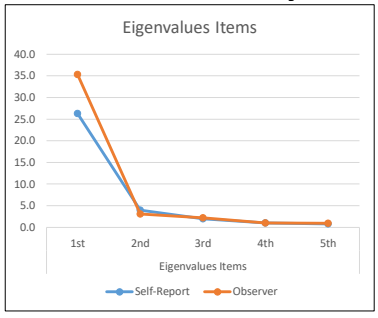
CEFI Adult Self (N = 1,600) & Observer (N = 1,600)

Item Factor Analyses

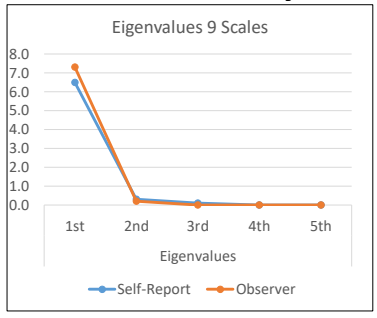


Eigenvalues from the Inter-Item Correlations

Form	1st:2nd	Factor								
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Self-Report	6.7	26.3	4.0	2.0	1.0	0.8	0.7	0.6	0.5	0.5
Observer	11.3	35.3	3.1	2.2	1.0	0.9	0.8	0.7	0.5	0.5

Note. Extraction method: Principal Axis Factoring. Only the first 9 eigenvalues are presented.

Scale Factor Analyses



Eigenvalues from the CEFI Adult Scales Correlations

Form	1st:2nd	Factor								
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th
Self-Report	21.7	6.5	0.3	0.1	0.0	0.0	0.0	-0.1	-0.1	-0.1
Observer	32.7	7.3	0.2	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1

Note. Extraction method: Principal Axis Factoring.

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CEFI Adult Consistency of Loadings

Consistency of Factor Loadings Across Groups

Exploratory factor analysis (EFA) was used to examine the replicability of the unidimensional factor structure of the CEFI Adult across several demographic groups (gender, age, race/ethnicity, and clinical status). The EFA procedure was conducted for each demographic group to determine if the factor structure was consistent across genders (males vs. females), ages (below vs. at or above the normative mean of 50), race/ethnicity (broken down into White vs. non-White to allow large enough sample sizes to detect differences), and clinical status (non-clinical vs. clinical). The factor loadings of the items were correlated across groups to compute the coefficient of congruence (Abdi, 2010); results revealed a very high degree of consistency across all groups (see Table 8.6), indicating that the unidimensionality of the CEFI Adult generalized across the demographic groups.

Consistency of Factor Loadings Across Groups

Grouping Factor	CEFI Adult Form	Coefficient of Congruence	Group 1		Group 2	
			Level	N	Level	N
Gender	Self-Report	.998	Male	795	Female	865
	Observer	.999	Male	795	Female	865
Racial/Ethnic Group	Self-Report	.997	White	1,153	Non-white	507
	Observer	.999	White	1,154	Non-white	506
Age	Self-Report	.997	Under 50 years	840	50+ years	820
	Observer	.999	Under 50 years	840	50+ years	820
Clinical Status	Self-Report	.993	Non-clinical	1,501	Clinical	159
	Observer	.996	Non-clinical	1,497	Clinical	163

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Exploratory Factor Analysis

Conclusions

- From nationally representative samples aged 5 to 80 years (N = 6,700) indicates that Executive Function behaviors are best seen as one factor
  - CEFI: Parent (N=1,400), Teacher (N=1,400) and Self (N=700),
  - CEFI Adult: Self (N = 1,600) and Observer (N = 1,600) ratings

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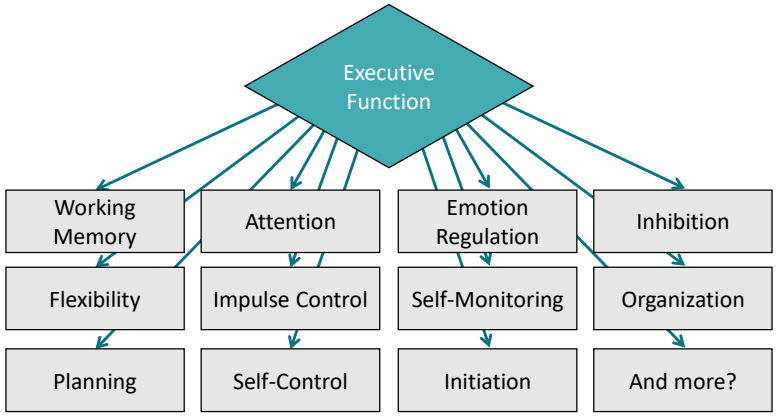
EF and its components

Abilities, cognitive processes, and behaviors



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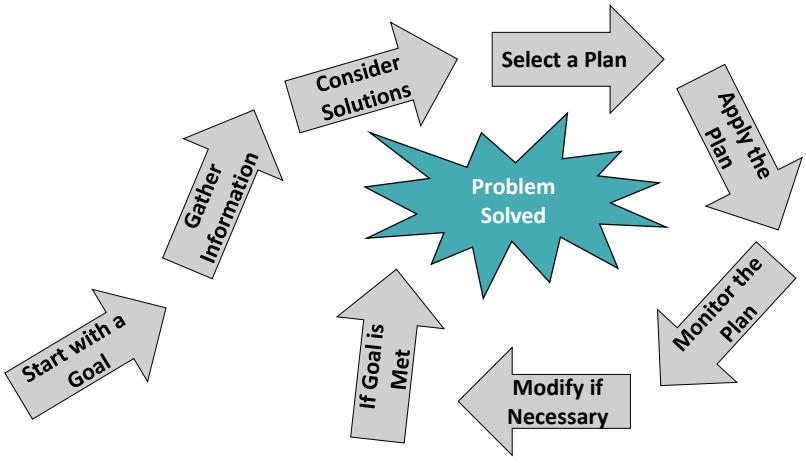
Naglieri & Goldstein, 2012

Executive Function is: ***how*** **you do what you decide to do**



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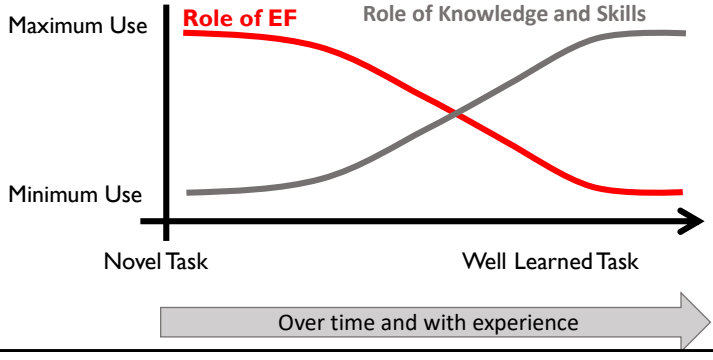
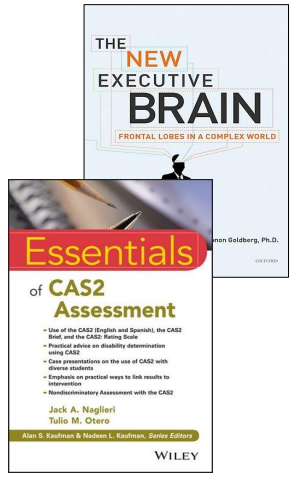
EF's Learning Curves (Naglieri & Otero, 2017)

- Learning depends upon instruction and EF
- At first, EF plays a major role in learning (see Goldberg, 2009, p. 90)
- When a new task is learned and practiced it becomes a skill and execution requires less EF (see Naglieri & Otero, 2017, p. 117)





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Executive Function Involves

"*How* you do what *you* decide to do" demands…

- **Initiation** to achieve a goal, **planning** and **organizing** parts of a task, **attending** to details to notice success of the solution, keeping information in **memory**, having **flexibility** to modify the solution as information from **self-monitoring** is received and demonstrating **emotion regulation** (which also demands **inhibitory control**) to ensure clear thinking so that the task is completed successfully.

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QUESTIONS

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Presentation Outline

- Introduction to Executive Function (EF)
- EF Behaviors
- EF and Cognition (intelligence)
- EF and Social Emotional Skills
- EF and Academic/Job Performance
- Research about EF as ability, behavior, and SE
- Conclusions

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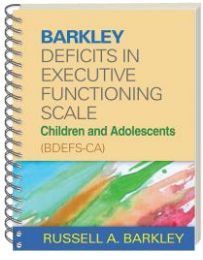
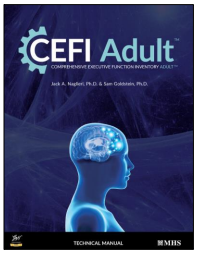
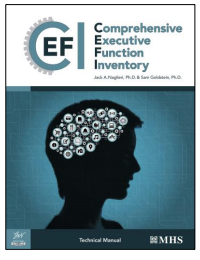
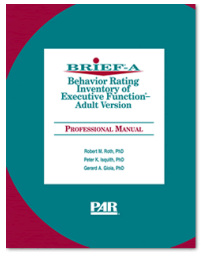
Psychometrics of EF Rating Scales

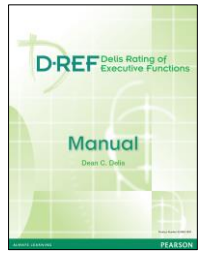
Some published rating scales











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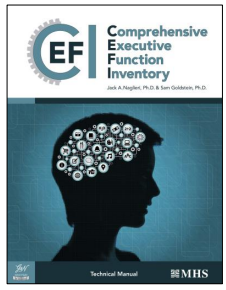
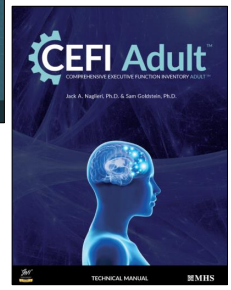
CEFI and the CEFI Adult

- **Strength based** EF measures
- Items are **positively** worded
- Higher scores = **good** behaviors related to EF
- Scores set at mean of **100**, SD of **15**
- CEFI: Ages 5-18 years rated by a parent, teacher, or the child/youth
- CEFI Adult: Ages 18+ years rated by the adult or an observer





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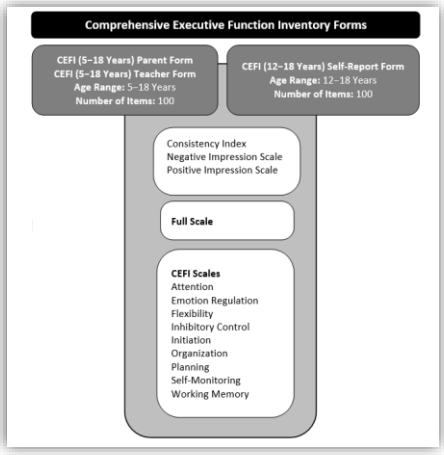
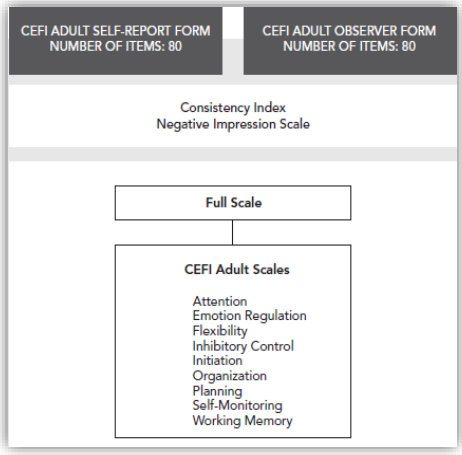
CEFI & CEFI-Adult Scales





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One Factor and 9 Scales?

