Using CEFI and CAS2 to measure Behaviors related to Executive Function and More!

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conclusions   1

Resources and Disclosures

conclusions   2

I

www.jacknaglieri.com

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

My Background

➢ Interest in intelligence and instruction

➢ Exper

- Need
- Psych
- Evide

➢ My pe resear

➢ Why t

Formula for Success

➢ IF we want to get our students to achieve they have to THINK SMART

➢ One way to engage students is to have them work in groups

- Conversations stimulate thinking and increase learning

➢ We will use this same approach in today's session

conclusions   5

Core Groups

➢ Groups of 4-5
➢ Roles
1. **C**oach
2. **O**rganizer/Time Keeper
3. **R**ecorder
4. **E**nergizer

conclusions   6

Core Group

➢Share with your CORE GROUP

- Your Name
- Where are you from?
- What do you do?
- What brings you here today?

Chat Chums

• Knee to Knee, Eye to Eye and share….
•Remember back to your own school days. Do you recall being taught how to "think smart?" Yes or no? Share memories.

8

Presentation Outline
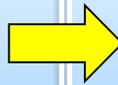
→ What is Executive Function (EF)
  - Historical Perspective
  - Definitions of Executive Function
➢ EF measured by CEFI
➢ EF measured by CAS2
➢ Using CEFI and CAS2 for SLD Determination
➢ Important Research about EF
➢ Conclusions

conclusions   9

EF Lesson on Saturday Night Live

➢ We will begin by learning about how EF can be taught to students, using one of the lessons from **efintheclassroom.net**

➢ The lessons teach aspects of EF and are structured as follows:

→ STEP 1 – View the video
  - STEP 2 – Discuss the video with the person sitting next to you.
  - STEP 3 – Share your ideas with everyone

conclusions   10

EF Lesson on Saturday Night Live

EF Lesson on Saturday Night Live

➢ STEP 1 – View the video

➢ STEP 2 – Discussion of the video with someone sitting next to you.

➢ STEP 3 – Share your ideas with everyone

Time to Think and Talk

➢**Task:**

➢Talk with your partner(s)

➢What was the main point ?

➢Was the goal achieved ?

➢Why was it so hard to get the students to think?

➢Your own questions and thoughts..

conclusions

All Lessons available at: www.efintheclassroom.net

conclusions   14

History Class: Saturday Night Live

➢ STEP 1 – View the video

➢ STEP 2 – Discussion of the video with someone sitting next to you.

- Consider:
  - What was the main point ?
  - Was the goal achieved ?
  - What did the teacher do wrong ?
  - Your own questions and thoughts..

➢ STEP 3 – Share your ideas with everyone

conclusions 15

History Class: SNL

Metacognition

The ability to think about your thinking

Phrase of the week: Are you thinking about thinking?

Watch Seinfeld History Lesson Video:
http://www.schooltube.com/video/30747e2e060f4e4efc5b/

1. Why was the teacher frustrated in the video?
2. What could the students in the video have done differently?
3. Why was it so hard for the students to think about history?
4. Do you think about how you're doing your work *while* you are actually doing it?

Wrap-Up:

This week whenever you are stuck, you must describe to the teacher what you did. How you got to where you are?
This is an example of being aware of what you're thinking, sometimes called "self-monitoring". Write in your notebook how you think this could benefit you.

conclusions 16

History Class: Student Comments

➢ 'The teacher was frustrated because the students weren't thinking about what he was saying'

➢ 'They should have paused before responding so that they could think'

➢ 'When you feel pressure you'll say anything if you don't know the answer'

conclusions 17

History Class: Student Comments

➢'The way teachers run the class stops you from thinking because they tell you there is only one way to do something – but it's a fact that there is more than one way to solve a problem'

➢'That's what I like about this class, there are different ways to solve the problems'

➢'We need to know why the teacher is getting us to learn history'

conclusions 18

History Class: Saturday Night Live

➢Teach students to think not just remember

➢**How** to learn is just as important as **what** to learn

➢This is what Thinking Smart is all about

➢This is the theme of today's workshop

➢We can measure thinking smart (using EF) with the CEFI and the CAS2
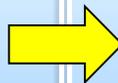
conclusions 19

Presentation Outline

➢What is Executive Function (EF)
 • Historical Perspective
 • Definitions of Executive Function

➢EF measured by CEFI

➢EF measured by CAS2

➢Using CEFI and CAS2 for SLD Determination

➢Important Research about EF

➢ Conclusions

conclusions 20

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.
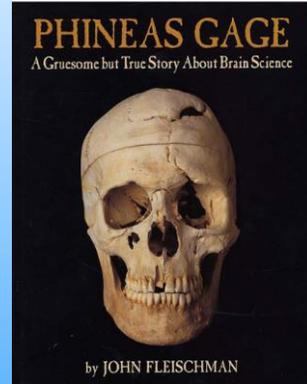
conclusions   21

The Curious Story of Phineas Gage

➤ September 13, 1848 26 year old Phineas Gag 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
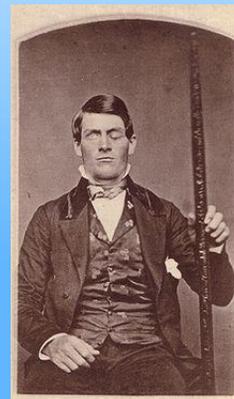
22

Fleishman (2002, p 70)

➤ From Damaiso (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

"HORRIBLE ACCIDENT" IN VERMONT • 7

Fleishman (2002)

PATH OF IRON BAR
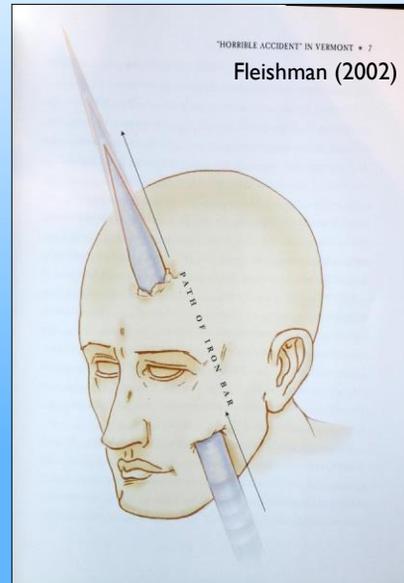
Before . . . & . . . After

➤ **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 decision making, control of impulses and interpersonal relationships

1. Intellect
2. Behavior
3. Emotion
4. Work
5. Impairment

conclusions   24

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.
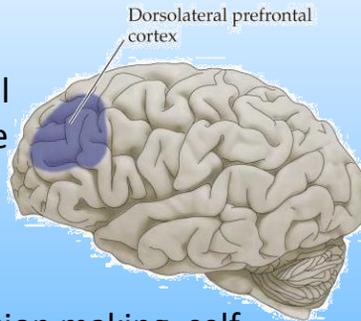
conclusions   25

The Curious Story of Phineas Gage

The Skull of Phineas Gage is at Harvard's Warren Anatomical Museum

The skull of Phineas Gage

The skull of Phineas Gage, along with the tamping iron which did the damage. On display at Harvard's Warren Anatomical Museum.

Frontal Lobes and Executive Function(s)

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

conclusions 27

Executive Function (s)

➢In 1966 Luria first wrote and defined the concept of Executive Function (EF)

➢He credited Bianchi (1895) and Bekhterev (1905) with the initial definition of the process

1902 - 1977

conclusions 28

Executive Functions

➢ Elkhonon Goldberg provides a valuable review of what the frontal lobes do

➢ Describes EF as the orchestra leader

http://www.elkhonongoldberg.com/
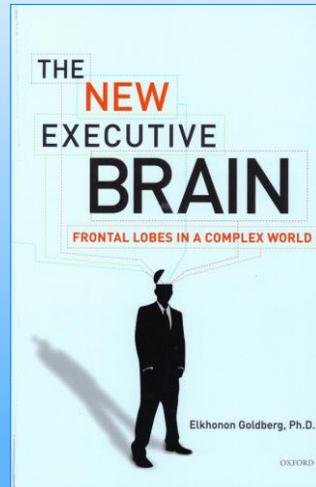
conclusions 29

Goldberg (2009, p. 4)

➢ "The frontal lobes … are liked 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…"
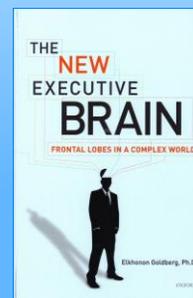
conclusions 30

Goldstein, Naglieri, Princiotta, & Otero (2013)

➢ Executive function(s) has come to be an umbrella term used for many different "abilities"-- planning, working memory, attention, inhibition, self-monitoring, self-regulation and initiation -- carried out by pre-frontal lobes.

➢ We found more than 30 definitions of EF(s)

conclusions   31

Executive Function

➢ EF has 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).

conclusions   32

16

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)

conclusions

33

CEFI (Naglieri & Goldstein, 2012)

conclusions

34

17

CEFI Full Scale (100 items)

CEFI Parent Rating Scale (Ages 5-18)

CEFI Teacher Rating Scale (Ages 5-18)

CEFI Self-Rating Scale (Ages 12-18)

1. Attention
2. Emotion Regulation
3. Flexibility
4. Inhibitory Control
5. Initiation
6. Organization
7. Planning
8. Self-Monitoring
9. Working Memory

1. Consistency Index
2. Negative Impression
3. Positive Impression

35

EXPLORATORY FACTOR ANALYSES

➤The normative samples for parents, teacher, and self ratings were randomly split into two samples and EFA conducted using

- the item raw scores
- nine scales' raw scores

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

➤The sample ...

conclusions 36

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

conclusions   37

ITEM FACTOR ANALYSES – PART 1

➢ For the *first half* of the normative sample for Parent, Teacher and Self ratings' **item scores** (90 items) was analyzed using exploratory factor analysis

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

conclusions   38

Item Factor Analyses – Part 1

➢ Item Level FA

➢ Scale Level FA

conclusions

39
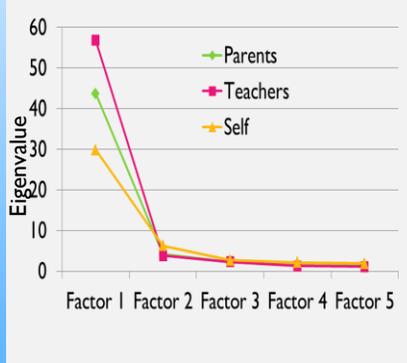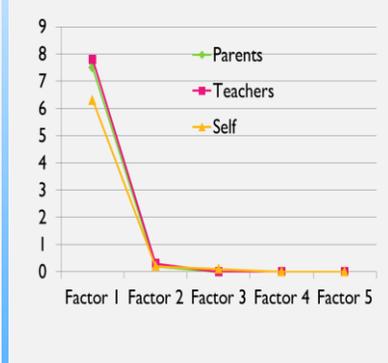
EXPLORATORY FACTOR ANALYSES

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, Age and Clinical/typical status

conclusions

40

20

Adult CEFI Normative Samples

➤Self (N = 1,600) and Observer (N = 1,600) results: 1 factor
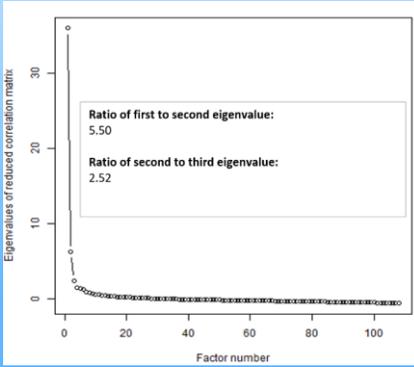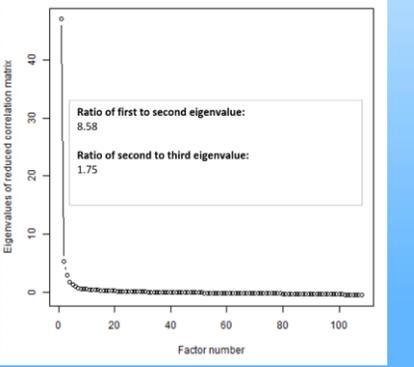
CEFI Adult Consistency of Loadings

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.

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
Clinical Status	Self-Report Form	.993	Non-clinical	1,501	Clinical	159
	Observer Form	.996	Non-clinical	1,497	Clinical	163

conclusions

43

EXPLORATORY FACTOR ANALYSES

➢ Conclusions
- 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
- From nationally representative samples aged 5 to 80 years (N = 6,700) indicates .. Executive Function best describes the concept

conclusions

44

EF and its components

➢Abilities, cognitive processes, and behaviors
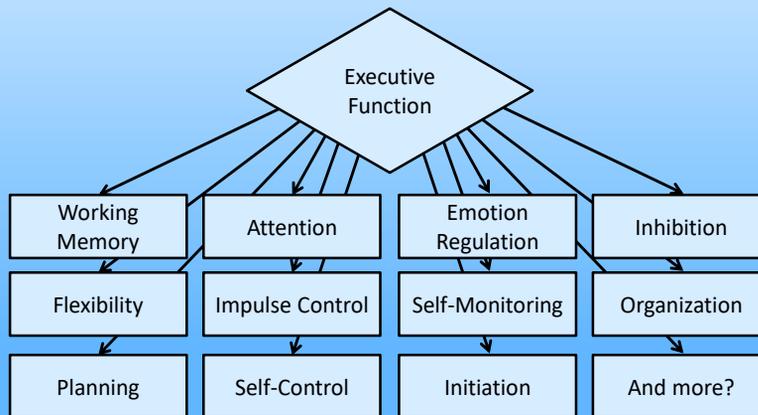
conclusions   45

Naglieri & Goldstein, 2012

➢Executive Function is: *how* you do what you decide to do.
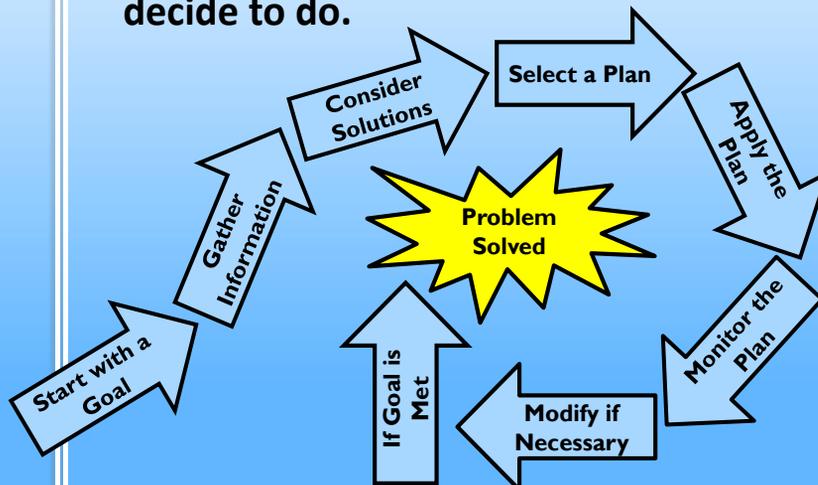
conclusions   46

Does a13 month old have EF?

