Making Connections between Executive Function, IQ, Intelligence, and Instruction

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EF

PASS

IQ

Knowledge

Keynote at: Fordham University's 6th Annual Betty Finn Assessment Conference Theme: Assessment of Executive Functions for Academic Interventions.

Recognition – Dr. Tulio Otero Chicago School of Professional Psychology for his comments and contributions to this presentation.

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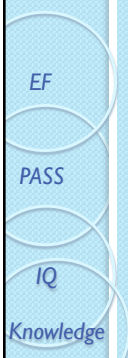
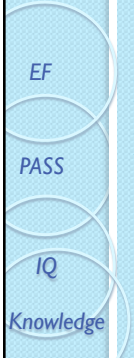
My Background

- Interest in intelligence and instruction
- Experiences at C. W. Post College
- Experiences as a school Psychologist
- Experiences at UGA
  - Test development
  - Need for science to support practice
  - Psychometrics
- My personal perspective on being a researcher and test developer
- Evidence based interpretation

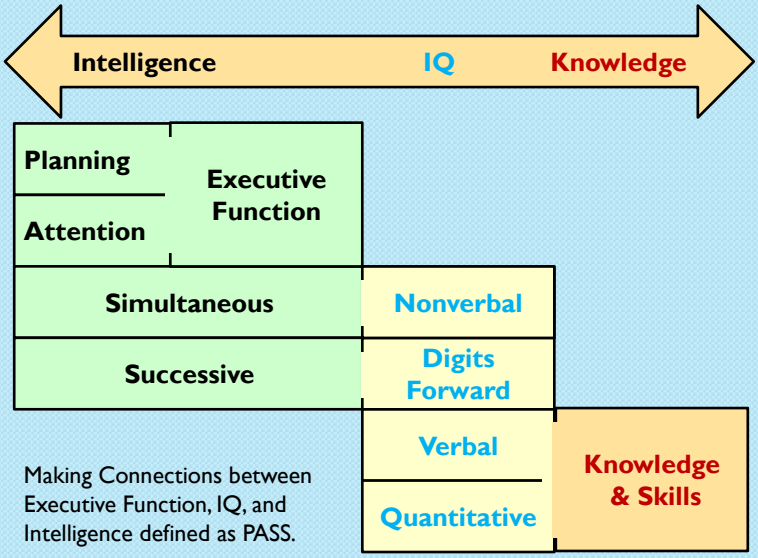


My Conclusions

- We have to rethink using traditional IQ to define intelligence
- Traditional IQ has too much knowledge and skills
- Intelligence should be as free of knowledge and skills as possible
- Intelligence should be defined by brain function
- EF is part of intelligence as defined by PASS, traditional IQ has a little PASS and a lot of knowledge and skills



Conclusions & the Intelligence Achievement Continuum



Making Connections between Executive Function, IQ, and Intelligence defined as PASS.

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Presentation Outline

- Making Connections between IQ, Intelligence, Executive Function, and Instruction
  - What is IQ?
  - What is Intelligence?
  - What is EF?
  - Instruction and IQ, Intelligence & EF

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Knowledge

conclusions 6

Presentation Outline

- Making Connections between IQ, Intelligence, Executive Function, and Instruction
  - What is IQ? – **A LITTLE HISTORY**
  - What is Intelligence?
  - What is EF?
  - Instruction and IQ, Intelligence & EF

PASS

IQ

Knowledge

Origins of Traditional IQ

- April 6, 1917 is remembered as the day the United States entered World War I.

"All the News That's Fit to Print."

The New York Times.

LATE CITY EDITION

U. S. DECLARES WAR, PACIFIC BATTLE WIDENS; MANILA AREA BOMBED; 1,500 DEAD IN HAWAII; HOSTILE PLANES SIGHTED AT SAN FRANCISCO

TURN BACK TO SEA

Two Formations Neared City on Radio Beams, Then Went Astray

ALARM IS WIDESPREAD

Whole Coast Has a Nervous Night—Many Cities Blacked Out

Philippines Pounded All Day As Raiders Strike at Troops

Air Base Near Capital Among Targets Hit by Japanese—Landing on Luzon Is Said to Be Under Way With Aid of Fifth Columnists Reported

BATTLESHIP LOST

Capsized in Pearl Harbor, Destroyer Is Blown Up, Other Ships Hurt

FLEET NOW IS FIGHTING

Aid Rushed to Hawaii—Some Congressmen Sharply Critical

UNITY IN CONGRESS

Only One Negative Vote as President Calls to War and Victory

BOUNDS OF CHEERS

Miss Rankin's Is Sole 'No' as Both Houses Act in Quick Time

Origins of Traditional IQ

- On that day same a group of psychologists held a meeting in **Harvard University's Emerson Hall** to discuss the possible role psychologists could play with the war effort (Yerkes, 1921).
- Yerkes, Thorndike, Seashore, Terman, and others…

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Origins of Traditional IQ

- A group of psychologists decided to meet at the Training School in Vineland, New Jersey on May 28, 1917 to identify possible tests
- They considered many options (including the group tests that Lewis Terman's student Arthur S. Otis developed)

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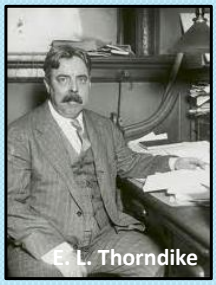
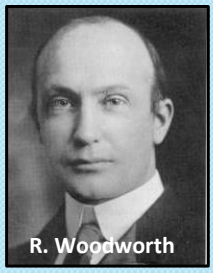
Origins of Traditional IQ





- The goal was to find tests that could efficiently evaluate a wide variety of men, be easy to administer and easy to score.
- The tests they assembled were examined in a study involving about 4,000 subjects and the data collected and analyzed by another group including: Woodworth, Thorndike (Chief Statistician), Otis, and Thurstone

EF PASS IQ Knowledge

Origins of Traditional IQ

- On July 20, 1917 the first research study showed that the Alpha and Beta tests could
  - "aid in segregating and eliminating the mentally incompetent,
  - classify men according to their mental ability;
  - assist in selecting competent men for responsible positions" (p. 19, Yerkes, 1921).
- Thus, on **July 20, 1917 the verbal (& quantitative) / nonverbal IQ test format was born - Traditional IQ tests.**

EF PASS IQ Knowledge

Origins of Traditional IQ

- The next step was application of the Alpha and Beta tests which was accomplished in about 250 testing sites around the country
- One of the Enlisted personnel in the Medical Corps trained in the School for Military Psychology was
- **DAVID WECHSLER**

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Origins of Traditional IQ

- In May of 1918 a 22 year-old David Wechsler arrived at Camp Logan in Texas to use the newly developed Alpha and Beta (Yerkes, 1921, p. 40)

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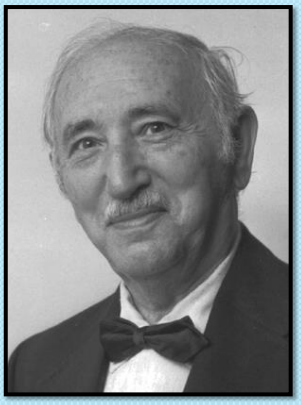
Army Testing Program?

- David Wechsler (January 12, 1896 – May 2, 1981)
- The Army also sent Wechsler to the University of London to work with Spearman and Pearson (1918)
- He got an idea…make a version of the Army tests for use by clinical psychologists
- He contacted the Psychological Corporation…Who did he speak with?



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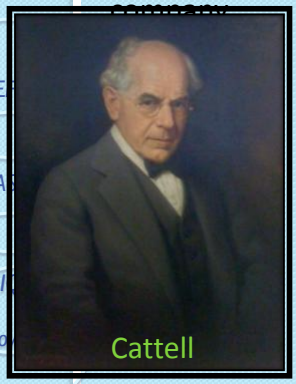
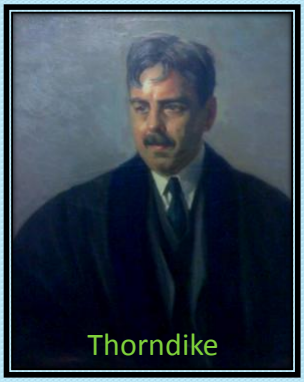
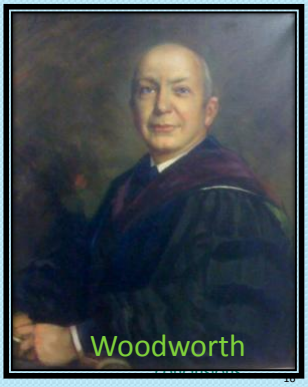
The Psychological Corporation

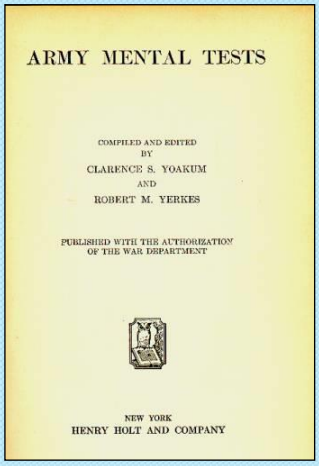
Cattell, Thorndike and Woodworth all have portraits at corporate headquarters of The Psychological Corporation (now Pearson) in San Antonio, Texas. They were on the board of the and instrumental in the formation of the company.


Cattell


Thorndike


Woodworth

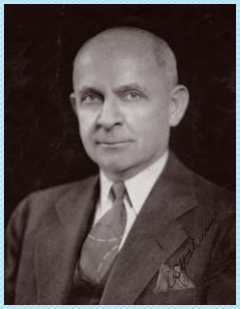
IQ's Origins

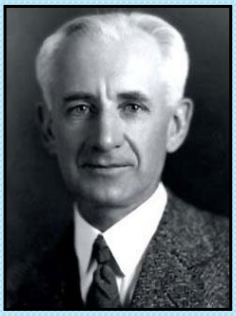

ARMY MENTAL TESTS

COMPILED AND EDITED
BY
CLARENCE S. YOAKUM
AND
ROBERT M. YERKES

PUBLISHED WITH THE AUTHORIZATION
OF THE WAR DEPARTMENT

NEW YORK
HENRY HOLT AND COMPANY





- Yoakum & Yerkes (1920) summarized the methods used by the military to
  - classify people from many backgrounds by mental capacity

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1920 Army Testing

- Army Alpha
  - Synonym- Antonym
  - Disarranged Sentences
  - Number Series
  - Arithmetic Problems
  - Analogies
  - Information

Verbal & Quantitative

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Army Mental Tests → Information & WISC

EXAMINATION Q

Test 5 Information.

1 The color of fresh snow is white blue brown green
2 The ears are used in breathing digestion hearing seeing
3 Cows eat mostly meat grass nuts fruit
4 Dogs like best to eat grass seeds fruits meat
5 Thorns grow on daisies buttercups sun-flowers roses
6 Bull Durham is the name of chewing-gum aluminum-ware tobacco clothing
7 America was discovered by Drake Hudson Columbus Cabot
8 The apple grows on a vine bush tree reed
9 Berlin is the capital of Russia Germany England France
10 Blood is pumped by the lungs liver heart kidneys
11 Molasses is obtained from honey petroleum turpentine sugar-cane
12 Bowling is played with rackets cards balls dice
13 Baltimore is in Maryland Virginia Pennsylvania Ohio
14 St. Paul is in Missouri Minnesota Mississippi Florida
15 Ordinary flour is made from barley rye oats wheat
16 The lemon is most like the apple pear peach orange
17 The sacrifice hit comes in foot-ball tennis base-ball hand-ball
18 Gas engines are lubricated by gasoline air water oil
19 Buenos Ayres is a city of Spain Argentina Brazil Portugal

Army Mental Tests → Similarities on WISC

TEST 4

If the two words of a pair mean the same or nearly the same, draw a line under *same*. If they mean the opposite or nearly the opposite, draw a line under *opposite*. If you cannot be sure, guess. The two samples are already marked as they should be.

