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

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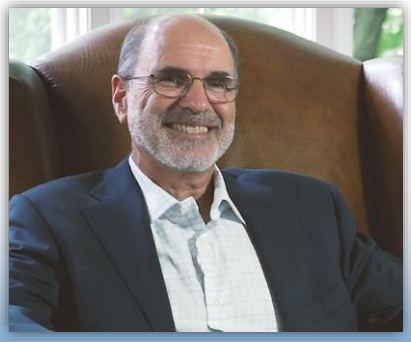

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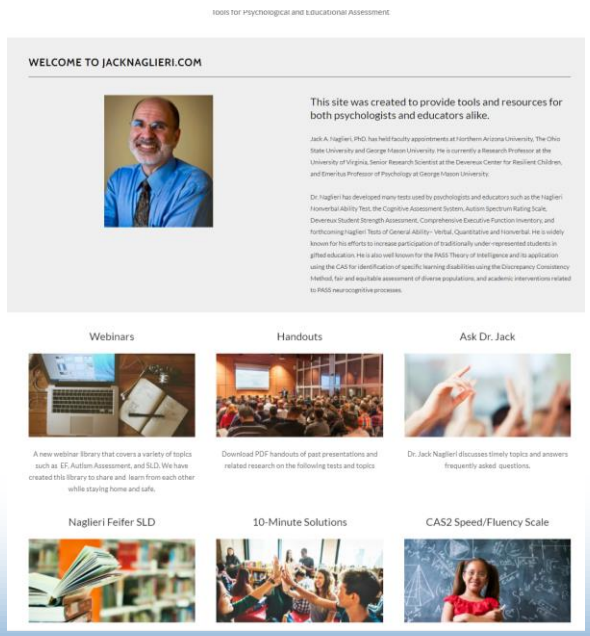

FOR MORE INFORMATION PLEASE GO TO MY WEB PAGE

2

Disclosures

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Plan for the day

1. Feel free to leave your microphone *unmuted* as long as it is quiet in your location
2. You can certainly raise your hand and ask a question at any time
3. At the end of each segment of the presentation you will have the opportunity to discuss the content with your group and share any ideas you wish

4

4

Core Group Discussion → Deeper Learning

- **C**oach – Help the group decide what to do
- **O**rganizer – Guide the discussion
- **R**ecorder – Keep notes and speak for the group
- **E**nergizer – Focus the group !

5

Introduction

- Interest in why people learn differently given the same instruction
- Led me to school psychology and decades later to intervention research
- Experiences as a school Psychologist

6

Traditional IQ and Achievement Tests

- When I started working as a school psychologist in 1975…I realized the impact the tests we use have on our ultimate decisions about a student.
- Intelligence tests that required knowledge posed an equity problem
- Rating scales with limited norms could be misleading
- Interpretation of scores which could change the course of a person's life was often based on clinical experience
- The concept of EF is a good example

1975 Charles Champagne Elementary, Bethpage, NY

7

7

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

8

8

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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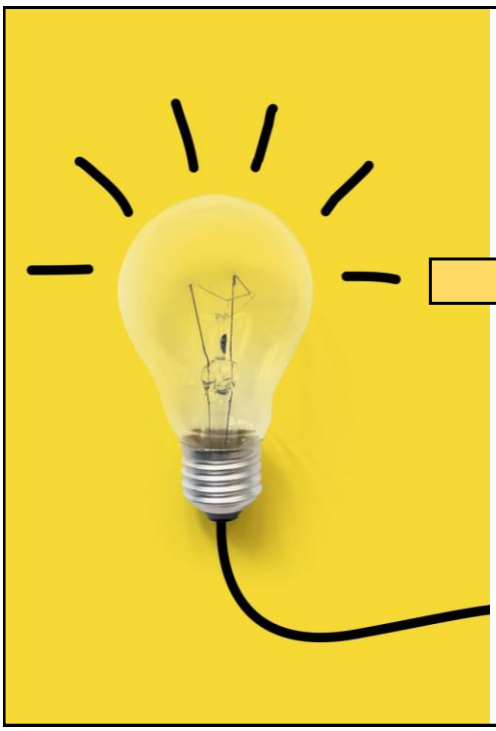


Presentation Outline

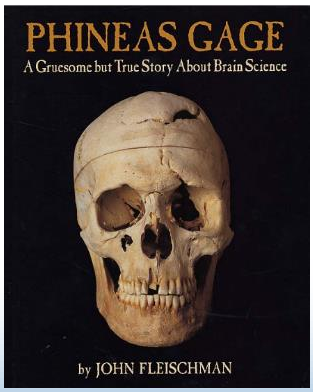
Introduction to Executive Function (EF)

- 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

10

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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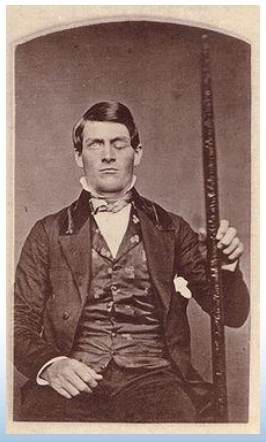
The Curious Story of Phineas Gage

- 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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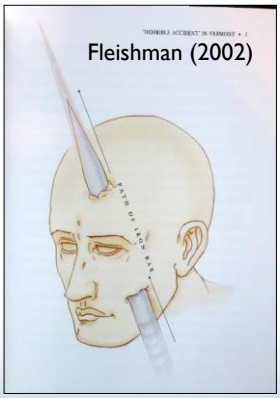
Fleishman (2002, p 70)

- 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



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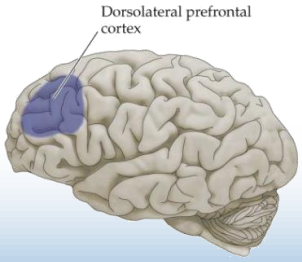
More Specifically

- 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

15

15

Frontal Lobes and Executive Function(s)

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

16

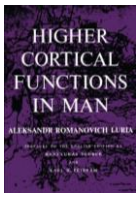
One of the great challenges in this world is to know enough about a subject to think your right; but not enough about the subject to know your wrong!

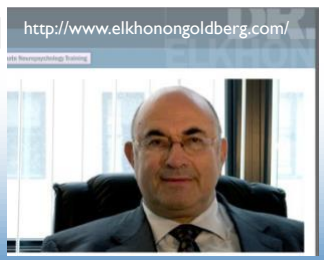
Neil deGrasse Tyson

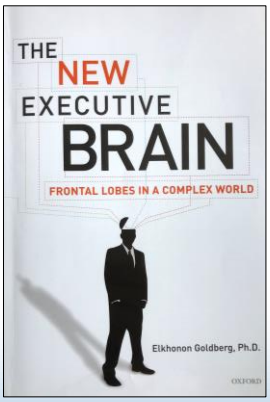
17

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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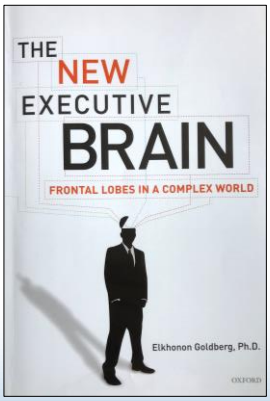
Goldberg (2009, p. 4)

- "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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19

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!

20

20

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).

21

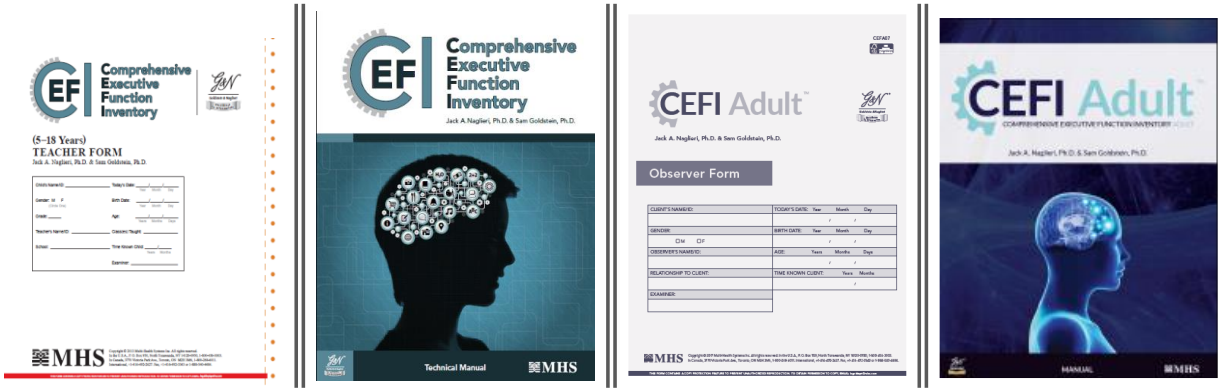
21

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)

22

22



CEFI (Naglieri & Goldstein, 2012, 2017)

23

23

Largest Exploratory Factor Analysis

- The normative samples of ratings from Parents (N=1,400), Teachers (N=1,400) and Self (N=700) ratings
- 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

24

24

Factor Analytic Methodology

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:

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

25

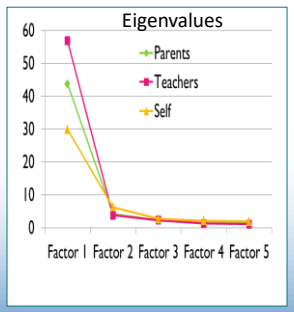
25

CEFI Parent (N=1,400), Teacher (N=1,400) and Self (N=700)

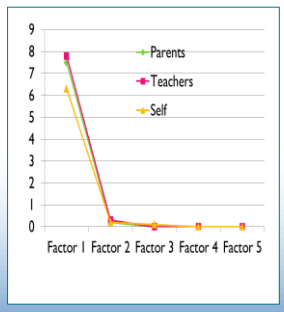
CEFI Adult Self (N = 1,600) & Observer (N = 1,600)

- Factor analytic studies using the CEFI and CEFI-Adult nationally representative standardization samples (N = 6,700)

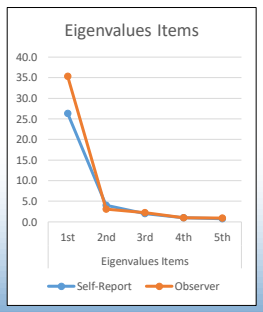
Item Factor Analyses



Scale Factor Analyses



Item Factor Analyses



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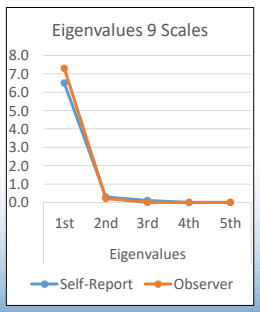

26

Exploratory Factor Analysis

Table 8.6. 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

27

27

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.