47

Age 19 months: Knowledge & EF
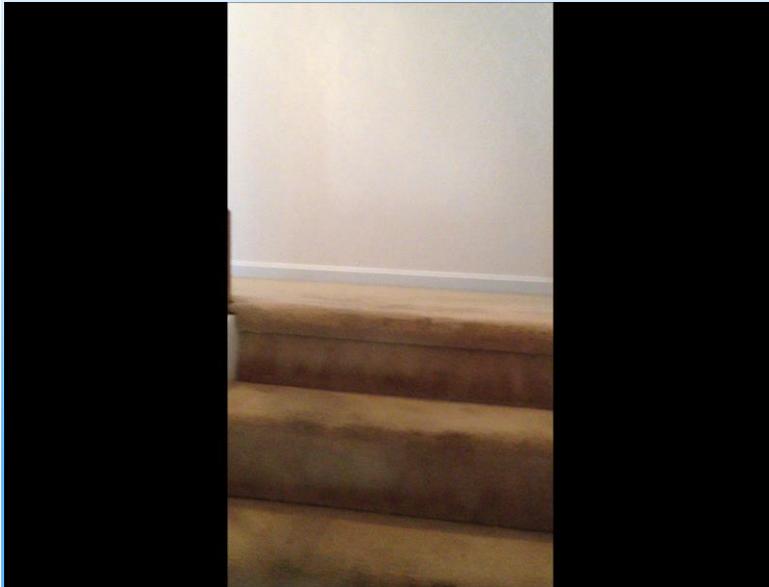
conclusions   48

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

➢ Learning depends upon instruction and EF
➢ At first, EF plays a major role in learning
➢ When a new task is learned and practiced it becomes a skill and execution requires less EF

Maximum Use — **Role of EF** — **Role of Knowledge and Skills**

Minimum Use

Novel Task — Well Learned Task

Over time and with experience
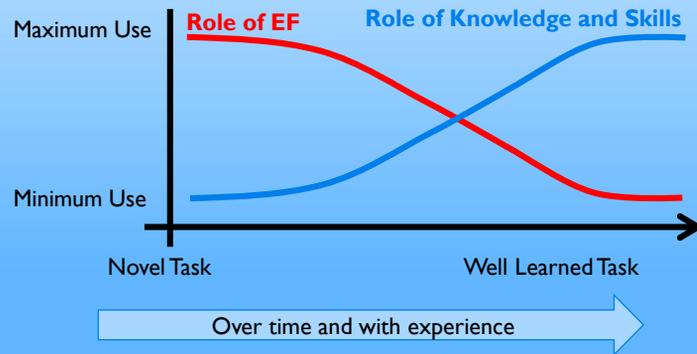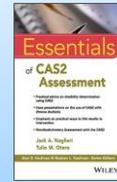
conclusions

Which Lemming has good EF?

conclusions

50

25
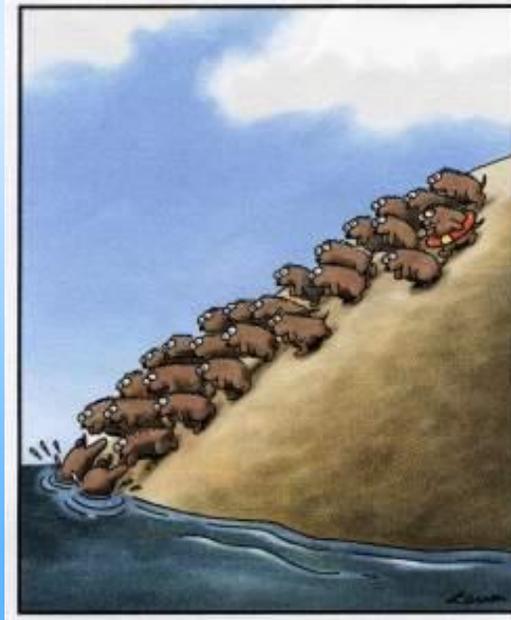
Executive Function Involves

➢ *"How* you decide *what* 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.

conclusions   51

Time to Think and Talk

➢**Task:**

➢Discuss in your groups

- EF as a single concept
- Other ideas

➢Your own questions and thoughts..

➢Report to the audience

conclusions

EF: ability, behavior, social-emotional skill?

All are reflections of FRONTAL LOBE activity

Brain, Cognition, & Behavior

➢**EF ability** is provided by the Frontal Lobes of the brain (an intelligence)

➢**EF behaviors** are the result of experiences that influence likelihood that a person is strategic when doing things

➢**EF Emotions** are the result of learning

➢It is very important to measure EF *Behaviors* and EF *Ability* and *Emotion* because they may be different

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- Historical Perspective
- Definitions of Executive Function

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➢EF measured by CAS2
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➢Important Research about EF
➢ Conclusions

conclusions   55

Comprehensive Executive Function Inventory (CEFI)
Jack A. Naglieri & Sam Goldstein

- CEFI is a **strength based** EF measure
- Items are **positively** worded
- Higher scores = **good** behaviors related to EF
- Scores set at mean of **100** SD of **15**
- Ages 5-18 years rated by a parent, teacher, or the child/youth.
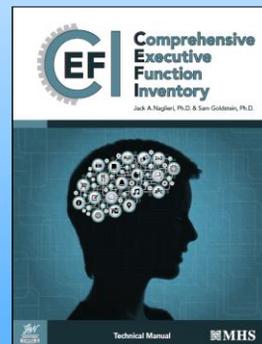
conclusions   56

Free Use of CEFI: http://info.mhs.com/cefi

CEFI Normative Samples

- ➢ 1,400 ratings by Parents for children aged 5-18 years
- ➢ 1,400 ratings by Teachers for children aged 5-18 years
- ➢ 700 ratings from the self-report form for those aged 12-18 years
- ➢ There were equal numbers of ratings of or by males and females
- ➢ Stratified according to the 2009 US Census by race/ethnicity, parental education, region, age, and sex

conclusions

58

CEFI Administration & Scoring

```
                    CEFI Administration
                    & Scoring Methods

        Paper and Pencil                    Online
        Administration                   Administration

Hand Scoring Using    Examiner enters      Examiner enters
CEFI Record Form      responses in MHS     responses into CEFI
                      Online Assessment    Scoring Software
                      Center:              Program:
                      Automated scoring    Automated scoring
                      and report           and report
```

conclusions   59
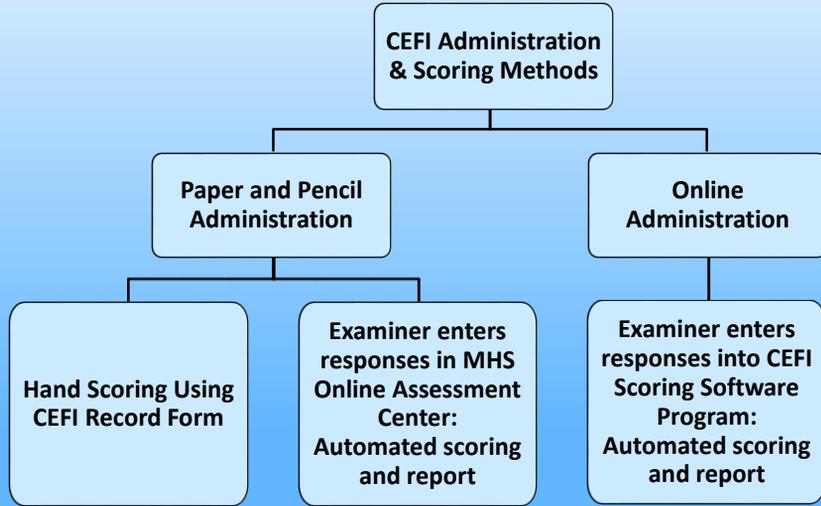
CEFI Forms & Scales (also in Spanish)

```
CEFI Parent        CEFI Teacher       CEFI Self-
Rating Scale       Rating Scale       Rating Scale
(Ages 5-18)        (Ages 5-18)        (Ages 12-18)
```

CEFI Full Scale (100 items)

1. Attention
2. Emotion Regulation
3. Flexibility
4. Inhibitory Control
5. Initiation
6. Organization
7. Planning
8. Self-Monitoring
9. Working Memory

1. Consistency Index
2. Negative Impression
3. Positive Impression

conclusions
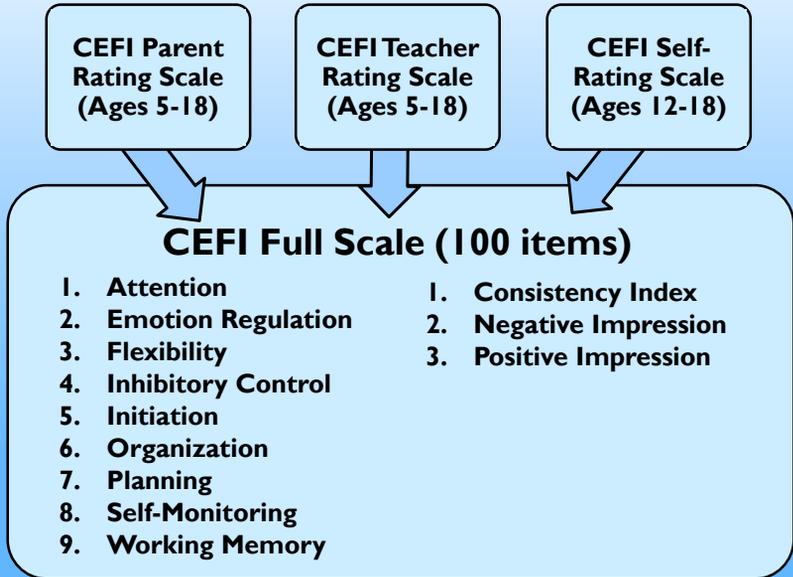
CEFI Items by Scale

Table C.4. Attention (12 items)

Item #	Parent/Teacher Item *During the past 4 weeks, how often did the child...*	Self-Report Item *During the past 4 weeks, how often did you...*
3.	finish a boring task?	finish a boring task?
11.	work well in a noisy environment?	work well in a noisy environment?
21.	work well for a long time?	work well for a long time?

Table C.5. Emotion Regulation (9 items)

Item #	Parent/Teacher Item *During the past 4 weeks, how often did the child...*	Self-Report Item *During the past 4 weeks, how often did you...*
10.	control emotions when under stress?	control emotions when under stress?
12.	stay calm when handling small problems?	stay calm when handling small problems?
42.	find it hard to control his/her emotions? (R)	find it hard to control your emotions? (R)

Table C.6. Flexibility (7 items)

Item #	Parent/Teacher Item *During the past 4 weeks, how often did the child...*	Self-Report Item *During the past 4 weeks, how often did you...*
7.	come up with a new way to reach a goal?	come up with a new way to reach a goal?
41.	come up with different ways to solve problems?	come up with different ways to solve problems?
45.	have many ideas about how to do things?	have many ideas about how to do things?

conclusions   61

CEFI Items by Scale

Table C.7. Inhibitory Control (10 items)

Item #	Parent/Teacher Item *During the past 4 weeks, how often did the child...*	Self-Report Item *During the past 4 weeks, how often did you...*
1.	think before acting?	think before acting?
19.	find it hard to control his/her actions? (R)	find it hard to control your actions? (R)
32.	think of the consequences before acting?	think of the consequences before acting?

Table C.8. Initiation (10 items)

Item #	Parent/Teacher Item *During the past 4 weeks, how often did the child...*	Self-Report Item *During the past 4 weeks, how often did you...*
16.	start something without being asked?	start something without being asked?
30.	start conversations?	start conversations?
39.	take on new projects?	take on new projects?

Table C.9. Organization (10 items)

Item #	Parent/Teacher Item *During the past 4 weeks, how often did the child...*	Self-Report Item *During the past 4 weeks, how often did you...*
5.	complete one task before starting a new one?	complete one task before starting a new one?
13.	organize his/her thoughts well?	organize your thoughts well?
18.	appear disorganized? (R)	appear disorganized? (R)

conclusions   62

CEFI Items by Scale

Table C.10. Planning (11 items)

Item #	Parent/Teacher Item *During the past 4 weeks, how often did the child...*	Self-Report Item *During the past 4 weeks, how often did you...*
9.	prepare for school or work?	prepare for school or work?
15.	solve problems creatively?	solve problems creatively?
22.	do things in the right order?	do things in the right order?
28.	plan for future events?	plan for future events?

Table C.11. Self-Monitoring (10 items)

Item #	Parent/Teacher Item *During the past 4 weeks, how often did the child...*	Self-Report Item *During the past 4 weeks, how often did you...*
6.	ask for help when needed?	ask for help when needed?
14.	fix his/her mistakes?	fix your mistakes?
17.	change a plan that was not working?	change a plan that was not working?
29.	learn from past mistakes?	learn from past mistakes?

Table C.12. Working Memory (11 items)

Item #	Parent/Teacher Item *During the past 4 weeks, how often did the child...*	Self-Report Item *During the past 4 weeks, how often did you...*
4.	forget instructions? (R)	forget instructions? (R)
8.	remember how to do something?	remember how to do something?
23.	forget instructions with many steps? (R)	forget instructions with many steps? (R)
26.	remember many things at one time?	remember many things at one time?

One Factor and 9 Scales?

➢ NOTE: EF is a unidimensional concept

➢ Use the Full Scale to answer the question "Is the child 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
Attention
Emotion Regulation
Flexibility
Inhibitory Control
Initiation
Organization
Planning
Self-Monitoring
Working Memory

conclusions   64

CEFI Characteristics

➢Automated scoring and reporting includes intervention suggestions

➢Scores are based on nationally representative normative sample that is representative of the US

CEF Comprehensive Executive Function Inventory
Jack A. Naglieri, Ph.D. & Sam Goldstein, Ph.D.

Technical Manual ✕MHS
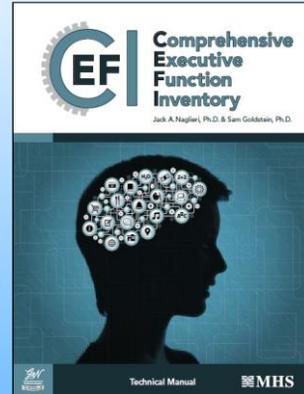
conclusions

65

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	101.7	Youth's Average				

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

Free Use of CEFI: mhs.com/cefi

CEFI Scale Reliability

CEFI Internal Reliability Coefficients for the Normative Sample			
	Parent (N = 1,396)	Teacher (N=1,400)	Self (N = 700)
Full Scale	.99	.99	.97
Attention	.93	.96	.86
Emotion Regulation	.89	.93	.78
Flexibility	.85	.90	.77
Inhibitory Control	.90	.94	.80
Initiation	.89	.93	.80
Organization	.91	.94	.85
Planning	.92	.96	.85
Self-Monitoring	.87	.92	.78
Working Memory	.89	.94	.83

68

CEFI Interpretation

Step 1: Examine Quality of the Ratings:
Consistency, Positive and Negative
Impression

Step 2: Interpret Scale Scores

Step 3: Compare CEFI Scale Scores

Step 4: Examine Item-Level Responses

Step 5: Compare Results Across Raters

Step 6: Compare Results Over Time

conclusions   69

CEFI Interpretive Report

Comprehensive Executive Function Inventory

G&N
Goldstein & Naglieri
Excellence In Assessments

(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

conclusions   70

Step 1: Impression Scales

➢ A particular response style is indicated if the standard score is less than 76 (< 5% of the normative sample).