- EF is a unidimensional concept
- Use the Full Scale to answer the question "Is the individual poor in EF or not?"
- Use the 9 scales to identify the specific groups of items that represent 9 different types of behaviors that can be addressed by Intervention

CEFI Scales	CEFI Adult Scales
Attention	Attention
Emotion Regulation	Emotion Regulation
Flexibility	Flexibility
Inhibitory Control	Inhibitory Control
Initiation	Initiation
Organization	Organization
Planning	Planning
Self-Monitoring	Self-Monitoring
Working Memory	Working Memory

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CEFI Full Scale and Treatment Scores

Illustration of Executive Function Weakness and Strengths on the CEFI (5–18 Years) Teacher Form

CEFI Scales	Standard Score		Difference From Youth's Average	Statistically Significant? (Yes/No)	Executive Function Strength/Weakness	90%/95% (circle one) Confidence Interval	Percentile Rank	Classification
Attention (AT)	95	+	- 6.7	Yes	-	90 to 100	37	Average
Emotion Regulation (ER)	82	+	- 19.7	Yes	Weakness	77 to 90	12	Low Average
Flexibility (FX)	112	+	10.3	Yes	Strength	103 to 118	79	High Average
Inhibitory Control (IC)	99	+	- 2.7	No	-	93 to 105	47	Average
Initiation (IT)	120	+	18.3	Yes	Strength	112 to 125	91	Superior
Organization (OG)	99	+	- 2.7	No	-	93 to 105	47	Average
Planning (PL)	101	+	- 0.7	No	-	96 to 106	53	Average
Self-Monitoring (SM)	102	+	0.3	No	-	95 to 109	55	Average
Working Memory (WM)	105	=	3.3	No	-	99 to 111	63	Average
Sum of Standard Scores	915	÷9	= 101.7	Youth's Average				

Note. Differences from the Child's/Youth's Average are significant at $p < .10$.

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CEFI Adult Full Scale and Treatment Scores

Example of Executive Function Strengths and Weaknesses on the CEFI Adult Self-Report Form: Computerized Interpretive Report

CEFI Adult Scales							
Scale	**Standard Score**	**90% Confidence Interval**	**Percentile Rank**	**Classification**	**Difference From Average (91.6)**	**Statistically Significant?**	**Executive Function Strength/Weakness**
Attention	100	90–110	50	Average	8.4	No	—
Emotion Regulation	104	93–113	61	Average	12.4	Yes	—
Flexibility	119	106–125	90	High Average	27.4	Yes	Strength
Inhibitory Control	90	82–101	25	Average	-1.6	No	—
Initiation	84	78–96	14	Low Average	-7.6	No	—
Organization	88	82–97	21	Low Average	-3.6	No	—
Planning	78	73–93	7	Below Average	-13.6	Yes	Weakness
Self-Monitoring	92	83–103	30	Average	0.4	No	—
Working Memory	69	65–84	2	Well Below Average	-22.6	Yes	Weakness

Note. Differences from the client's average (91.6) are significant at $p < .10$.

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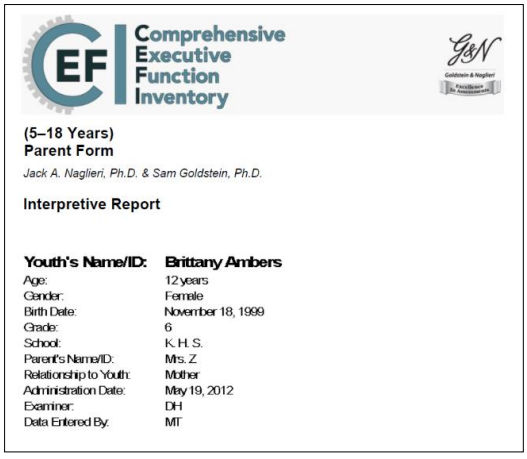
CEFI and CEFI Adult Interpretive Reports



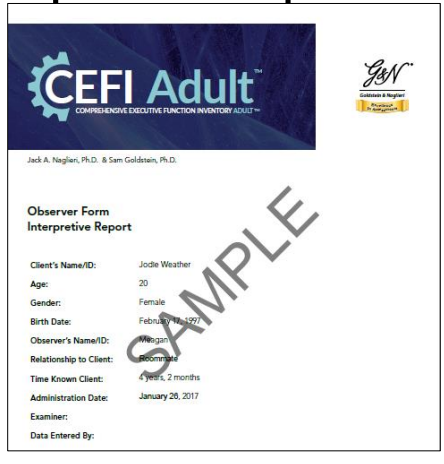
Comprehensive Executive Function Inventory

(5–18 Years)
Parent Form

Jack A. Naglieri, Ph.D. & Sam Goldstein, Ph.D.

Interpretive Report

Youth's Name/ID:	**Brittany Ambers**
Age:	12 years
Gender:	Female
Birth Date:	November 18, 1999
Grade:	6
School:	K. H. S.
Parent's Name/ID:	Mrs. Z
Relationship to Youth:	Mother
Administration Date:	May 19, 2012
Examiner:	DH
Data Entered By:	MT



CEFI Adult
COMPREHENSIVE EXECUTIVE FUNCTION INVENTORY ADULT

Jack A. Naglieri, Ph.D. & Sam Goldstein, Ph.D.

Observer Form
Interpretive Report

SAMPLE

Client's Name/ID:	Jodie Weather
Age:	20
Gender:	Female
Birth Date:	February 7, 1997
Observer's Name/ID:	Meagan
Relationship to Client:	Roommate
Time Known Client:	4 years, 2 months
Administration Date:	January 26, 2017
Examiner:	
Data Entered By:	

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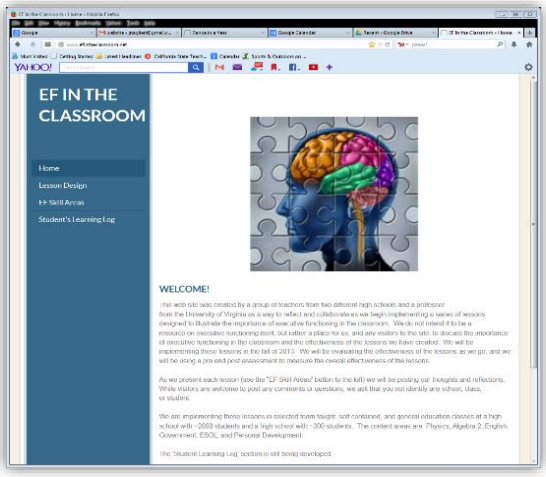
First lesson plan is "thinking about thinking"



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Interventions for EF Behaviors

CEFI Scales

- Attention
- Emotion Regulation
- Flexibility
- Inhibitory Control
- Initiation
- Organization
- Panning
- Self-Monitoring
- Working Memory

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- Sustained Attention
- Emotional Control
- Cognitive Flexibility
- Response Inhibition
- Task Initiation
- Organization
- Planning
- Response Inhibition
- Working Memory

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QUESTIONS

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Presentation Outline

- Introduction to Executive Function (EF)
- EF Behaviors
- EF and Cognition (intelligence)
- EF and Social Emotional Skills
- EF and Academic/Job Performance
- Research about EF as ability, behavior, and SE
- Conclusions

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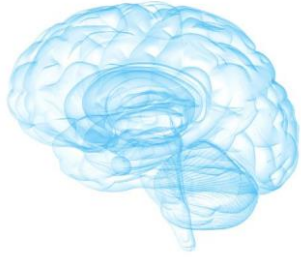
EF is a Brain-Based Ability

- EF is an ability (type of intelligence) by virtue of its relationship to the brain
- If we define intelligence from a neurocognitive perspective
- But note that EF is not measured by traditional IQ tests



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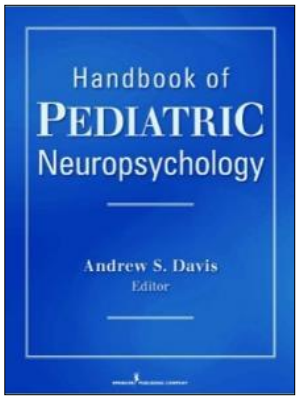
A Theory of Learning



28 **Cognitive Assessment System: Redefining Intelligence From a Neuropsychological Perspective**

Jack A. Naglieri and Tulio M. Otero

INTRODUCTION

Pediatric neuropsychology has become an important field for understanding and treating developmental, psychiatric, psychosocial, and learning disorders. By addressing both brain functions and environmental factors intrinsic in complex behaviors, such as thinking, reasoning, planning, and the variety of executive capacities, clinicians are able to offer needed services to children with a variety of learning, psychiatric, and developmental disorders. Brain–behavior relationships are investigated by neuropsychologists by interpreting several aspects of an individual's cognitive, language, emotional, social, and motor behavior. Standardized instruments are used by neuropsychologists to collect information and derive inferences

Such tools should not only evaluate the underlying processes necessary for efficient thinking and behavior but also provide for the development of effective interventions and address the question of prognosis.

FROM NEUROPSYCHOLOGY THEORY TO ASSESSMENT

Luria's theoretical account of dynamic brain function is perhaps one of the most complete (Lewandowski & Scott, 2008). Luria conceptualized four interconnected levels of brain–behavior relationships and neurocognitive disorders that the clinician needs to know: the structure of the brain, the functional organization based on structure,

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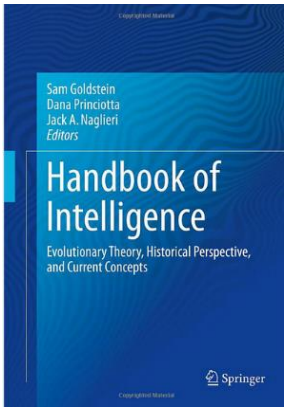
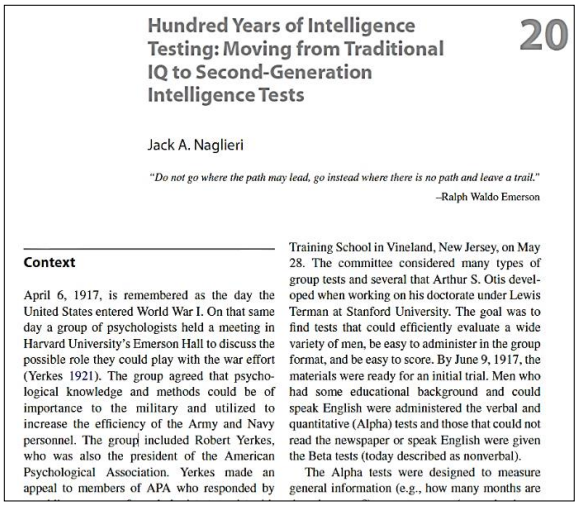
100 Years of Intelligence and IQ





Hundred Years of Intelligence Testing: Moving from Traditional IQ to Second-Generation Intelligence Tests 20

Jack A. Naglieri

"Do not go where the path may lead, go instead where there is no path and leave a trail."
–Ralph Waldo Emerson

Context

April 6, 1917, is remembered as the day the United States entered World War I. On that same day a group of psychologists held a meeting in Harvard University's Emerson Hall to discuss the possible role they could play with the war effort (Yerkes 1921). The group agreed that psychological knowledge and methods could be of importance to the military and utilized to increase the efficiency of the Army and Navy personnel. The group included Robert Yerkes, who was also the president of the American Psychological Association. Yerkes made an appeal to members of APA who responded by

Training School in Vineland, New Jersey, on May 28. The committee considered many types of group tests and several that Arthur S. Otis developed when working on his doctorate under Lewis Terman at Stanford University. The goal was to find tests that could efficiently evaluate a wide variety of men, be easy to administer in the group format, and be easy to score. By June 9, 1917, the materials were ready for an initial trial. Men who had some educational background and could speak English were administered the verbal and quantitative (Alpha) tests and those that could not read the newspaper or speak English were given the Beta tests (today described as nonverbal).