SAMPLES { good—bad ..... same—opposite
little—small ..... same—opposite

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1 wet—dry ..... same—opposite 1
2 in—out ..... same—opposite 2
3 hill—valley ..... same—opposite 3
4 allow—permit ..... same—opposite 4
5 expand—contract ..... same—opposite 5

6 class—group ..... same—opposite 6
7 former—latter ..... same—opposite 7
8 confess—admit ..... same—opposite 8
9 shy—timid ..... same—opposite 9
10 delicate—tender ..... same—opposite 10

11 extinguish—quench ..... same—opposite 11
12 cheerful—melancholy ..... same—opposite 12
13 accept—reject

Knowledge

conclusions

Army Mental Tests → Arithmetic on WISC

TEST 2

Get the answers to these examples as quickly as you can.
Use the side of this page to figure on if you need to.

SAMPLES
1 How many are 5 men and 10 men?....Answer (15)
2 If you walk 4 miles an hour for 3 hours, how far do you walk?..Answer (12)

1 How many are 40 guns and 6 guns?....Answer ( )
2 If you save $6 a month for 5 months, how much will you save?....Answer ( )
3 If 32 men are divided into squads of 8, how many squads will there be?....Answer ( )
4 Mike had 11 cigars. He bought 3 more and then smoked 6. How many cigars did he have left?....Answer ( )
5 A company advanced 6 miles and retreated 3 miles. How far was it then from its first position?....Answer ( )
6 How many hours will it take a truck to go 48 miles at the rate of 4 miles an hour?....Answer ( )
7 How many pencils can you buy for 40 cents at the rate of 2 for 5 cents?....Answer ( )
8 A regiment marched 40 miles in five days. The first day they marched 9 miles, the second day 6 miles, the third 10 miles, the fourth 9 miles. How many miles did they march the last day?....Answer ( )
9 If you buy 2 packages of tobacco at 8 cents each and a pipe for 55 cents, how much change should you get from a two-dollar bill?....Answer ( )
10 If it takes 8 men 2 days to dig a 160-foot drain, how many men are needed to dig it in half a day?....Answer ( )

ARMY MENTAL TESTS

Army Mental Tests - Vocabulary

SAMPLES
sky—blue : : grass— table green warm big
fish—swims : : man— paper time walks girl
day—night : : white— red black clear pure

In each of the lines below, the first two words are related to each other in some way. What you are to do in each line is to see what the relation is between the first two words, and underline the word in heavy type that is related in the same way to the third word. Begin with No. 1 and mark as many sets as you can before time is called.

1 gun—shoots : : knife— run cuts hat bird.... 1
2 ear—hear : : eye— table hand [illegible] play.... 2
3 dress—woman : : feathers— [illegible] neck feet bill.... 3
4 handle—hammer : : knob— key room [illegible] door.... 4
5 shoe—foot : : hat— coat nose head collar.... 5
6 water—drink : : bread— cake coffee eat pie.... 6
7 food—man : : gasoline— gas oil automobile spark.... 7
8 eat—fat : : starve— thin food [illegible] thirsty.... 8
9 man—home : : bird— fly insect worm nest.... 9
10 go—come : : sell— leave buy money papers.... 10
11 peninsula—land : : bay— boats pay ocean Massachusetts.... 11
12 hour—minute : : minute— man [illegible] short.... 12
13 abide—depart : : stay— over home play leave.... 13
14 January—February : : June— July May month year.... 14
15 bold—timid : : advance— proceed retreat campaign soldier.... 15

ARMY MENTAL TESTS

Army Mental Tests → Comprehension on WISC

This is a test of common sense. Below are sixteen questions. Three answers are given to each question. You are to look at the answers carefully; then make a cross in the square before the best answer to each question, as in the sample:

SAMPLE — Why do we use stoves? Because
- ☐ they look well
- ☒ they keep us warm
- ☐ they are black

Here the second answer is the best one and is marked with a cross. Begin with No. 1 and keep on until time is called.

1 If plants are dying for lack of rain, you should
- ☒ water them
- ☐ ask a florist's advice
- ☐ put fertilizer around them

2 A house is better than a tent, because
- ☐ it costs more
- ☒ it is more comfortable
- ☐ it is made of wood

- ☐ give it to the first poor man you meet
- ☒ tell him of his mistake

5 Why should food be chewed before swallowing?
- ☒ it is better for the health
- ☐ it is bad manners to swallow without chewing
- ☐ chewing keeps the teeth in condition

EF PASS IQ

1920 Army Testing

- Army Alpha
  - Synonym- Antonym
  - Disarranged Sentences
  - Number Series
  - Arithmetic Problems
  - Analogies
  - Information
- Army Beta
  - Maze
  - Cube Imitation
  - Cube Construction
  - Digit Symbol
  - Pictorial Completion
  - Geometrical Construction

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Verbal & Quantitative

Nonverbal (Performance)

Slides by Jack A. Naglieri, Ph.D. (jnaglieri@gmail.com)

Army Mental Tests → WISC Picture Arrangement & Block Design

Test 9.—Picture Arrangement

E. presents demonstrational set and allows S. to see it for about 15 seconds. Then, making sure that S. is attending, he slowly rearranges the pictures and points to each one in succession, attracti
of important
sents set (*a*),
to indicate th
stand, E. sho
to set (*b*). S
as (*a*), except

Test 4.—Cube Construction

(*a*) E. presents model 1 and the corresponding blocks, points to bottom, top, and sides of model; then places it upon the table and assembles the blocks rather slowly, turning each block over in the fingers and pointing to painted and unpainted sides. E. now presents the same model and the blocks in irregular order, then points in order to S., to the model, to the blocks, and nods affirmatively. E. repeats, if S. does not understand.

(*b*) E. presents model 2 with the nine blocks for its construction; shows S. bottom, top, and sides of model; then places it

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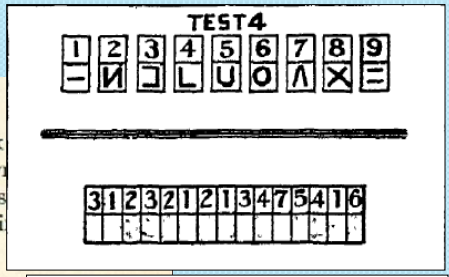
Army Mental Tests → WISC Digit Symbol (Coding) & Mazes

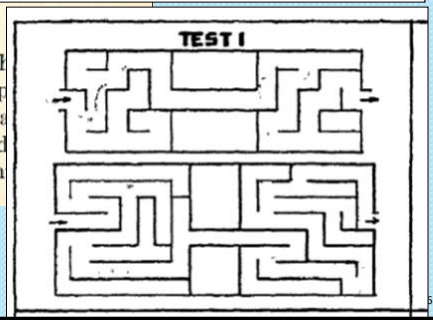
Test 7.—Digit Symbol

E. shows S. the record sheet, points to blank
sample, then to symbol for 2 at top of page, w
proceeds in the same way with the other parts
then gives S. pencil, points to space below 3 i
nods affirmatively.

Test 8.—The Maze

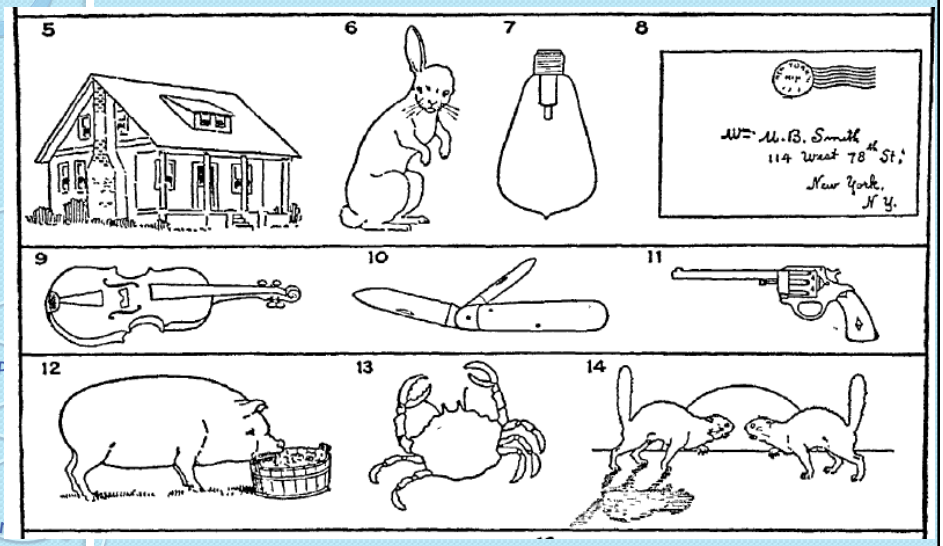
E. shows S. demonstration maze (*a*), and with
ceeds to trace the shortest way out. At critical p
tates, moves pencil in wrong direction without ma
his head, and continues to work in the right d
next presents test maze A, gives S. pencil, poin





Knowledge

Army Mental Testing → WISC Picture Completion



Army Alpha and Beta

- The Army Alpha contained Verbal and Quantitative tests which Wechsler put on his **Verbal IQ scale**
- The Army Beta contained visual-spatial tests which Wechsler put on his **Performance IQ**, (Perceptual Reasoning) and which is often called Nonverbal
- Did this mean Wechsler believed in Verbal and Nonverbal intelligences?

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Wechsler's Definition

- Definition of intelligence does not mention verbal or nonverbal *abilities*:

  "The aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment (1939)"

David Wechsler, Ph.D.

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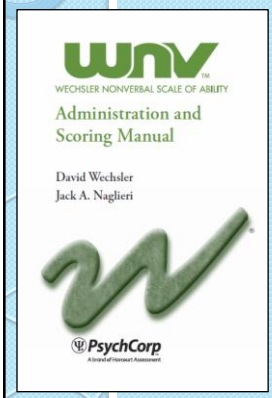
Alan Kaufman on Wechsler and the Wechsler Nonverbal Scale



Foreword

In addition, the emphasis in the *WNV Manual* that the Full Scale measures *general ability nonverbally*—and *not* nonverbal ability—is an important distinction that further ties the WNV to Dr. Wechsler. Although his intelligence tests in the 1930s and 1940s departed from the one-score *Stanford-Binet* by offering separate Verbal and Performance IQs as well as a profile of scaled scores, Dr. Wechsler remained a firm believer in Spearman's *g* theory throughout his lifetime. He believed that his Verbal and Performance Scales represented different ways to access *g*, but he never believed in nonverbal intelligence as being separate from *g*. Rather, he saw the Performance Scale as the most sensible way to measure the general intelligence of people with hearing impairments, language disorders, or limited proficiency in English. And that is precisely what the WNV is intended to do.

The WNV has an impressive set of validity data in the manual along with evidence that the battery is reliable, well normed in the US and Canada, and useful for clinical assessment with varied populations. Its built-in brief form makes it a flexible instrument for a variety of testing purposes within the 4- to 21-year age range, and its clever administrative aids make it a user friendly instrument whenever it is desirable or essential to test a person's general intelligence nonverbally.

The two authors, my late mentor and my prized student, make a potent team. Dr. Wechsler would be proud.

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IQ

Knowledge

Verbal Nonverbal Intelligence?

- Verbal / Nonverbal is a practical division
- Advantages of Verbal tests
  - they correlate with achievement because they have achievement in them
    - Information, Vocabulary, Arithmetic
- Advantages of Nonverbal Tests
  - they correlate with achievement without having achievement in them
- **Why NONVERBAL** ?

EF PASS IQ Knowledge

conclusions

1927 Army Testing

Why Beta?

Men who fail in alpha are sent to beta in order that injustice by reason of relative unfamiliarity with English may be avoided. Men who fail in beta are referred for individual examination by means of what may appear to be the most suitable and altogether appropriate procedure among the varied methods available. This reference for careful individual examination is yet another attempt to avoid injustice either by reason of linguistic handicap or accidents incident to group examining.

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Note there is no mention of measuring verbal and nonverbal intelligences

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Nonverbal Assessment

- "Nonverbal" describes the methods used to measure general intelligence, not nonverbal ability
- There is no assumption that verbal and nonverbal and abilities are being measured
- These tests measure GENERAL ABILITY using tests of different content

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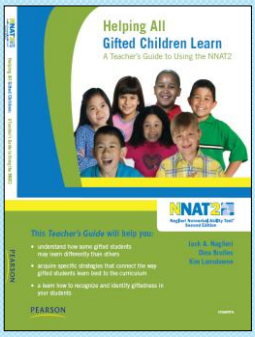
General Intelligence

(Naglieri, Brulles & Lansdowne, 2009)

- General ability is what allows us to solve many different kinds of problems that may involve words, pictures, or numbers, reasoning, memory, sequencing, verbal and math skills, patterning, connecting ideas across and within content areas, insights, making connections, drawing inferences, analyzing simple and complex ideas.