Scale	Interpretive Text	
	Standard Score ≤ 75	Standard Score > 75
Consistency Index	The rater responded in a different way to similar items. This rating pattern is not typical and should be further investigated.	The pattern of ratings is typical.
Negative Impression Scale	The pattern of ratings may under-estimate the child's behavior. This rating pattern is not typical and should be further investigated.	ratings is typical.
Positive Impression Scale	The pattern of ratings may over-estimate the child's behavior. This rating pattern is not typical and should be further investigated.	The pattern of ratings is typical.
Time to Completion	The rater spent considerably less time than is usual completing the CEFI.	The time the rater took to complete the CEFI was typical.

Time to Completion is only for online administration

71

CEFI Interpretation

Step 1: Examine Quality of the ratings:
    Consistency, Positive and Negative
    Impression

Step 2: Interpret Scale Scores

Step 3: Compare CEFI Scale Scores

Step 4: Examine Item-Level Responses

Step 5: Compare Results Across Raters

Step 6: Compare Results Over Time

conclusions   72

Step 2: Interpret Scale Scores

➢All scales are set at mean of 100, SD of 15

➢Low scores mean poor EF

Table 4.3. Interpretation Guidelines for Examining Scale Scores

Scale	Interpretation Guidelines
Full Scale	Reflects overall executive function. The Full Scale score is made up of 90 items from nine different areas that are conceptually related to executive function (i.e., Attention, Emotion Regulation, Flexibility, Inhibitory Control, Initiation, Organization, Planning, Self-Monitoring, and Working Memory). The CEFI Scales describe the content of the items for intervention purposes. If there is significant variation among the CEFI Scales, the Full Scale score will sometimes be higher and other times lower than scores on these scales. However, the Full Scale score is a good description of a child's/youth's executive function behaviors if there is no significant variation among the CEFI Scales.
Attention	Describes how well a child/youth can avoid distractions, concentrate on tasks, and sustain attention.
Emotion Regulation	Indicates the child's/youth's control and management of emotions, including staying calm when handling small problems and reacting with the right level of emotion.
Flexibility	Reflects a child's/youth's skill at adjusting behavior to meet circumstances, including coming up with different ways to solve problems, having many ideas about how to do things, and being able to solve problems using different approaches.

CEFI Interpretive Report

CEFI Interpretive Report

CEFI (5–18 Years) Parent Interpretive Report for Brittany Ambers   Admin Date: 05/19/2012

CEFI Results

Brittany Ambers's **Full Scale** standard score of 75 falls in the *Below Average* range and is ranked at the 5th percentile. This means that her score is equal to, or greater than, 5% of those obtained by youth her age in the standardization group. There is a 90% probability that Brittany Ambers's true Full Scale standard score is within the range of 73 to 78. The CEFI Full Scale score is made up of items that belong on separate scales called Attention, Emotion Regulation, Flexibility, Inhibitory Control, Initiation, Organization, Planning, Self-Monitoring, and Working Memory. There was no significant variation among the CEFI Scales. This indicates that Brittany Ambers obtained similar scores on the separate scales. This also means that the Full Scale is a good description of her executive function behaviors.

Brittany Ambers's **Initiation** scale score describes how she begins tasks or projects on her own, including starting tasks easily, being motivated, and taking the initiative when needed. Her standard score of 84 falls in the *Low Average* range and is ranked at the 14th percentile. There is a 90% probability that her true Initiation standard score is within the range of 78 to 93. Item score variability suggests that ratings for Brittany Ambers were low on, for example, initiating conversations and putting plans into action.

Brittany Ambers's **Flexibility** scale score describes how she adjusts her behavior to meet circumstances, including coming up with different ways to solve problems, having many ideas about how to do things, and being able to solve problems using different approaches. Her standard score of 80 falls in the *Low Average* range and is ranked at the 9th percentile. There is a 90% probability that her true Flexibility standard score is within the range of 74 to 92. Ratings for Brittany Ambers were low on, for example, using a different strategy when another doesn't work.

Brittany Ambers's **Attention** scale score reflects how well she can avoid distractions, concentrate on tasks, and sustain attention. Her standard score of 79 falls in the *Below Average* range and is ranked at the 8th percentile. There is a 90% probability that her true Attention standard score is within the range of 74 to 87. Variability in item scores indicates that ratings for Brittany Ambers were low on, for example, finishing a boring task, avoiding distraction and noticing details. (See the *CEFI Items by Scale* section of this report for additional low item scores.)

conclusions   75

Report

Intervention Strategies are provided for each of the 9 CEFI scales

CEFI (12–18 Years) Self-Report Interpretive Report for Random2   Admin Date: 01/07/2

Intervention Strategies for Attention

Helping a Child Overcome Problems with Inattention

First, help the child understand the nature of his or her attention problems, including:

- Concepts such as attention, resistance to distraction, and control of attention.
- Recognition of how attention affects daily functioning.
- Recognition that the deficit can be overcome.
- Basic elements of the control program.

Second, teachers and parents can help the child improve his or her motivation and persistence:

- Promote success via small steps.
- Ensure success at school and at home.
  - Allow for oral responses to tests.
  - Circumvent reading whenever possible.
- Teach rules for approaching tasks.
  - Help the child define tasks accurately.
  - Assess the child's knowledge of problems.
  - Encourage the child to consider all possible solutions.
  - Teach the child to use a correct test strategy.
- Discourage passivity and encourage independence.
  - Do not rely too heavily on teacher-oriented approaches.
  - Require the child to take responsibility for correcting his or her own work.
  - Help the child to become more self-reliant.
- Encourage the child to avoid:
  - Excessive talking.
  - Working fast with little accuracy.
  - Giving up too easily.
  - Turning in sloppy, disorganized papers.

Third, teachers and parents should give the child specific problem-solving strategies.

- Model and teach strategies that improve attention and concentration.
- Help the child to recognize when he or she is under- or over-attentive.

Naglieri, J. A., & Pickering, E. B., Helping Children Learn: Intervention Handouts for Use at School and at Home, Second Edition, 2010. Baltimore: Paul H. Brookes Publishing Co., Inc. www.brookespublishing.com. Used with the permission of the publisher.

conclusions   76

CEFI Interpretation

Step 1: Examine Quality of the ratings:
Consistency, Positive and Negative
Impression

Step 2: Interpret Scale Scores

Step 3: Compare CEFI Scale Scores

Step 4: Examine Item-Level Responses

Step 5: Compare Results Across Raters

Step 6: Compare Results Over Time

conclusions   77

Step 3: Compare CEFI Scale 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
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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
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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 $p < .10$.

CEFI Interpretation

Step 1: Examine Quality of the ratings:
Consistency, Positive and Negative
Impression

Step 2: Interpret Scale Scores

Step 3: Compare CEFI Scale Scores

Step 4: Examine Item-Level Responses

Step 5: Compare Results Across Raters

Step 6: Compare Results Over Time

conclusions   79

Step 5: Between Rater Comparisons

Table 4.5. Critical Values ($p < .10$) Denoting Statistically Significant Differences Between

Scale	Parent to Parent		Teacher to Teacher		Parent to Teacher		Parent to Self-Report	Teacher to Self-Report
	5–11 Years	12–18 Years	5–11 Years	12–18 Years	5–11 Years	12–18 Years	12–18 Years	12–18 Years
Full Scale	5	5	4	4	4	4	8	5
Attention	10	10	7	7	9	9	13	11
Emotion Regulation	13	12	10	10	11	11	15	14
Flexibility	14	14	12	12	13	13	15	15
Inhibitory Control	12	12	9	9	11	10	14	13
Initiation	13	12	10	10	12	11	14	14
Organization	12	10	10	9	11	10	12	12
Planning	11	10	8	8	10	9	13	11
Self-Monitoring	14	12	11	11	13	11	15	14
Working Memory	13	12	9	9	11	11	11	13

conclusions   80

CEFI Interpretation

Step 1: Examine Quality of the ratings: Consistency, Positive and Negative Impression

Step 2: Interpret Scale Scores

Step 3: Compare CEFI Scale Scores

Step 4: Examine Item-Level Responses

Step 5: Compare Results Across Raters

Step 6: Compare Results Over Time

conclusions 81

Step 6: Compare Results Over Time

➢Determine if CEFI pre post scores differ significantly – but also if the post-test standard score is in the Average range or higher

Table 4.6. Critical Values Denoting Statistically Significant Change Over Time

| | Parent Form | | | | Teacher Form | | | | Self-Report Form | |
| | 5–11 Years | | 12–18 Years | | 5–11 Years | | 12–18 Years | | 12–18 Years | |
Scale	$p < .05$	$p < .10$	$p < .05$	$p < .10$	$p < .05$	$p < .10$	$p < .05$	$p < .10$	$p < .05$	$p < .10$
Full Scale	6	5	5	5	4	4	4	4	8	6
Attention	12	10	11	10	9	7	9	7	16	13
Emotion Regulation	15	13	14	12	11	10	11	10	20	17
Flexibility	17	14	16	14	14	12	14	12	20	17
Inhibitory Control	15	12	14	12	11	9	11	9	19	16
Initiation	15	13	14	12	12	10	12	10	19	16
Organization	14	12	12	10	11	10	11	9	17	14
Planning	13	11	12	10	10	8	9	8	17	14
Self-Monitoring	17	14	14	12	13	11	12	11	20	17
Working Memory	15	13	14	12	11	9	11	9	18	15

CEFI – ADULT FORM (2017)

CEFI Adult (ages 18+)

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

CEFI Adult (ages 18+)

➢ 80 items in same 9 scales

conclusions

85

CEFI Adult (ages 18+)

➢ Same interpretation method

86

Interpretive Report

Interpretive Report

CEFI Adult Online vs Paper

➢ No differences across administration method

Table F.2. Mean Standard Score Differences Between Administration Methods for the CEFI Adult Self-Report Form

Scale	Obt. r	Cor. r	Online M	Online SD	Paper-and-Pencil M	Paper-and-Pencil SD	d-ratio	F (1, 53)	p
Full Scale	.99	.99	102.9	12.4	102.7	12.6	-0.01	0.40	.531
Attention	.90	.96	101.9	11.3	101.7	12.0	-0.02	0.07	.793
Emotion Regulation	.97	.98	103.8	13.7	103.8	13.8	0.00	0.01	.938
Flexibility	.98	.99	103.1	13.3	103.3	13.5	0.01	0.29	.590
Inhibitory Control	.97	.98	101.5	13.5	101.2	13.6	-0.03	0.65	.423
Initiation	.89	.95	102.4	12.3	102.1	11.9	-0.03	0.19	.662
Organization	.95	.98	102.2	11.6	102.2	11.0	0.00	0.01	.942
Planning	.95	.98	102.7	11.6	102.3	12.1	-0.04	0.68	.412
Self-Monitoring	.98	.99	101.9	12.2	101.9	12.2	0.00	0.03	.856
Working Memory	.98	.99	102.6	13.1	102.3	13.4	-0.03	0.65	.424

Note. Obt. *r* = Obtained correlation, Cor. *r* = Corrected correlation. All correlations significant, $p < .001$. $N = 52$. Guidelines for interpreting Cohen's *d* are as follows: small effect size = 0.2, medium effect size = 0.5, and large effect size = 0.8. Positive *d*-ratio values indicate higher scores for the paper-and-pencil administration.

conclusions 89

CEFI Adult Race & Ethnicity

Table 8.9. CEFI Adult Full Scale Score Comparison Between Black and White Groups

Form		Black Sample	Matched White Sample	d-ratio	F (df)	p
Self-Report Form	M	100.5	98.5	0.13	1.56 (1,352)	.212
	SD	16.2	14.4			
	N	177	177			
Observer Form	M	99.5	99.7	-0.01	0.02 (1,362)	.892
	SD	15.5	13.9			
	N	182	182			

Note. Guidelines for interpreting Cohen's *d* are as follows: small effect size = 0.2; medium effect size = 0.5; large effect size = 0.8. Positive *d*-ratio values indicate higher scores in the Black sample.

Table 8.10. CEFI Adult Full Scale Score Comparison Between Hispanic and White Groups

Form		Hispanic Sample	Matched White Sample	d-ratio	F (df)	p
Self-Report Form	M	101.0	99.4	0.10	0.95 (1,346)	.330
	SD	16.8	13.6			
	N	174	174			
Observer Form	M	98.9	100.6	-0.12	1.29 (1,358)	.258
	SD	14.7	15.0			
	N	180	180			

Note. Guidelines for interpreting Cohen's *d* are as follows: small effect size = 0.2; medium effect size = 0.5; large effect size = 0.8. Positive *d*-ratio values indicate higher scores in the Hispanic sample.

Note: . Samples of Black and Hispanic individuals from the normative sample were compared to samples of White individuals from the normative sample matched on age, gender, U.S. geographical region, and education level.

90

INTERVENTIONS FOR EF BEHAVIORS

www.efintheclassroom.net

➢ **Start with Awareness of thinking about thinking**
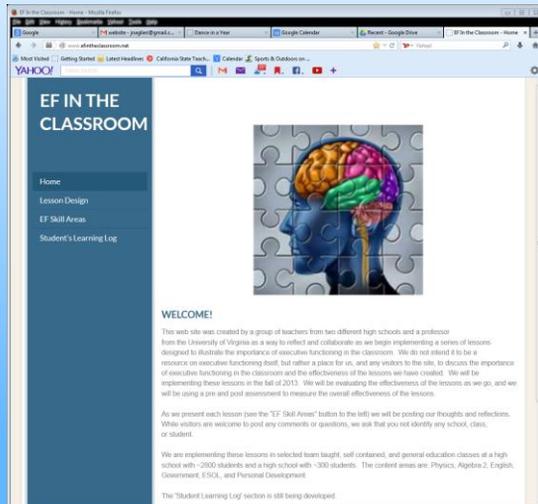
Structure of the lessons

- Each topic is discussed for one week
- Monday – class lesson
- Tues-Thurs reminders
- Friday – class reflection
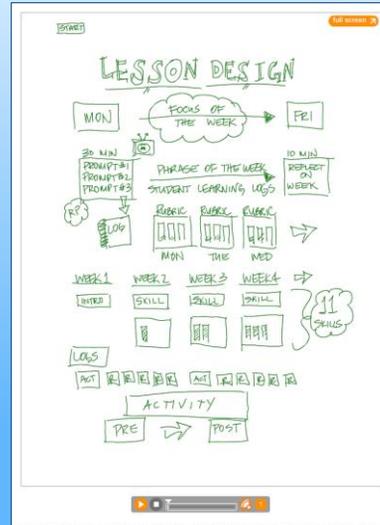
conclusions 93

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
- Goal Directed Persistence

conclusions 94

Other Lessons from www.efintheclassroom.net

Working Memory
Lesson
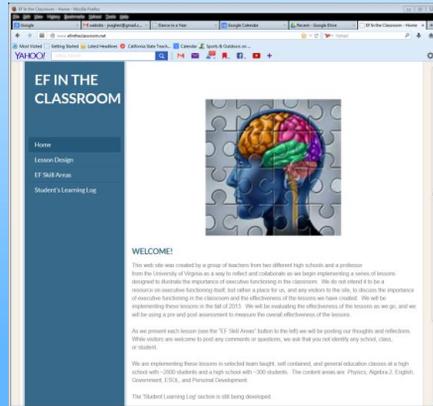
conclusions

95

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
- Goal Directed Persistence

conclusions

96

What is Working Memory

➢Georgiou, Das, and Hayward (2008) described *working memory* as the capacity of the individual to store information for a short period of time and manipulate it using a phonological loop and visual–spatial sketchpad (Baddeley & Hitch, 1974)