The Alpha tests were designed to measure general information (e.g., how many months are

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A Neurocognitive Test Measures Thinking not Knowledge

What does the examinee have to **know** to complete a task?

- This is dependent on *instruction*

How does the examinee have to **think** to complete a task?

- This is dependent on the *brain – 'basic psychological processes'*
- Some thinking involves executive function and some does not

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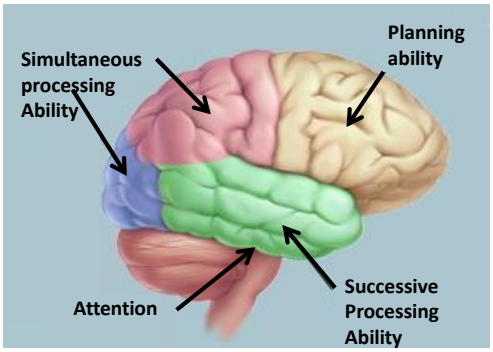
Brain, Cognition, & Behavior

- The brain is the seat of abilities called PASS
- These abilities comprise what has been described as a modern view of intelligence (Naglieri & Otero, 2011)

Naglieri, J. A. & Otero, T. (2011). Cognitive Assessment System: Redefining Intelligence from A Neuropsychological Perspective. In A. Davis (Ed.). *Handbook of Pediatric Neuropsychology (320-333)*. New York: Springer Publishing.



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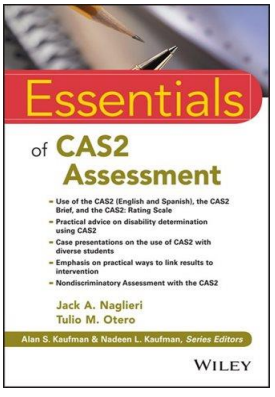
IQ defined by BRAIN function

- **PASS** theory is a modern way to define 'ability' (AKA – intelligence)
- **P**lanning = THINKING ABOUT THINKING
- **A**ttention = BEING ALERT
- **S**imultaneous = GETTING THE BIG PICTURE
- **S**uccessive = FOLLOWING A SEQUENCE



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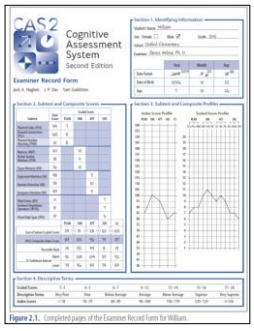
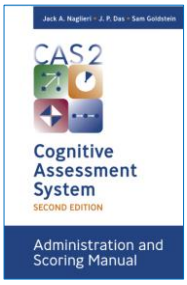
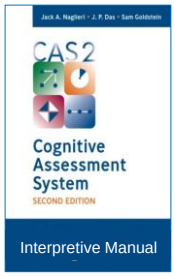
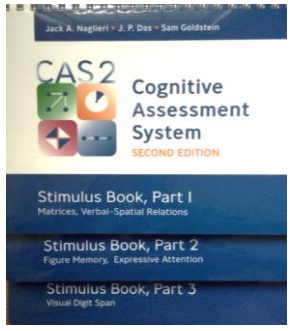
CAS2 for (Ages 5-18 yrs.)









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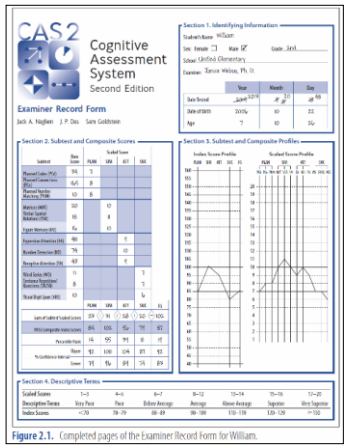
CAS2

- CAS2 Yields PASS and Full Scale score but ALSO
- ***Executive Function*** which is the combination of Planning and Attention subtests
- Also: Working Memory, Verbal, Nonverbal and a Visual and Auditory comparison



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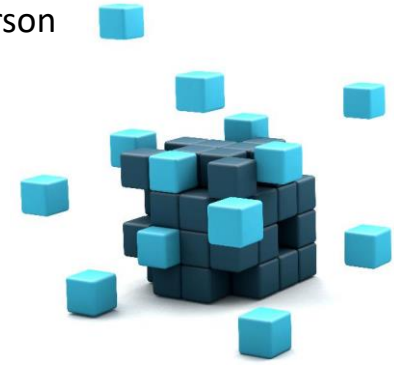
PASS Theory: Planning

- **Planning** is a neurocognitive ability that a person uses to determine, select, and use efficient solutions to problems
  - problem solving
  - developing plans and using strategies
  - retrieval of knowledge
  - impulse control and self-control
  - control of processing
- Planning tests measure Executive Function



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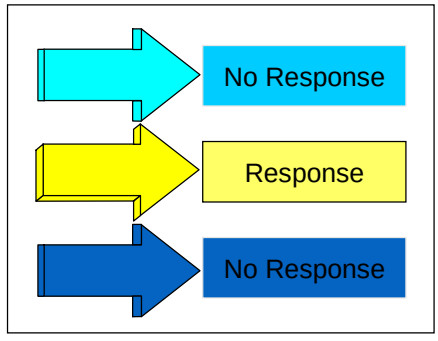
PASS Theory

- **Attention** is a neurocognitive ability that a person uses to selectively attend to some stimuli and ignore others
  - selective attention
  - focused cognitive activity over time
  - resistance to distraction



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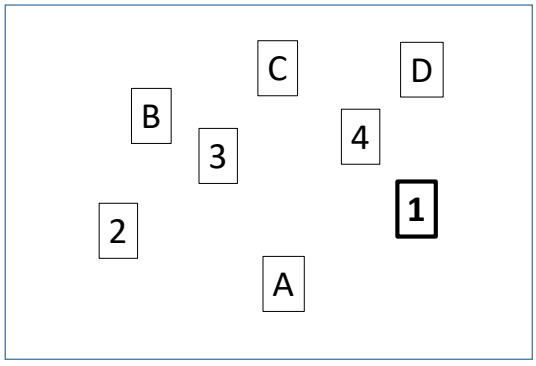
Planning & Attention Scales use…

Planned Connections (Trails)



RED	BLUE	GREEN	YELLOW
YELLOW	GREEN	RED	BLUE
RED	YELLOW	YELLOW	GREEN
BLUE	GREEN	RED	BLUE
GREEN	YELLOW	RED	YELLOW

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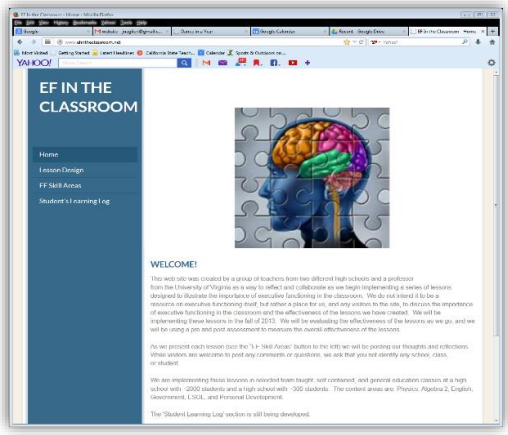
All Lessons Available for Free at

www.efintheclassroom.net



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Interventions for EF Behaviors

CEFI Scales	Efintheclassroom.net
• Attention	• Sustained Attention
• Emotion Regulation	• Emotional Control
• Flexibility	• Cognitive Flexibility
• Inhibitory Control	• Response Inhibition
• Initiation	• Task Initiation
• Organization	• Organization
• Planning	• Planning
• Self-Monitoring	• Response Inhibition
• Working Memory	• Working Memory

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Planning Lesson

Phrase of the week: What is your plan?

http://www.youtube.com/watch?v=bQLCZOG202k

1. What had to happen so that the people could dance together in this video?
2. What are the parts of a good plan?
3. How do you know if a plan is any good?
4. What should you do if a plan isn't working?
5. How do we use planning in this class?

Go to student learning log and create a plan for the week.

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Antwerp train Station (2009)

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Planning Lesson Student Responses

Q 1: What would you have to plan out?

- They had to learn the dance steps (knowledge)
- Someone had to start dancing (initiation)

Q2: What are the parts of a good plan?

- Think of possible problems (strategy generation)
- Organize the dance (organization)

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Planning Lesson Student Responses

Q3: How do you know if a plan is any good?

- Put the plan in action and see if it works (self-monitoring)
- Give it a try (perhaps learn by failing)

Q4: What should you do if a plan isn't working?

1. Fix it. (self-correction)
2. Go home! (a bad plan)

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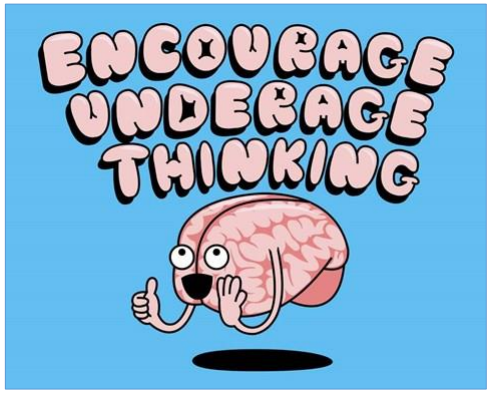
Planning Lesson Student Responses

Q5: How do you use planning in this class?

1. We don't plan in this class
2. Mrs. X does all the planning in this class so you don't have to think about planning

To encourage EF we have to stress thinking about *how to do what **you** chose to do*



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EF Instruction

We use posters like this one to remind the students of the importance of many aspects of EF

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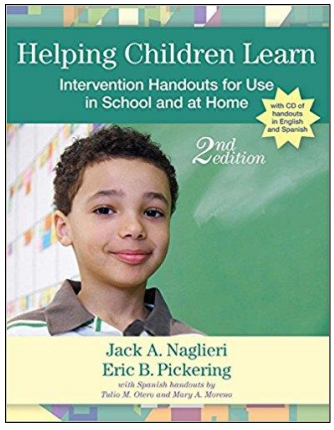
Encourage Planning

- Helping Children Learn Intervention Handouts for Use in School and at Home, *Second Edition* By Jack A. Naglieri, Ph.D., & Eric B. Pickering, Ph.D.,
- Spanish handouts by Tulio Otero, Ph.D., & Mary Moreno, Ph.D.