Table 8.6. Consistency of Factor Loadings Across Groups

Grouping Factor	Form	Coefficient of Congruence	Group 1		Group 2	
			Level	*N*	Level	*N*
Gender	Self-Report Form	.998	Male	795	Female	865
	Observer Form	.999	Male	795	Female	865
Race/Ethnicity	Self-Report Form	.997	White	1,153	Non-white	507
	Observer Form	.999	White	1,154	Non-white	506
Age	Self-Report Form	.997	Under 50 years	840	50+ years	820
	Observer Form	.999	Under 50 years	840	50+ years	820

CEFI Adult Consistency of Loadings

28

28

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
- The concept of Executive Function is one dimension

29

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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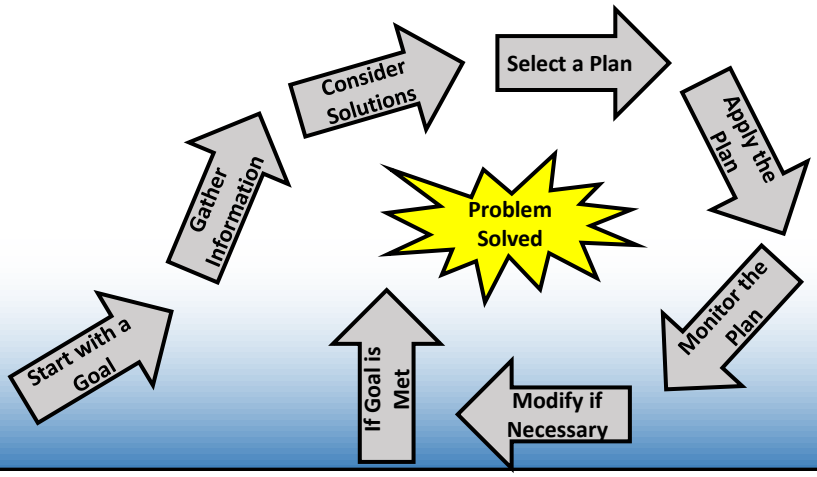
Naglieri & Goldstein, 2012

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



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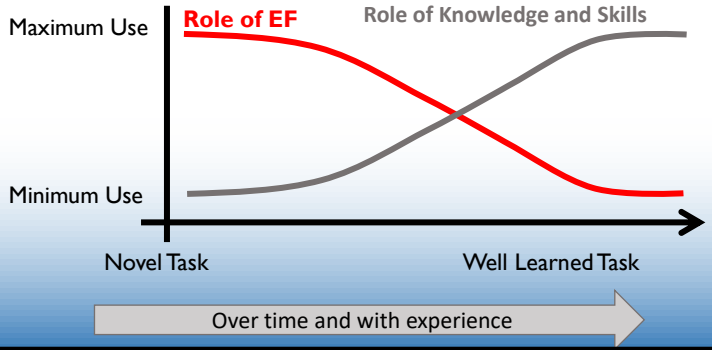
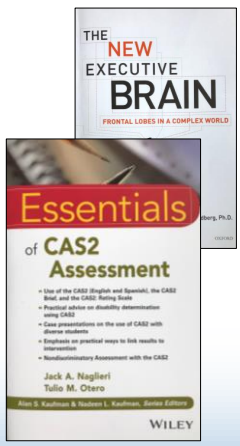
31

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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32

EF's Learning Curves
(Goldberg, 2009; Naglieri & Otero, 2017)

- Because MAKING DECISIONS about how to do what you decide to do is particularly demanded in novel situations, we need to fully engage our frontal lobes (EF) to be successful in our world today.

33

33

Coping with COVID Pandemic

- Our world has dramatically changed
- We have to figure out HOW to do just about everything
- This means EF is more important now than ever
- The cognitive demands of COVID make life much harder

34

Discussion: Reaction to EF as a unitary concept

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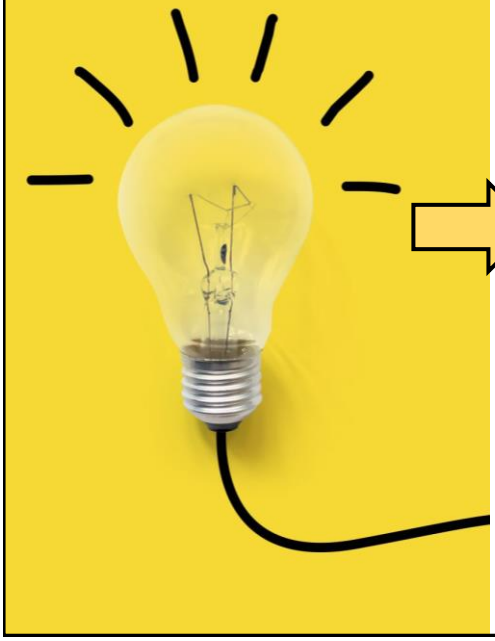


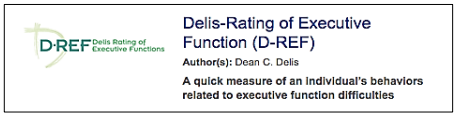
Presentation Outline

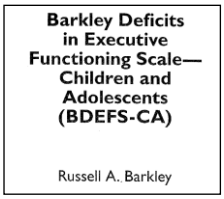
- Introduction to Executive Function (EF)
- EF Behaviors
- EF and Cognition (intelligence)
- EF and Social Emotional Skills
- EF and Academic/Job Performance
- Research about EF as ability, behavior, and SE
- Conclusions

36

Psychometrics of EF Rating Scales

Some published rating scales





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37

Comprehensive Executive Function Inventory (CEFI) and the Comprehensive Executive Function Inventory Adult (CEFI Adult)

Jack A. Naglieri & Sam Goldstein

- **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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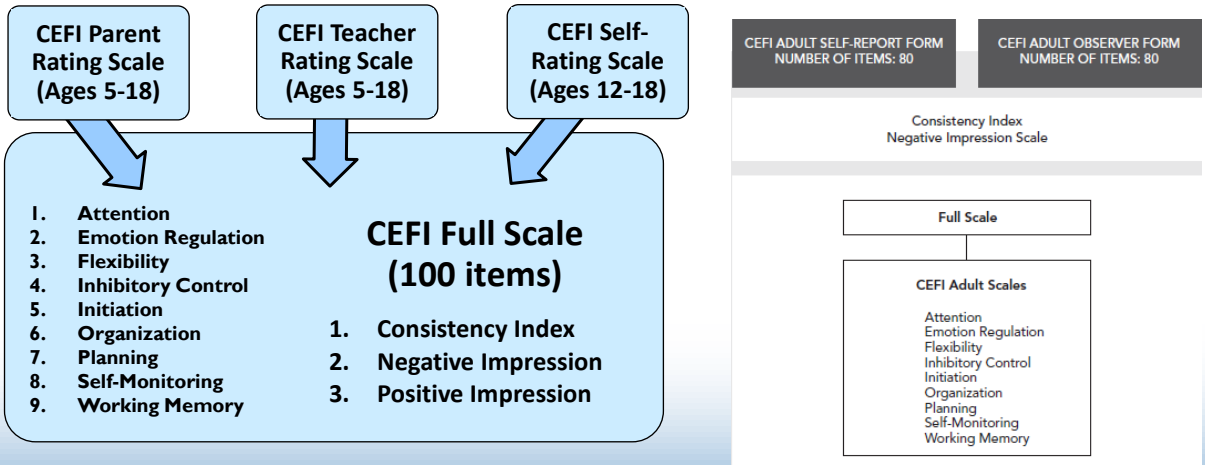
38

CEFI & CEFI-Adult Scales



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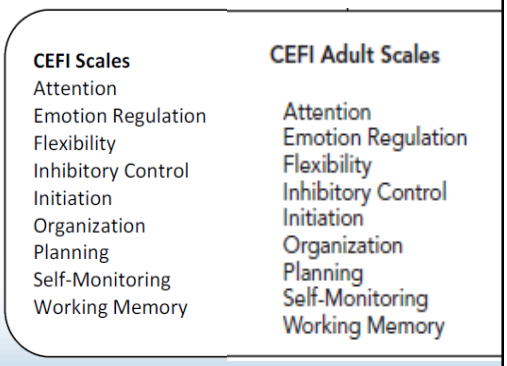
One Factor and 9 Scales?

- 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



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CEFI Full Scale and Treatment Scores

Figure 4.1. 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 $p < .10$.

41

41

CEFI Adult Full Scale and Treatment Scores

Table 4.4. Example of Executive Function Strengths and Weaknesses on the CEFI Adult Self-Report Form: Computerized Interpretive Report

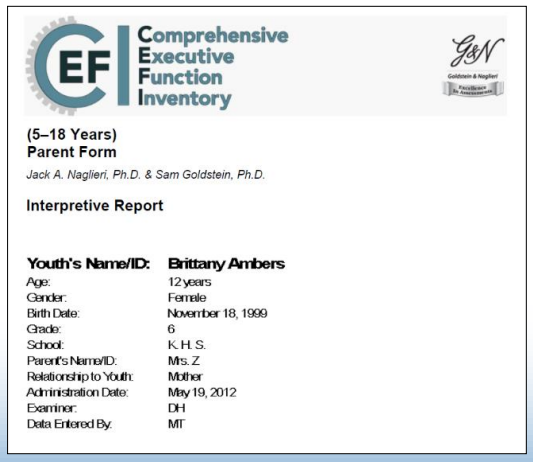
CEFI Adult Scales							
Scale	Standard Score	90% Confidence Interval	Percentile Rank	Classification	Difference From Average (91.6)	Statistically Significant?	Executive Function Strength/Weakness
Attention	100	90-110	50	Average	8.4	No	—
Emotion Regulation	104	93-113	61	Average	12.4	Yes	—
Flexibility	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 $p < .10$.

42

42

CEFI and CEFI Adult Interpretive Reports



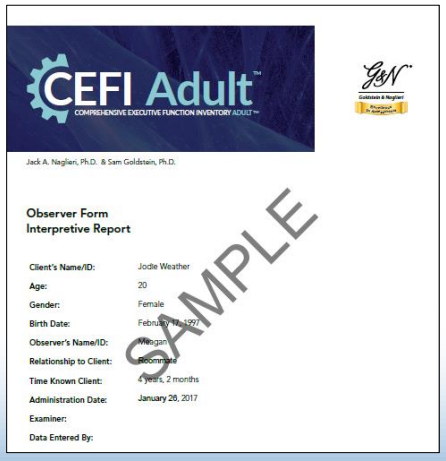
Comprehensive Executive Function Inventory

(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

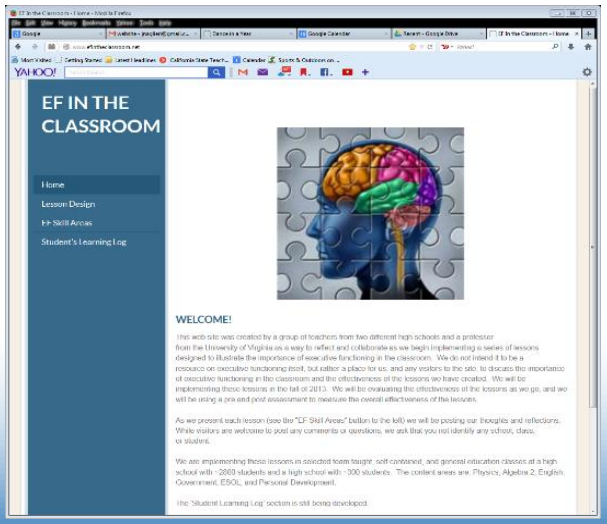
Client's Name/ID:	Jodie Weather
Age:	20
Gender:	Female
Birth Date:	February 17, 1997
Observer's Name/ID:	Megan
Relationship to Client:	Roommate
Time Known Client:	4 years, 2 months
Administration Date:	January 26, 2017
Examiner:	
Data Entered By:	

43

43

www.efintheclassroom.net

First lesson plan is "thinking about thinking"



44

Interventions for EF Behaviors

CEFI Scales

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

Efintheclassroom.net

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

45

45

QUESTIONS about CEFI?

46

46

TIME TO STRETCH

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47

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

48

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

49

49

Intelligence as Neurocognitive Functions

- In my first working meeting with JP Das (February 11, 1984) we proposed that intelligence was better REinvented as neurocognitive processes and we began development of the **C**ognitive **A**ssessment **S**ystem (Naglieri & Das, 1997).

➢ We conceptualized intelligence as Planning, Attention, Simultaneous, and Successive (PASS) neurocognitive processes based on Luria's concepts of brain function.