➢The *visual–spatial sketchpad* is described as a mental image of visual and spatial features (Engle & Conway, 1998)

➢The *phonological loop* refers to retention of information from speech-based systems that are particularly important when order of information is required (Engle & Conway, 1998)

conclusions

Working Memory Game

➢You will see a series of words presented at 2 per second. The words are from two different categories. For example, Man - Hammer - Boat - Woman, would be organized into Man and Woman (people), Hammer and Saw (tools)

➢When you see the STOP sign, that is the time for you will write the words down in two columns.

conclusions

Ready Trial 1

START

conclusions

conclusions

**Put the words in groups.
Write them down.**

conclusions

**Next Item:
Put the words in SOME
NUMBER of groups.**

conclusions

Ready Trial 2

START

conclusions

conclusions

Put the words into groups. Write them down.

conclusions

Let's Take a Mindful Moment or Brain Break (or Syn-nap)

The brain needs time **process!**
- ➢ **Stretch**
- ➢ Cross Laterals
- ➢ Walk and Talk
- ➢ Energizers
- ➢ Relaxers

conclusions 106

Presentation Outline

➢What is Executive Function (EF)
- Historical Perspective
- Definitions of Executive Function

➢EF measured by CEFI

➢EF measured by CAS2

➢Using CEFI and CAS2 for SLD Determination

➢Important Research about EF

➢ Conclusions

conclusions   107

EF is a Brain-Based Ability

➢EF is an ability by virtue of its relationship to the brain

➢Because there is a relationship between BRAIN FUNCTION and BEHAVIOR, behaviors tell us about the ABILITY (sometimes…)

➢EF skills are the result of EF Ability *and* well practiced behaviors that reflect EF
- Not all abilities and not all behaviors involve EF

conclusions   108

A Theory of Learning

Handbook of
PEDIATRIC
Neuropsychology

Andrew S. Davis
Editor

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 about brain–behavior relationships. Technology, such as magnetic resonance imaging (MRI), functional MRI (FMRI), positron emission tomography, computerized tomography, and diffusion tensor imaging, has reduced the need for neuropsychological tests to localize and access brain damage. Neuropsychological tests, however,

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, syndromes and impairments arising in brain disorders, and clinical methods of assessment (Korkman, 1999). His theoretical formulations, methods, and ideas are articulated in works such as *Higher cortical functions in man* (1966, 1980) and *The Working Brain* (1973). Luria viewed the brain as a functional mosaic, the parts of which interact in dif-

---

Cognition or Knowledge?

➢ What does the student have to **know** to complete a task?
  • This is dependent on *instruction*

➢ How does the student have to **think** to complete a task?
  • This is dependent on the *brain – PASS*

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.

Simultaneous processing Ability

Planning ability

Attention

Successive Processing Ability
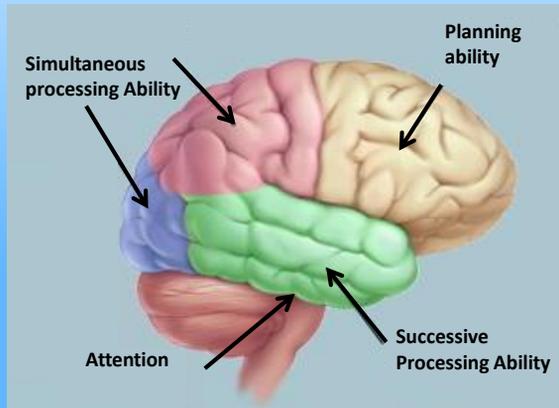
IQ defined by BRAIN function

➤ **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

conclusions   112

CAS2 (Ages 5-18 yrs.)

CAS2

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

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

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

conclusions 115

Planned Codes 1
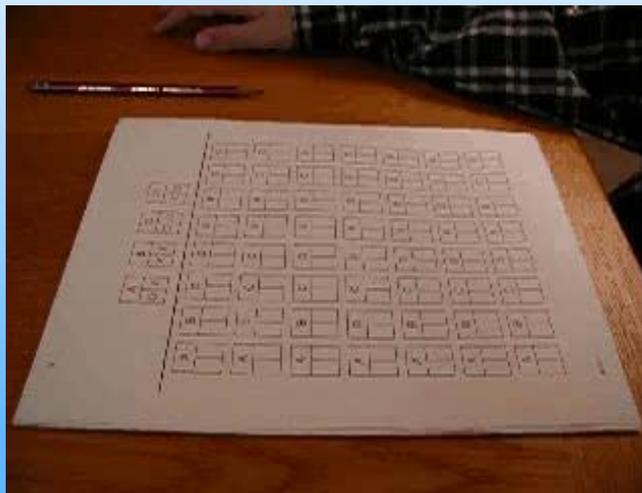
conclusions 116

Planned Codes Page 2
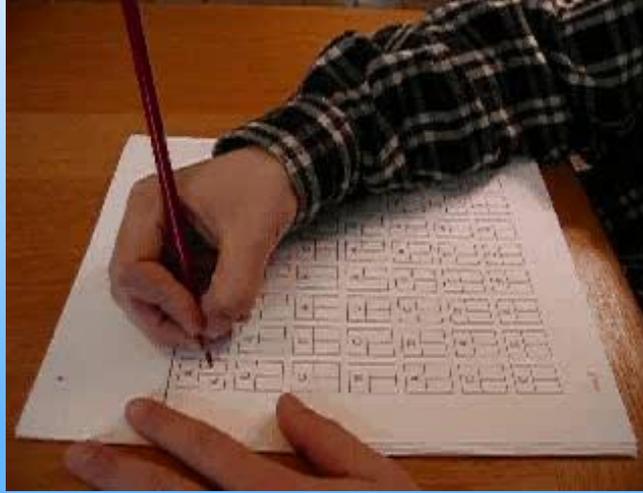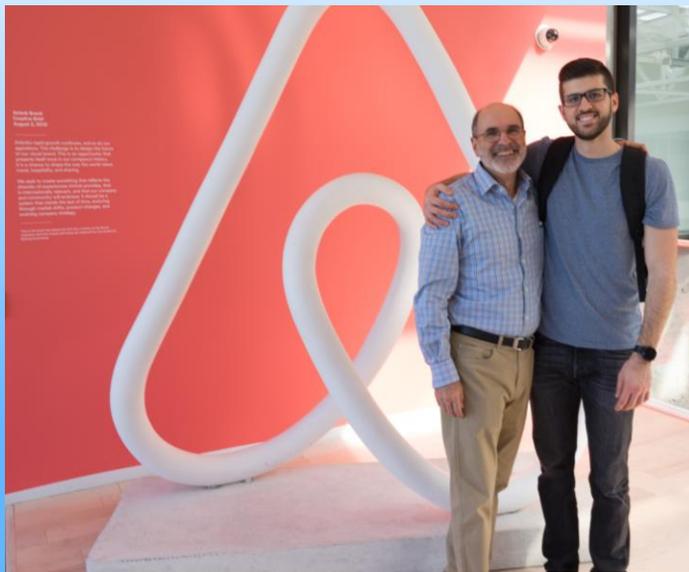
Math Strategies

Note to the Teacher: When we teach children skills by helping them use strategies and plans for learning, we are teaching both knowledge and processing. Both are important.

Efintheclassroom.net

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.

conclusions 120

Antwerp train Station (2009)

Planning Lesson Student responses

➢Q: What would you have to plan out?
- They had to learn the dance steps (knowledge)
- Someone had to start dancing (initiation)
- Permission from train station (planning)

➢Q: What are the parts of a good plan?
- Think of possible problems (strategy generation)
- Organize the dance (organization)
- Practice the dance steps (initiation)
- Have a good idea of what to do (knowledge)

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)

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

How might students react to being told that now they have to think and planning?

Like the Seinfeld video

This Planning Lesson

➢This lesson brings to light the important distinction between planning over a long time (what was just shown) and real time planning

EF Instruction

➢We use posters like this one to remind the students of the importance of PLANNING
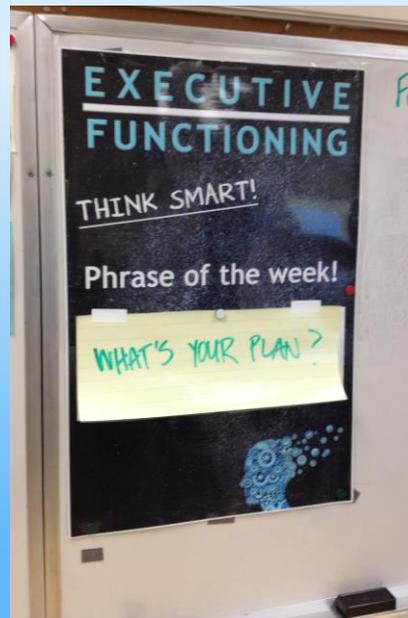
Encourage Planning

➢ 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.
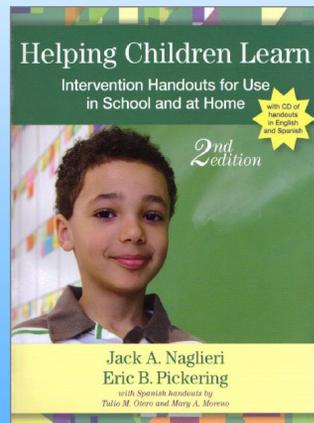
conclusions   127

Step 1 – Talk with Students

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.

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.

Think smart and use a plan!

I figured out how to do it!

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!

Another Lesson from www.efintheclassroom.net

www.Efintheclassroom.net
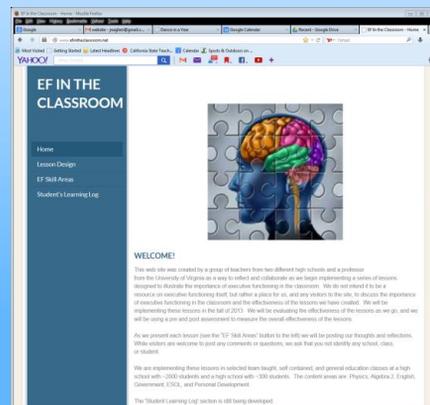
Interventions for EF Behaviors

➢ 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
  - Goal Directed Persistence

conclusions

131

Planning

Teaching Students About Planning

How Learning Depends on Planning Ability

The purpose of education is certainly to provide students with knowledge and skills, but researchers have found that children also need to learn how to learn. To achieve that goal, we must teach students to evaluate, apply solutions, self-monitor, and self-correct—in short, to plan their work and use plans to solve all types of problems. When we teach our students to become strategic, self-reliant, reflective, and flexible learners, we are teaching use of a method called *Cognitive Strategy Instruction* (Scheid, 1993), and this is an effective method.

When reading, and especially when obtaining meaning from text, the student must plan an approach to examining the information that is provided. This involves applying strategies to separate the important from the less important part of the text, concentrate on the details, self-monitor, and self-correct as needed. Students who are good at writing organize their goals before beginning and reflect and revise during and following production of the text. When doing math, students who are successful evaluate the problem, choose which method to use to solve it, evaluate the success of that method, change methods if necessary, and check the final answer carefully. This is also sometimes referred to as metacognition, problem solving, strategic behavior, or a self-reliant learning style. When we use cognitive strategy instruction, we are teaching students to think about what they are doing so that they can be more successful.

Importantly, these descriptions of how to learn, and the cognitive strategy instruction approach in general, are descriptions of the behaviors associated with the cognitive processing ability called *Planning* in this book (see the Planning Explained handout, p. 55). In order to help students be more successful, we must teach them to be more planful.

How to Teach Planning

Think smart and use a plan!

I figured out how to do it!

Use a plan.

Figure 1. A drawing that helps students remember to use a plan.

The first step in teaching children to become strategic, self-reliant, reflective, and flexible learners is to tell them what a plan is and give them an easy way to remember to use a plan. In Figure 1 (which also appears in the PASS poster on the CD), we provide a fast and simple message: "Think smart and use a plan!" We should provide cognitive strategies in specific academic areas, such as decoding, reading comprehension, vocabulary, spelling, writing, math problem solving, science, and so forth, so that we

page 1 of 2

132

conclusions

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.

133

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 [
Successive) given by special education teachers to students with ADHD
experimental group were exposed to a brief cognitive strategy instruction
development and application of effective planning for mathematical comp
standard math instruction. Standardized tests of cognitive processes a
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, a
follow-up. Large pre–post effect sizes were found for students in the exp
math worksheets (0.85 and 0.26), Math Fluency (1.17 and 0.09), and Nu
At 1 year follow-up, the experimental group continued to outperform t
students with ADHD evidenced greater improvement in math worksh
(which measured the skill of generalizing learned strategies to other si
when provided the PASS-based cognitive strategy instruction.

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
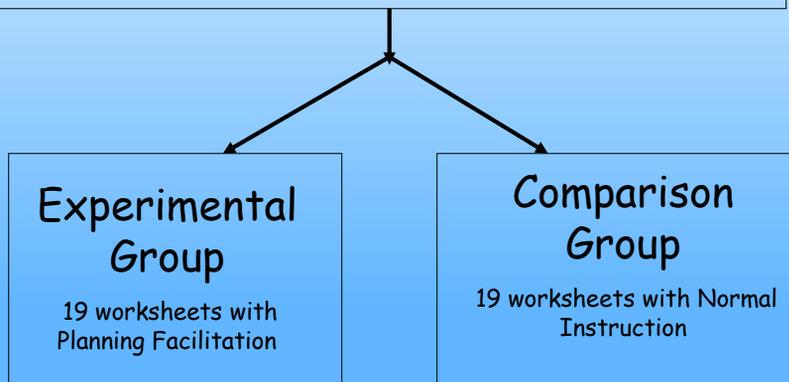
conclusions   135

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

conclusions   136

Normal Instruction and Planning Facilitation Sessions

▶ Normal Instruction
- 10 minute math worksheet
- 10 - 20 of <u>math instruction</u>
- 10 minute math worksheet

▶ Planning Facilitation
- 10 minute math worksheet
- 10 minutes of <u>planning facilitation</u>
- 10 minute math worksheet

conclusions   137

Planning 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?

conclusions   138

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."