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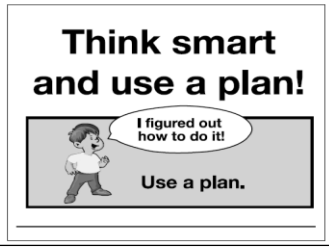
Step 1 – Talk with Students

How Can You Be Smarter?

You can be smarter if you PLAN before doing things. Sometimes people say, "Look before you leap," "Plan your work and work your plan," or "Stop and think." These sayings are about using the ability to plan. When you stop and think about *how* to study, you are using your ability to plan.

You will be able to do more if you remember to use a plan. An easy way to remember to use a plan is to look at the picture "Think smart and use a plan!" (Figure 1). You should always use a plan for reading, vocabulary, spelling, writing, math problem solving, and science.

Do you have a favorite plan for learning spelling words? Do you use flashcards or go on the Internet to learn? Do you ask the teacher or another student for help? You can learn more by using a plan for studying that works best for you.



It is smart to have a plan for doing all schoolwork. When you read, you should have a plan. One plan is to look at the questions you have to answer about the story first. Then read the story to find the answers. Another plan is to make a picture of what you read so that you can see all the parts of the story. When you write you should also have a plan. Students who are good at writing plan and organize their thoughts first. Then they think about what they are doing as they write. Using a plan is a good way to be smarter about your work!

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Planning

Planning Facilitation for Math Calculation

Math calculation is a complex activity that involves recalling basic math facts, following procedures, working carefully, and checking one's work. Math calculation requires a careful (i.e., planful) approach to follow all of the necessary steps. Children who are good at math calculation can move on to more difficult math concepts and problem solving with greater ease than those who are having problems in this area. For children who have trouble with math calculation, a technique that helps them approach the task planfully is likely to be useful. Planning facilitation is such a technique.

Planning facilitation helps students develop useful strategies to carefully complete math problems through discussion and shared discovery. It encourages students to think about how they solve problems, rather than just think about whether their answers are correct. This helps them develop careful ways of doing math.

How to Teach Planning Facilitation

Planning facilitation is provided in three 10-minute time periods: 1) 10 minutes of math, 2) 10 minutes of discussion, and 3) 10 more minutes of math. These steps can be described in more detail:

Step 1: The teacher should provide math worksheets for the students to complete in the first 10-minute session. This gives the children exposure to the problems and ways to solve them. The teacher gives each child a worksheet and says, "Here is a math worksheet for you to do. Please try to get as many of the problems correct as you can. You will have 10 minutes." Slight variations on this instruction are okay, but do not give any additional information.

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Hammill Institute on Disabilities
Journal of Learning Disabilities
44(2) 184–195

DOI: 10.1177/0022219410391190
http://journaloflearningdisabilities
.sagepub.com
SAGE

A Cognitive Strategy Instruction to Improve Math Calculation for Children With ADHD and LD: A Randomized Controlled Study

Jackie S. Iseman[1] and Jack A. Naglieri[1]

Abstract

The authors examined the effectiveness of cognitive strategy instruction b
Successive) given by special education teachers to students with ADHD
experimental group were exposed to a brief cognitive strategy instructio
development and application of effective planning for mathematical comp
standard math instruction. Standardized tests of cognitive processes ar
students completed math worksheets throughout the experimental ph
Johnson Tests of Achievement, Third Edition, Math Fluency and *Wechsle*
Numerical Operations) were administered pre- and postintervention, ar
follow-up. Large pre–post effect sizes were found for students in the expe
math worksheets (0.85 and 0.26), Math Fluency (1.17 and 0.09), and Nun
At 1 year follow-up, the experimental group continued to outperform th
students with ADHD evidenced greater improvement in math worksh
(which measured the skill of generalizing learned strategies to other sim
when provided the PASS-based cognitive strategy instruction.

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Design of the Study

Experimental and Comparison Groups

7 worksheets with Normal Instruction

Experimental Group

19 worksheets with Planning Facilitation

Comparison Group

19 worksheets with Normal Instruction

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Instructional Sessions

- Math lessons were organized into "instructional sessions" delivered over 13 consecutive days
- 7 Baseline and 19 Intervention sessions
- Each instructional session was 30-40 minutes
- Each instructional session was comprised of three segments as shown below

10 minutes	10-20 minutes	10 minutes
10 minute math worksheet	Planning Facilitation or Normal Instruction	10 minute math worksheet

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Strategy Instruction

- Teachers facilitated discussions to help students become more self-reflective about use of strategies
- Teachers asked questions like:
  - What was your goal?
  - Where did you start the worksheet?
  - What strategies did you use?
  - How did the strategy help you reach your goal?
  - What will you do again next time?
  - What other strategies will you use next time?

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Student Strategies

Table 3. Students' Comments During Planning Facilitation Sessions

Goals
- "My goal was to do all of the easy problems on every page first, then do the others."
- "To get as many correct as I can."
- "To get as many right as quickly as possible."
- "To take time and make sure I get them correct."

Starting place
- "I started on the first one."
- "I skipped around."
- "I do the easy ones first."
- "I look at the type of problem and the number of steps and decide which problems to do first."

Overall plan
- "I did all the easy problems on a page and went onto the next one."
- "I do all the addition first, then the easy minus, and then I move onto the harder ones."
- "I do the problems I know, then I check my work."

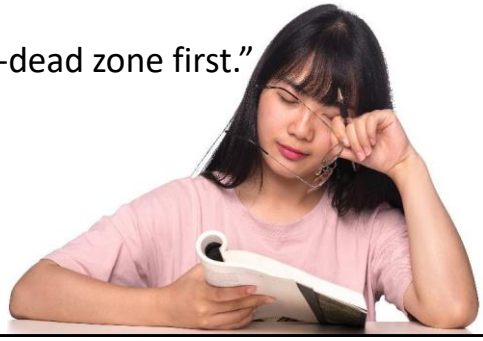
Specific strategies
- "I simplify fractions first."
- "Skip the longer multiplication questions."
- "The problems that have lots of steps take more time, so I skip them."
- "I do them [the algebra] by figuring out what I can put in for X to make the problem work."
- "I draw lines so I don't get my columns confused [on the multiplication]."
- "I stopped drawing lines because it slowed me down."
- "If a problem is taking a long time I skip it and come back to it if I have time."
- "I did the ones that take the least time."
- "Remember that anything times 0 is 0."

Noticing patterns in the worksheets
- "I did all the problems in the brain-dead zone first."
- "I started in the middle of the page, the problems on top take longer."
- "Next time I'll skip the hard multiplication at the top of the first page."

73

Student Plans

- "My goal was to do all of the easy problems on every page first, then do the others."
- "I do the problems I know, then I check my work."
- "I do them (the algebra) by figuring out what I can put in for X to make the problem work."
- "I did all the problems in the brain-dead zone first."
- "I try not to fall asleep."



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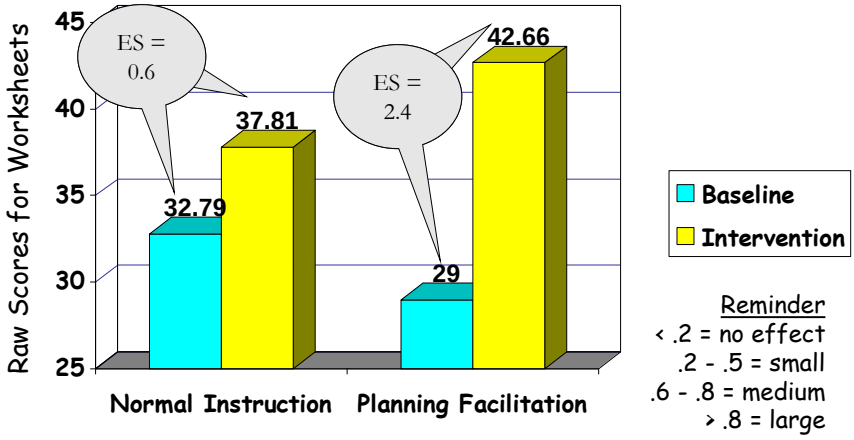
Worksheet Means and Effect Sizes for the Students with ADHD



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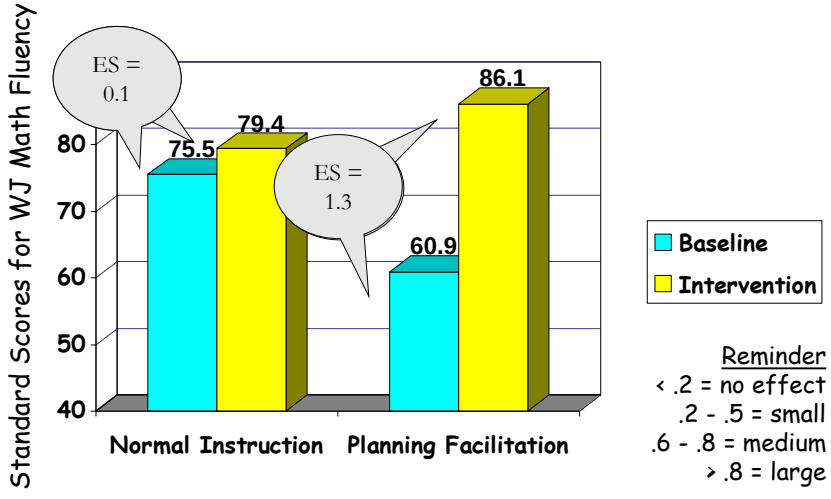
WJ Math Fluency Means and Effect Sizes for the Students with ADHD



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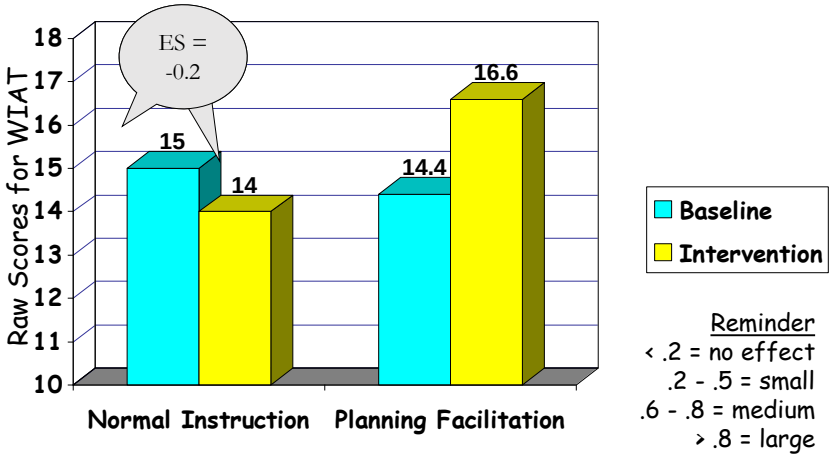
WIAT Numerical Operation Means and Effect Sizes for Students with ADHD



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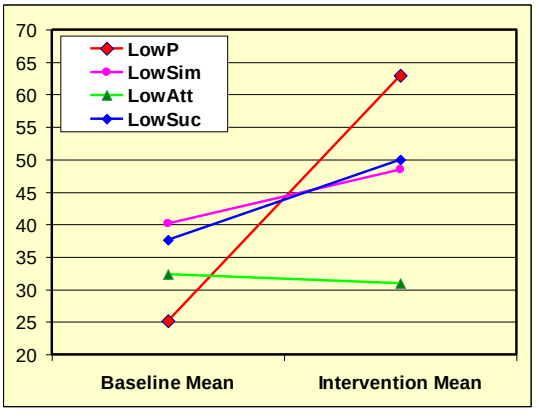
Iseman (2005)

- Baseline Intervention means by PASS profile
- Different response to the same intervention



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One Year Follow-up

At 1-year follow-up, 27 of the students were retested on the WJ-III ACH Math Fluency subtest as part of the school's typical yearly evaluation of students. This group included 14 students from the comparison group and 13 students from the experimental group. The results indicated that the improvement of students in the experimental group ($M = 16.08$, $SD = 19$, $d = 0.85$) was significantly greater than the improvement of students in the comparison group ($M = 3.21$, $SD = 18.21$, $d = 0.09$).