50

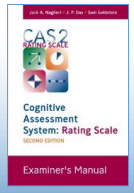
PASS Comprehensive System

(Naglieri, Das, & Goldstein, 2014)

- **CAS2 Core & Extended English & Spanish** for comprehensive
- Assessment
- **CAS2 Brief** for re-evaluations, instructional planning, gifted screening
- **CAS2 Rating Scale** for teacher ratings

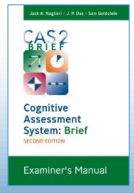
CAS2 Rating Scale
(4 subtests)

Total Score
Planning
Simultaneous
Attention
Successive



CAS2 Brief
(4 subtests
20 minutes)

Total Score
Planning
Simultaneous
Attention
Successive



CAS2 Core
(8 subtests
40 minutes)

Full Scale
Planning
Simultaneous
Attention
Successive

CAS2 Extended
(12 subtests
60 minutes)

Full Scale
Planning
Simultaneous
Attention
Successive
Supplemental Scales
Executive Function
Working Memory
Verbal / Nonverbal
Visual / Auditory
Speed / Fluency

51

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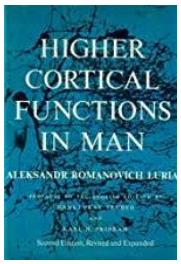
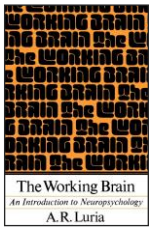
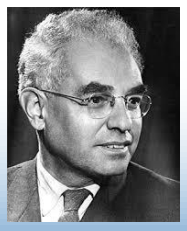
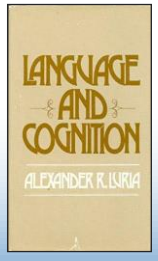
PASS Neurocognitive Theory









- **P**lanning = THINKING ABOUT HOW YOU DO WHAT YOU DECIDE TO DO
- **A**ttention = BEING ALERT AND RESISTING DISTRACTIONS
- **S**imultaneous = GETTING THE BIG PICTURE
- **S**uccessive = FOLLOWING A SEQUENCE

PASS = 'basic psychological processes'

NOTE: Easy to understand concepts!

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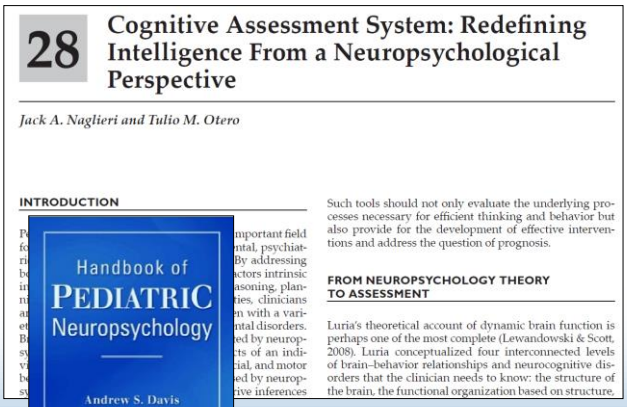
A Theory of Learning



28 Cognitive Assessment System: Redefining Intelligence From a Neuropsychological Perspective

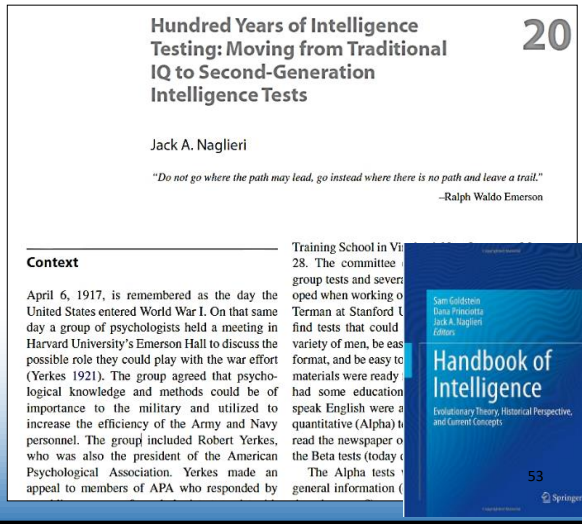
Jack A. Naglieri and Tulio M. Otero

INTRODUCTION

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,



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

53

53

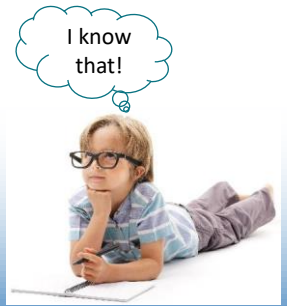
A Neurocognitive Test Measures Thinking not Knowing

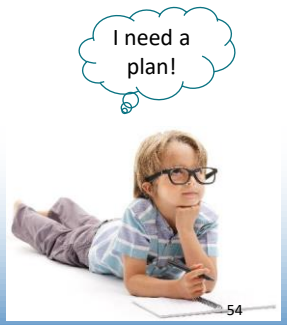
What does the examinee have to **know** to complete a task?

- 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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PASS Provides a Common Language

- Psychologists, teachers, parents, and students can all use a common language to describe abilities without the esoteric terms we have used for years – NO psychobabble

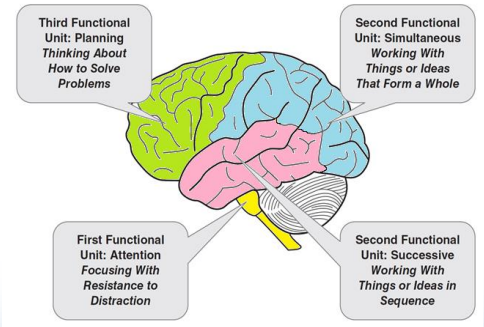

Figure 1.2 Three Functional Units and Associated Brain Structures

From: *Essentials of CAS2 Assessment*. Naglieri & Otero, 2017

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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 and Speed/Fluency

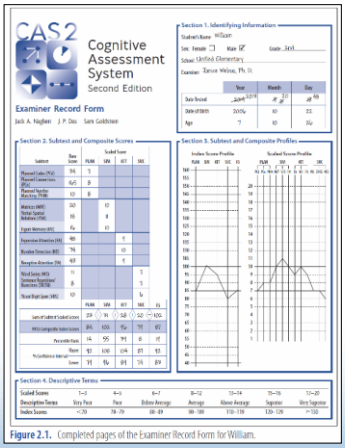

Figure 2.1. Completed pages of the Examiner Record Form for William.

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PASS Theory Based on Brain Function – Planning

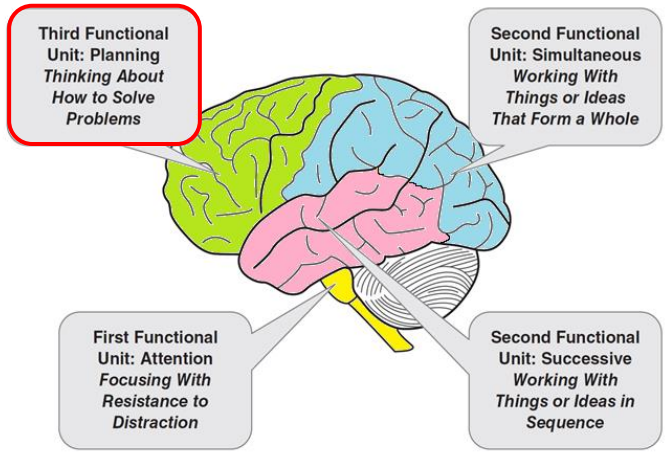

Figure 1.2 Three Functional Units and Associated Brain Structures

From: *Essentials of CAS2 Assessment*. Naglieri & Otero, 2017

57

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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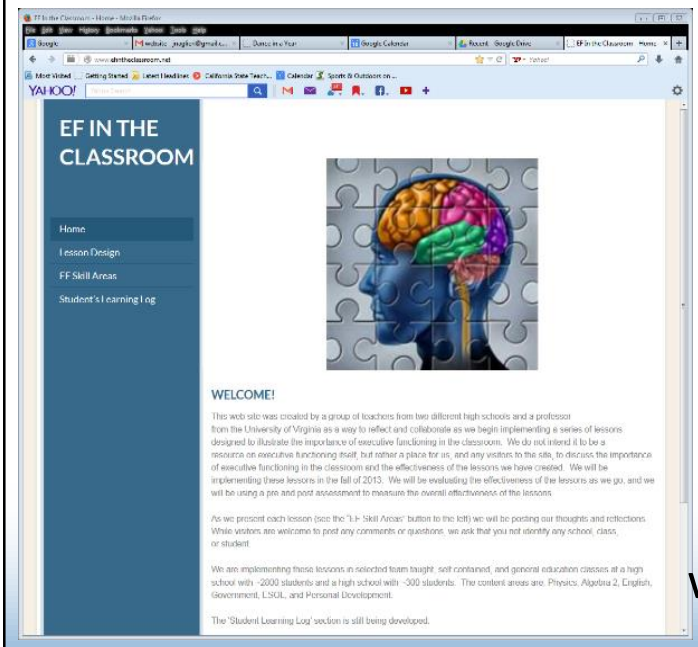

All Lessons available at no cost

www.efintheclassroom.net

59

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Interventions for EF Behaviors

CEFI Scales

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

Efintheclassroom.net

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

60

60

Antwerp train Station (2009)

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.

61

61

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)

62

62

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)

1. Q4: What should you do if a plan isn't working?
   1. Fix it. (self-correction)
   2. Go home ! (a bad plan)

63

63

Planning Lesson Student responses

Q5: How do you use planning in this class?

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

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

64

64

EF Instruction

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

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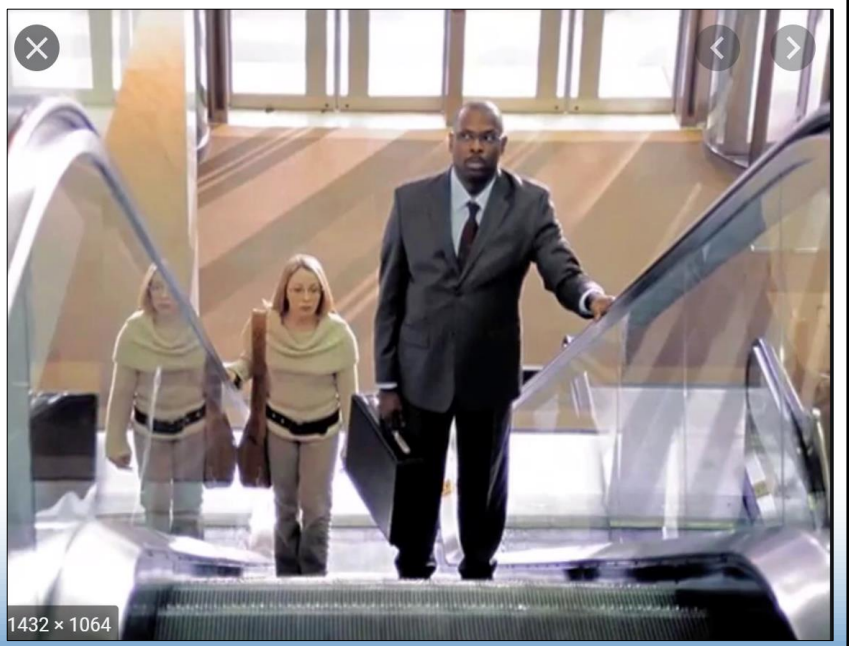
Why kids are stuck on the escalator?

Perhaps our educational and parenting approach has focused more on "enabling" vs. "empowering"



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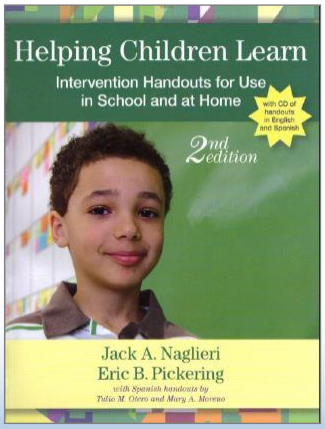
Encourage Planning

- 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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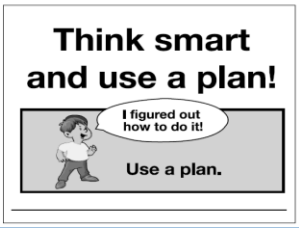
Step 1 – Talk with Students

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!