conclusions   139

Worksheet Means and Effect Sizes for the Students with ADHD

ES = 0.6

ES = 2.4

42.66

37.81

32.79

29

Raw Scores for Worksheets

45
40
35
30
25

Normal Instruction   Planning Facilitation

☐ Baseline
☐ Intervention
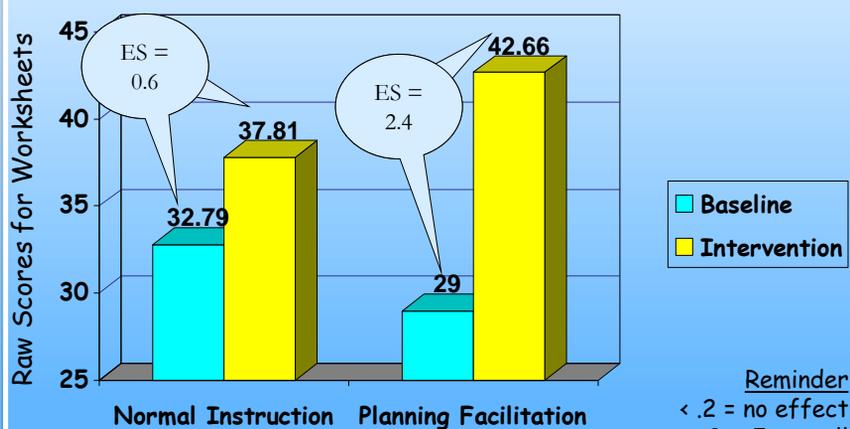
Reminder
< .2 = no effect
.2 - .5 = small
.6 - .8 = medium
> .8 = large

conclusions   140

WJ Math Fluency Means and Effect Sizes for the Students with ADHD
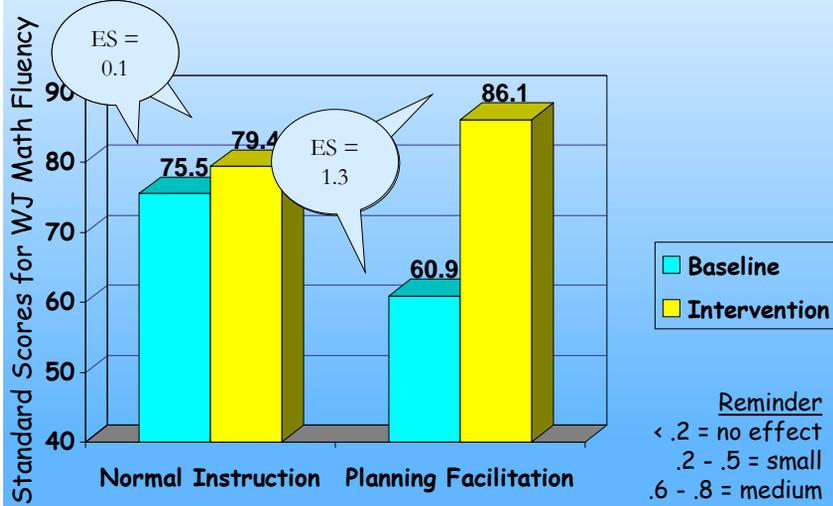
WIAT Numerical Operation Means and Effect Sizes for Students with ADHD
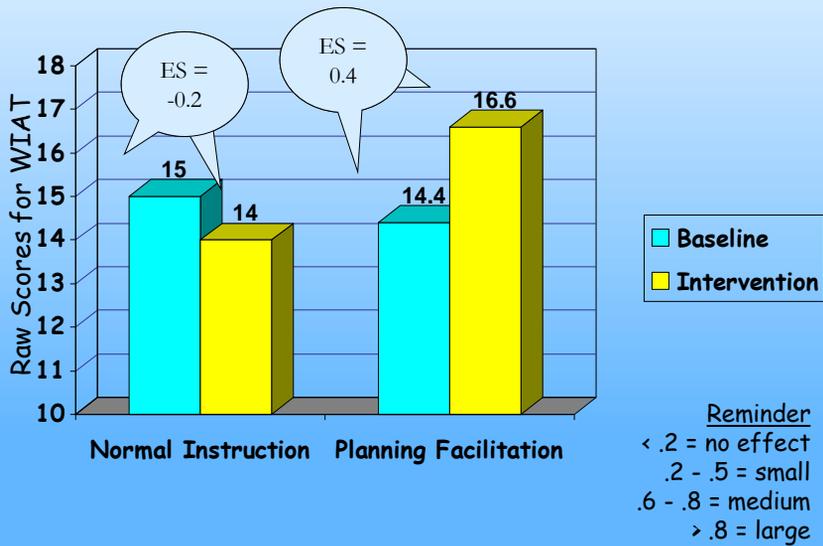
Iseman (2005)

- ➤ Baseline Intervention means by PASS profile
- ➤ Different response to the same intervention
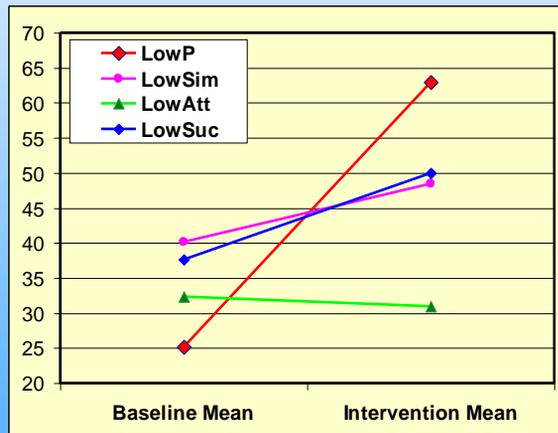
conclusions   143

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 ($M = 3.21$, $SD = 18.21$, $d = 0.09$).

conclusions   144

Instructional Implications

➢Planning Strategy Instruction is easily implemented in the classroom and can be used to improve Executive Functioning

➢The method yields substantial results within a minimal of time (10 half-hour sessions over 10 days)

➢Planning Strategy Instruction can be applied in math as well as other content areas (e.g., reading comprehension)

conclusions   145

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
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

conclusions   146

73

conclusions   147
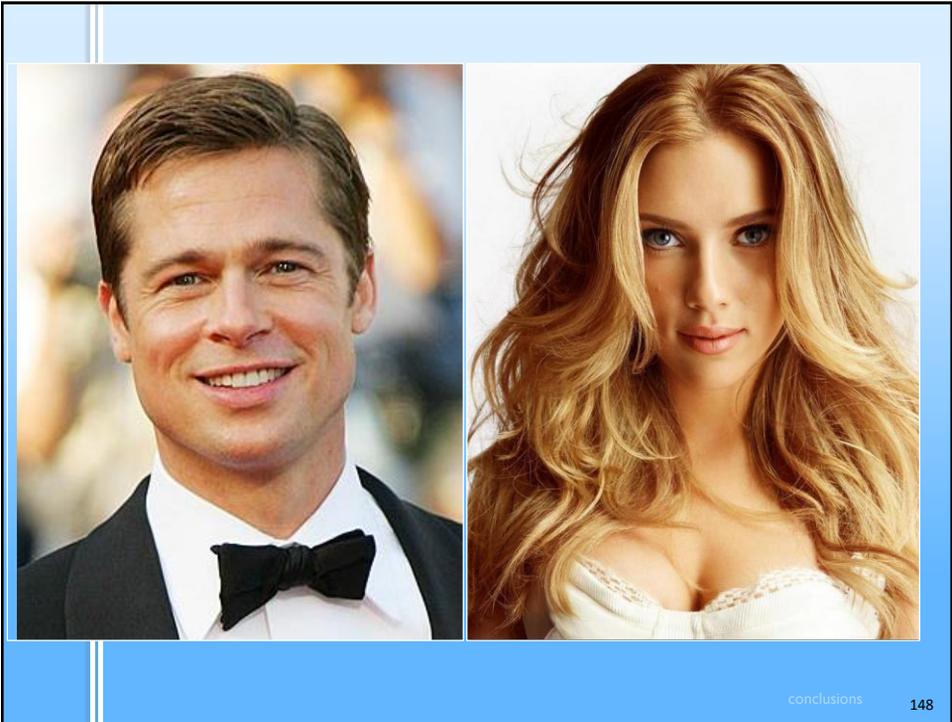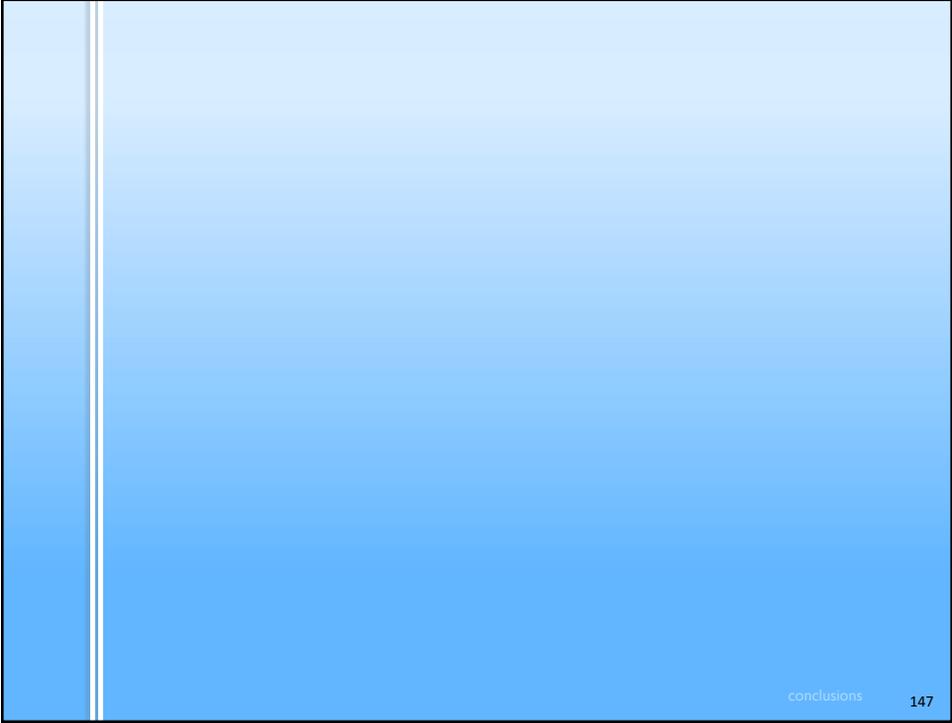
conclusions   148

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

No Response

Response

No Response
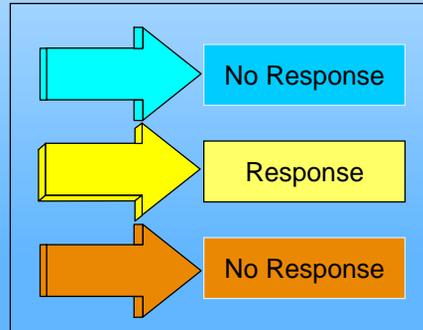
conclusions 149

Attention Test Instructions:
You will see words like
RED
Your task: say the COLOR (green) not the word (red)

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

READY ?

conclusions 150
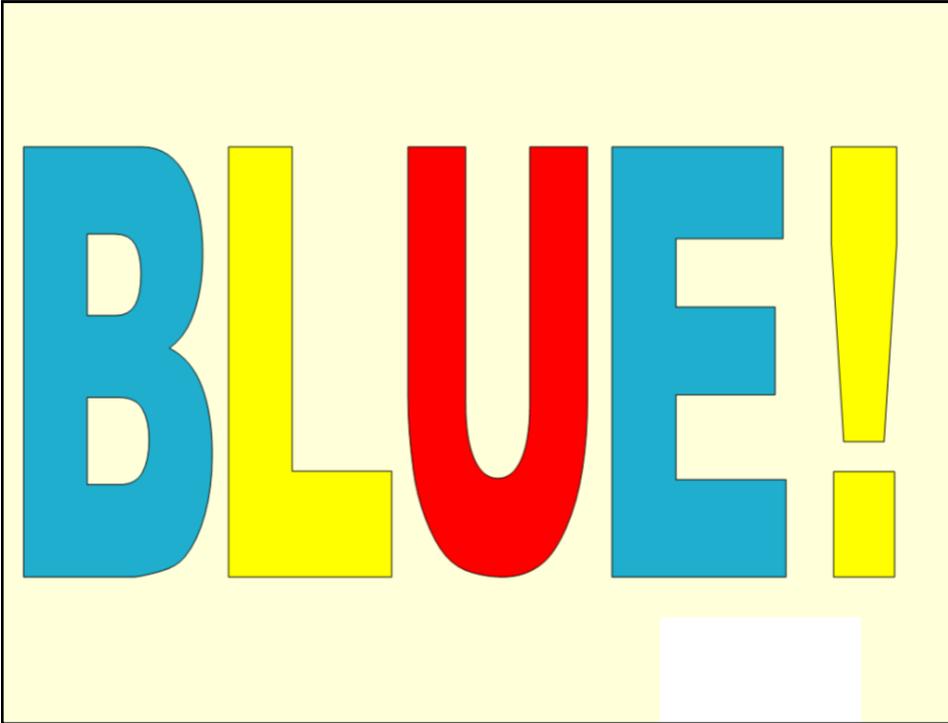
Expressive Attention - Italiano

ROSSO	BLU	VERDE	GIALLO
GIALLO	VERDE	ROSSO	BLU
ROSSO	GIALLO	GIALLO	VERDE
BLU	VERDE	ROSSO	ROSSO
VERDE	GIALLO	BLU	GIALLO

conclusions 152

Expressive Attention – Korean CAS

▫ The child says the color not the word

노랑	초록	빨강	파랑
빨강	노랑	노랑	초록
초록	파랑	초록	빨강
초록	노랑	빨강	노랑
빨강	파랑	빨강	초록

conclusions   153

Attention

This sheet has a strong Attention demands because of the similarity of the options

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

leave school

11. 3:15 p.m.

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.

12. 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.

13. 3:50 p.m.

14. Lance fished from 6:00 A.M. to 9:45 A.M. How long did he fish?

    A 3 hours   B 3 hours and 15 minutes
    C 3 hours and 45 minutes   D 4 hours and 45 minutes

14. 3 hours 45 min,

conclusions   154

Efintheclassroom.net
Attention Lesson

➢ Start by making students aware of what attention is …
➢ View Attention video from Apollo Robbins
➢ Then provide Discussion
  • What did you learn from this video?
  • How can you attend better?
  • How can you resist distractions better?
➢ Then an Assignment – Make a list of times when you did well, and not so well, paying attention, noticing details, and resisting distractions.

conclusions   155

Efintheclassroom.net
Attention Lesson

Sustained Attention Lesson

Phrase of the week: Where is your focus?

Video: http://www.youtube.com/watch?v=jKCT-simmBo&noredirect=1

Q1: Why do you think you were tricked by this video?

Q2: How do you decide what to pay attention to, and what not to, in this class?

Q3: What are you biggest distractions in class? What will you have the hardest time ignoring?

Hand out Learning Logs:

Students go to SA section and create a list they (or the class as a whole) will try to ignore this week.

conclusions   156

Attention Lesson

conclusions   157

OK

EF in the Classroom

➤ Why do you think you were tricked by this video?

➤ How do you decide what to pay attention to, and what not to?

➤ What are you biggest distractions today?

➤ What will you have the hardest time ignoring?

➤ Your own questions and thoughts.