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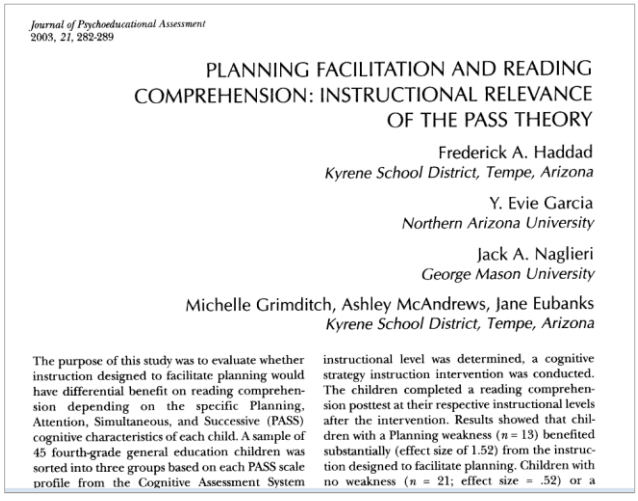
EF and Reading Comprehension



Journal of Psychoeducational Assessment
2003, 21, 282-289

PLANNING FACILITATION AND READING COMPREHENSION: INSTRUCTIONAL RELEVANCE OF THE PASS THEORY

Frederick A. Haddad
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Y. Evie Garcia
Northern Arizona University

Jack A. Naglieri
George Mason University

Michelle Grimditch, Ashley McAndrews, Jane Eubanks
Kyrene School District, Tempe, Arizona

The purpose of this study was to evaluate whether instruction designed to facilitate planning would have differential benefit on reading comprehension depending on the specific Planning, Attention, Simultaneous, and Successive (PASS) cognitive characteristics of each child. A sample of 45 fourth-grade general education children was sorted into three groups based on each PASS scale profile from the Cognitive Assessment System instructional level was determined, a cognitive strategy instruction intervention was conducted. The children completed a reading comprehension posttest at their respective instructional levels after the intervention. Results showed that children with a Planning weakness ($n = 13$) benefited substantially (effect size of 1.52) from the instruction designed to facilitate planning. Children with no weakness ($n = 21$; effect size = .52) or a

80

EF Scale on CAS2 and SLD Determination

- Use the CAS2 Executive Function Scale to assess students who may have a Specific Learning Disability (SLD)
- Combine that information with CEFI, DESS, and when achievement failure is also found…then EF can be viewed as a SLD

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SLD Definition

- "Specific learning disability" a disorder in one or more of the basic psychological processes which manifests as academic failure in specific areas…
- Executive function IS a basic psychological process and therefore a weakness on the CAS2 EF (or Planning Attention) scales could support SLD eligibility

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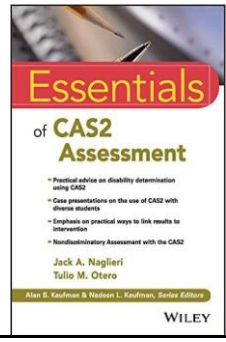
Discrepancy/Consistency Method

- An EF disorder can be used to identify a Pattern of Strengths and Weaknesses PSW using the Discrepancy/Consistency Method (Naglieri & Otero, 2017)
  - Low EF (Planning Attention)
  - High Scores (Simultaneous Successive)
  - Low academic test scores



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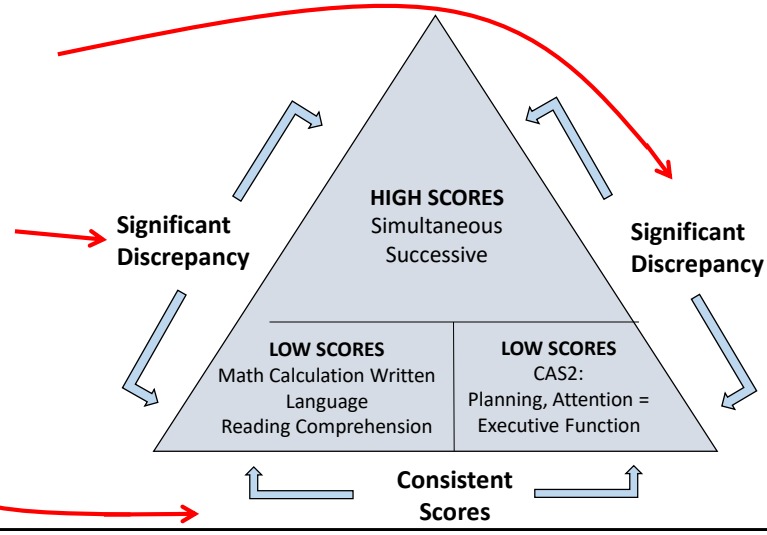
Discrepancy Consistency Method

- **Discrepancy** between high and low processing scores
- **Discrepancy** between high processing and low achievement
- **Consistency** between low processing and low achievement



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PASS Neurocognitive Abilities that are not EF

MHS ASSESSMENTS

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PASS Theory

- **Simultaneous** is a neurocognitive ability a person uses to integrate stimuli into groups
  - Parts are seen as a whole
  - Each piece of information is related to others
  - Visual spatial tasks like blocks and puzzles on the Wechsler Nonverbal Scale
  - KABC Simultaneous Scale
  - Subtests like Block Design, Object Assembly, etc.

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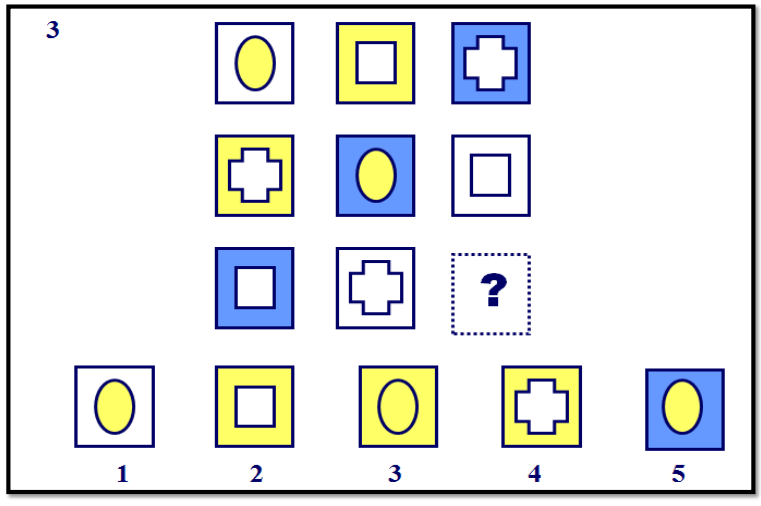
Progressive Matrices



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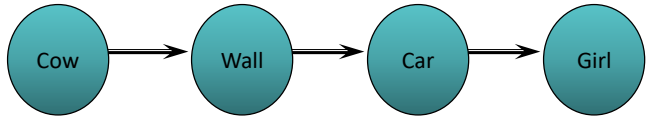
Successive Processing

Successive processing is a basic cognitive ability which we use to manage stimuli in a specific serial order

- Stimuli form a chain-like progression
- Stimuli are not inter-related



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Using good EF to overcome a neurocognitive processing disorder

89

Ben's Problem with Successive Processing

Ben was an energetic but frustrated third-grade student who liked his teachers, was popular with his peers, and fit in well socially at school. However, Ben said he did not like school at all, particularly schoolwork. Ben was good at turning in all of his work on time, and he worked hard, but he earned poor grades. He appeared to be getting more and more frustrated at school.

In general, Ben struggled to perform well because he had a lot of trouble following directions that were not written down, his writing often did not make sense, and he did not appear to comprehend what he read. Ben's teachers noticed that when directions for assignments and projects were given orally in class, he often only finished part of the task. Ben's teacher described an assignment in which students had to collect insects, label them, organize them into a collection, and then give a brief presentation about each insect. Unlike any other student, Ben chose to make the labels for the insects first and then go look for the insects. He found only a few of the insects he had made labels for, and when he put them in the collection, they were not in the order that had been specified. He also had trouble with the spelling of the scientific names of the insects and made many errors in the sequence of letters in the words.

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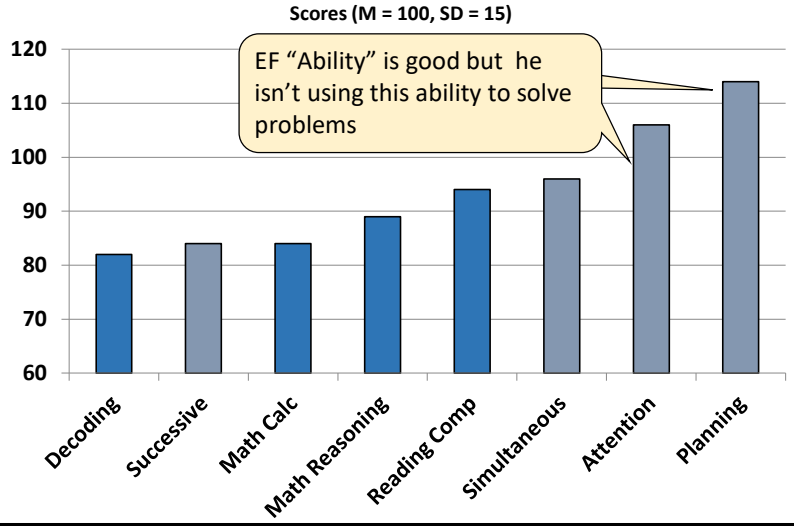
Ben's Problem with Successive processing Ability



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Ben's Problem with Successive Processing

- Ben has difficulty whenever ANY task requires sequencing
  - Academic or ability tests
  - Visual or auditory tests
  - Math or spelling or reading
  - Tasks that require memory of seque
- How do we help him learn better?