68

68

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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 based on PASS (Planning, Attention, Simultaneous, Successive) given by special education teachers to students with ADHD randomly assigned by classroom. Students in the experimental group were exposed to a brief cognitive strategy instruction for 10 days, which was designed to encourage reas the comparison group received- ievement were given at pretest. All dized achievement tests (*Woodcock- ed Achievement Test, Second Edition,* ncy was also administered at 1 year up but not the comparison group on ations (0.40 and –0.14, respectively). n group. These findings suggest that nsfer to standardized tests of math nd continued advantage 1 year later

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.

69

Instructional Sessions

- Math lessons were organized into "instructional sessions" delivered over 13 consecutive days
- 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

Experimental Group
19 worksheets with Planning Facilitation

Vs.

Control Group
19 worksheets with Normal Instruction

70

70

Planning (Metacognitive) Strategy Instruction

Teachers Asked

- 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?

Students Responded

- "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 draw lines to keep the columns straight"
- "I did the ones that took the least time"

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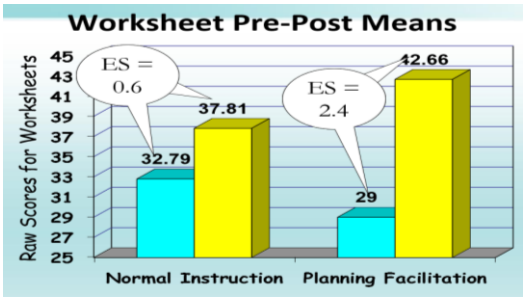
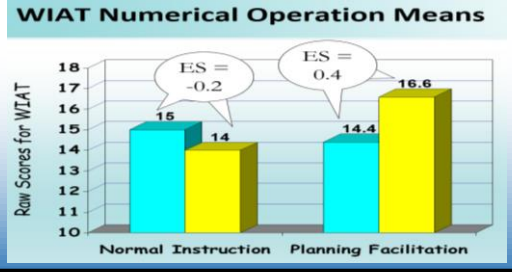
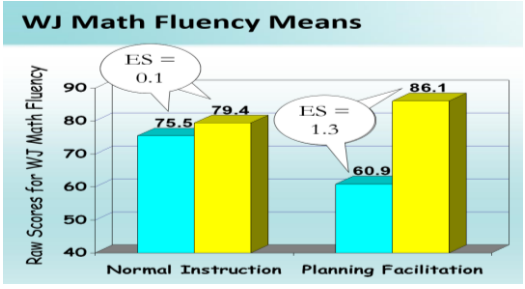
Pre-Post Means and Effect Sizes for the Students with LD and ADHD







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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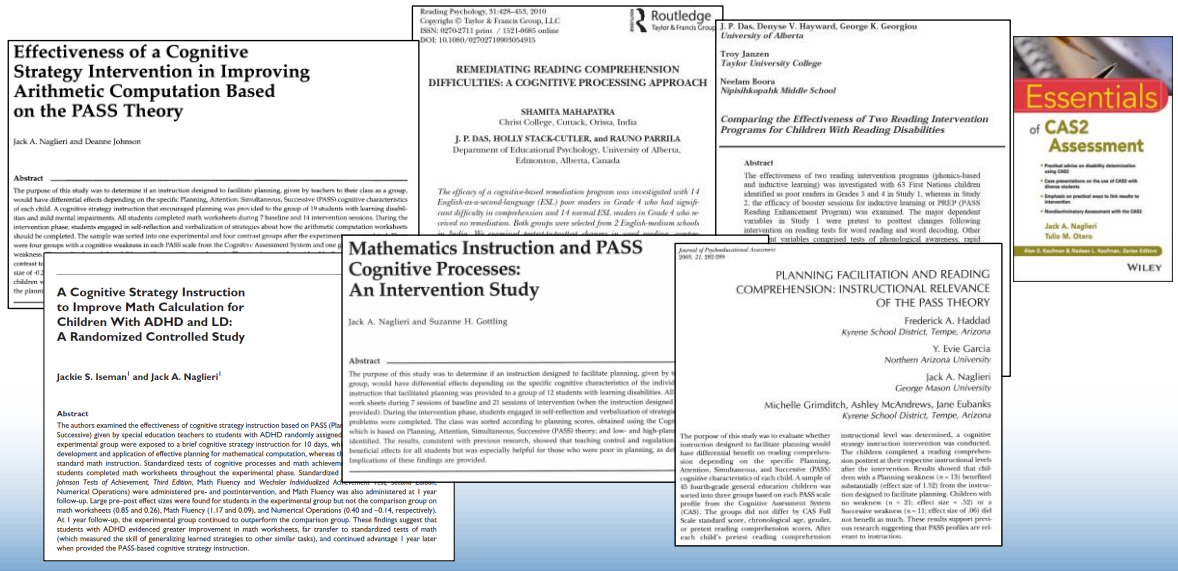
Summary of PASS Intervention Research in Essentials of CAS2



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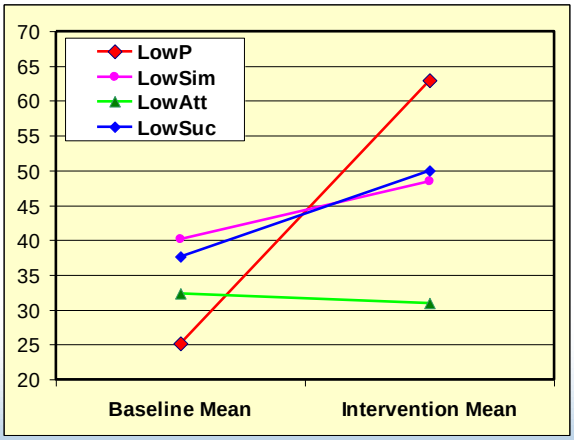
Iseman (2005)

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



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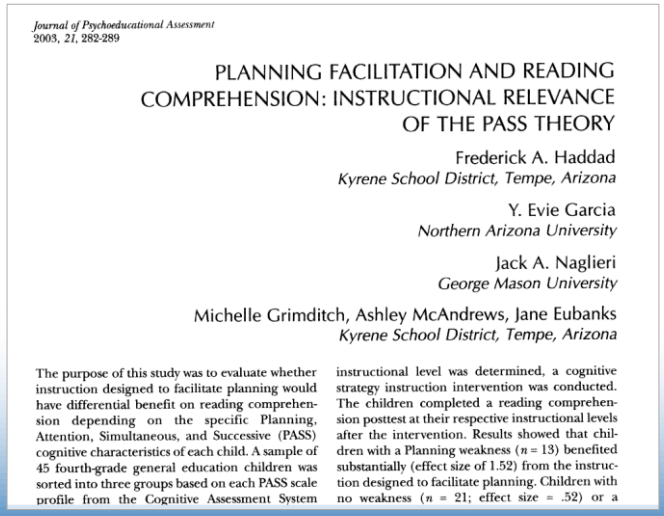
EF and Reading Comprehension



Journal of Psychoeducational Assessment
2003, *21*, 282-289

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

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Kyrene School District, Tempe, Arizona

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

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75

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, DESSA, and when achievement failure is also found…then EF can be viewed as a SLD

76

76

SLD Definition

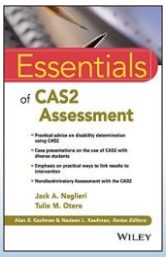
- "Specific learning disability" a disorder in one or more of the basic psychological processes which manifests as academic failure in specific areas…
- Executive function IS a basic psychological process and therefore a weakness on the CAS2 EF (or Planning Attention) scales could support SLD eligibility

77

77

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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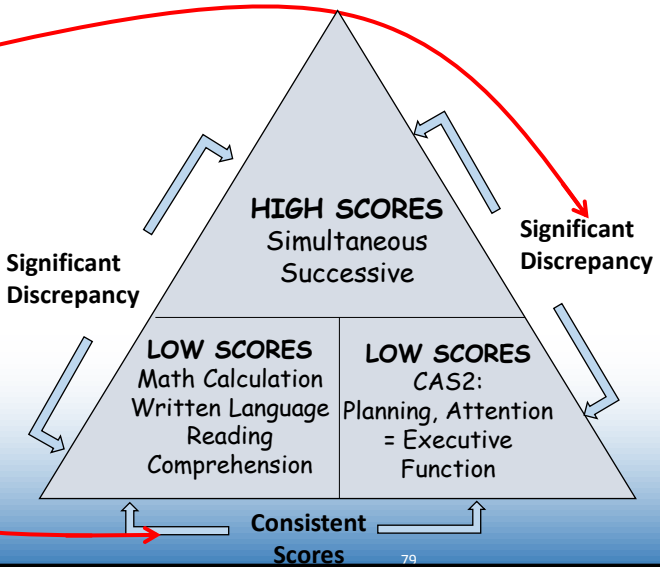
Discrepancy Consistency Method

- **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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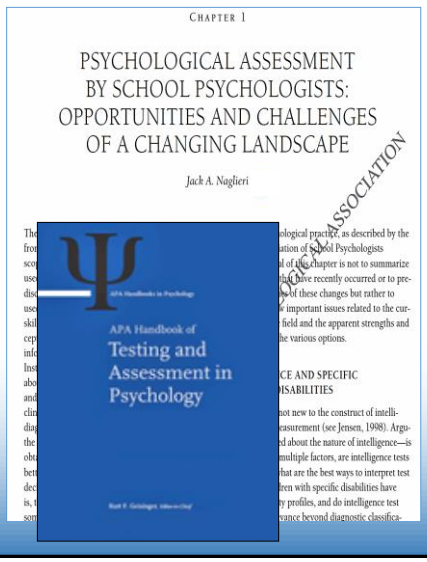
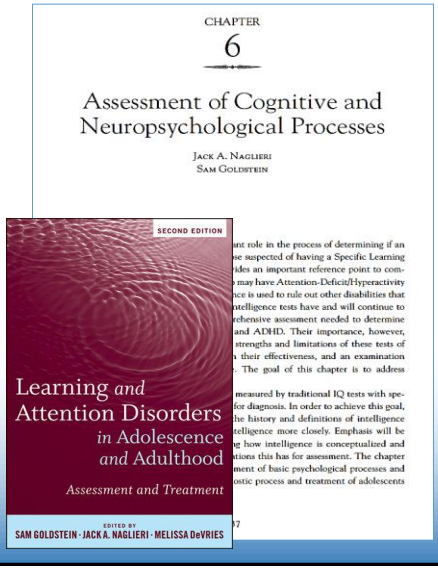
PASS Scales can be Interpreted and SHOULD be: Profiles





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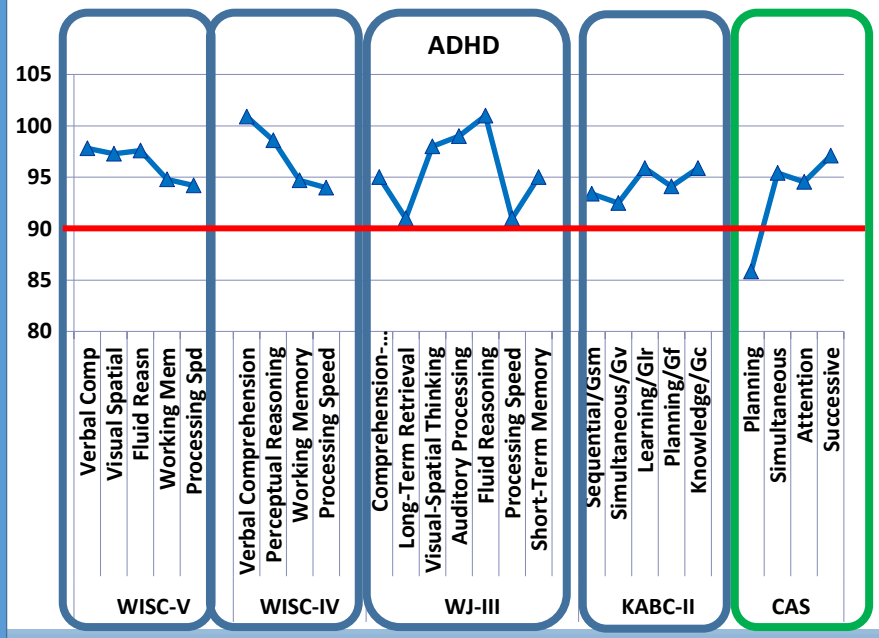
Profiles on all these widely used ability tests show that PASS scores from the CAS are sensitive to the cognitive component of ADHD Hyperactive / Combined Type (Planning)