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VERBAL

Verbal intelligence or achievement?

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VIQ is Achievement - Vocabulary

What does *scared* mean?
(The child answers orally)

Someone who is *glad* is
(a) tall
(b) proud
(c) happy
(d) alone

Wechsler or Binet Vocabulary item presented orally by the examiner:

Stanford Achievement Test Reading Vocabulary

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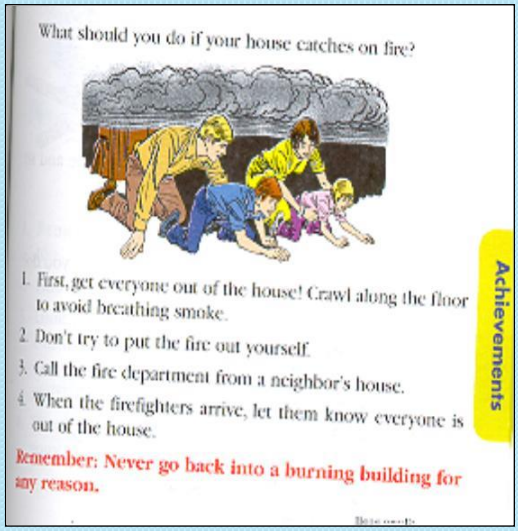
VIQ is Achievement-Comprehension

One item on the Wechsler Comprehension subtest is like this:

What should you do if you see smoke in your house?



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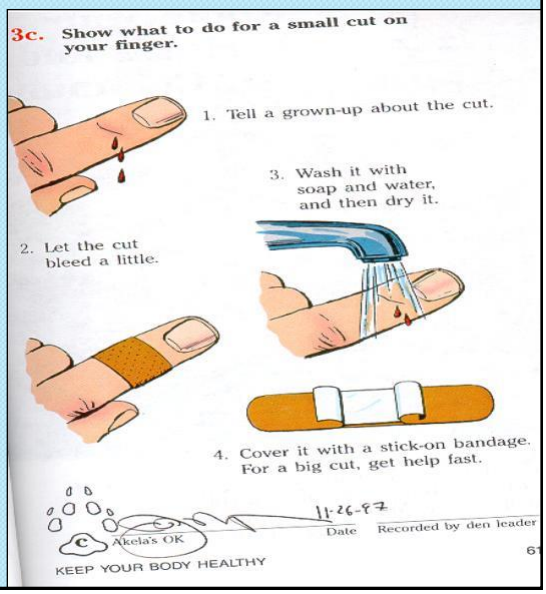
VIQ is Achievement-Comprehension

One item on the Wechsler Comprehension subtest is like this:

What should you do if you cut your finger?



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VIQ is Achievement - Arithmetic

"A boy had twelve books and sold five. How many books did he have left?"

Stanford-Binet 5th Ed.
Quantitative items

Peter counted seventeen lily pads at the pond. There were frogs sitting on five of the lily pads, and the rest were empty. How many lily pads were empty?
(a) 22 (b) 13 (c) 12

Stanford Achievement Test
Math item

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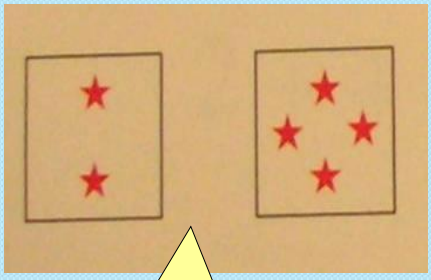
Quantitative Ability or Achievement?

- "Neal had five marbles. Then his mother gave him three more marbles. How many marble did he have then?"

Wechsler Individual Achievement
Numerical Operations Subtest

- "How many stars are there all together?"



Stanford-Binet 5
Quantitative Reasoning

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Quantitative Ability or Achievement?

- "Drinks and snacks cost money. Show me how much money these drinks and snacks would cost."

SB5 Quantitative Reasoning

- "If you bought both balls and you had this much money, how much money would you have left?"

WJ-III ACH Applied Problems

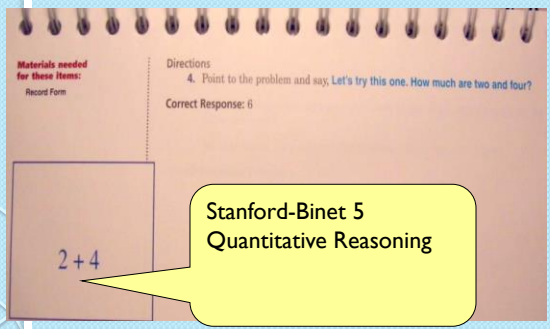
EF

PASS

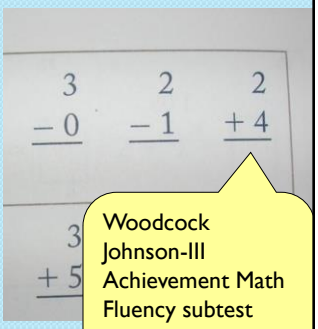
IQ

Knowledge

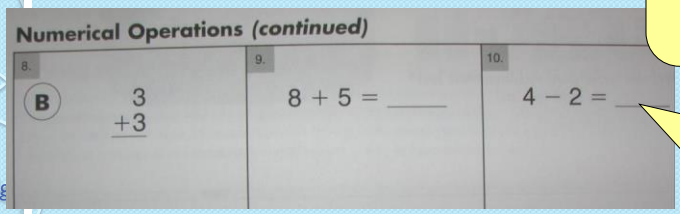
The Same Arithmetic Item!



Stanford-Binet 5 Quantitative Reasoning



Woodcock Johnson-III Achievement Math Fluency subtest



WIAT-II Numerical Operations

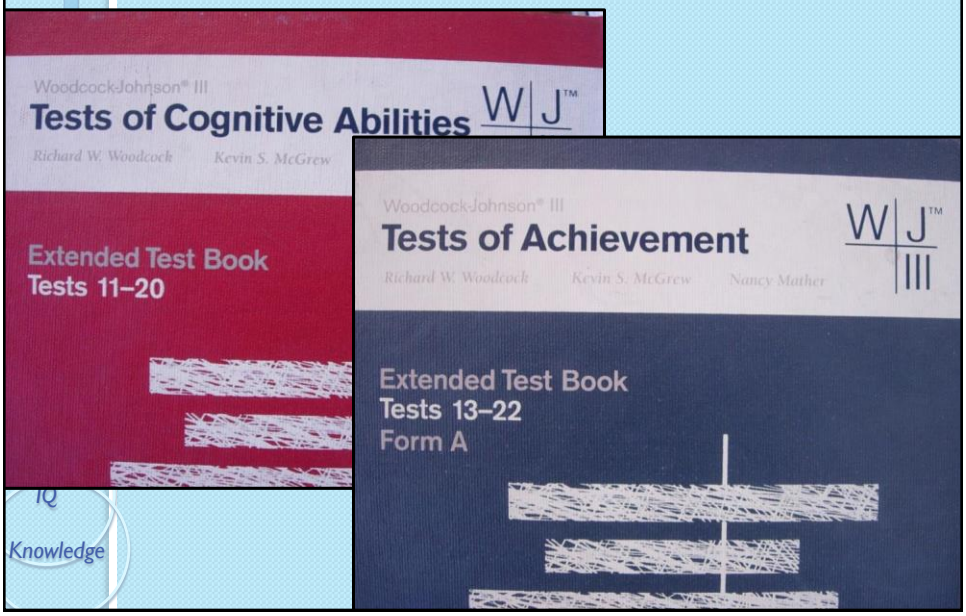
EF

PASS

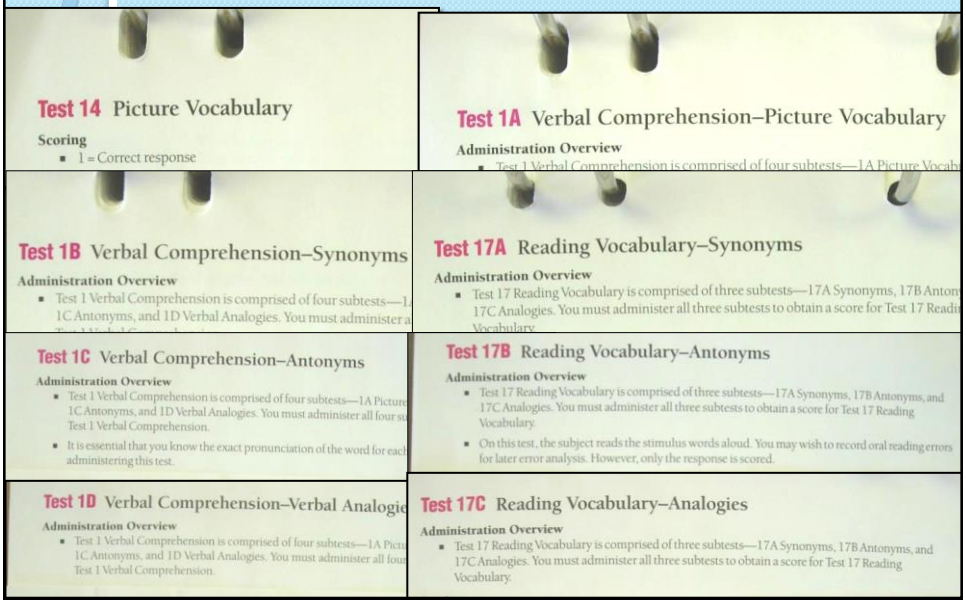
IQ

Knowledge

Ability or Achievement ?



Which is Ability and which is Achievement?



Myth of Verbal IQ - Conclusions

- The lack of a clear distinction between ability and achievement tests has corrupted the very concept of "verbal ability"
- A child who does not have an adequately enriched educational experience will be at disadvantage when assessed with so-called Verbal and Quantitative reasoning "ability" tests

EF
PASS
IQ
Knowledge

conclusions

Poverty and Test Scores

- Children from homes with limited enrichment
  - many students receive low test scores because of unequal opportunity to learn
- Too many minority students are penalized on traditional tests of intelligence leading to under- and over-representation
- Many children with Specific Learning Disabilities do poorly on Verbal and Quantitative tests because of school failure and get LOW IQs

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Knowledge

conclusions

Minority Representation

- There is under-representation of minorities in gifted (Ford, 1998).
  - Black, Hispanic, and Native American students by 50% to 70% (U.S. Department of Education, 1993)
- The over-representation of minorities in special education is a significant problem (Naglieri & Rojahn, 2000).
- Achievement laced IQ tests contribute to this problem!

EF PASS IQ Knowledge

conclusions

Take Away Message

- Traditional IQ tests do NOT measure EF
- That does NOT mean that EF is not part of intelligence…if we…
- Define intelligence in a way that is takes brain function into consideration
- Start by being open to ***a new way of thinking about intelligence***

EF PASS IQ Knowledge

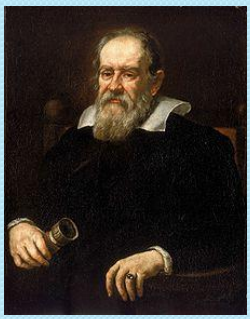
conclusions 48

Presentation Outline

- Making Connections between IQ, Intelligence, Executive Function, and Instruction
  - What is IQ?
  - What is Intelligence?
  - What is EF?
  - Instruction and IQ, Intelligence & EF

EF
PASS
IQ
Knowledge

Reset our Thinking



- "It appears to me", Vincenzo Galileo remarked, "that those who rely simply on the weight of authority to prove any assertion, without search out the arguments to support it, act absurdly. I wish to question freely without any sort of adulation. That well becomes any who are sincere in the search for truth." (James Reston's book, Galileo)

EF
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Revolution in 1983

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EF

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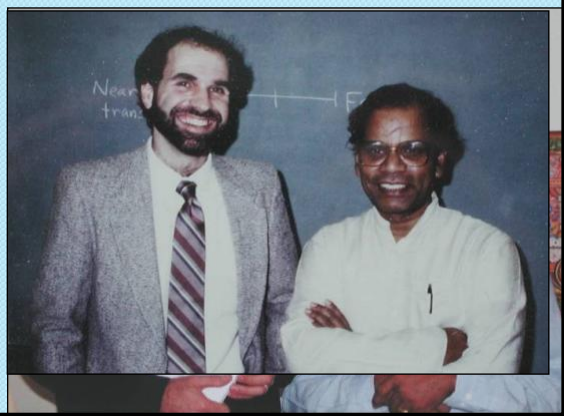
IQ

Knowledge

Neurocognitive Abilities

- Das and Naglieri publish the Cognitive Assessment System (Naglieri & Das, 1997) and the CAS2 (Naglieri, Das, & Goldstein, 2014.)
- The CAS is the first ability test to be built on a specific theory of intelligence.
- How?