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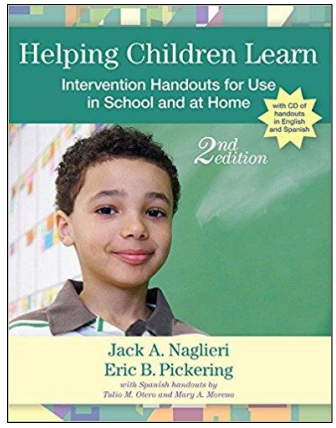
Teach Children about their Abilities

- Helping Children Learn Intervention Handouts for Use in School and at Home, *Second Edition (*Naglieri, & Pickering, 2011)
- Spanish handouts by Tulio Otero & Mary Moreno



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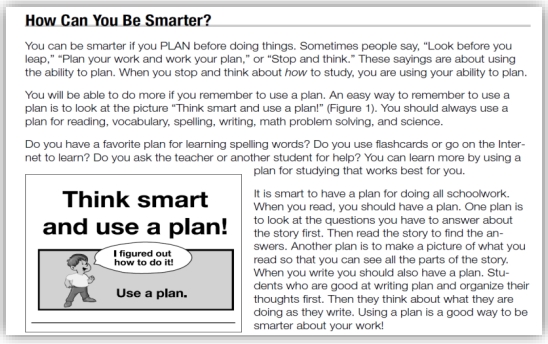
Ben's Problem with Successive Ability

Teach him to use his strength in EF (Planning)



How Can You Be Smarter?

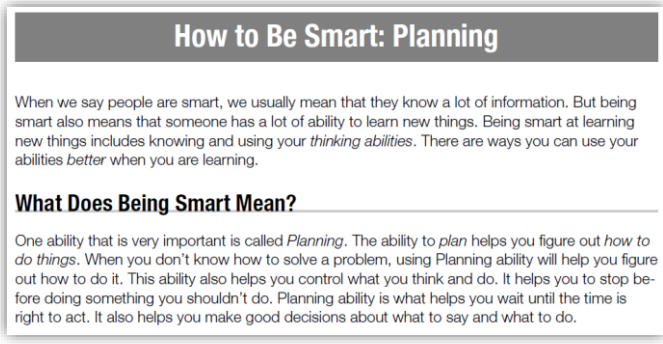
You can be smarter if you PLAN before doing things. Sometimes people say, "Look before you leap," "Plan your work and work your plan," or "Stop and think." These sayings are about using the ability to plan. When you stop and think about *how* to study, you are using your ability to plan.

You will be able to do more if you remember to use a plan. An easy way to remember to use a plan is to look at the picture "Think smart and use a plan!" (Figure 1). You should always use a plan for reading, vocabulary, spelling, writing, math problem solving, and science.

Do you have a favorite plan for learning spelling words? Do you use flashcards or go on the Internet to learn? Do you ask the teacher or another student for help? You can learn more by using a plan for studying that works best for you.

Think smart and use a plan!

It is smart to have a plan for doing all schoolwork. When you read, you should have a plan. One plan is to look at the questions you have to answer about the story first. Then read the story to find the answers. Another plan is to make a picture of what you read so that you can see all the parts of the story. When you write you should also have a plan. Students who are good at writing plan and organize their thoughts first. Then they think about what they are doing as they write. Using a plan is a good way to be smarter about your work!



How to Be Smart: Planning

When we say people are smart, we usually mean that they know a lot of information. But being smart also means that someone has a lot of ability to learn new things. Being smart at learning new things includes knowing and using your *thinking abilities*. There are ways you can use your abilities *better* when you are learning.

What Does Being Smart Mean?

One ability that is very important is called *Planning*. The ability to *plan* helps you figure out *how to do things*. When you don't know how to solve a problem, using Planning ability will help you figure out how to do it. This ability also helps you control what you think and do. It helps you to stop before doing something you shouldn't do. Planning ability is what helps you wait until the time is right to act. It also helps you make good decisions about what to say and what to do.

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Ben's Problem with Successive Ability

Teach him to recognize sequences

How to Teach Successive Processing Ability

The first step in teaching children about their own abilities is to explain what Successive processing ability is. In Figure 1 (which is included in the PASS poster on the CD), we provide a fast and

1. Teach children that most information is presented in a specific sequence so that it makes sense.
2. Encourage children by asking, "Can you see the sequence of events here?" or "Did you see how all of this is organized into a sequence that must be followed?"
3. Remind the students to think of how information is sequenced in different content areas, such as reading, spelling, and arithmetic, as well as in sports, playing an instrument, driving a car, and so forth.
4. Teach children that the sequence of information is critical for success.
5. Remind students that seeing the sequence requires careful examination of the serial relationships among the parts.

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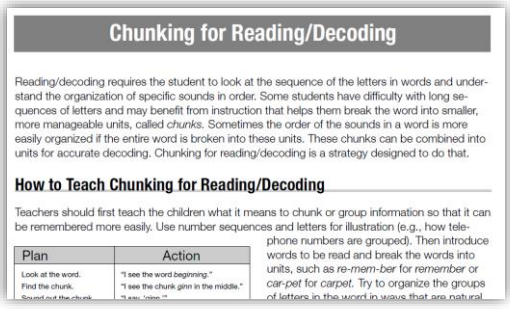
Solutions for Ben- Use EF

Teach him to use strategies



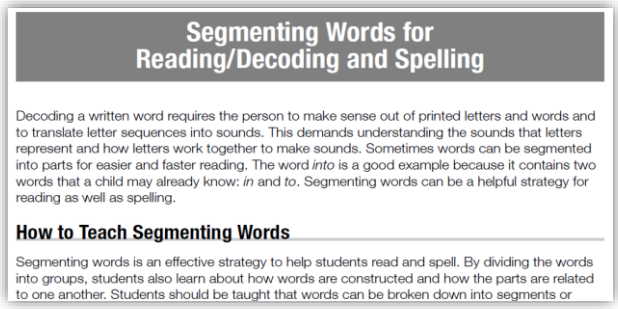
Chunking for Reading/Decoding

Reading/decoding requires the student to look at the sequence of the letters in words and understand the organization of specific sounds in order. Some students have difficulty with long sequences of letters and may benefit from instruction that helps them break the word into smaller, more manageable units, called *chunks*. Sometimes the order of the sounds in a word is more easily organized if the entire word is broken into these units. These chunks can be combined into units for accurate decoding. Chunking for reading/decoding is a strategy designed to do that.

How to Teach Chunking for Reading/Decoding

Teachers should first teach the children what it means to chunk or group information so that it can be remembered more easily. Use number sequences and letters for illustration (e.g., how telephone numbers are grouped). Then introduce words to be read and break the words into units, such as *re-mem-ber* for *remember* or *car-pet* for *carpet*. Try to organize the groups of letters in the word in ways that are natural

Plan	Action
Look at the word.	"I see the word *beginning*."
Find the chunk.	"I see the chunk *ginn* in the middle."



Segmenting Words for Reading/Decoding and Spelling

Decoding a written word requires the person to make sense out of printed letters and words and to translate letter sequences into sounds. This demands understanding the sounds that letters represent and how letters work together to make sounds. Sometimes words can be segmented into parts for easier and faster reading. The word *into* is a good example because it contains two words that a child may already know: *in* and *to*. Segmenting words can be a helpful strategy for reading as well as spelling.

How to Teach Segmenting Words

Segmenting words is an effective strategy to help students read and spell. By dividing the words into groups, students also learn about how words are constructed and how the parts are related to one another. Students should be taught that words can be broken down into segments or

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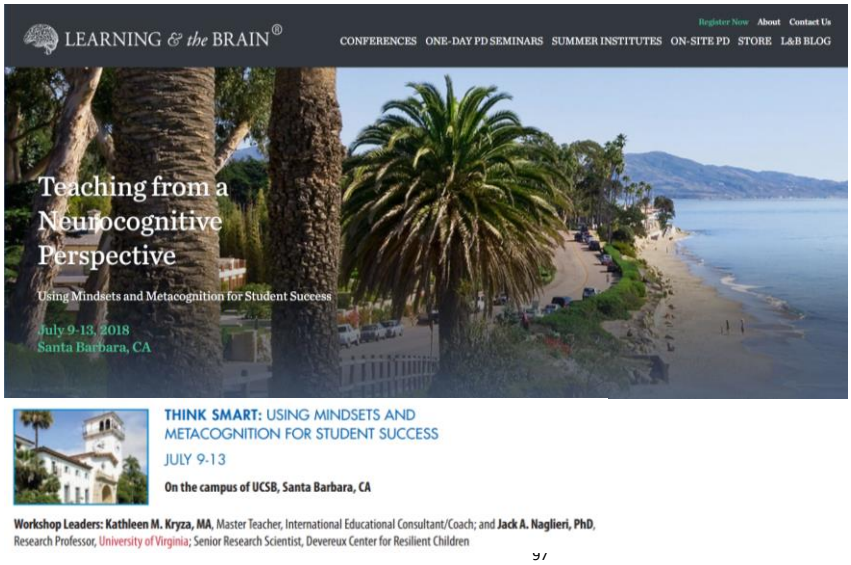
Want to Learn More About PASS Theory?… Come to California this July 12-17, 2020 for a *Learning and the Brain* Seminar



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APA | WEBINAR SERIES

QUESTIONS

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Presentation Outline

- Introduction to Executive Function (EF)
- EF Behaviors
- EF and Cognition (intelligence)
- EF and Social Emotional Skills
- EF and Academic/Job Performance
- Research about EF as ability, behavior, and SE
- Conclusions

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Phineas had Social Emotional Deficit

- Phineas had profound social emotional problems after his injury to the frontal lobes
- Phineas was
  - Insulting
  - impulsively says things
  - uses vulgar language
  - can't manage his emotions
  - inconsistent in social situations
  - doesn't recognize he is offensive
  - looses control in interactions with others

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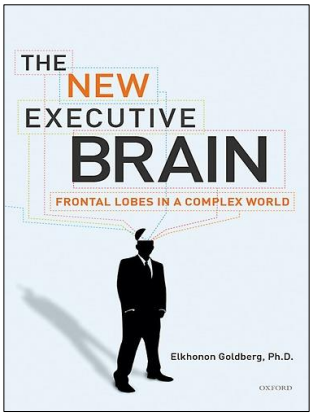
Frontal Lobes and Emotion

Goldberg (2011, p 116-117)

- the "emphasis in the classic studies of frontal lobe syndromes was on cognition [intelligence] rather than on affect [social emotional]"
- 'very few researchers have attempted to merge cognitive and emotional aspects of frontal lobe dysfunction'



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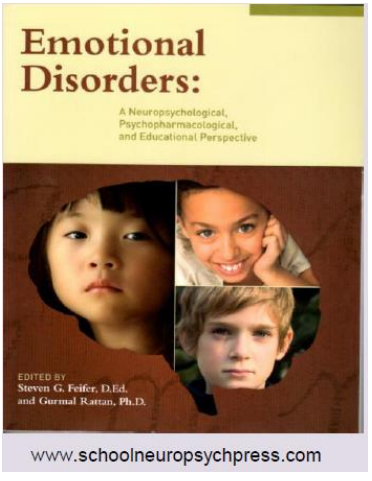
Feiffer & Rattan (2009)

- This book contains a collection of papers on the relationship between EF and Emotional Disorders
- See Feifer@comcast.net