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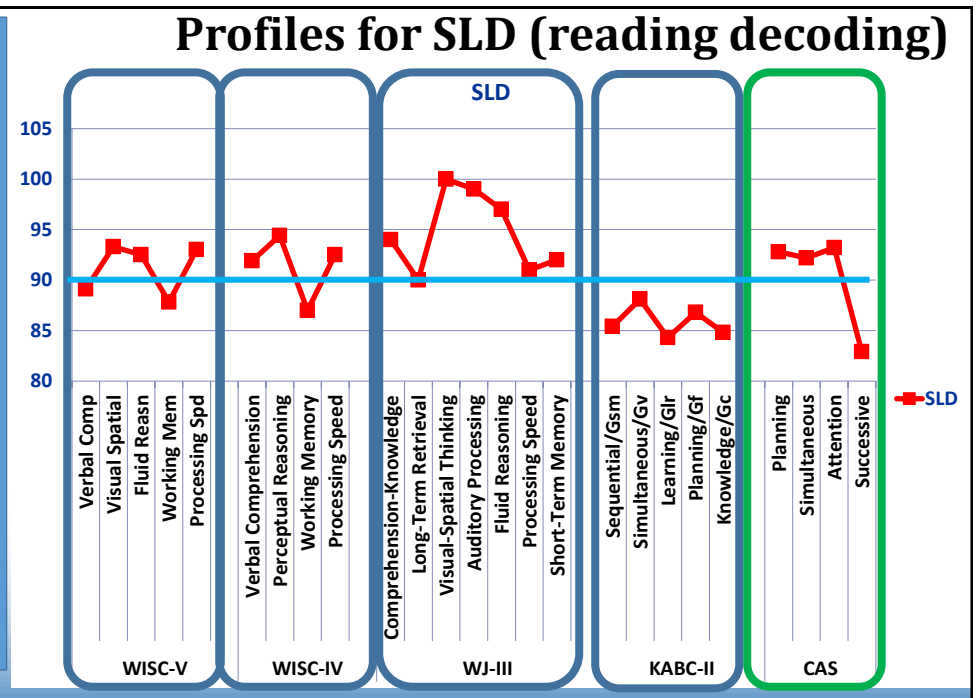
Profiles on all these widely used ability tests show that PASS scores from the CAS are sensitive to the cognitive component that underlies READING DECODING failure (Successive Processing)



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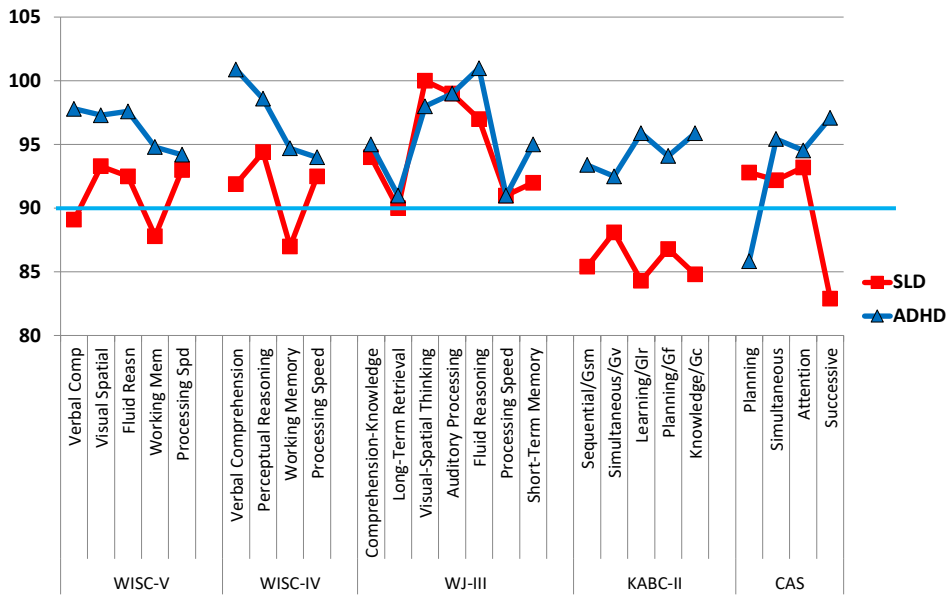
Looking at SLD and ADHD profiles on all these tests is very revealing…PASS works

Profiles for SLD (reading decoding) & ADHD



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How Are You Feeling?

84

84

Feeling Overwhelmed?

Mindful Breathing

85

85

PASS Theory Based on Brain Function –– Attention

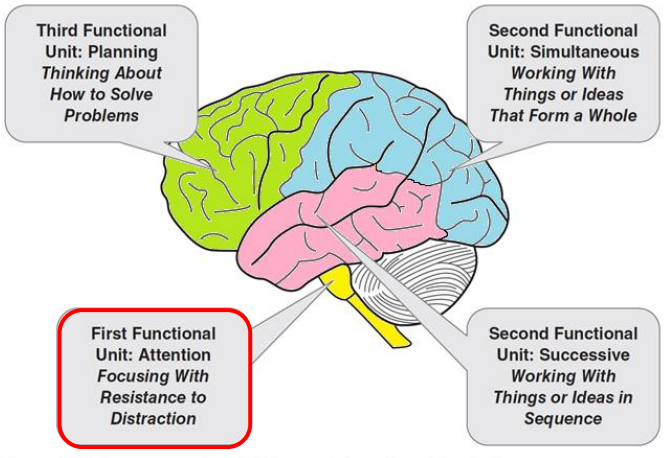


Figure 1.2 Three Functional Units and Associated Brain Structures

From: *Essentials of CAS2 Assessment*. Naglieri & Otero, 2017

86

86

Attention Subtests

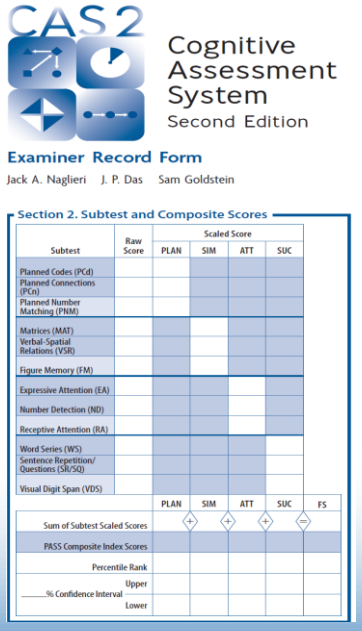
Expressive Attention

Number Detection

Find the numbers that look like this: 1 2						
1	5	1	4	2	2	5

Receptive Attention

N n	T r	b t
TR	n b	A a



87

87

PASS Theory: Attention

- Attention is a basic psychological process we use to
  - selectively attend to some stimuli and ignores others
  - Focus our cognitive activity
  - Selective attention
  - Resistance to distraction
  - Listening, as opposed to hearing

RED	RED	BLUE
YELLOW	YELLOW	RED
BLUE	RED	YELLOW
BLUE	BLUE	BLUE
YELLOW	BLUE	YELLOW

88

88

CAS2: Rating Scale Attention

Directions for Items 21–30. These questions ask how well the child or adolescent pays attention and resists distractions. The questions also ask about how well someone attends to one thing at a time. Please rate how well the child or adolescent pays attention.

During the past month, how often did the child or adolescent . . .	Never	Rarely	Sometimes	Frequently	Always
21. work well in a noisy area?	0	1	2	3	4
22. stay with one task long enough to complete it?	0	1	2	3	4
23. not allow the actions or conversations of others to interrupt his or her work?	0	1	2	3	4
24. stay on task easily?	0	1	2	3	4
25. concentrate on a task until it was done?	0	1	2	3	4
26. listen carefully?	0	1	2	3	4
27. work without getting distracted?	0	1	2	3	4
28. have a good attention span?	0	1	2	3	4
29. listen to instructions or directions without getting off task?	0	1	2	3	4
30. pay attention in class?	0	1	2	3	4

___ + ___ + ___ + ___ + ___ = ☐
Attention Raw Score

89

89

11. **A** 3:15 A.M.
B 3:30 P.M.
C 3:15 P.M.
D 3:15 A.M.

leave school

12. Trent began studying at 5:00 P.M. and finished 1 hour and 22 minutes later. What time did he finish?
A 6:22 A.M. **B** 5:22 P.M. **C** 6:10 P.M. **D** 6:22 P.M.

13. Maura began basketball practice at 3:00 P.M. and finished 50 minutes later. What time did she finish?
A 3:50 P.M. **B** 3:05 A.M. **C** 4:05 P.M. **D** 4:50 A.M.

11. 3:15 p.m.
12. 6:22 p.m.
13. 3:50 p.m.

Attention

Reading comprehension is difficult because of the similarity of the options

90

90

Using A Strength in PLANNING to improve ATTENTION

Jose: Age 10, 5th Grade, Bilingual Student
by Tulio M. Otero, Ph.D.

Jose reading problems and the teacher these concerns:

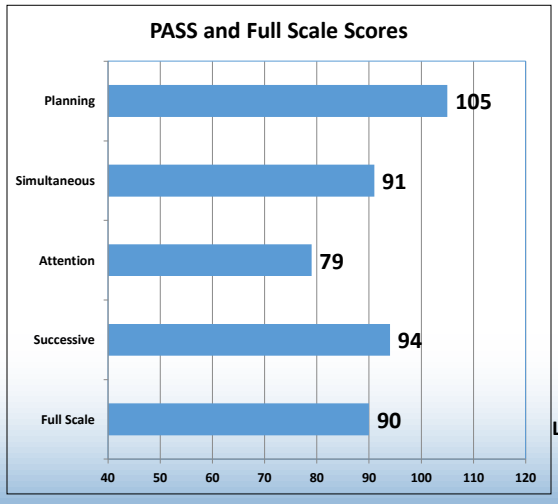
phonemic awareness, reading fluency, reading comprehension math problem-solving, spelling, written expression

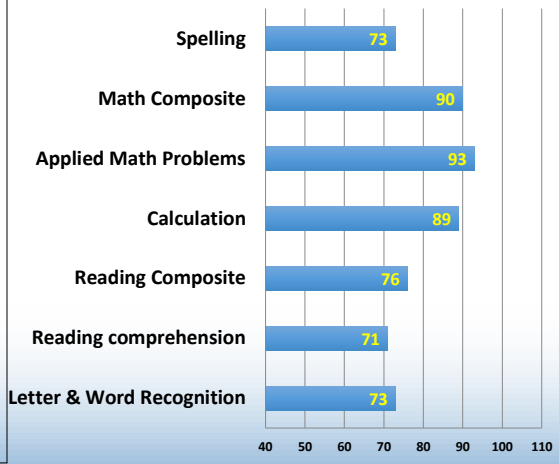
Jose also receives ELL services and his current ACCESS scores are as follows: Listening 5.8, Speaking 1.9, Reading 2.8, Writing 3.5.