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Neurocognitive Abilities

- Start with a *theory*
- A theory based on brain research
- Build a new test on the theory
- Do not let traditional IQ constrain the content of a new test
- Expand the scope of the test to include specific abilities not in traditional IQ
- Replace IQ with neurocognitive abilities

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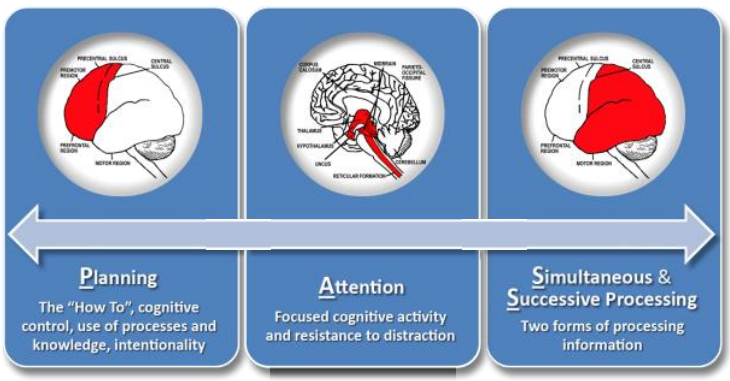
Neurocognitive Abilities

Three Functional Units described by A. R. Luria (1972)



Neurocognitive Abilities

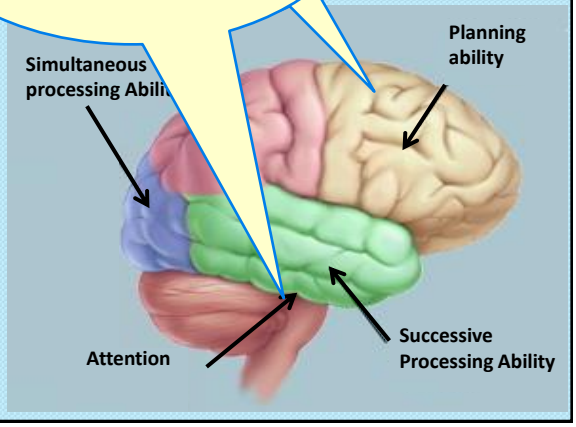
- **PASS** theory is a modern way to define 'ability' (AKA – intelligence)
- **P**lanning = THINKING ABOUT THINKING
- **A**ttention = BEING ALERT
- **S**imultaneous = GETTING THE BIG PICTURE
- **S**uccessive = FOLLOWING A SEQUENCE

EF
PASS
IQ
Knowledge

Neurocog…ities

- The brai… …ASS
- These ab… …described as a moder… …glieri & Otero, 2011)

NOTE: Planning and Attention can also be described as EXECUTIVE FUNCTION



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

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Knowledge

The Neurocognitive PASS *Theory*

28 Cognitive Assessment System: Redefining Intelligence From a Neuropsychological Perspective

Jack A. Naglieri and Tulio M. Otero

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Knowledge

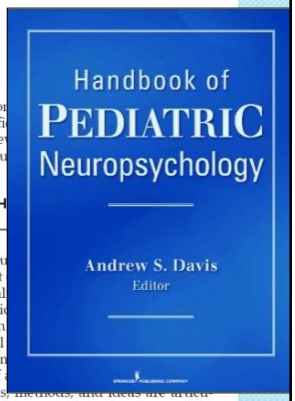
INTRODUCTION

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 o
cesses necessary for effi
also provide for the de
tions and address the qu

FROM NEUROPSYCH TO ASSESSMENT

Luria's theoretical accou
perhaps one of the most
2008). Luria conceptual
of brain–behavior relati
orders that the clinician
the brain, the functional
syndromes and impairm
and clinical methods of
theoretical formulations,
lated 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-



The Neurocognitive PASS *Test*

The Cognitive Assessment System

Jack A. Naglieri, Cara Conway

THEORY UNDERLYING THE CAS

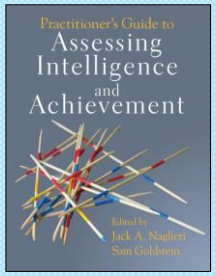
The *Cognitive Assessment System (CAS)* (Naglieri & Das, 1997a) is a multidimensional measure of ability based on a cognitive and neuropsychological processing theory called *Planning, Attention, Simultaneous, and Successive (PASS)* (Naglieri, 1999a, 2005). The PASS theory described by Naglieri and Das (1997b, 2005) is a reconceptualization of intelligence largely, but not solely, based on the neuropsychological work of A. R. Luria (1966, 1973, 1980, 1982). The four processes that make up the PASS theory represent a blend of cognitive and neuropsychological constructs, such as executive functioning (Planning) and selective attention (Attention), including tests that in the past were often arguably described as nonverbal/visual-spatial (Simultaneous) and sequencing/memory (Successive) (Naglieri & Das, 2002).

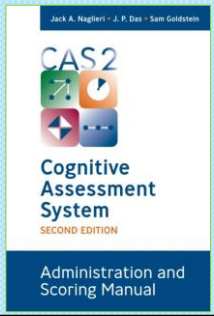
The PASS theory is a different approach to understanding intelligence that not only the theory may have its roots in neuropsychology, "its branches are spread over developmental and educational psychology" (Varnhagen & Das, 1986, p. 130). Thus, with its connections to developmental and cognitive processing, the PASS theory offers an advantage in explanatory power over the notion of traditional general intelligence (Naglieri & Das, 2002).

PASS Defined

The four cognitive processes that make up the PASS theory are each associated with different brain regions, cognitive abilities, and behaviors (Naglieri, Conway, & Goldstein, 2007). The four processes of the PASS theory are described more fully below.

Planning is a mental activity that provides cognitive control, intentionality, organization, self-regulation and use of processes, knowledge, and skills. This includes self-monitoring and impulse control as well as generation, evaluation, and execution of a plan. This process may involve control over the other three processes, as well as





Neurocognitive PASS Theory for Teachers (www.kathleenkryza.com)

EF
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Kathleen Kryza's
InfiniteHorizons
www.kathleenkryza.com

Inspiring Ideas for Teachers

August, 2013

Quick Links

"It is tempting, if the only tool you have is a hammer, to treat everything as if it were a nail." - Abraham Harold Maslow

Plan to Succeed!

In the July newsletter, Self-Regulation Empowers Students, we discussed Jack Naglieri's P.A.S.S. theory (Naglieri, 2010).

We described the four abilities as presented in the P.A.S.S. theory: Planning, Attention, Simultaneous processing, and Successive processing. When taught in conjunction, these abilities are shown to have long-term positive effects for students both in terms of academic success as well as personal concepts of self-efficacy.

As promised, we will now dig a little deeper into the first ability listed in the P.A.S.S. theory –

Resources
Services
Products
Contact

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PASS Theory: Planning

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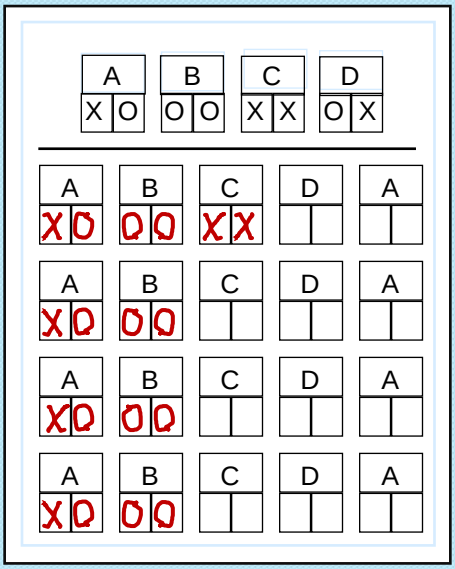
- **Planning** is a neurocognitive ability used to determine, select, self-monitor, and self-correct thoughts and actions.
  - control thoughts, behavior, and emotions, and
  - Getting more information when needed
  - Developing and using strategies
  - Impulse control and self-control
  - Solving novel problems

Planned Codes

- Child fills in the codes in the empty boxes
- Students are encouraged to think of a good way to complete the page

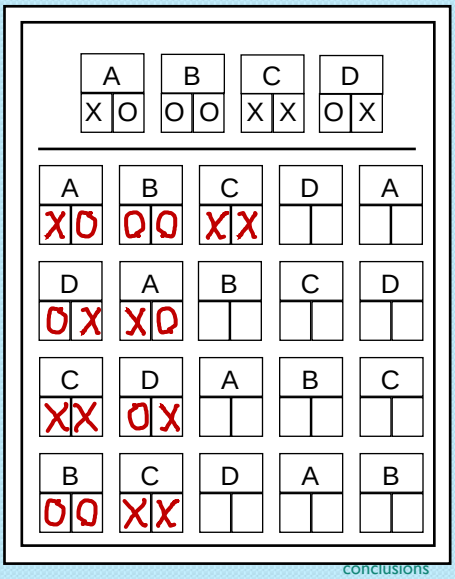


EF PASS IQ Knowledge

conclusions 61

Planned Codes 2

- Page 2
- What is a good plan to complete this page?
- Note orientation

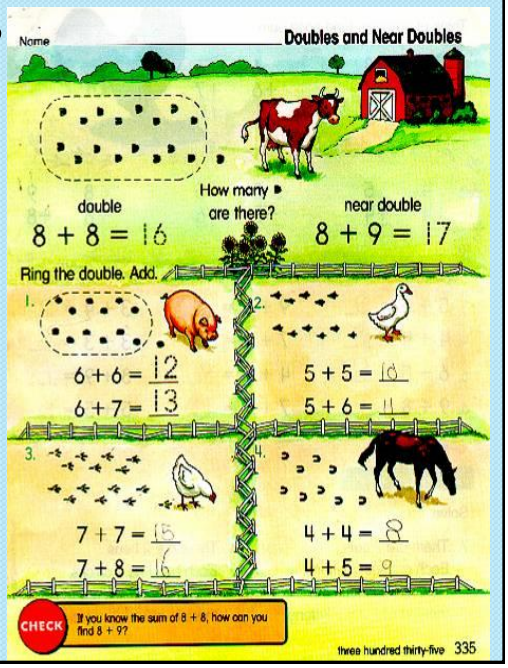


EF PASS IQ Knowledge

conclusions

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.



EF
PAS
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PASS Theory: Planning

Planning

- Evaluate a task
- Select or develop a strategy to approach a task
- Monitor progress during the task
- Develop new strategies when necessary

Examples of classroom problems related to Planning

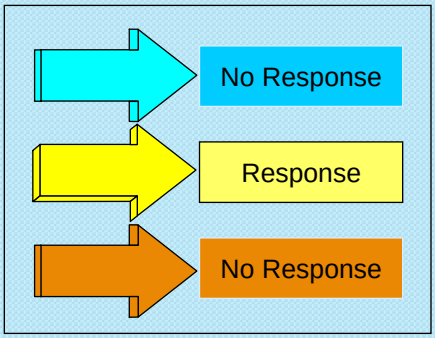
- Using the same strategy even if it is not effective
- Struggling to initiate and complete tasks
- Not monitoring progress during a task
- Misinterpretation of what is read

Naglieri, J. and Pickering, E., Helping Children Learn, 2003

EF
PASS
IQ
Knowledge

PASS Theory

- **Attention** is a neurocognitive ability used to selectively attend and resist distractions
  - selective attention
  - focused cognitive activity over time
  - resistance to distraction



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IQ
Knowledge

Attention Test Instructions:
You will see words like

RED

Your task: say the COLOR (blue) not the word (red)

READY ?