EF ability and the brain

➢ Planning and Attention have been included in conceptualizations of Executive Function

➢ The next two abilities are **not** related to EF

- We will see what they are and …
- See how we can improve performance when these abilities are required by using EF (strategies) to improve performance

conclusions   159

WHAT IS NOT EF IN PASS

conclusions   160

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

conclusions 161

Progressive Matrices

conclusions 162

PASS Theory

➢**Simultaneous** processing is what Gestalt psychology was based on

➢Seeing the whole
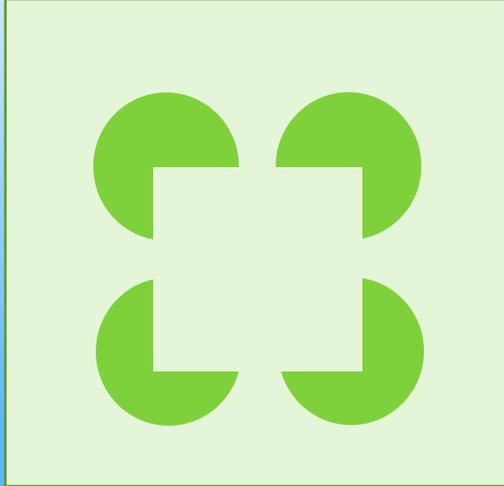
conclusions   163

Verbal-Spatial Relations
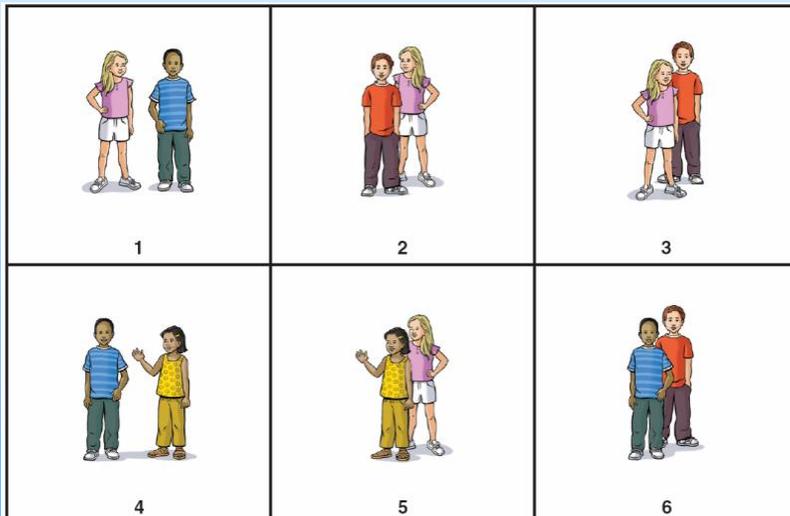
Which picture shows a boy behind a girl?

Numbers from 1 to 100

How can EF be brought to this Work sheet?

Use Simultaneous processing to see that patterns

Use EF to manage low Simultaneous

➢ How do you help a child with low simultaneous ability?

➢ Teach students to USE EF STRATEGIES

➢ What kinds of strategies could you use for tasks that require seeing the whole?

conclusions 166

Use EF

Graphic Organizers for Connecting and Remembering Information

Remembering and relating information is a common part of learning and daily life. Students are often expected to learn large amounts of new and unfamiliar information. Learning facts requires the student to see how information is connected or related. Students often remember this information better if they see it graphically and understand how it relates to knowledge they already have. Graphic organizers are designed to help students (and teachers) present and organize information so it is easier to understand and remember.

Graphic Organizers

New information is better remembered if it is connected to information the students already know. Graphic organizers are visual representations of information that shows the links of new information to other new and existing information. This makes the new information easier to understand and learn. Furthermore, the visual nature of graphic organizers and the links they make help students understand the connections between information parts. For example, a graphic organizer might be used to teach young children about different animals. A child learning about different kinds of animals might already know what a fish is. This knowledge can be used to graphically organize whales, sharks, and dolphins. They all live underwater, but sharks have gills and are fish. (Whales and dolphins have blowholes and breathe air, so they are not fish.) Figure 1 represents one way to map this graphically.

Another type of graphic organizer is a Venn diagram, which uses circles to demonstrate how concepts are related. Figure 2 shows the same information as Figure 1, but in the form of a Venn diagram.

How to Teach Graphic Organizers

Graphic organizers are fairly simple to create. They need not be reserved for factual information. They can be used for activities such as exploring creative concepts, organizing writing, and developing language skills. The following four steps can be used to create a graphic organizer:

1. Select information that you need to present to the child (which may be from a story, a chapter, or any concept).
2. Determine the key components that are necessary for the child to learn.

page 1 of 2

Figure 1. One kind of graphic organizer.

167

Venn Diagram

Graphic Organizers for Connecting and Remembering Information *(continued)*
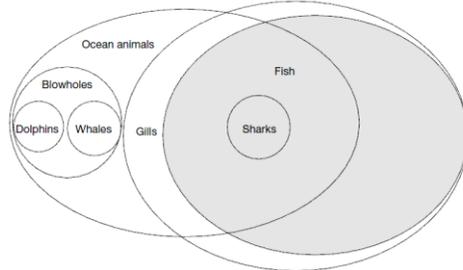
Figure 2. A Venn diagram used as a graphic organizer.

3. Create the graphic representation of the information. The illustration should include the key concepts, concepts the child already knows, and the linkages between the concepts.
4. Present the organizer to the child and discuss it to be sure he or she understands the information and sees the connections.

conclusions

168

84

Successive Processing Ability

▶ **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

Cow → Wall → Car → Girl
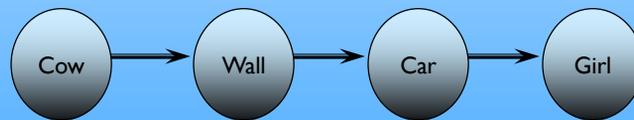
conclusions 169

Sentence Questions (Ages 8-17)

▢ The child answers a question read by the examiner

1. The blue is yellow. Who is yellow?

10. The red greened the blue with a yellow. Who used the yellow?

20. The red blues a yellow green of pinks, that are brown in the purple, and then grays the tan. What does the red do first?

conclusions 170

Successive

The sequence of the sounds is emphasized in this work sheet
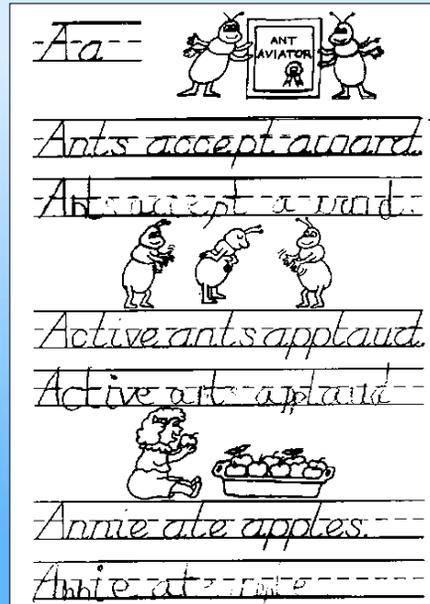
conclusions   171

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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.

Ben's Problem with Successive processing Ability

Scores (M = 100, SD = 15)

EF "Ability" is good but he isn't using this ability to solve problems

conclusions 173
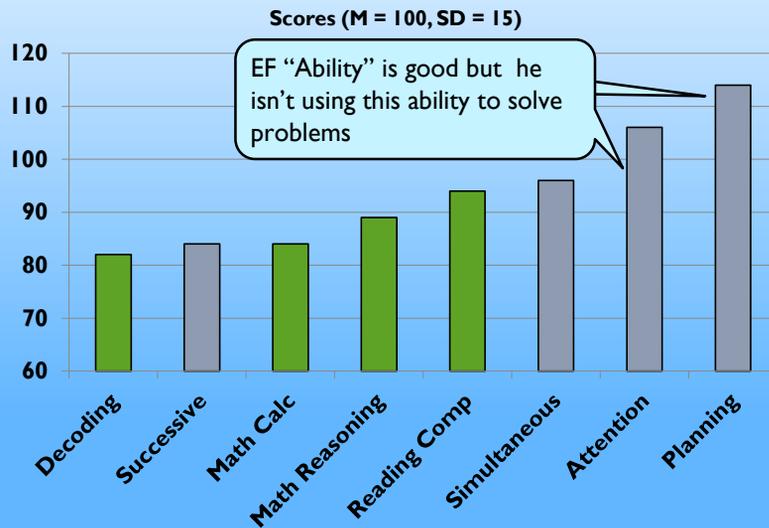
Case of Ben

➢ Planning = Strength

➢ Successive = Weakness and it is < 85; so it can be considered a 'disorder in basic psychological processes'

		Diff
Planning	114	14
Attention	106	6
Simultaneous	96	–4
Successive	84	–16
PASS Mean	100	

conclusions 174

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?

conclusions 175

Teach Children about their Abilities

➢ 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.

Helping Children Learn
Intervention Handouts for Use in School and at Home
with CD of handouts in English and Spanish
2nd edition

Jack A. Naglieri
Eric B. Pickering
with Spanish handouts by
Tulio M. Otero and Mary A. Moreno
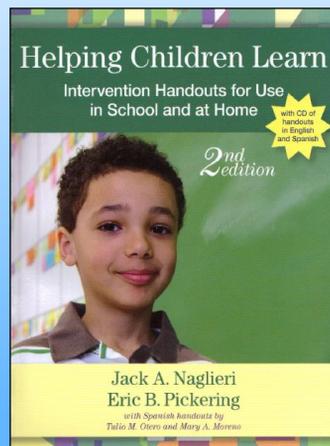
conclusions 176

Use EF with Sequencing Tasks

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!

I figured out how to do it!

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!

Ben's Problem with Successive Ability

➢Teach him to use his strength in Planning

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.

Ben's Problem with Successive Ability

➢Teach him to recognize sequences

How to Teach Successive Processing Ability

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.

conclusions   179

Ben's Problem with Successive Ability

➢Teach him to use strategies

Chunking for Reading/Decoding

Readin
stand
quence
more r
easily
units fo

Segmenting Words for Reading/Decoding and Spelling

How

Teache
be rem

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

How to Teach Segmenting Words

Plan

Look at
Find the
Sound

Segmenting words is an effective strategy to help students read and spell. By divi

Teaching Children to use EF

➢ 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.
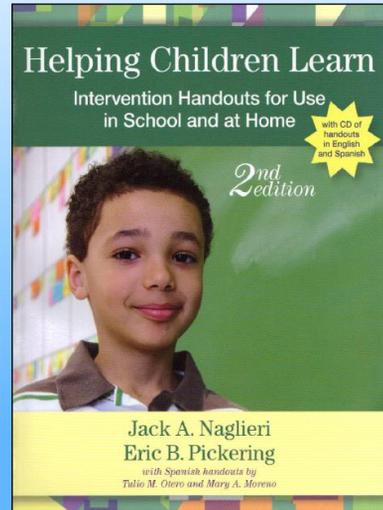
conclusions   181

Step 1 – Talk with Students

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.

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.

Think smart and use a plan!

I figured out how to do it!

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!

Time to Think and Talk

➢ **Task:**

➢ Discuss in your groups

- EF as intelligence?
- Not on Wechsler…?

➢ Your own questions and thoughts..

➢ Report to the audience

conclusions

Take Away Messages

➢ CAS Planning and Attention scores tell about Executive Function
- So CAS *includes* EF as a critical part of ability (aka intelligence)

➢ Traditional IQ tests do not measure Executive Function
- So EF is the important ability missed when you look at an IQ score

conclusions 185

HOW TO EMPOWER STUDENTS' MINDSET

conclusions 186

Mountain View Alternative HS

conclusions 187

For Inspiration: Good Example of Growth Mindset

conclusions 188

Two Mindsets

Fixed mindset:
◇ Effort will not make a difference
◇ You either get it or you don't

Growth mindset:
❖ Enjoy effort and the process of learning
❖ You can always grow and learn

conclusions

Measure of Mindset (From Naglieri & Otero, 2017)

INTERVENTION 153 | 154 ESSENTIALS OF CAS2 ASSESSMENT

Measure of Mindset (Child & Adolescent)
Jack A. Naglieri & Kathleen M. Kryza - Copyright © 2015

Name _____
Date _____

Instructions: These 10 questions ask about how you think and feel. The answers you give can help us know your thoughts about how you learn. Please read every question carefully and circle the number under the word that tells what you do.

	Never	Sometimes	Most times	Always
1 I don't give up easily.	0	1	2	3
2 When things get hard I say, "I Can do it"	0	1	2	3
3 When I fail I try harder until I get it done.	0	1	2	3
4 I believe that I can learn from my mistakes.	0	1	2	3
5 I think I can do almost anything if I try hard enough.	0	1	2	3
6 When I don't understand something I give up.	0	1	2	3
7 I do not like to be challenged.	0	1	2	3
8 When work is hard I think, "I can not do it."	0	1	2	3
9 When things get hard I do something else.	0	1	2	3
10 When I fail I do something else that is more fun.	0	1	2	3

Figure 5.2 Measure of Mindset: Child & Adolescent Version
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Measure of Mindset (Teacher & Parent)
Jack A. Naglieri & Kathleen M. Kryza - Copyright © 2015

Name _____
Date _____

Instructions: These 10 questions ask about a child or adolescent's attitudes toward learning. Please read every question carefully and circle the number under the word that tells what you have observed about your child.

	Never	Sometimes	Most times	Always
1 He/she doesn't give up easily.	0	1	2	3
2 When things get hard he/she says, "I can do it!"	0	1	2	3
3 Failure leads him/her to try harder until the task is finished.	0	1	2	3
4 He/she views failure as an important part of learning.	0	1	2	3
5 He/she believes that you can do anything if you try hard enough.	0	1	2	3
6 He/she is afraid of failure.	0	1	2	3
7 When things get hard he/she avoids the work.	0	1	2	3
8 He/she believes that hard work usually does not pay off.	0	1	2	3
9 He/she is fast to give up on a task.	0	1	2	3
10 He/she sees failure as proof of a person's limitations.	0	1	2	3

Figure 5.3 Measure of Mindset: Teacher & Parent Version
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Presentation Outline

➢ What is Executive Function (EF)
- Historical Perspective
- Definitions of Executive Function

➢ EF measured by CEFI

➢ EF measured by CAS2

➢ Using CEFI and CAS2 for SLD Determination

➢ Relevant Research about EF
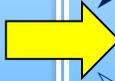
➢ Conclusions

conclusions   191

Discrepancy Consistency Method
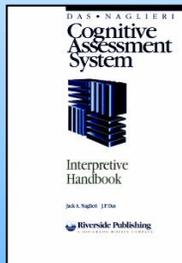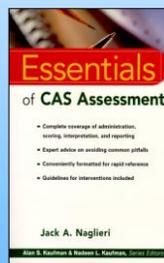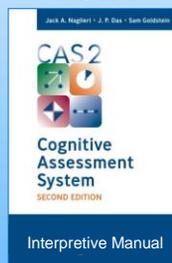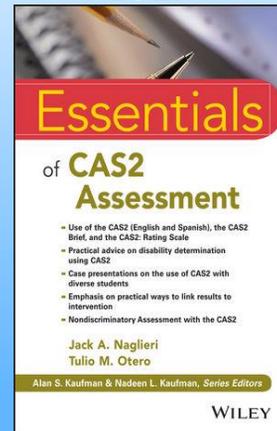
2017

1997   **1999**   **2014**

Naglieri, J. A. & Otero, T. M. (2017). Essentials of CAS2
Assessment. New York: Wiley

192

Discrepancy Consistency Model for SLD

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

Significant Discrepancy

Significant Discrepancy

Cognitive Processes and Academic Strengths

Specific Academic Skill Weakness(es)

Disorder in one or more basic cognitive processes

Consistent Scores

conclusions 193

Figure 7.4 Clark's Scores Illustrate the PSW Approach to SLD Determination Using the Discrepancy/Consistency Method

Significant *Discrepancy* Between Achievement and PASS Scores

Significant *Discrepancy* in PASS Scores From the Child's Mean

Planning = 98
Successive = 91
Simultaneous = 89
Math Concepts = 97
Math Computation = 95
Attention = 93

Spelling = 77
Phonological Processing = 79
Reading Comprehension = 79
Written Expression = 84

CEFI Full Scale = 82
Planning = 80

Consistency Between Achievement and PASS scores

Essentials of **CAS2** Assessment

- Use of the CAS2 (English and Spanish), the CAS2 Brief, and the CAS2: Rating Scale
- Practical advice on disability determination using CAS2
- Case presentations on the use of CAS2 with diverse students
- Emphasis on practical ways to link results to intervention
- Nondiscriminatory Assessment with the CAS2

Jack A. Naglieri
Tulio M. Otero

Alan S. Kaufman & Nadeen L. Kaufman, *Series Editors*

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194

Presentation Outline

➢ What is Executive Function (EF)
  • Historical Perspective
  • Definitions of Executive Function
➢ EF measured by CEFI
➢ EF measured by CAS2
➢ Using CEFI and CAS2 for SLD Determination
➢ Important Research about EF
➢ Conclusions

conclusions   195

Non-Discriminatory Tests

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

Handbook of Intelligence
Evolutionary Theory, Historical Perspective, and Current Concepts

Sam Goldstein
Dana Princiotta
Jack A. Naglieri
Editors

🕿 Springer

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

196

98
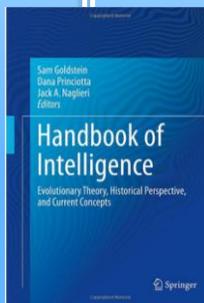
Race Differences

Table 1.6 Standard Score Mean Differences by Race on Traditional and Nontraditional Intelligence Tests

Test	Difference
Traditional IQ Tests	
SB-IV (matched samples)	12.6
WISC-IV (normative sample)	11.5
WJ-III (normative sample)	10.9
WISC-IV (matched samples)	10.0
Nontraditional Tests	
K-ABC (normative sample)	7.0
K-ABC (matched samples)	6.1
KABC-II (matched samples)	5.0
CAS2 (normative sample)	6.3
CAS (demographic controls of normative sample)	4.8
CAS2 (demographic controls of normative sample)	4.3

Note: The data for these results are reported for the Stanford-Binet IV from Wasserman (2000); Woodcock-Johnson III from Edwards and Oakland (2006); Kaufman Assessment Battery for Children from Naglieri (1986); Kaufman Assessment Battery for Children II from Lichenberger, Sotelo-Dynega, and Kaufman (2009); CAS from Naglieri, Rojahn, Matto, and Aquilino (2005); CAS2 from Naglieri, Das, and Goldstein (2014a); and Wechsler Intelligence Scale for Children IV (WISC-IV) from O'Donnell (2009).