2018 WISC4 Spanish : VCI 55, PRI 92, WM 86, PS 91

91

CAS2 and KTEA-III Scores (January 2020)





92

92

Jose was given this simple intervention

Remember to check how well you are attending. If you are having a problem, use a plan and look at this (taped to his desk).

From: Naglieri, J. A., & Pickering, E. B. (2010). *Helping Children Learn: Intervention Handouts for Use at School and Home (Second Edition).* Baltimore, MD: Brookes Publishing.

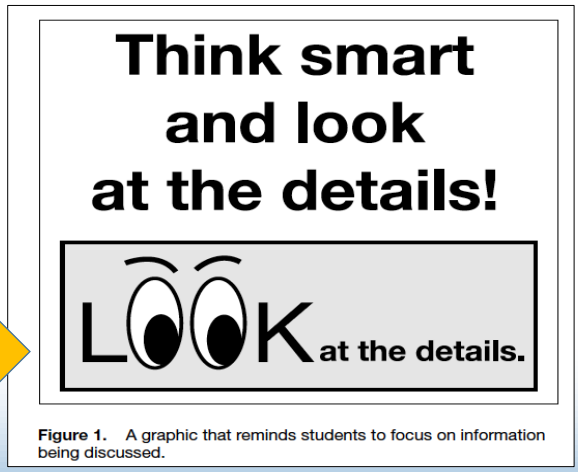


Figure 1. A graphic that reminds students to focus on information being discussed.

93

Two weeks later!

- Teacher reported that José has increased his reading accuracy by at least 80%.
- He read 16 words correctly out of a list of 20.
- He has done this over the last 3. sessions.

94

PASS Theory Based on Brain Function - Simultaneous Processing

NOT EF

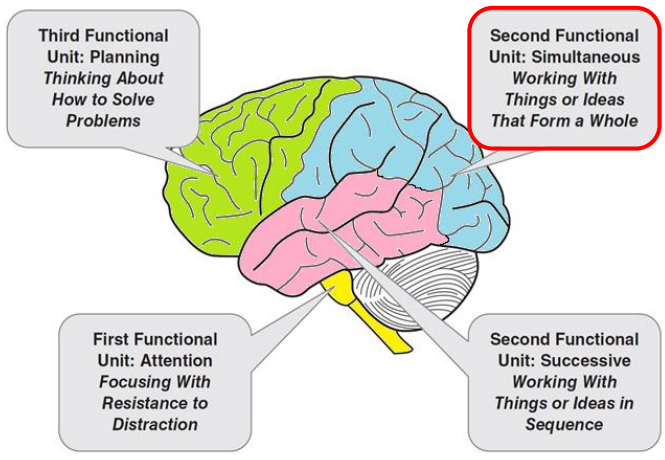


Figure 1.2 Three Functional Units and Associated Brain Structures

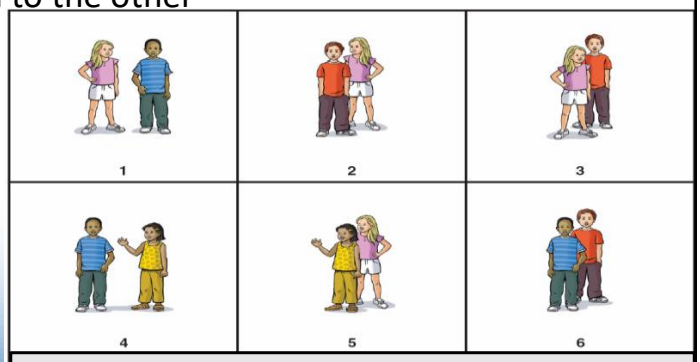
From: *Essentials of CAS2 Assessment*. Naglieri & Otero, 2017

95

95

PASS Theory: Simultaneous

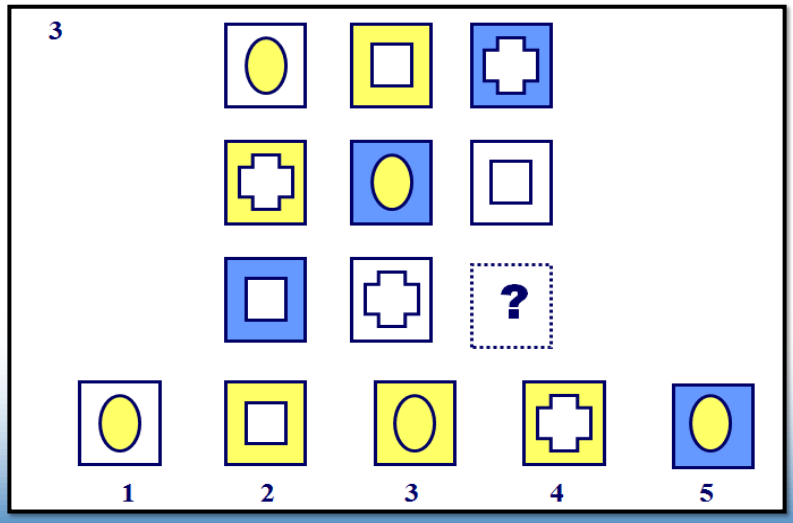
- **Simultaneous** processing is used to integrate stimuli into groups
  - Each piece must be related to the other
  - Stimuli are seen as a whole
- Academics:
  - Reading comprehension
  - geometry
  - math word problems
  - whole language
  - verbal concepts



Which picture shows a boy behind a girl?

96

Progressive Matrices



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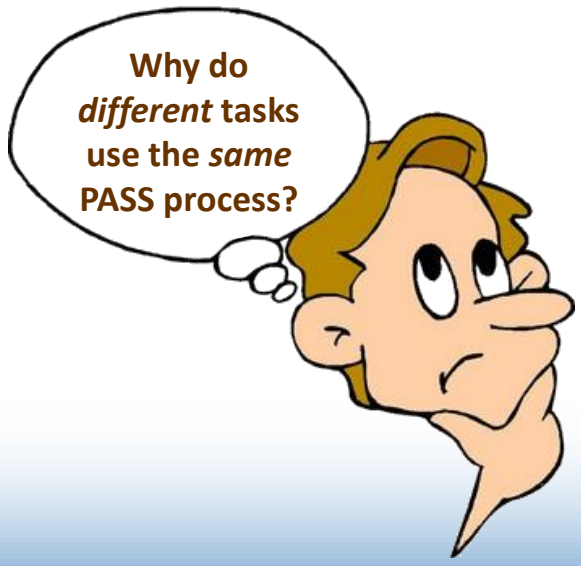


And Consider this…

- Even though the Simultaneous tasks were different in content (shapes, words, grammatical structure) they required **Simultaneous** processing!

98

98

PASS Theory Based on Brain Function - Successive Processing

NOT EF

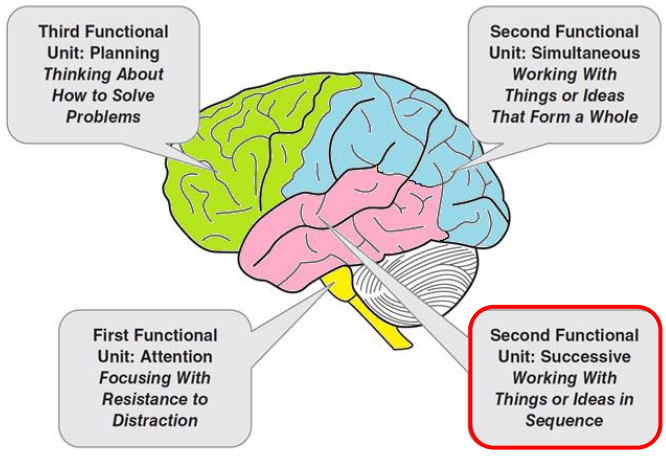


Figure 1.2 Three Functional Units and Associated Brain Structures

From: *Essentials of CAS2 Assessment*. Naglieri & Otero, 2017

99

99

PASS Theory: Successive

- **Successive** processing is a basic psychological process we use to manage stimuli in a specific serial order
  - Stimuli form a chain-like progression
  - Recall a series of words
  - Decoding words
    - Letter-sound correspondence
    - Phonological tasks
    - Understanding the syntax of sentences
    - Comprehension of written instructions

Recall of Numbers in Order
Successive Processing

4	3	8	6	1

100

100

Successive and Syntax

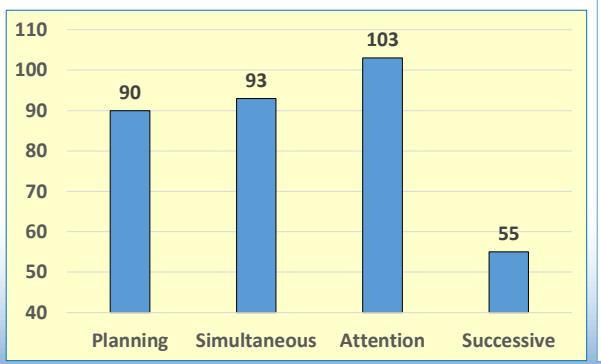
- Sentence Repetition
  - Child repeats sentences exactly as stated by the examiner such as:
  - ***The red greened the blue with a yellow.***
- Sentence Questions
  - Child answers a question about a statement made by the examiner such as the following:
  - ***The red greened the blue with a yellow. Who got greened?***

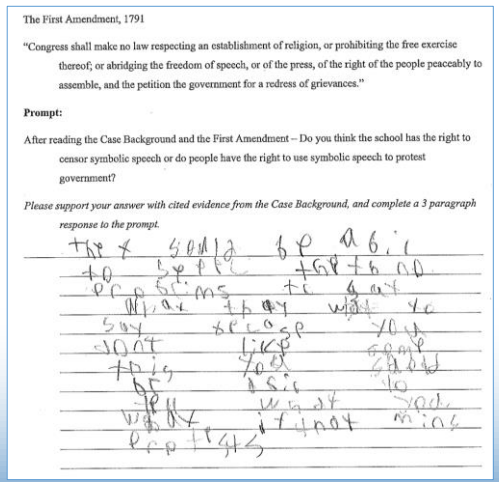
101

101

PASS and Handwriting

- Acquisition of handwriting demands Successive processing




The First Amendment, 1791

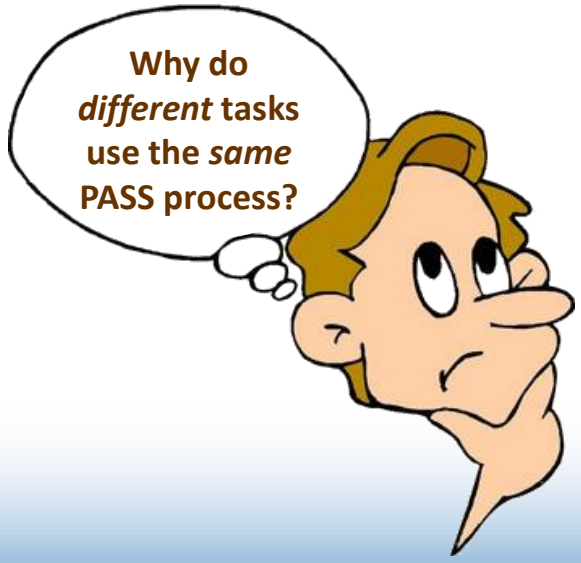
"Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press, of the right of the people peaceably to assemble, and the petition the government for a redress of grievances."

Prompt:

After reading the Case Background and the First Amendment -- Do you think the school has the right to censor symbolic speech or do people have the right to use symbolic speech to protest government?

Please support your answer with cited evidence from the Case Background, and complete a 3 paragraph response to the prompt.