EF
PASS
IQ
Knowledge

Expressive Attention - Italiano

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

EF
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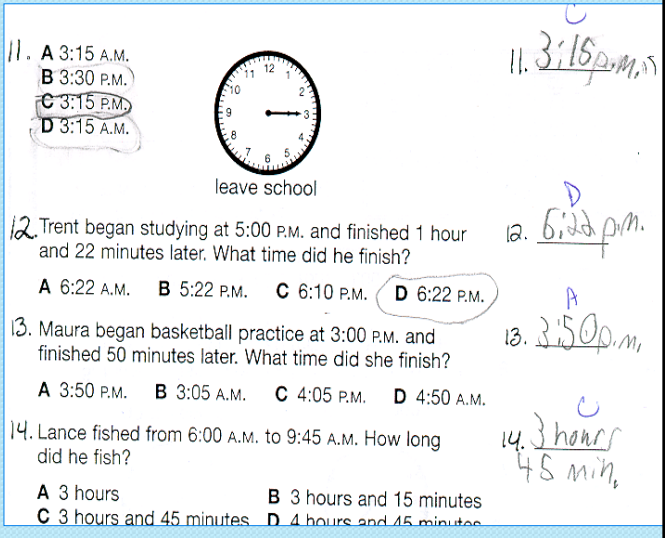
IQ
Knowledge

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

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

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

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

EF
PASS
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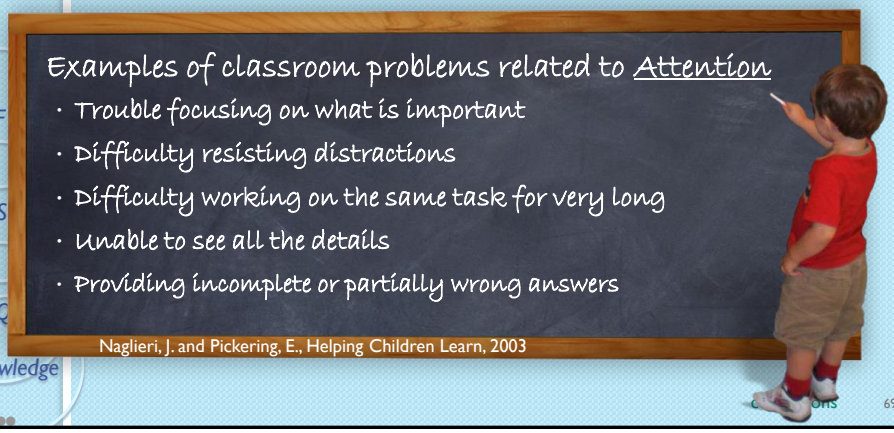
Knowledge

PASS Theory: Attention

Attention

- Focus on one thing and ignore others
- Resist distractions in the learning environment



EF
PAS
IQ
Knowledge

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Planning & Attention = EF

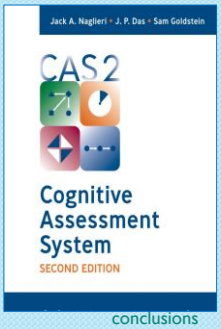
- The concept of Executive Function is about the frontal lobes
- The frontal lobes are associated with Planning in the PASS theory of intelligence
- According to Luria there are strong interconnections between the frontal lobes and Attention
- Planning and Attention have both unique attributes as well as joint functions = EF

EF
PASS
IQ
Knowledge

conclusions

Planning & Attention = EF

- To recognize the relationship between the PASS theory and EF the
  - CAS – Second Edition (Naglieri, Das & Goldstein, 2014) has the same PASS and Full Scales as before *and* a scale for
  - **Executive Function**
    (Planned Connections and Expressive Attention)



EF
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Knowledge

conclusions

PASS Theory

- **Simultaneous** is a neurocognitive ability a person uses to integrate separate stimuli into a whole or group.
  - Parts are seen as a whole
  - Seeing relationships among parts
  - Visual spatial tasks like Block Design, Object Assembly, Matrices
  - Wechsler Perceptual Reasoning, KABC Simultaneous Scale

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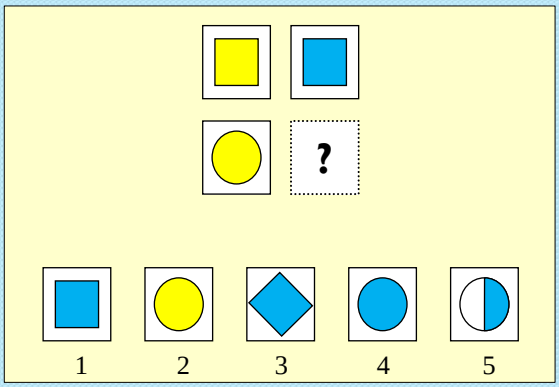
Knowledge

conclusions 72

Simultaneous Neurocognitive Ability

Simultaneous ability is used whenever the inter-relationships among ideas is required.



EF
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Knowledge

PASS Theory

- **Simultaneous** processing is what Gestalt psychology was based on
- Seeing the whole

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Knowledge

PASS Theory: Simultaneous

Simultaneous Processing

- Relate separate pieces of information into a group
- See how parts related to whole
- Recognize patterns

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Examples of classroom problems related to Simultaneous Processing

- Difficulty comprehending text
- Difficulty with math word problems
- Trouble recognizing sight words quickly
- Trouble with spatial tasks
- Often miss the overall idea

Naglieri, J. and Pickering, E., Helping Children Learn, 2003

conc... 75

Successive Neurocognitive 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
  - Speech, motor movements, reading decoding, spelling, recall of numbers in order, etc.

EF
PASS
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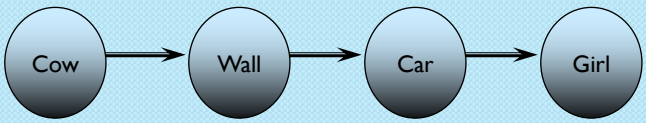
Knowledge



conclusions 76

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?

EF
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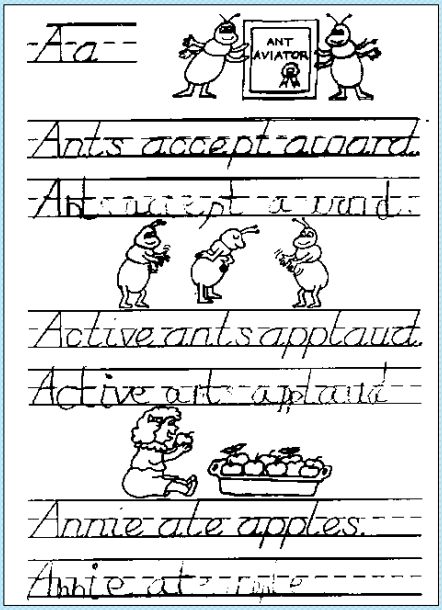
Knowledge

Successive

The sequence of the sounds is emphasized in this work sheet



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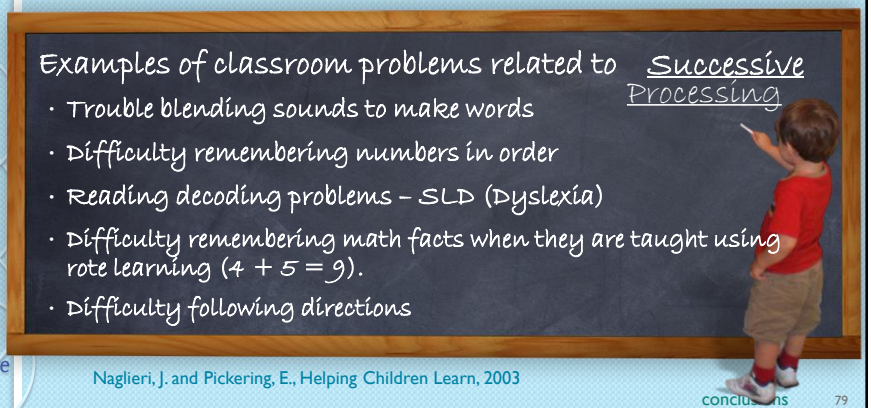
PASS Theory: Successive

Successive Processing

- Use information in a specific order
- Follow instructions presented in sequence



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Naglieri, J. and Pickering, E., Helping Children Learn, 2003

Does PASS theory as measured by the Cognitive Assessment System work?

Research says YES !

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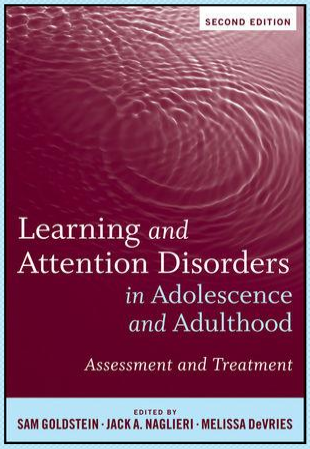
Comparison of Intelligence Tests



EF

PASS

IQ

Knowledge

CHAPTER
6

Assessment of Cognitive and Neuropsychological Processes

JACK A. NAGLIERI
SAM GOLDSTEIN

INTRODUCTION

Assessment of intelligence plays an important role in the process of determining if an adolescent or adult has a disability. For those suspected of having a Specific Learning Disability (SLD), the intelligence test provides an important reference point to compare to levels of achievement. For those who may have Attention-Deficit/Hyperactivity Disorder (ADHD), the measure of intelligence is used to rule out other disabilities that may better explain the person's behavior. Intelligence tests have and will continue to provide a critical component of any comprehensive assessment needed to determine the presence of disabilities, such as SLD and ADHD. Their importance, however, demands a thorough understanding of the strengths and limitations of these tests of ability, an appreciation of the research on their effectiveness, and an examination of modern views of assessing intelligence. The goal of this chapter is to address these issues.

This chapter reexamines intelligence as measured by traditional IQ tests with special attention to the utility such tests have for diagnosis. In order to achieve this goal, the chapter includes a brief overview of the history and definitions of intelligence and examines examples of measures of intelligence more closely. Emphasis will be placed on the importance of understanding how intelligence is conceptualized and measured by different tests and the implications this has for assessment. The chapter also provides a conceptual model of assessment of basic psychological processes and how that information can aid in the diagnostic process and treatment of adolescents and adults.

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conclusions

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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 profiles – UNSUPPORTED so use Scales instead

Naglieri & Goldstein (2011)

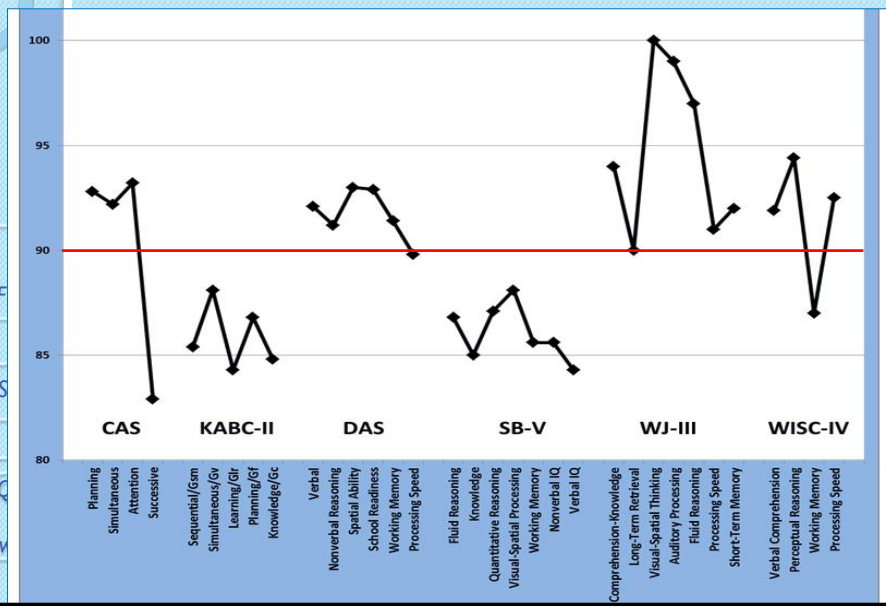
be examined, especially if the separate scales have ample theoretical and empirical support. In the sections that follow, research on the scale profiles is presented first for those ability tests that are used for adolescents and adults, and then for those that can be used only with adolescents. The goal is not to describe these instruments; interested readers should examine their respective test manuals. Instead, the goal is to examine the mean scores of the scales from each test. This examination helps us understand if the ability test shows a particular pattern for a specific clinical group. Such information could have important implications for understanding the cognitive characteristics of that clinical group and allow for possible diagnostic and intervention considerations. These findings, however, must be taken with recognition that the samples are not matched across the various studies, the accuracy of the diagnosis may not have been verified, and some of the sample sizes may be small. Notwithstanding these limitations, the findings do provide important insights into the extent to which these various tests can be used for assessment of adolescents and adults suspected of having an SLD or attention deficit.