Essentials
of **CAS2**
Assessment
- Use of the CAS2 (English and Spanish), the CAS2 Brief, and the CAS2: Rating Scale
- Practical advice on disability determination using CAS2
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Jack A. Naglieri
Tulio M. Otero
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Race and Ethnicity on CEFI

Table 8.9. Comparison Between Black and White Groups: CEFI Full Scale

Form		Black	Matched White Sample	d-ratio	F (df)	p
Parent	M	97.7	99.0	-0.07	0.59 (1, 385)	.445
	SD	16.8	17.9			
	N	195	196			
Teacher	M	95.6	102.2	-0.44	19.16 (1, 390)	< .001
	SD	14.9	14.9			
	N	196	196			
Self-Report	M	99.4	101.1	-0.10	0.56 (1, 190)	.454
	SD	15.9	16.2			
	N	98	98			

Note. Guidelines for interpreting $|d|$: small effect size = 0.2; medium effect size = 0.5; large effect size = 0.8.

Table 8.10. Comparison Between Hispanic and White Groups: CEFI Full Scale

Form		Hispanic	Matched White Sample	d-ratio	F (df)	p
Parent	M	101.4	99.5	0.13	2.48 (1, 610)	.116
	SD	15.2	14.7			
	N	308	308			
Teacher	M	98.2	100.9	-0.18	5.18 (1, 613)	.023
	SD	14.8	14.8			
	N	308	307			
Self-Report	M	101.6	100.6	0.06	0.31 (1, 302)	.579
	SD	16.0	15.7			
	N	154	154			

Note. Guidelines for interpreting $|d|$: small effect size = 0.2; medium effect size = 0.5; large effect size = 0.8.

Note: Teacher data are NOT controlled for Parental Education Levels

conclusions

198

Which Ability Tests have Useful Profiles ?

CHAPTER 1

PSYCHOLOGICAL ASSESSMENT
BY SCHOOL PSYCHOLOGISTS:
OPPORTUNITIES AND CHALLENGES
OF A CHANGING LANDSCAPE

Jack A. Naglieri

APA Handbook of
**Testing and
Assessment in
Psychology**
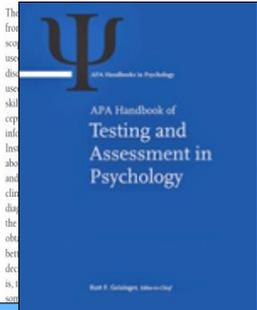
CHAPTER
6

Assessment of Cognitive and
Neuropsychological Processes

JACK A. NAGLIERI
SAM GOLDSTEIN

SECOND EDITION

Learning *and*
Attention Disorders
in Adolescence
and Adulthood

Assessment and Treatment

EDITED BY
SAM GOLDSTEIN · JACK A. NAGLIERI · MELISSA DeVRIES
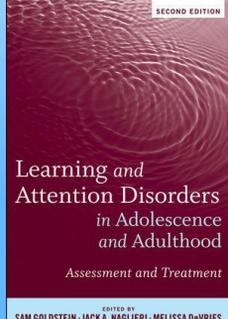
Naglieri & Goldstein (2011)

GROUP PROFILES BY ABILITY TEST

Because ability tests play such an important role in the diagnostic process, it is crucial to understand the sensitivity each test may have to any unique characteristics of those with an SLD or attention deficit. Clinicians need to know if an adolescent or adult has a specific deficit in ability that is related to a specific academic learning problem. There has been considerable research on, for example, Wechsler subtest profile analysis, and most researchers conclude that no profile has diagnostic utility for individuals with SLD or ADHD (Kavale & Forness, 1995). The failure of subtest profiles has led some to argue (e.g., Naglieri, 1999) that scale, rather than subtest, variability should

1. We need to know if intelligence tests yield distinctive profiles

2. Subtest profile analysis is UNSUPPORTED so use scale profiles instead

Profiles for SLD (reading decoding)

Profiles for students with ADHD

Profiles for SLD (reading decoding) & ADHD
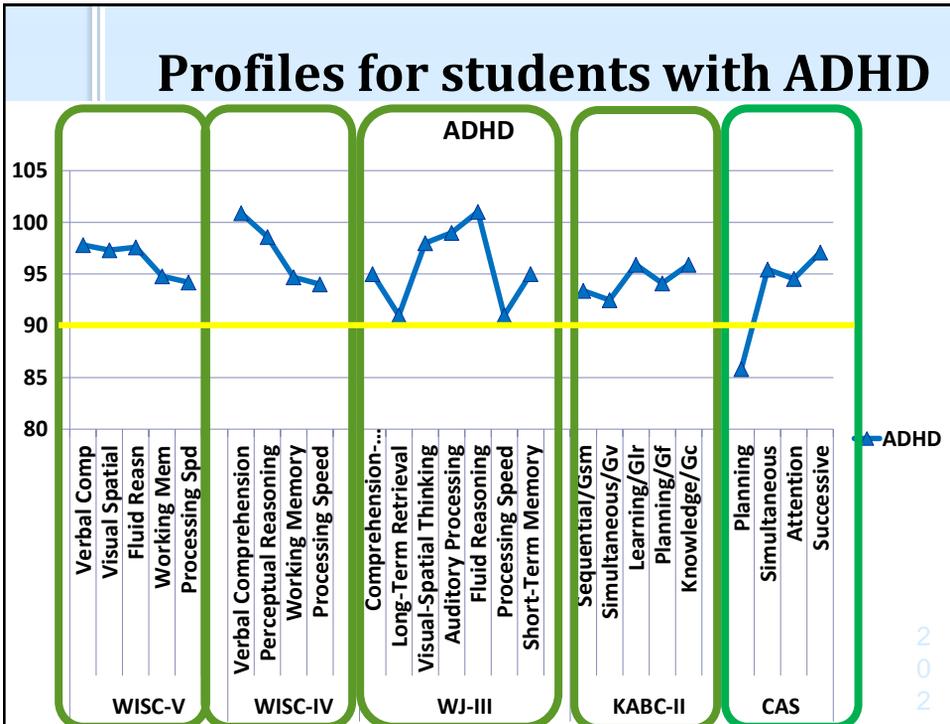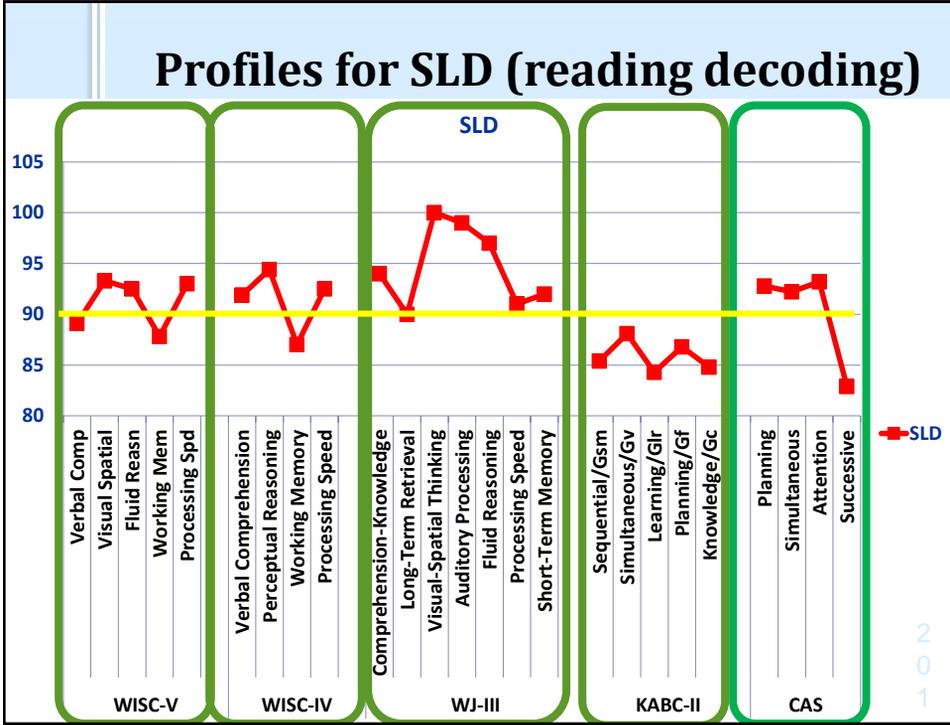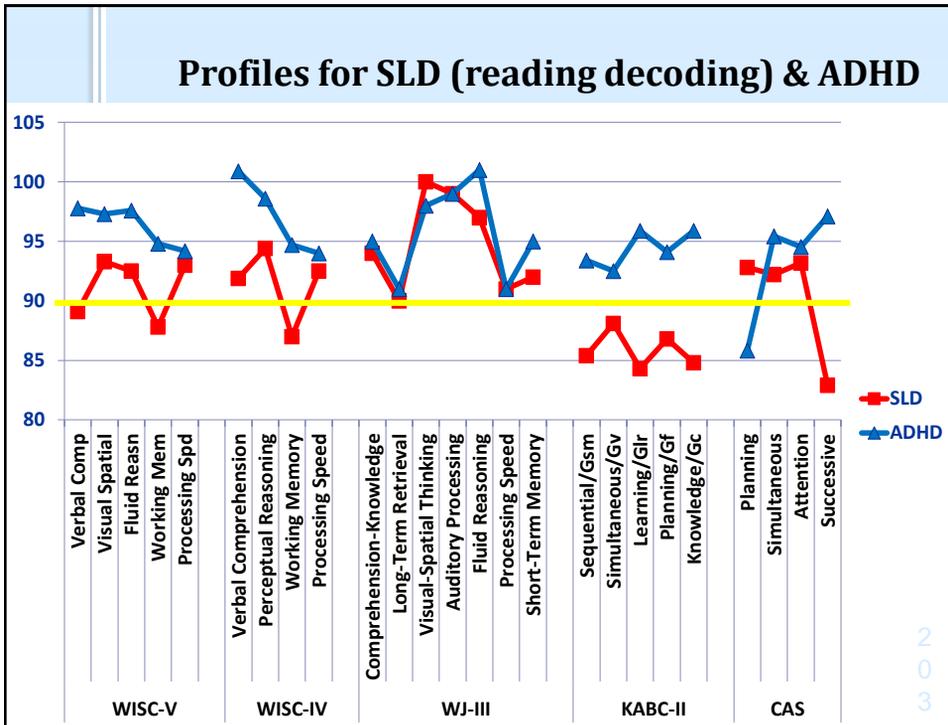
California Dyslexia Guidelines

Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge. (IDA 2002)

➤A *neurobiological disorder* manifested by reading decoding and spelling failure

conclusions 204

California Dyslexia Guidelines

Dyslexia may also be understood as one type of a "specific learning disability," which is defined in California's regulations pertaining to students who qualify for special education services. Title 5, *California Code of Regulations*, Section 3030(b)(10)(A) discusses specific learning disabilities and dyslexia as follows:

Specific learning disability means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may have manifested itself in the imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, **dyslexia,** and developmental aphasia. The basic psychological processes include attention, visual processing, auditory processing, **phonological processing,** sensory-motor skills, cognitive abilities including association, conceptualization and expression . . . Specific learning disabilities do not include learning problems that are primarily the result of visual, hearing, or motor disabilities, of intellectual disability, of emotional disturbance, or of environmental, cultural, or economic disadvantage.

conclusions   205

California Dyslexia Guidelines

➢ From Essentials of CAS2 Assessment (2017, Naglieri & Otero).