102



And Consider this…

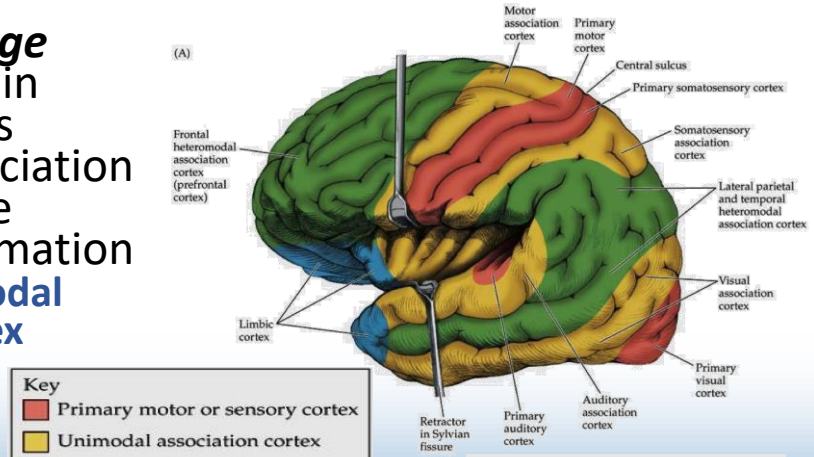
- Even though the Successive tasks were different in content (words, numbers, syntax) and modality (auditory and visual), they required **Successive** processing!

103

103

Heteromodal Association Cortex (Goldberg, 2006)

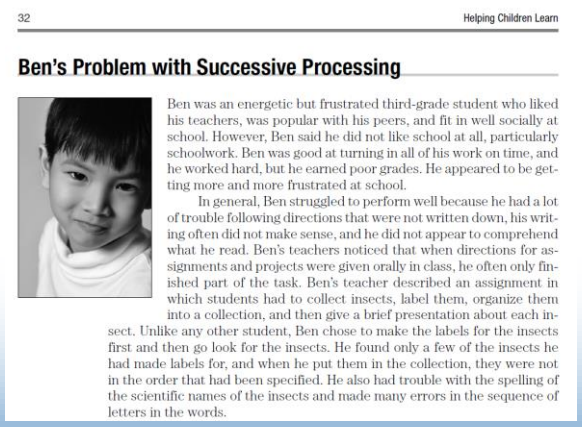
- Our brains ***merge stimuli*** coming in from the senses (unimodal association cortex) into one stream of information in the **Heteromodal association cortex**
- (green areas)



https://goo.gl/images/cyphg7

104

Using good EF to overcome a neurocognitive processing disorder

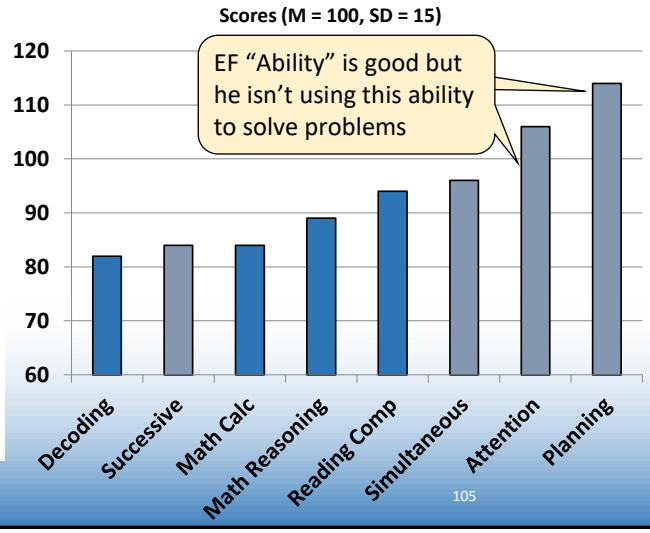


32 Helping Children Learn

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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105

Ben's Problem with Successive Ability

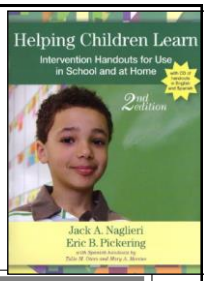
- Ben has difficulty whenever ANY task requires sequencing
  - Academic or ability tests
  - Visual or auditory tests
  - Math or spelling or reading
  - Tasks that require memory of sequences
- How do we help him learn better?

106

106

Ben's Problem with Successive

Teach him to use his strength in EF (Planning)

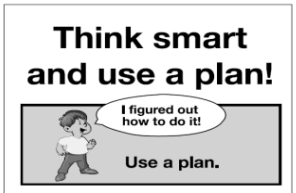


How Can You Be Smarter?

You can be smarter if you PLAN before doing things. Sometime
leap," "Plan your work and work your plan," or "Stop and think."
the ability to plan. When you stop and think about *how* to study

You will be able to do more if you remember to use a plan. An e
plan is to look at the picture "Think smart and use a plan!" (Figu
plan for reading, vocabulary, spelling, writing, math problem sol

Do you have a favorite plan for learning spelling words? Do you
net to learn? Do you ask the teacher or another student for help
plan for studying th



It is smart to have a
When you read, yo
to look at the quest
the story first. Then
swers. Another plan
read so that you ca
When you write you
dents 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.

107

107

Ben's Problem with Successive

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.

Chunking for Reading/Decoding

Reading/decoding requires the student to look at the sequence of the letters in words an
stand the organization of specific sounds in order. Some students have difficulty with long
quences of letters and may benefit from instruction that helps them break the word into s
more
easily
units

Segmenting Words for Reading/Decoding and Spelling

Hov

Teac
be re

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

Pla

Look
Find

How to Teach Segmenting Words

108

108

When to use Cognitive or Behavioral Interventions

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

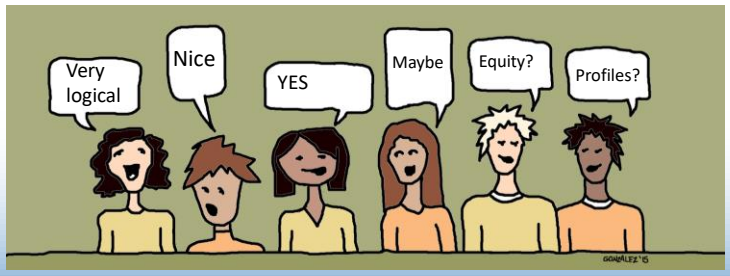
- IF any or all of #2-4 are low
- but #1 is normal,
- then not neurocognitive failure,
- behaviors are environmentally determined

109

109

Core Group Activity

- **QUESTION: Have you seen students who appear low in EF due to their environment?**



110

110

TIME TO STRETCH

111

111

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

112

112

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

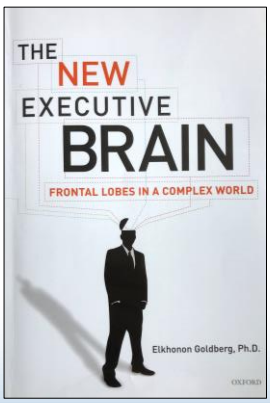
113

113

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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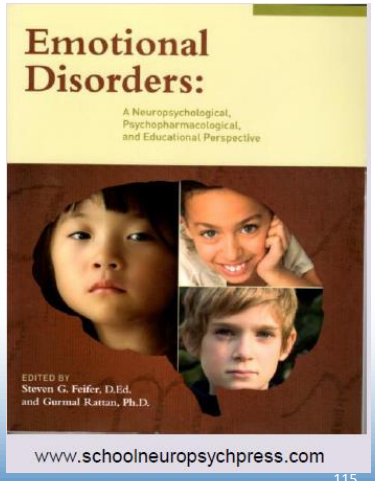
Feiffer & Rattan (2009)

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

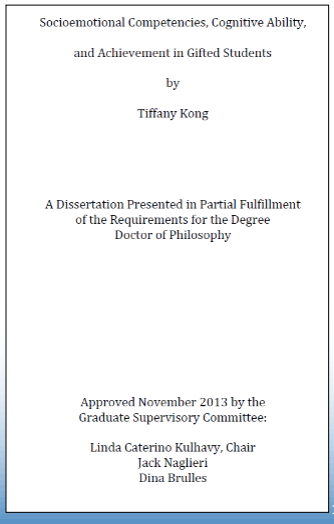


115

115

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:

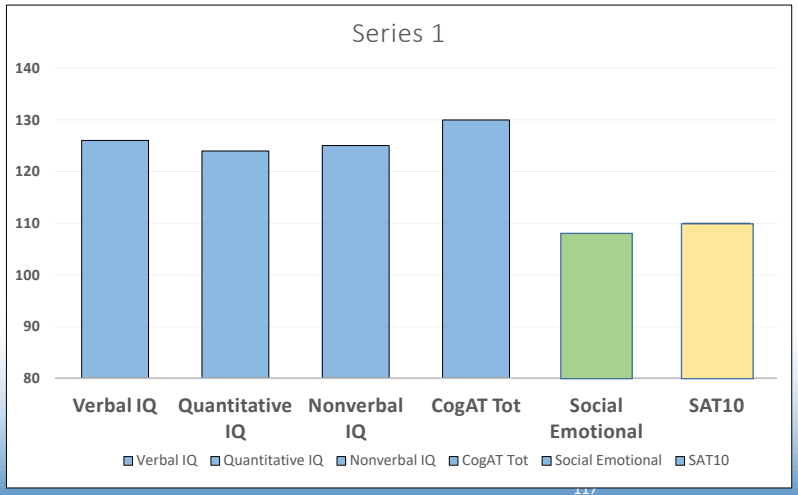
Linda Caterino Kulhavy, Chair
Jack Naglieri
Dina Brulles

116

116

Tests used with Gifted Students

- CogAT = Verbal, Quantitative, Nonverbal
- DESSA is a 72-item rating scale of social-emotional
- SAT is norm-referenced achievement test



117

117

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

118

118

http://www.centerforresilientchildren.org/

119

119

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

120

120

Presentation Outline

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121

121

EF Academic and Life Tasks

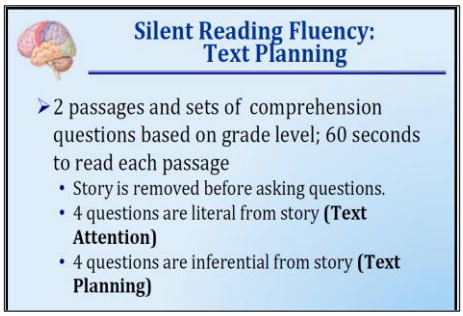
ANY task that demands that the person figure out HOW to do what they decide to do = EF

122

122

EF & Reading Comprehension

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



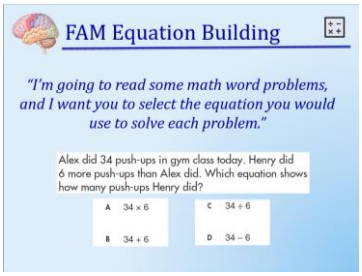
FAR Reading Comprehension subtests measures how well a student reads with a specific question or purpose in mind. In other words, the student has a strategy and is **using EF**

123

123

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

124

124

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**

125

125

Achievement Test Scores and EF

- **On the FAR:**
- Word Recall- requires the student to repeat back a list of words when provided with a category to aid memory (i.e. tell me all the parts of a bicycle, or all vegetables).
- Silent Reading Fluency: Comprehension- the student reads a passage silently and then answers a series of 8 questions when the story is removed.
- **On the FAM:**
- Equation Building - the student is presented with a word problem and must choose from 4 response options the best way to represent the problem using math notations.
- Perceptual Estimation - requires the student to estimate the number of items in a picture when flashed before them using a cue.
- **On the FAW:**
- Motor Planning - requires the student to copy a brief sentence into a designated space provided without erasing.
- Executive Working Memory - the student must select two words from a list of words presented to best respond to a prompt question.
- Story Mapping - the student is presented with various story elements (i.e. setting, characters, plot, etc.) and must put them together to write a story in 5 minute.
- Retrieval Fluency - the student is presented with 3 words....and must think of a 4th word that is related to the other three

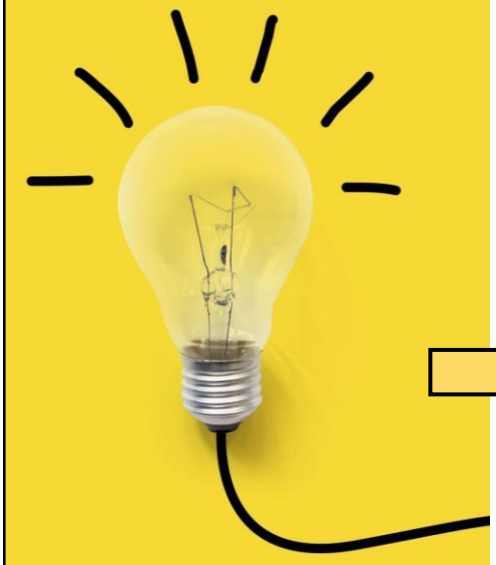
126

126

Your Questions or Thoughts?