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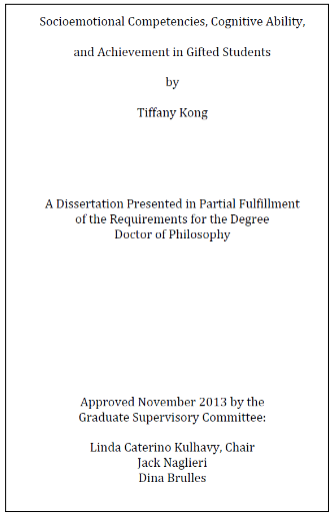
Kong (2013): IQ, SEL & Achievement

- Tiffany Kong studied CogAT, DESSA, and achievement scores for 276 elementary students grades K-8
- All gifted based on scores on verbal, quantitative, or nonverbal test scores at least 97th percentile



Socioemotional Competencies, Cognitive Ability,

and Achievement in Gifted Students

by

Tiffany Kong

A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Approved November 2013 by the
Graduate Supervisory Committee:

Linda Caterino Kulhavy, Chair
Jack Naglieri
Dina Brulles

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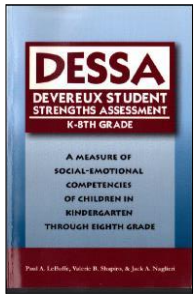
Measures

- CogAT is based on traditional IQ (Army Alpha and Beta) containing Verbal, Quantitative, Nonverbal
- DESSA is a 72-item rating scale of social-emotional skills such as Self Awareness, Relationship Skills, etc. related to resilience
- SAT is norm-referenced achievement test



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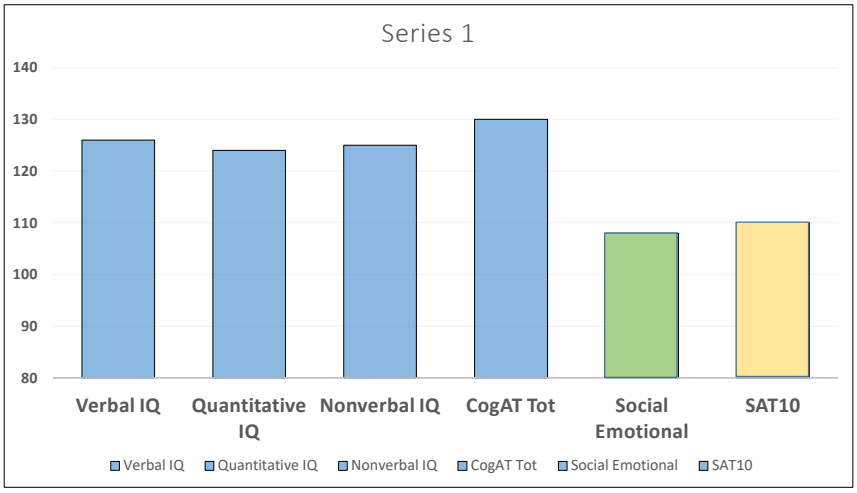
Ability, Social Emotional & Scores (Mn 100, SD = 15)



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Kong (2013): IQ, SEL & Achievement

- DESSA Total correlated .44 with Achievement (reading, math, language)
- CogAT Total correlated .36
- Hierarchical regression analysis showed that
  - CogAT did not add to the predication of achievement after DESSA scores were entered

DESSA predicted reading, language and math scores over IQ (CogAt) scores

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www.centerforresilientchildren.org

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QUESTIONS

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Take Away Messages

- Social Emotional Skills are the result of EF and what the person has learned in all aspects of the environment
- Individuals CAN BE TAUGHT good, or bad, social emotional skills

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Presentation Outline

- Introduction to Executive Function (EF)
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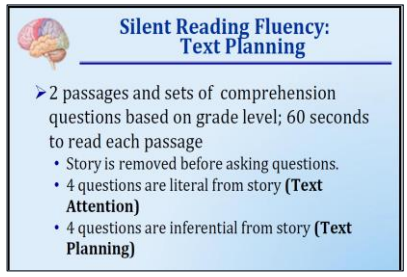
EF & Reading Comprehension

CAS2 EF scale measures the ability to use a strategy, attend and self-monitor while working toward a solution.



FAR Reading Comprehension subtests measures how well a student reads with a specific question or purpose in mind. In other words, the student has a strategy and is **using EF**

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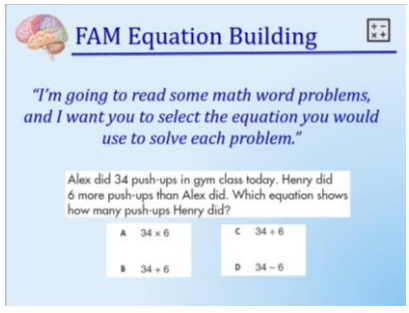
EF & Math

Task: The student does not need to solve the problem only choose the answer. This requires EF



This subtest puts focus on the "what to do" -- what strategy to use to properly set up the equation– which is EF, and reduces the importance of the actual math

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How to Connect EF and Reading

- Determine if there is a cognitive processing weakness (i.e. CAS2 EF score)
- Provide evidence of Reading failure
- Connect the particular academic skill in question (Silent Reading Fluency and Word Recall = Comprehension Index on the FAR).
- Connect low scores on behavioral measures of EF (CEFI, DESSA) to low EF

- **Poor EF (CAS-2/CEFI) + Poor Comprehension Index (FAR) = SLD in Reading Comprehension**

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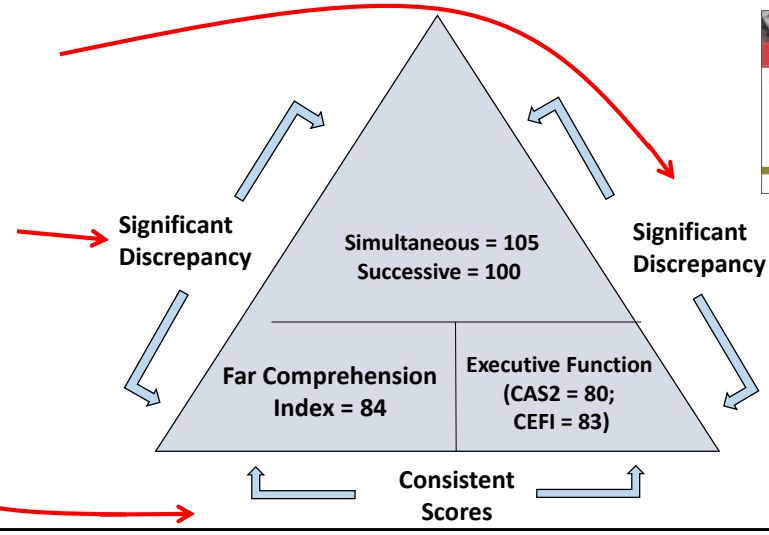
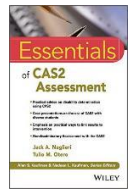
Discrepancy Consistency Method for SLD Eligibility Determination

- **Discrepancy** between high and low processing scores
- **Discrepancy** between high processing and low achievement
- **Consistency** between low processing and low achievement





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Planning Interventions

1. **Directional Questions** – ask questions at the beginning of the text instead of the end.
2. **Multiple Exposures**– encourage students to skim the material prior to reading, with emphasis on chapter and text headings.
3. **SOAR to SUCCESS** - A comprehension program for grades 3-6 to help students develop a reading plan.
   - 30-35 minute lessons…18 weeks.
   - 4 Key Strategies: Summarize, Clarify, Question, Predict

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QUESTIONS

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Executive Function Behaviors, Intelligence, and Achievement test scores

MHS ASSESSMENTS

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EF, WISC-IV, CAS, Achievement

- Data from Sam Goldstein's evaluation center in Salt Lake City, UT
- Children given the WISC-IV (N = 43), CAS (N = 62), and the WJIII achievement (N = 58) as part of the typical test battery

Demographic Characteristics of the CAS, WISC-IV, and WJ III ACH Validity Samples

Demographic		CAS		WISC-IV		WJ III ACH	
		N	%	*N*	%	*N*	%
Gender	Male	38	61.3	29	67.4	36	62.1
	Female	24	38.7	14	32.6	22	37.9
Race/ Ethnic Group	Hispanic	1	1.6	1	2.3	1	1.7
	Asian	2	3.2	2	4.7	2	3.4
	White	55	88.7	38	88.4	52	89.7
	Other	4	6.5	2	4.7	3	5.2
Parental Education Level	High school diploma or less	1	1.6	0	0.0	1	1.7
	Some college or associate's degree	21	33.9	12	27.9	18	31.0
	Bachelor's degree or higher	36	58.1	26	60.5	34	58.7
	Missing information	4	6.5	5	11.6	5	8.6
Diagnostic or Educational Group	ADHD	24	38.7	15	34.9	20	34.5
	Anxiety	15	24.2	9	20.9	14	24.1
	ASD	7	11.3	5	11.6	7	12.1
	LD	3	4.8	3	7.0	3	5.2
	Mood	4	6.5	3	7.0	5	8.6
	Other	9	4.8	8	4.6	9	5.1
Total		**62**	**100.0**	**43**	**100.0**	**58**	**100.0**
Age *M* (*SD*)		**10.4 (2.9)**		**10.2 (2.6)**		**10.5 (2.7)**	

Note. ADHD = Attention-Deficit/Hyperactivity Disorder; Anxiety = Anxiety Disorder; ASD = Autism Spectrum Disorder; LD = Learning Disorder; Mood = Mood Disorder.

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EF Behaviors (CEFI) & CAS

	CAS				
	FS	Plan	Sim	Att	Suc
CEFI					
Full Scale	.45	.49	.43	.37	.32

	WISC-IV				
	FS	VC	PR	WM	PS
CEFI					
Full Scale	.39	.44	.27	.30	.34

	WJ-III Achievement Tests				
CEFI Scales	Total	Broad Reading	Broad Math	Broad Written Language	Median
Full Scale	.51	.48	.49	.47	.49

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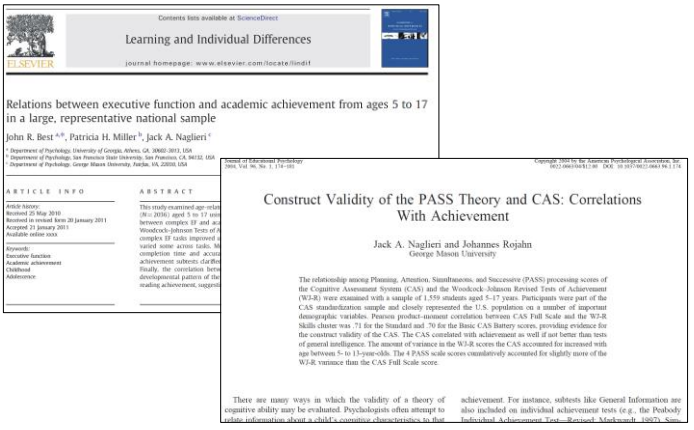
EF and Achievement (Naglieri & Rojahn, 2004)

- Correlation between Executive Function (Planning + Attention) with achievement = **.51** (N = 1,559) is stable across 5-17 year range
- EF scores added significantly to the prediction of achievement after Simultaneous and Successive scores



Contents lists available at ScienceDirect

Learning and Individual Differences

journal homepage: www.elsevier.com/locate/lindif

Relations between executive function and academic achievement from ages 5 to 17 in a large, representative national sample

John R. Best [a,*], Patricia H. Miller [b], Jack A. Naglieri [c]

ARTICLE INFO

ABSTRACT

Journal of Educational Psychology

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Construct Validity of the PASS Theory and CAS: Correlations With Achievement

Jack A. Naglieri and Johannes Rojahn
George Mason University

The relationship among Planning, Attention, Simultaneous, and Successive (PASS) processing scores of the Cognitive Assessment System (CAS) and the Woodcock-Johnson Revised Tests of Achievement (WJ-R) were examined with a sample of 1,559 students aged 5–17 years. Participants were part of the CAS standardization sample and closely represented the U.S. population on a number of important demographic variables. Pearson product–moment correlation between CAS Full Scale and the WJ-R Skills cluster was .71 for the Standard and .70 for the Basic CAS Battery scores, providing evidence for the construct validity of the CAS. The CAS correlated with achievement as well if not better than tests of general intelligence. The amount of variance in the WJ-R scores the CAS accounted for increased with age between 5- to 13-year-olds. The 4 PASS scale scores cumulatively accounted for slightly more of the WJ-R variance than the CAS Full Scale score.