➢ PSW model using the Discrepancy/Consistency Method

➢ The case of Jacob
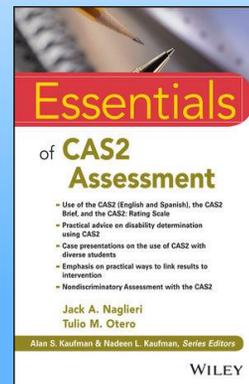
conclusions   206

Jacob 6th grade

Presenting Concerns: Reading, Math Word Problems, Anxiety

WISCV	COMPOSITE SCORE	RANGE	PERCENTILE RANK
Verbal Comprehension	89	Below Average	23%
Visual Spatial	84	Below Average	14%
Fluid Reasoning	82	Below Average	12%
Working Memory	72	Very Low	3%
Processing Speed	76	Very Low	6%
FULL SCALE SCORE	81	Below Average	10%
WIAT III Reading	87	Below Average	19%
WIAT III Math	90	Average	25%
WIAT III Writing	94	Average	34%

conclusions

Jacob 6th grade

CAS-2	COMPOSITE SCORE	RANGE	PERCENTILE RANK
Planning: the ability to apply a strategy, and self-monitor and self- correct performance while working toward a solution.	92	Average	30%
Attention: the ability to selectively focus on a stimulus while inhibiting responses from competing stimuli.	98	Average	45%
Simultaneous Processing- is the ability to reason and problem solve by integrating separate elements into a conceptual whole, and often requires strong visual-spatial problem solving skills.	90	Average	25%
Successive Processing- is the ability to put information into a serial order or particular sequence.	72	Very Low	3%
CAS-2 COMPOSITE SCORE	86	Below Average	18%

conclusions

Jacob 6th grade

FAR index	Standard score (95% CI)	Percentile	Qualitative descriptor
Phonological Index	75	5%	Moderately Below Average
Fluency Index	92	30%	Average
Mixed Index	81	10%	Below Average
Comprehension Index	97	42%	Average
FAR Total Index	**84**	**14%**	**Below Average**

KEY INTERPRETATION	Score	Percentile	Descriptor
Nonsense Word Decoding – requires the student to decode a series of nonsense words presented in order of increasing difficulty .	71	3%	Moderately Below Average
Irregular Word Reading Fluency – the student reads a list of phonologically irregular words arranged in order of increasing difficulty in 60 seconds.	95	37%	Average

conclusions

209

Discrepancy Consistency for Jacob

Poor Successive + Poor Phonological = SLD in Reading Decoding

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

Significant Discrepancy

Significant Discrepancy

Planning = 92
Attention = 98
Simultaneous = 90
Far Comp= 97

Far Phonological Index = 75

Successive = 72

Consistency

conclusions

210

105
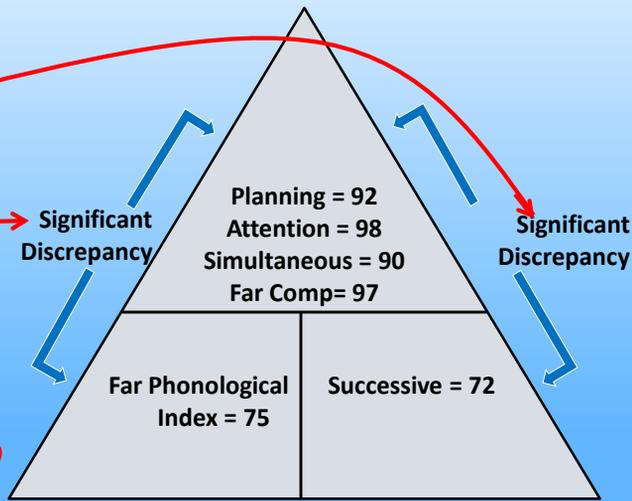
Executive Function Behaviors, Intelligence, and Achievement test scores

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

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

Demographic		CAS N	CAS %	WISC-IV N	WISC-IV %	WJ III ACH N	WJ III ACH %
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.

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**

conclusions

213

EF and Achievement (Naglieri & Rojahn, 2004)

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 relate information about a child's cognitive characteristics to that child's academic performance. Because cognitive ability and academic achievement share a significant portion of the same con-

achievement. For instance, subtests like General Information are also included on individual achievement tests (e.g., the Peabody Individual Achievement Test—Revised; Markwardt, 1997). Similarly, the WISC-III Vocabulary and Similarities subtests require knowledge of words, which is also assessed by vocabulary or word

conclusions

214

107

EF and Achievement (Naglieri & Rojahn, 2004)

➢ Correlation between Executive Function (Planning + Attention) and overall achievement (Skills Cluster) = **.51** (N = 1,559; p < .001)

➢ P&A added significantly to the prediction of achievement after Simultaneous and Successive scores were used in the regression equation

Table 3

Pearson Product–Moment Correlations Between the CAS Basic Battery and Standard Battery Full Scale Scores and the WJ-R Subscale and Cluster Scores (N = 1,559)

Scale	CAS Standard Battery subtests			
	Planning	Simultaneous	Successive	Attention
WJ-R subtests				
Letter-Word Identification	.47	.53	.49	.42
Passage Comprehension	.43	.50	.47	.39
Calculation	.50	.47	.36	.43
Applied Problems	.49	.60	.47	.44
Dictation	.50	.53	.49	.44
Word Attack	.41	.48	.44	.37
Reading Vocabulary	.42	.53	.50	.35
Quantitative Concepts	.51	.59	.49	.44
Proofing	.44	.48	.44	.40
WJ-R clusters				
Broad Reading	.48	.55	.50	.43
Basic Reading	.47	.54	.49	.42
Reading Comprehension	.44	.54	.50	.39
Broad Math	.54	.58	.45	.47
Basic Math	.55	.58	.46	.47
Math Reasoning	.49	.60	.47	.44
Basic Writing	.51	.55	.48	.45
Skills Cluster	.54	.62	.53	.48

Note. CAS = Cognitive Assessment System; WJ-R = Woodcock–Johnson Revised Tests of Achievement.

conclusions

215

Correlations with Achievement

➢ Next, a summary of ability test correlations with achievement EXCLUDING the scales that clearly require knowledge

➢ The average correlations of the SCALES with achievement and those without achievement were obtained to avoid *criterion contamination*…

Essentials
of **CAS2 Assessment**

- Use of the CAS2 (English and Spanish), the CAS2 Brief, and the CAS2: Rating Scale
- Practical advice on disability determination using CAS2
- Case presentations on the use of CAS2 with diverse students
- Emphasis on practical ways to link results to intervention
- Nondiscriminatory Assessment with the CAS2

Jack A. Naglieri
Tulio M. Otero

Alan S. Kaufman & Nadeen L. Kaufman, *Series Editors*
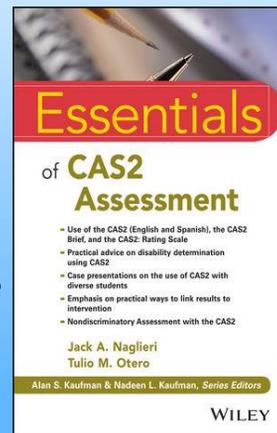
WILEY

Naglieri, J. A. & Otero, T. M. (2017). Essentials of CAS2 Assessment. New York: Wiley

conclusions 216

Correlations with Achievement

Correlations Between Ability and Achievement Test Scores			Average Correlation	
			All Scales	Scales without achievement
WISC-V	Verbal Comprehension	.74		
WIAT-III	Visual Spatial	.46		
N = 201	Fluid Reasoning	.40		
	Working Memory	.63		
	Processing Speed	.34	.53	.47
WJ-IV COG	Comprehension Knowledge	.50		
WJ-IV ACH	Fluid Reasoning	.71		
N = 825	Auditory Processing	.52		
	Short Term Working Memory	.55		
	Cognitive Processing Speed	.55		
	Long-Term Retrieval	.43		
	Visual Processing	.45	.54	.50
KABC	Sequential/Gsm	.43		
WJ-III ACH	Simultaneous/Gv	.41		
N = 167	Learning/Glr	.50		
	Planning/Gf	.59		.48
	Knowledge/GC	.70	.53	
CAS	Planning	.57		
WJ-III ACH	Simultaneous	.67		
N=1,600	Attention	.50		
	Successive	.60		.59

Note: WJ-IV Scales Comp-Know= Vocabulary and General Information; Fluid Reasoning = Number Se[...] Concept Formation; Auditory Processing = Phonological processing.

Note: All correlations are reported in the ability tests' manuals. Values per scale were averaged within each ability test using Fisher z transformations.

217

Time to Think and Talk

➢**Task:**

➢Discuss in your groups

- Do these data match what you see in practice?
- Does using PASS for SLD make sense?

➢Your own questions and thoughts..

➢Report to the audience

conclusions

Take Away Messages

➢ EF behaviors are significantly correlated with scores from a nationally normed test of academic skills (WJ-III)

➢ EF behaviors are significantly correlated with all four PASS scales

➢ EF behaviors are mostly correlated with WISC-IV Verbal scale which requires a lot of knowledge

conclusions   219

Sex Differences in Executive Function

conclusions   220

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**
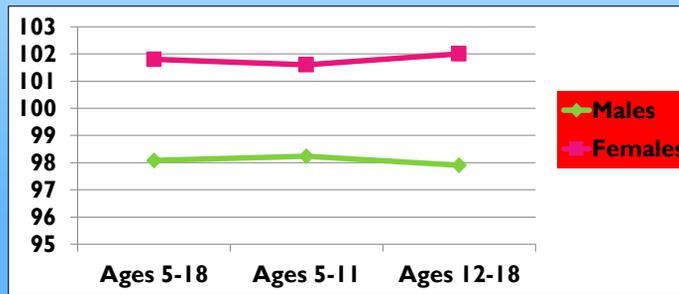
conclusions 221

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**

conclusions 222

111
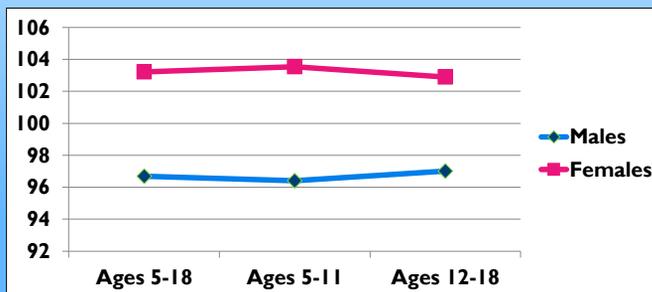
Gender Differences: Self Raters

➢Girls are better EF than Boys

	Mean	SD	N
Male	98.9	15.4	350
Female	101.0	14.6	350

Chart values: Males 98.9, Females 101

conclusions 223

Sex Differences: Ability

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

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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.

Sex Differences: Ability

A line graph showing scores from 94 to 104 across Planning, Attention, Simultaneous, and Successive. Planning and Attention are grouped under "Executive Function". Lines shown for Boys (blue) and Girls (pink).
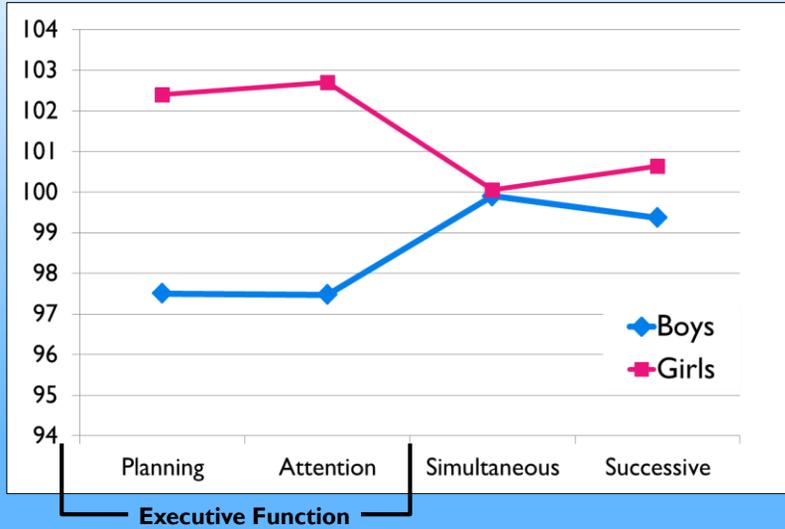
conclusions   225

Sex Differences: Social Emotional

DESSA
DEVEREUX STUDENT STRENGTHS ASSESSMENT
K-8TH GRADE

A MEASURE OF
SOCIAL-EMOTIONAL
COMPETENCIES
OF CHILDREN IN
KINDERGARTEN
THROUGH EIGHTH GRADE

Paul A. LeBuffe, Valerie B. Shapiro, & Jack A. Naglieri

KPRESS

TABLE 2.6

Means, SDs, Ns, and d-ratios for DESSA T-Scores by Gender

	Males			Male Female d-ratio	Females		
	Mean	SD	n		Mean	SD	n
TEACHER RATERS							
Personal Responsibility	48.23	9.98	631	-0.42	52.28	9.30	611
Optimistic Thinking	48.97	10.14	627	-0.30	51.88	9.47	612
Goal-Directed Behavior	48.60	10.05	631	-0.33	51.80	9.38	611
Social-Awareness	48.58	10.13	630	-0.31	51.66	9.64	612
Decision Making	48.44	10.08	631	-0.37	52.05	9.32	612
Relationship Skills	48.36	10.04	630	-0.41	52.33	9.30	612
Self-Awareness	49.05	10.28	631	-0.22	51.17	9.36	611
Self-Management	48.32	10.02	631	-0.39	52.02	9.18	612
Social-Emotional Composite	48.30	10.09	625	-0.38	51.93	9.02	609
PARENT RATERS							
Personal Responsibility	48.14	9.52	602	-0.36	51.66	9.87	641
Optimistic Thinking	48.37	9.86	602	-0.33	51.62	9.82	641
Goal-Directed Behavior	47.92	9.51	602	-0.41	51.90	9.96	641
Social-Awareness	48.71	9.75	602	-0.25	51.10	9.71	641
Decision Making	48.56	9.76	602	-0.29	51.41	9.62	641
Relationship Skills	48.40	9.72	602	-0.33	51.65	9.90	641
Self-Awareness	48.40	10.03	602	-0.32	51.54	9.51	641
Self-Management	48.80	9.98	602	-0.27	51.51	9.94	641
Social-Emotional Composite	48.24	9.51	602	-0.37	51.77	9.60	641

Devereux Elementary Student Strength Assessment (DESSA, LeBuffe Shapiro & Naglieri, 2009)

conclusions   226

Sex Differences: Social Emotional

Parent & Teacher Raters Females

Parent & Teacher Raters Males
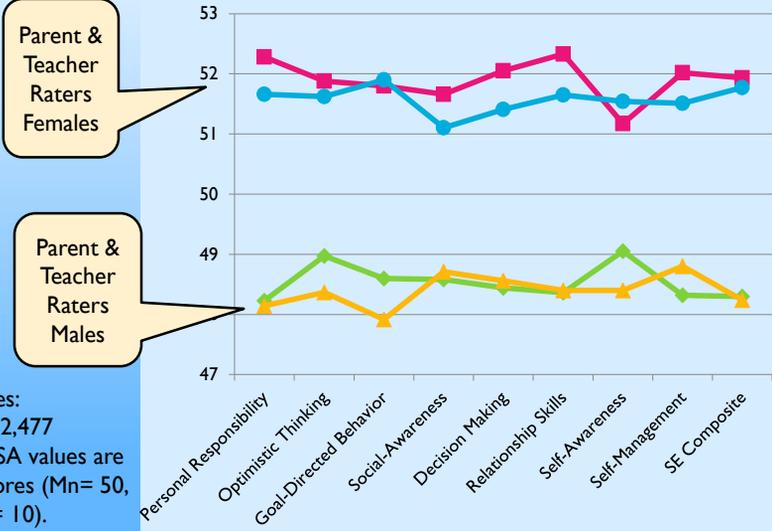
Notes:
N = 2,477
DESSA values are T-scores (Mn= 50, SD = 10).

Chart y-axis: 47, 48, 49, 50, 51, 52, 53

Chart x-axis: Personal Responsibility, Optimistic Thinking, Goal-Directed Behavior, Social-Awareness, Decision Making, Relationship Skills, Self-Awareness, Self-Management, SE Composite

conclusions

227

Sex Differences

conclusions

228

114

Presentation Outline

➢What is Executive Function (EF)
  • Historical Perspective
  • Definitions of Executive Function
➢EF measured by CEFI
➢EF measured by CAS2
➢Relevant Research about EF
➢Conclusions

conclusions   229

Conclusions

➢The teacher's role is to give the student knowledge of facts *and* to encourage the use of Executive Function

➢When we give students the responsibility to figure out how to do things we teach them to **THINK SMART! and use EF**

➢**This is the gift of smarter thinking**

➢**This is a gift of optimism**

➢**This is a gift for life success**

➢**EF is about LIFE not just school**

conclusions   230

CEFI Adult Sex Differences

➢Negligible gender differences (median Cohen's *d* effect size was 0.15) were found for the CEFI Adult

• CEFI Adult Full Scale male female d was -0.12 for self ratings and 0.03 for observer ratings