Scales should fit a theory and show mean score differences within a measure

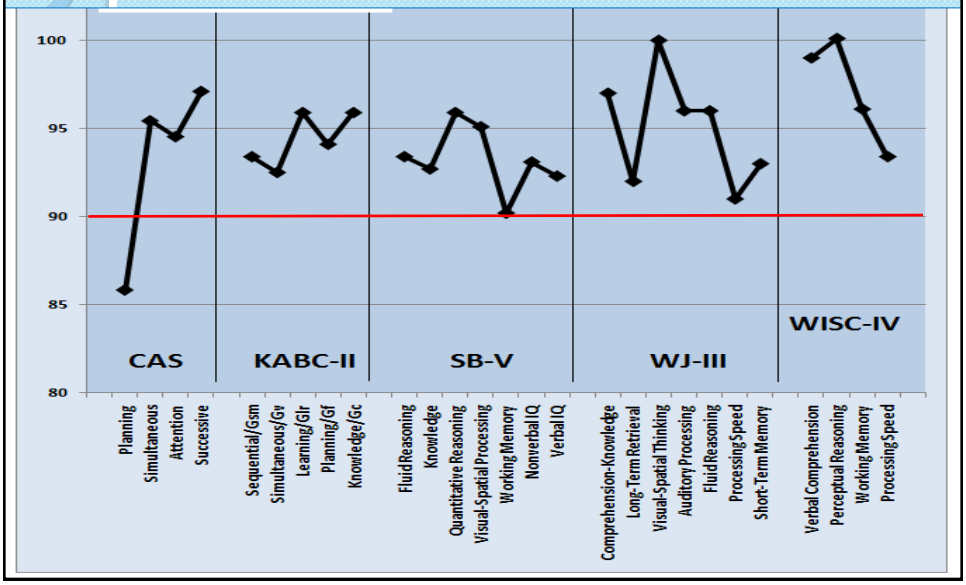
Limitations: different samples and accuracy of diagnostic group likely varies

conclusions 83

Comparison of Tests: Reading Decoding



Comparison of Tests: ADHD



Johnson, Bardos & Tayebi, 2003

- "this study suggests that the CAS…yields information that contributes to the differential diagnosis of students suspected of having a learning disability in writing"

EF

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Journal of Psychoeducational Assessment
2003, 21, 180-195

DISCRIMINANT VALIDITY OF THE COGNITIVE ASSESSMENT SYSTEM FOR STUDENTS WITH WRITTEN EXPRESSION DISABILITIES

Judy A. Johnson
University of Houston - Victoria
Achilles N. Bardos
University of Northern Colorado
Kandi A. Tayebi
Sam Houston State University

This study explored the PASS cognitive processing theory in junior high students (aged 11-15 years) with and without written expression disabilities. Ninety-six students with (n = 48) and without (n = 48) written expression disabilities were administered the Das-Naglieri: Cognitive Assessment System (DN:CAS; 1997) and the writing subtests of the Wechsler Individual Achievement Test (WIAT; 1992). Discriminant analyses were utilized to identify the DN:CAS subtests and composites that contributed to group differentiation. The Planning composite was found to be the most significant contributor among the four composite scores. Subsequent efficiency of classification analyses provided strong support for the validity of the obtained discriminant functions in that the four DN:CAS composite scale scores correctly identified 83% of the students as members of their respective groups.

conclusions

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Performance Across Race, Ethnicity, Culture and Language

Non-discriminatory Assessment

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Slides by Jack A. Naglieri, Ph.D.
(jnaglieri@gmail.com)

Mean Score Differences by Race

Traditional	
SB-IV (matched)	12.6
WISC–IV (normative sample)	11.5
WJ- III (normative sample)	10.9
WISC–IV (matched)	10.0
Second-Generation	
K-ABC (normative sample)	7.0
K-ABC (matched)	6.1
KABC-2 (matched)	5.0
CAS-2 (normative sample)	6.3
CAS (demographic controls)	4.8
CAS-2 (demographic controls)	4.3

Notes: Stanford-Binet IV (SB-IV) from Wasserman (2000); (Woodcock-Johnson III) WJ-III from Edwards & Oakland (2006); Kaufman Assessment Battery for Children (K-ABC) matched from Naglieri (1986); Kaufman Assessment Battery for Children-2 from (Lichenberger, Sotelo-Dynega & Kaufman, 2009); CAS from Naglieri, Rojahn, Matto & Aquilino (2005); Wechsler Intelligence Scale for Children – IV (WISC-IV) from O'Donnell (2009).

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Bilingual Hispanic Children's Performance on the English and Spanish Versions of the Cognitive Assessment System

Jack A. Naglieri
George Mason University
Tulio Otero
Columbia College, Elgin Campus
Brianna DeLauder
George Mason University
Holly Matto
Virginia Commonwealth University

School Psychology Quarterly
2007, Vol. 22, No. 3, 432–448

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This study compared the performance of referred bilingual Hispanic children on the Planning, Attention, Simultaneous, Successive (PASS) theory as measured by English and Spanish versions of the Cognitive Assessment System (CAS; Naglieri & Das, 1997a). The results suggest that students scored similarly on both English and Spanish versions of the CAS. Within each version of the CAS, the bilingual children earned their lowest scores in Successive processing regardless of the language used during test administration. Small mean differences were noted between the means of the English and Spanish versions for the Simultaneous and Successive processing scales; however, mean Full Scale scores were similar. Specific subtests within the Simultaneous and Successive scales were found to contribute to the differences between the English and Spanish versions of the CAS. Comparisons of the children's profiles of cognitive weakness on both versions of the CAS showed that these children performed consistently despite the language difference.

Keywords: bilingual assessment, intelligence, PASS Theory, Cognitive Assessment System, non-biased assessment

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English Spanish CAS

Table 2. Means, Standard Deviations, *d* Ratios, and Obtained and Correction Correlations Between the English and Spanish Versions of the Cognitive Assessment System (CAS; *N* = 55)

CAS Subtests and Scales	CAS English		CAS Spanish			Correlations	
	M	*SD*	*M*	*SD*	*d*	Obtained	Corrected
Scales							
Planning	92.65	13.19	92.65	13.48	.00	.96	.97
Simultaneous	89.05	12.81	93.05	13.76	−.30	.90	.93
Attention	94.84	13.96	95.11	13.94	−.02	.98	.98
Successive	78.04	13.17	83.15	12.69	−.40	.82	.89
Full Scale	84.64	13.66	87.64	13.85	−.22	.96	.97

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conclusions

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US and Italian Samples: Factor Structure

Psychological Assessment
2013, Vol. 25, No. 1, 157–166

1040-3590/13/$12.00 DOI: 10.1037/a0029828

Multigroup Confirmatory Factor Analysis of U.S. and Italian Children's Performance on the PASS Theory of Intelligence as Measured by the Cognitive Assessment System

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Stefano Taddei
University of Florence

Kevin M. Williams
Multi-Health Services, Toronto, Ontario, Canada

This study examined Italian and U.S. children's performance on the English and Italian versions, respectively, of the Cognitive Assessment System (CAS; Naglieri & Conway, 2009; Naglieri & Das, 1997), a test based on a neurocognitive theory of intelligence entitled PASS (Planning, Attention, Simultaneous, and Successive; Naglieri & Das, 1997; Naglieri & Otero, 2011). CAS subtest, PASS scales, and Full Scale scores for Italian (N = 809) and U.S. (N = 1,174) samples, matched by age and gender, were examined. Multigroup confirmatory factor analysis results supported the configural invariance of the CAS factor structure between Italians and Americans for the 5- to 7-year-old (root-mean-square error of approximation [RMSEA] = .038; 90% confidence interval [CI] = .033, .043; comparative fit index [CFI] = .96) and 8- to 18-year-old (RMSEA = .036; 90% CI = .028, .043; CFI = .97) age groups. The Full Scale standard scores (using the U.S. norms) for the Italian (100.9) and U.S. (100.5) samples were nearly identical. The scores between the samples for the PASS scales were very similar, except for the Attention Scale (d = 0.26), where the Italian sample's mean score was slightly higher. Negligible mean differences were found for 9 of the 13 subtest scores, 3 showed small d-ratios (2 in favor of the Italian sample), and 1 was large (in favor of the U.S. sample), but some differences in subtest variances were found. These findings suggest that the PASS theory, as measured by CAS, yields similar mean scores and showed factorial invariance for these samples of Italian and American children, who differ on cultural and linguistic characteristics.

Keywords: intelligence, neuropsychology, cross-cultural, cognitive assessment system, PASS theory

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US and Italian Samples: Mean Scores

Table 5

Means and SDs for Italian Children (N = *809) on the CAS Subtests and PASS and Full Scales Using U.S. Norms and Comparisons to U.S. Sample* (N = *1,174), Matched by Age*

Subtests and scales	Italian			U.S.					
	M	*SD*	*n*	*M*	*SD*	*n*	*F*	*p*	*d*-ratio
CAS composite scales									
Planning	97.7	13.4	809	100.5	15.4	1,174	18.1	<.01	−0.19
Simultaneous	103.0	13.9	809	101.1	14.1	1,174	9.3	<.01	0.14
Attention	104.2	13.7	809	100.6	14.4	1,174	32.2	<.01	0.26
Successive	99.0	12.5	809	100.5	14.5	1,174	5.1	.02	−0.11
Full Scale	100.9	12.9	809	100.5	14.8	1,174	2.3	.13	0.03

Note. CAS = Cognitive Assessment Syste… = Planning, Attenti… multaneous, and Successive. U.S. sample *N*s vary due … Designations for *d*-ratios are as follows: T = tr… <.2), S = small (.2), M… edium (.5), and L = large (.8). For all *F* values the *df*s a… for Speech Rate (1, 1219) and Sentence Ques… 1,762).