There are many ways in which the validity of a theory of cognitive ability may be evaluated. Psychologists often attempt to

achievement. For instance, subtests like General Information are also included on individual achievement tests (e.g., the Peabody

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Sex Differences in Executive Function

MHS® ASSESSMENTS

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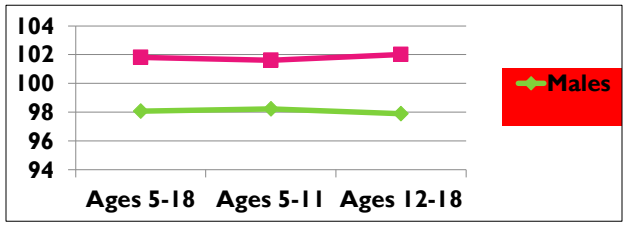
CEFI Sex Differences: Parent Raters

Girls are smarter than boys

Parents	N	Mn	SD	N	Mn	SD	ES
Ages 5-18	700	**98.1**	14.9	699	**101.8**	15.0	**-0.25**
Ages 5-11	350	**98.2**	14.3	349	**101.6**	15.6	**-0.22**
Ages 12-18	350	**97.9**	15.4	350	**102.0**	14.4	**-0.28**



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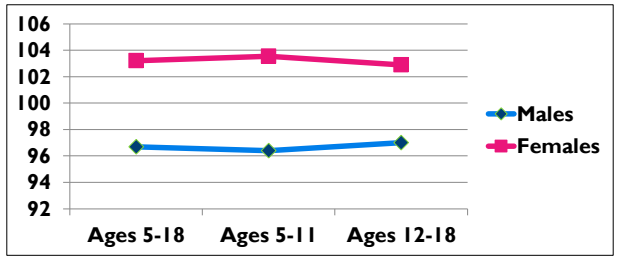
CEFI Sex Differences: Teacher Raters

Girls are smarter than boys

Teachers	N	Mn	SD	N	Mn	SD	ES
Ages 5-18	700	**96.7**	14.4	700	**103.2**	15.0	**-0.44**
Ages 5-11	350	**96.4**	14.5	350	**103.5**	14.9	**-0.49**
Ages 12-18	350	**97.0**	14.4	350	**102.9**	15.0	**-0.40**



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Sex Differences: Ability

Girls are smarter than boys

Journal of Educational Psychology
2001, Vol. 93, No. 2, 430–437

0022-0663/01/$5.00 DOI: 10.1037//0022-0663.93.2.430

Gender Differences in Planning, Attention, Simultaneous, and Successive (PASS) Cognitive Processes and Achievement

Jack A. Naglieri
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Ohio State University

Gender differences in ability and achievement have been studied for some time and have been conceptualized along verbal, quantitative, and visual-spatial dimensions. Researchers recently have called for a theory-based approach to studying these differences. This study examined 1,100 boys and 1,100 girls who matched the U.S. population using the Planning, Attention, Simultaneous, Successive (PASS) cognitive-processing theory, built on the neuropsychological work of A. R. Luria (1973). Girls outperformed boys on the Planning and Attention scales of the Cognitive Assessment System by about 5 points (d = .30 and .35, respectively). Gender differences were also found for a subsample of 1,266 children on the Woodcock–Johnson Revised Tests of Achievement Proofing (d = .33), Letter–Word Identification (d = .22), and Dictation (d = .22). The results illustrate that the PASS theory offers a useful way to examine gender differences in cognitive performance.

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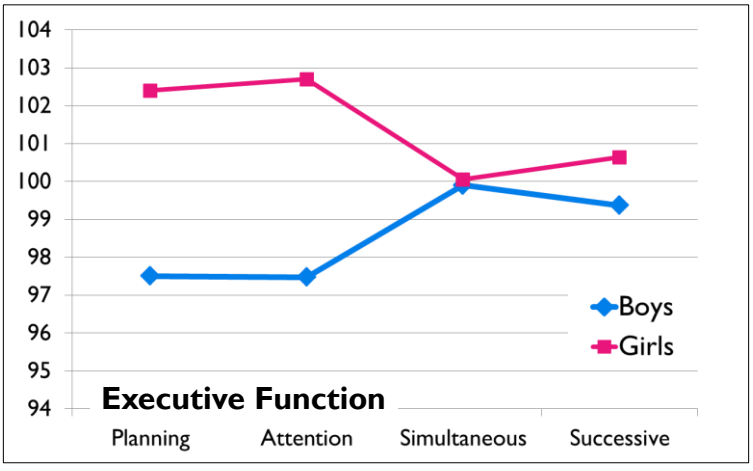
Sex Differences: Ability



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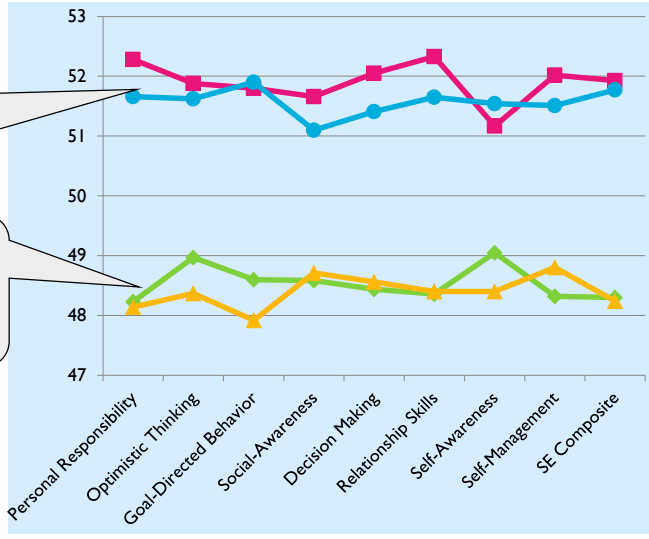
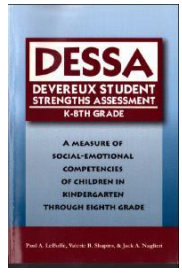
Sex Differences: Social Emotional

Parent & Teacher Raters **Females**

Parent & Teacher Raters **Males**





N = 2,477
DESSA values are T scores
(Mn= 50, SD = 10)

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Presentation Outline

- Introduction to Executive Function (EF)
- EF Behaviors
- EF and Cognition (intelligence)
- EF and Social Emotional Skills
- EF and Academic/Job Performance
- Research about EF as ability, behavior, and SE
- Conclusions

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Rating Scale of Impairment & EF

- **Measure the impact of low EF**
- "Impairment is a reduced ability to meet the demands of life because of a psychological, physical, or cognitive condition" (Goldstein & Naglieri, 2016, p. 6).
- The American Psychiatric Association in the new DSM-5 (APA, 2013) emphasizes impairment over and above symptom presentation.
- World Health Organization's International Classification of Functioning, Disability and Health (WHO, 2001) also has guidelines for impairment.

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RSI Forms and Scores

- Rating Scale of Impairment (RSI) for ages 5-18 based on Parent and Teacher ratings

RATING SCALE OF IMPAIRMENT (RSI)			
RSI (5–12 YEARS)		RSI (13–18 YEARS)	
PARENT FORM	TEACHER FORM	PARENT FORM	TEACHER FORM
Number of Items: 41 Reading Level: 5.8 Admin Time: 10 mins.	Number of Items: 29 Reading Level: 6.6 Admin Time: 5 mins.	Number of Items: 49 Reading Level: 5.9 Admin Time: 10 mins.	Number of Items: 29 Reading Level: 6.6 Admin Time: 5 mins.
RSI Scales School Social Mobility Domestic Family	**RSI Scales** School Social Mobility	**RSI Scales** School/Work Social Mobility Domestic Family Self-Care	**RSI Scales** School Social Mobility
TOTAL SCORE	TOTAL SCORE	TOTAL SCORE	TOTAL SCORE

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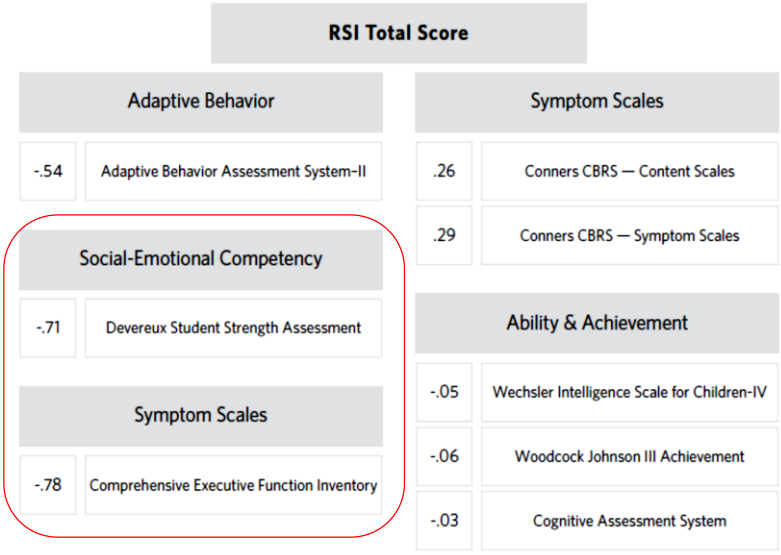
RSI and EF correlations (Manual pg. 115)



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Comprehensive EF Evaluation

Neurocognitive Explanation

1. Low EF **ability** (e.g., CAS2 EF Scale)
2. Low on **behavior rating scale of EF**
3. Low on **social-emotional rating scale** (i.e., protective factors related to resilience)
4. Low on **specific academic** tasks

Environmental Explanation

- If any or all of #2-4 are low but #1 is normal, then not neurocognitive failure, behaviors are environmentally determined

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Conclusions

- Assessment of EF should be comprehensive and include cognition, behavior and academic skills
- We can encourage the use of EF
- This is the gift of smarter thinking
- This is a gift of optimism
- This is a gift for life success

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QUESTIONS & ANSWERS

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