127

127



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

128

Executive Function Behaviors, Intelligence, and Achievement test scores

129

EF Behaviors (CEFI) & CAS

- Children given the WISC-IV (N = 43), CAS (N = 62), and the WJIII achievement (N = 58) as part of the typical test battery

Table 8.26. Demographic Characteristics of the CAS, WISC-IV, and WJ III ACH Validity Samples

Demographic		Sample					
		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.

	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

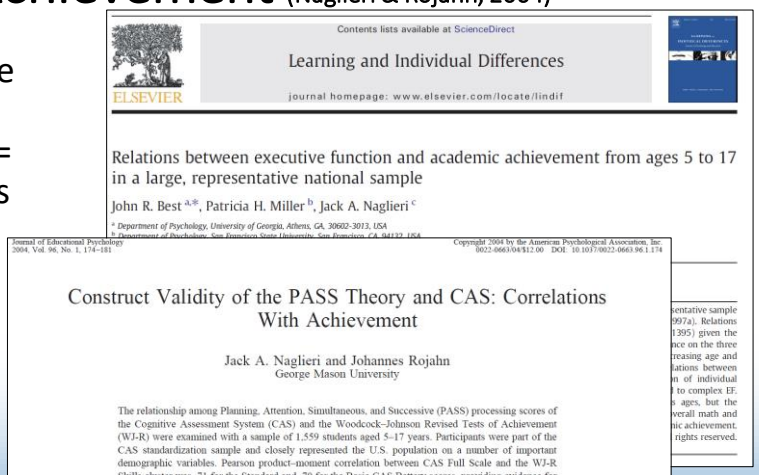
	WJ-III Achievement Tests				
CEFI Scales	Total	Broad Reading	Broad Math	Broad Written Language	Median
Full Scale	.51	.48	.49	.47	.49

130

130

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



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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]

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0022-0663/04/$12.00 DOI: 10.1037/0022-0663.96.1.174

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.

131

Sex Differences in Executive Function

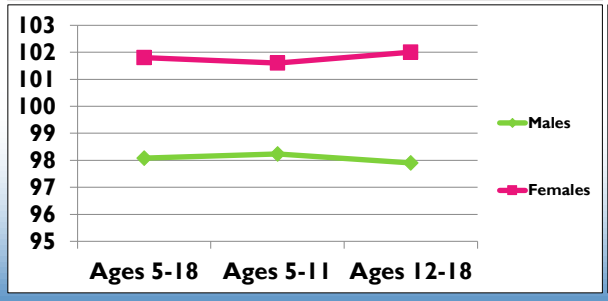
132

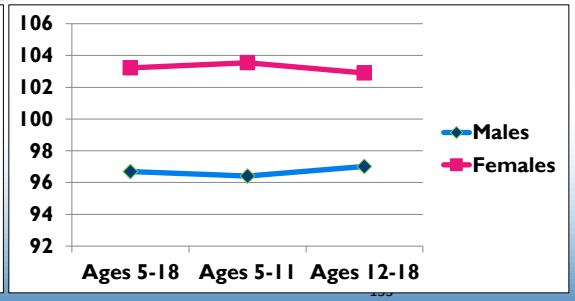
CEFI Sex Differences: Parent Raters

- 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**

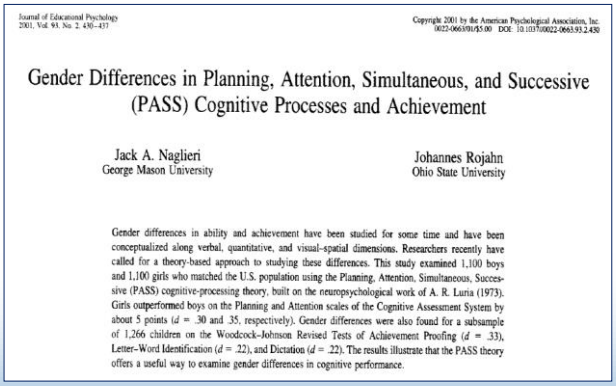
Teachers	N	Mn	SD	N	Mn	SD	ES
Ages 5-18	700	**96.7**	14.4	700	**103.2**	15.0	**-0.44**
Ages 5-11	350	**96.4**	14.5	350	**103.5**	14.9	**-0.49**
Ages 12-18	350	**97.0**	14.4	350	**102.9**	15.0	**-0.40**





133

Sex Differences in PASS Cognitive Processes



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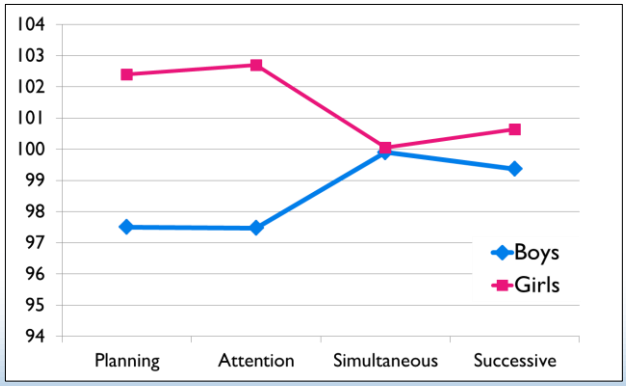
Gender Differences in Planning, Attention, Simultaneous, and Successive (PASS) Cognitive Processes and Achievement

Jack A. Naglieri
George Mason University

Johannes Rojahn
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.



Girls are Smarter than Boys !

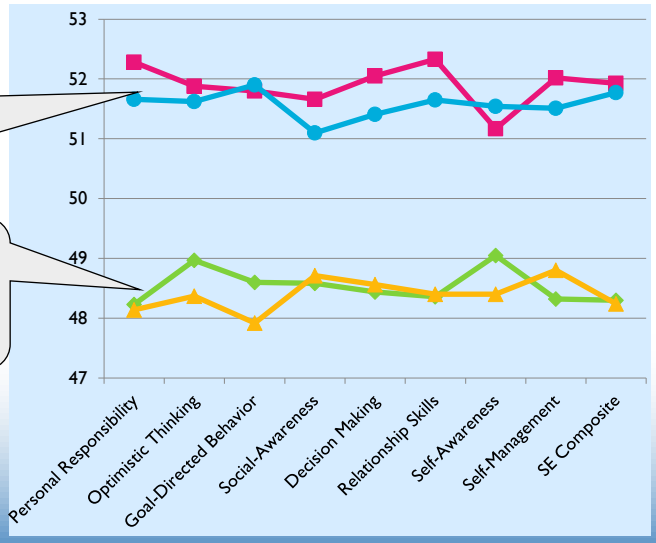
134

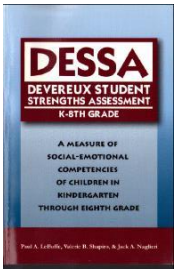
134

Sex Differences: Social Emotional

Parent & Teacher Raters **Females**

Parent & Teacher Raters **Males**

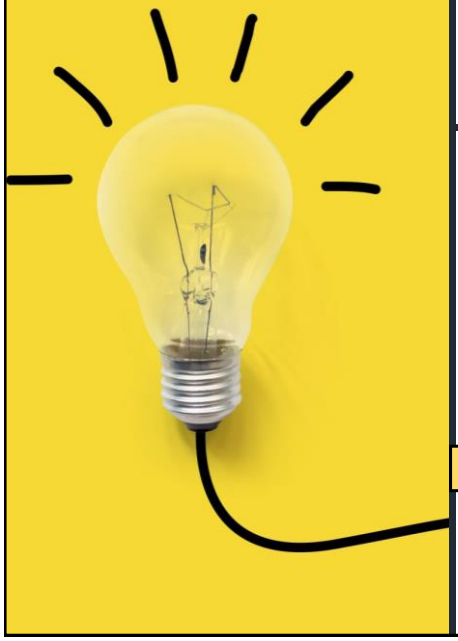




N = 2,477
DESSA values are T scores (Mn= 50, SD = 10)

135

135



Presentation Outline

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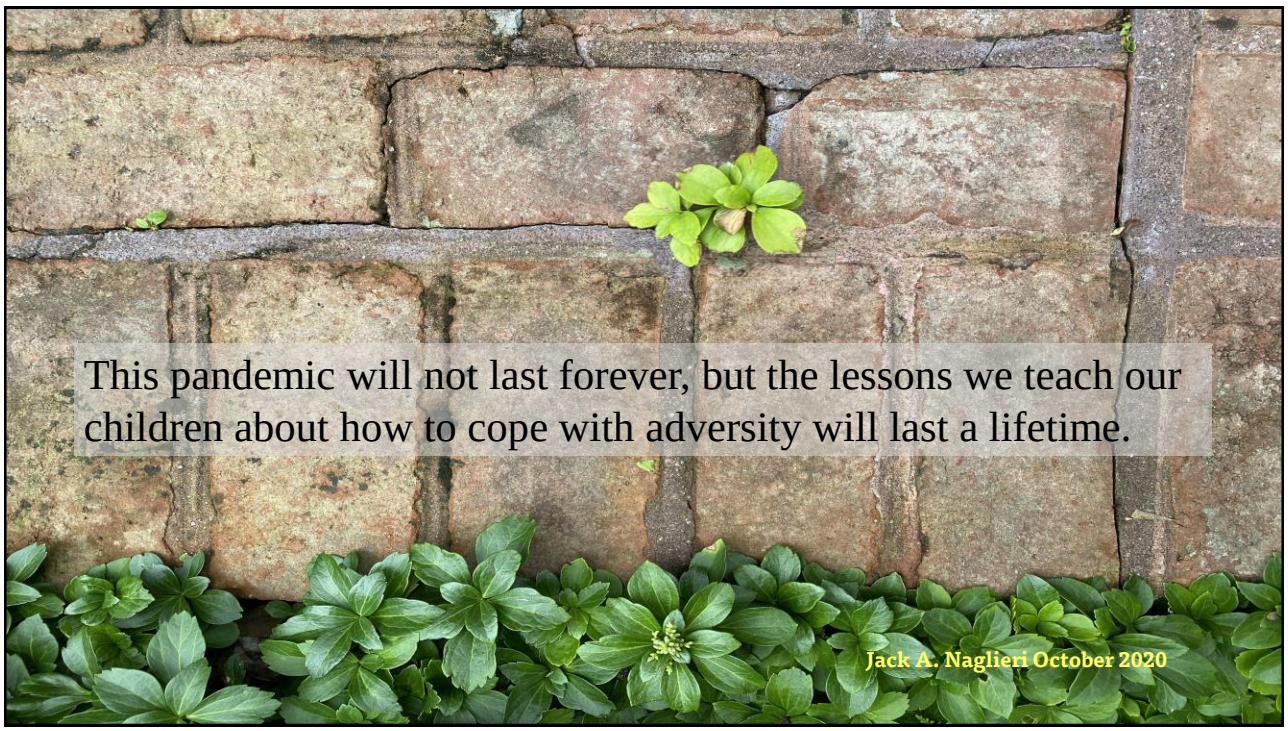
136

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

137

137



138