Knowledge

Italian mean = 100.9 &US mean = 100.5

Conclusions

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EF and Achievement (Naglieri & Rojahn, 2004)

Journal of Educational Psychology
2004, Vol. 96, No. 1, 174–181

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

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

Jack A. Naglieri and Johannes Rojahn
George Mason University

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

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

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EF and Achievement (Naglieri & Rojahn, 2004)

- Correlation (median) between Executive Function (Planning + Attention) and Skills Cluster = **.51**
- BUT, the *r* between all 4 PASS and achievement was **.72**
- **Conclusion – PASS explains more achievement than EF**

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

	Full Scale	Planning	Attention	Simultaneous	Successive
Broad Reading	.64	.48	.43	.55	.50
Basic Reading	.63	.47	.42	.54	.49
Reading Comprehension	.61	.44	.39	.54	.50
Broad Math	.66	.54	.47	.58	.45
Basic Math	.67	.55	.47	.58	.46
Math Reasoning	.65	.49	.44	.60	.47
Basic Writing	.65	.51	.45	.55	.48
Woodcock Achievment (Skills Cluster)	.71	.54	.48	.62	.53

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Take Away Message

- Intelligence is better conceptualized based on brain function
- PASS is a brain-based theory of intelligence
- PASS is measured by the Cognitive Assessment System – Second Edition (Naglieri, Das & Goldstein, 2014)
- **PASS includes EF**
  - **So you won't have to say that the child is smart (traditional IQ) but bad in EF**

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Presentation Outline

- Making Connections between IQ, Intelligence, Executive Function, and Instruction
  - What is IQ?
  - What is Intelligence?
  - What is EF?
  - Instruction and IQ, Intelligence & EF

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Frontal Lobes and Executive Function(s)

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

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Executive 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

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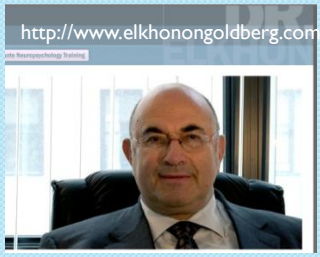
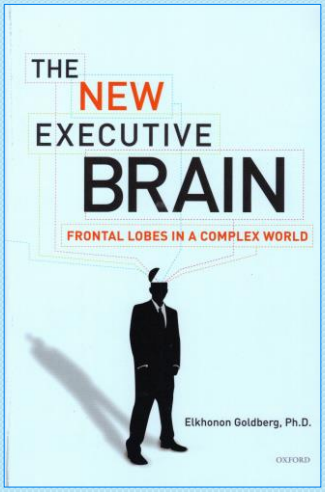
Executive Functions

- Elkhonon Goldberg provides a valuable review of what the frontal lobes do
- Describes EF as the orchestra leader





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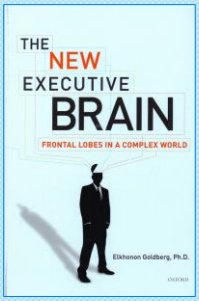
Goldberg (2009, p. 4)

- "The frontal lobes … are 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…"



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What is Executive Function(s)

There is no formal excepted definition of EF

- We find a vague general statement of EF including
  - Inhibition, Working Memory, Planning, Problem-Solving,
  - Goal-Directed Activity, Self-Motivation
  - Strategy Development Emotion Regulation,
- Some definitions from our chapter…

Introduction: A History of Executive Functioning as a Theoretical and Clinical Construct

Sam Goldstein, Jack A. Naglieri, Dana Princiotta, and Tulio M. Otero

Introduction

Executive function (EF) has come to be an umbrella term used for a diversity of hypothe-

Phineas survived and after a period of recovery changes in Phineas' behavior and personality became apparent. Phineas was described as "disinhibited" or "hyperactive," which suggested a lack of inhibition often found in those with dam-

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What is Executive Function(s)

1. Lezak (1995): "how and whether a person goes about doing something" (p. 42).
2. Gioia, Isquith, Guy, & Kenworthy (2000): "a collection of processes that are responsible for … managing cognitive, emotional, and behavioral functions" (p. 1).
3. McCloskey (2006): "think of executive functions as a set of independent but coordinated processes rather than a single trait" (p. 2).
4. Dawson & Guare (2010): "Executive skills allow us to organize our behavior over time" (p. 1).
5. Delis (2012): "Executive functions reflect the ability to manage and regulate one's behavior (p. 14).

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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).

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Executive Function(s)

- Given all these definitions of EF(s) we wanted to address the question…
  - Executive Function***s …*** or
  - Executive Function?
- One way to answer the question is to research the factor structure of EF behaviors
- Factor structure of the Comprehensive Executive Function Inventory (CEFI)

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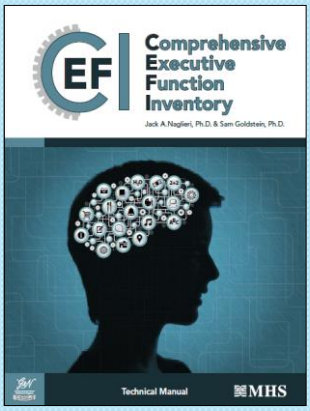
CEFI Authors (New Orleans, 2008)



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CEFI Standardization Samples

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

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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
  - CEFI nine scales' raw scores
    - **Attention, Emotion Regulation, Flexibility,**
    - **Inhibitory Control, Initiation, Organization,**
    - **Planning, Self-Monitoring, and Working Memory**

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Item Factor Analyses

90 Item factor analysis clearly indicted that one factor was the best solution

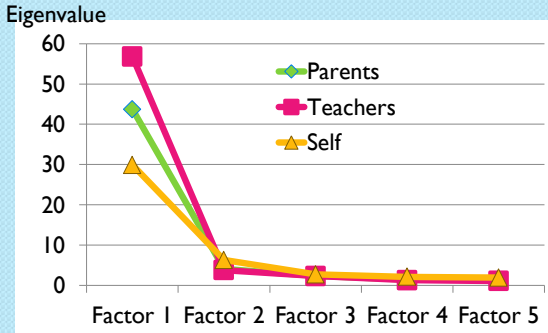

Table 8.2. Eigenvalues from the Inter-Item Correlations

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

Note. Extraction ncipal Axis Factoring. Only the first 10 eigenvalues are presented.

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Scale Factor Analyses

EFA for item groups: Attention, Emotion Regulation, Flexibility, Inhibitory Control, Initiation, Organization, Planning, Self-Monitoring, and Working Memory scales

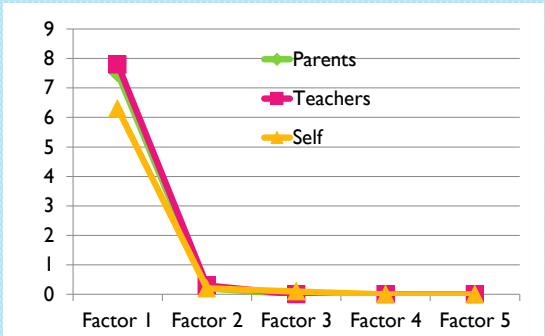

Table 8.4. Eigenvalues of the CEFI Scales Correlations

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

Note. Extraction method: Png.

EF PASS IQ Knowledge

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

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Exploratory Factor Analyses

- Conclusions
  - When using parent (N = 1,400), teacher (N = 1,400), or self-ratings (N = 700) based on behaviors observed and reported for a nationally representative sample (N = 3,500) aged 5 to 18 years Executive Function *not* function**s** is the best term to use

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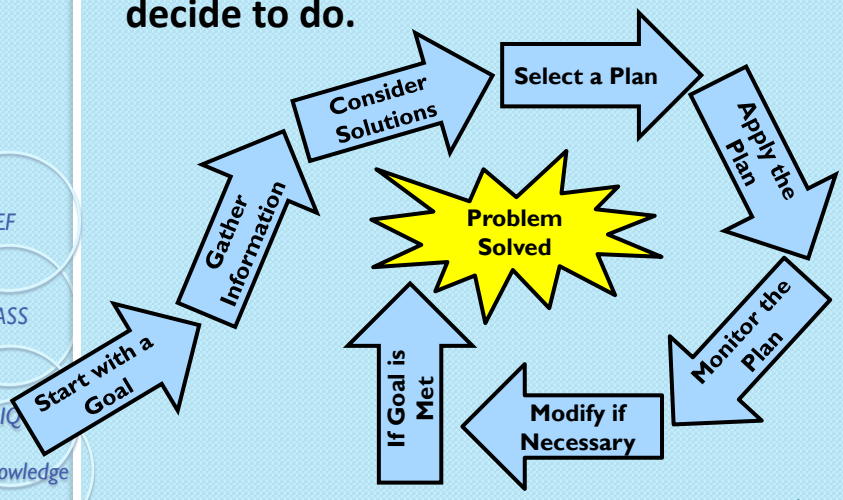
Naglieri & Goldstein, 2012

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



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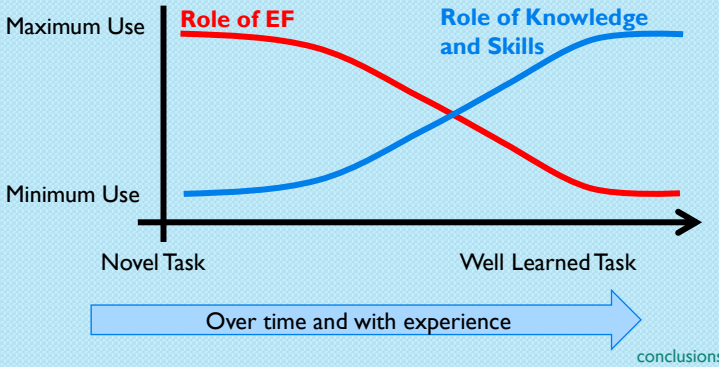
Intelligence (& EF) Learning Curves

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



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Intelligence (& EF) Learning Curves

- Because learning demands more intelligence when the task is novel, we MUST teach with an understanding of the learner's abilities and limitations
- As learning progresses then knowledge builds to create deeper knowledge and eventually expertise

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Kryza Practical EF Instruction

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Practical Strategies for Developing Executive Functioning Skills for ALL Learners in the Differentiated Classroom

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Kathleen Kryza

It's the first week of school for Alicia, a middle school teacher in a large school district in Michigan. She's been prepping for the first days of school for weeks, getting her room ready, and planning lessons. Last week she attended staff development sessions to learn about the new district and state initiatives and mandates that must be followed this year. Starting tomorrow, she will be immersed for the next 180 school days with a full day's schedule of three different preps—seven 50-minute classes with at least 32 students in each class. She can't imagine adding one more thing to her already overfull "To Do" list. But over the summer, Alicia read a book on teaching executive functioning skills to special needs learners. She really sees the value in teaching these important skills to her most at-risk students, but when can she possibly find time to do this? And how?

Alicia, like many teachers, understands the importance of developing executive functioning skills in her students, but given the full schedule of required academic content she needs to teach,

According to Judy Willis, a neurologist turned middle school teacher and international educational consultant, "We can identify the practices that benefit all learners by looking at the skills

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Kryza et al (2011)

Winning Formula for Success in Your Co-Taught Classroom

Mindsets plus **Skill Sets** equals **RESULTS!**

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conclusions

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Presentation Outline

- Making Connections between IQ, Intelligence, Executive Function, and Instruction
  - What is IQ?
  - What is Intelligence?
  - What is EF?
  - Instruction and IQ, Intelligence & EF

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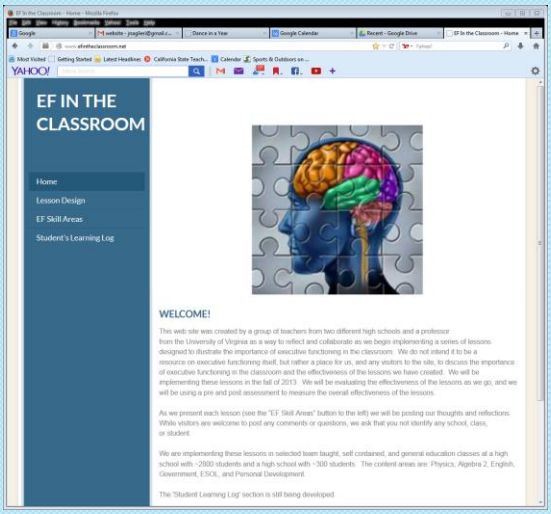
www.efintheclassroom.net

- **Start with Awareness of thinking about thinking**



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EF Lesson Plan

- *Presentation of the Theme* - Students are given a task to do or video to what that provides a stimulus about the theme related to a specific executive functioning skill.
  - This activity and the resulting discussion will engage them in the learning process
- *Discussion* is facilitated by the teacher – This means getting the students to think about the message
  - Teacher encourages a discussion about the theme (what it means, is it important, how might this help you do better, etc).
  - The teacher could present or ask the students to provide other examples related to the theme
- *Reflection Period* –
  - The teacher presents a summary of what was said and what was learned.
  - The students might make an entry in their EF DIARY about what they learned
- After this session, the students should be reminded about the theme whenever appropriate

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EF Lesson Plan Logistics

1. The EF sessions cover a theme about how to think when working in or out of the classroom
2. Seat students so that conversation will be facilitated (e.g., in a circle)
3. 30 minute sessions should be interactive

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EF Lesson Plan Logistics

1. At the start of the week, teachers ***facilitate*** the discussion beginning with some kind of an illustration of a ***theme***.
2. The discussion should emphasize the theme which the students are reminded about from that point on.
3. The theme can be entered into a notebook and/or placed someone visible in the classroom
4. At the end of the week there is another discussion about the ***theme*** and how it influenced them

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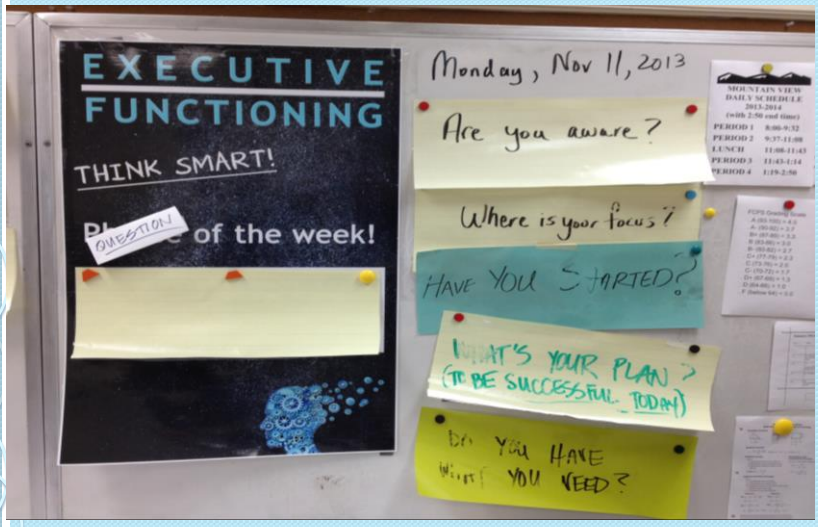
EF Posters in the Class

EF Posters in the Class



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EF Lesson Plan *Themes*

- Attention
- Flexibility
- Inhibition
- Initiation
- Self-Monitoring
- Working Memory
- Organization
- Planning
- Emotional Regulation

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EF Instruction

- We use posters like this one to remind the students of the importance of PLANNING

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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.

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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 (knowledge)

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Planning Lesson Student responses

- Q3: How do you know if a plan is any good?
  - Put the plan in action and see if it works (self-monitoring)
  - Give it a try (perhaps learn by failing)
- Q4: What should you do if a plan isn't working?
  - Fix it. (self-correction)
  - Go home ! (a bad plan)

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Planning Lesson Student responses

Q5: How do you use planning in this class?

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

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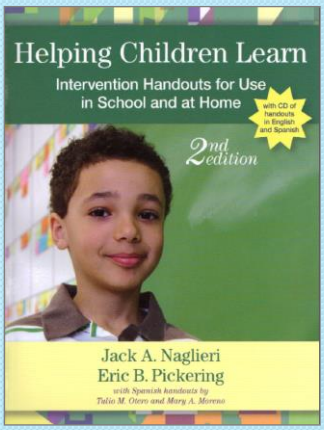
Encourage Planning

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



EF

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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.

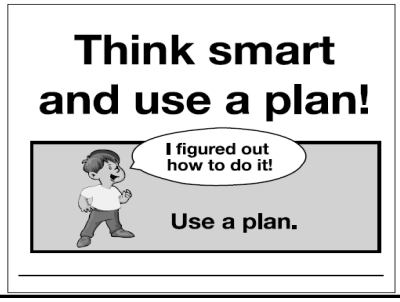
Step 1 – Talk with Students

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.



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

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Effectiveness of a Cognitive Strategy Intervention in Improving Arithmetic Computation Based on the PASS Theory

Jack A. Naglieri and Deanne Johnson

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Abstract

The purpose of this study was to determine if an instruction designed to facilitate planning, given by teachers to their class as a group, would have differential effects depending on the specific Planning, Attention, Simultaneous, Successive (PASS) cognitive characteristics of each child. A cognitive strategy instruction that encouraged planning was provided to the group of 19 students with learning disabilities and mild mental impairments. All students completed math worksheets during 7 baseline and 14 intervention sessions. During the intervention phase, students engaged in self-reflection and verbalization of strategies about how the arithmetic computation worksheets should be completed. The sample was sorted into one experimental and four contrast groups after the experiment was completed. There were four groups with a cognitive weakness in each PASS scale from the Cognitive Assessment System and one group with no cognitive weakness. The results showed that children with a cognitive weakness in Planning improved considerably (large effect size of 1.4), in contrast to those with a cognitive weakness in Attention (small effect size of 0.3), Simultaneous weakness (a slight deterioration and effect size of -0.2), Successive weakness (medium effect size of 0.4), and no cognitive weakness (small effect size of .2). These data showed that children with a Planning weakness benefitted from the instruction designed to help them be more plaful. Those childrne who received the planning-based instruction who were not low inplanning did not show the same level of improvement.

Students & Results

- 21 children with LD and mild mental impairments
- Teachers followed Planning Facilitation method described by Naglieri and Gottling (1997, 1997)
- Students were given instruction that facilitated the use of Planning (Naglieri & Pickering, 2010)
- FINDING:

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	Pre N Correct	Post N Correct	% Change	Effect Size
Overall Change	22.6	29.2	46.2	0.44
Low in Planning	10	25	142	1.4

Hammill Institute on Disabilities

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http://journaloflearningdisabilities.sagepub.com
SAGE

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

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

Abstract

The authors examined the effectiveness of cognitive strategy instruction b
Successive) given by special education teachers to students with ADHD
experimental group were exposed to a brief cognitive strategy instructi
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 sin
when provided the PASS-based cognitive strategy instruction.

Design of the Study

Experimental and Comparison Groups

7 worksheets with Normal Instruction

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Experimental Group

19 worksheets with Planning Facilitation

Comparison Group

19 worksheets with Normal Instruction

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

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

Strategy Instruction

- Teachers *facilitated discussions* to help students become more self-reflective about use of strategies – NO DIRECT INSTRUCTION
- Teachers asked questions like:
  - What was your goal?
  - Where did you start the worksheet?
  - What strategies did you use?
  - How did the strategy help you reach your goal?
  - What will you do again next time?
  - What other strategies will you use next time?

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Student Plans

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

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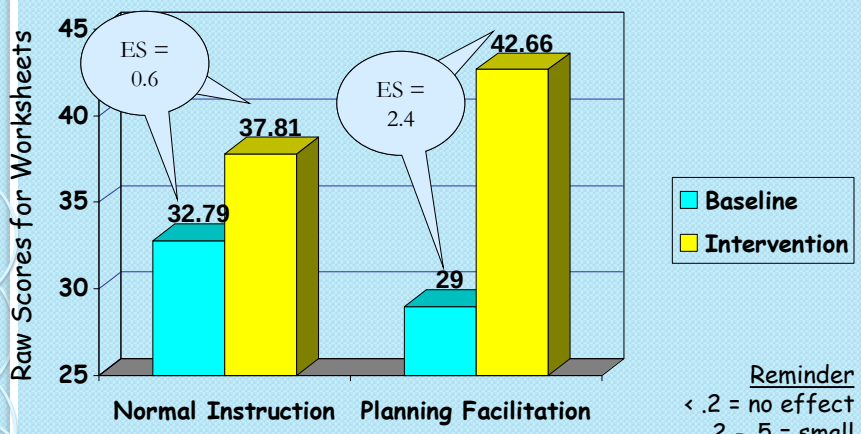
Worksheet Means and Effect Sizes for the Students with ADHD



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

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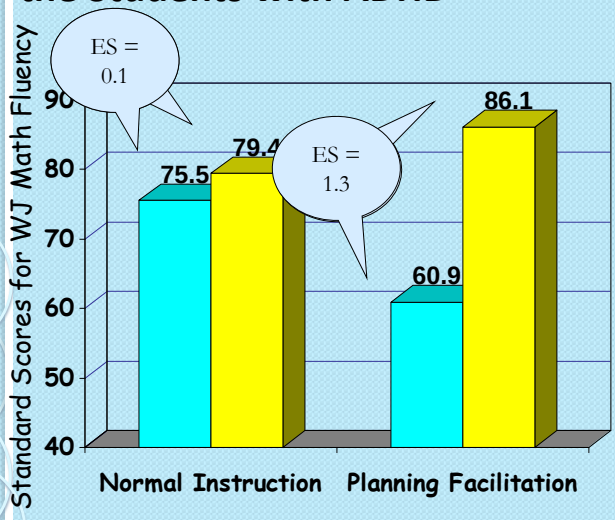
WJ Math Fluency Means and Effect Sizes for the Students with ADHD



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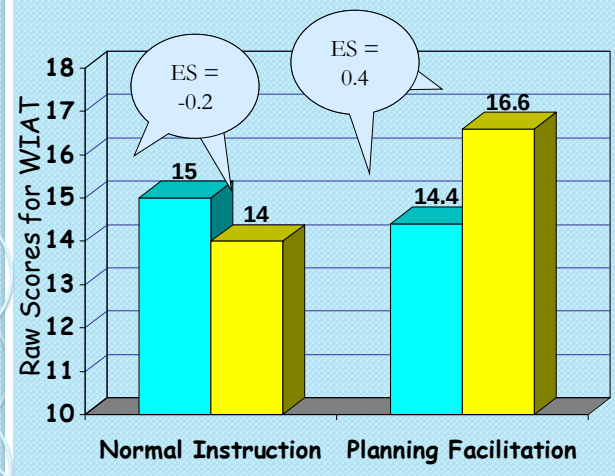
Reminder
< .2 = no effect
.2 - .5 = small
.6 - .8 = medium
> .8 = large

conclusions 141

WIAT Numerical Operation Means and Effect Sizes for Students with ADHD



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Reminder
< .2 = no effect
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.6 - .8 = medium
> .8 = large

conclusions 142

One Year Follow-up

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

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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)

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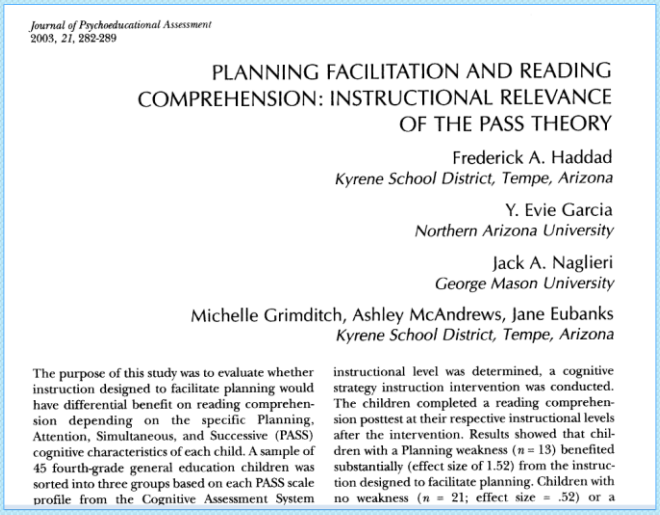
Reading Comprehension



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

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

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

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Take Away Message

- Academic performance can be improved substantially by helping students THINK
- Thinking Smart means using EF to function better
- Teachers can make SUBSTANTIAL impact by teaching EF skills

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Sex Differences in EF and PASS Neurocognitive Abilities

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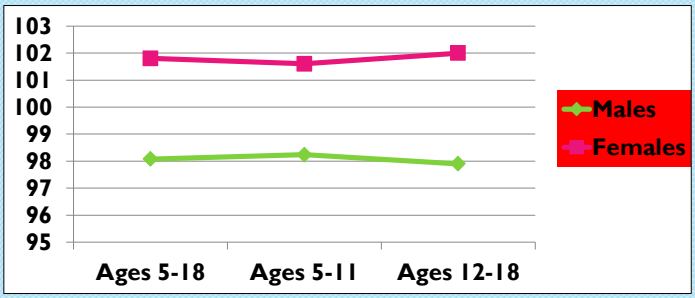
CEFI Sex Differences: Parent Raters

- Girls are Smarter than Boys

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



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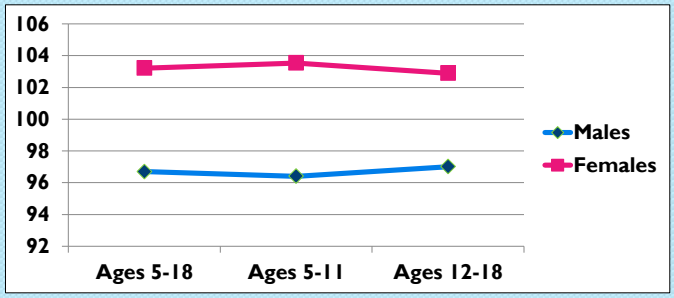
CEFI Sex Differences: Teacher Raters

- Girls are Smarter than Boys

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



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Sex Differences: Ability

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

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

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

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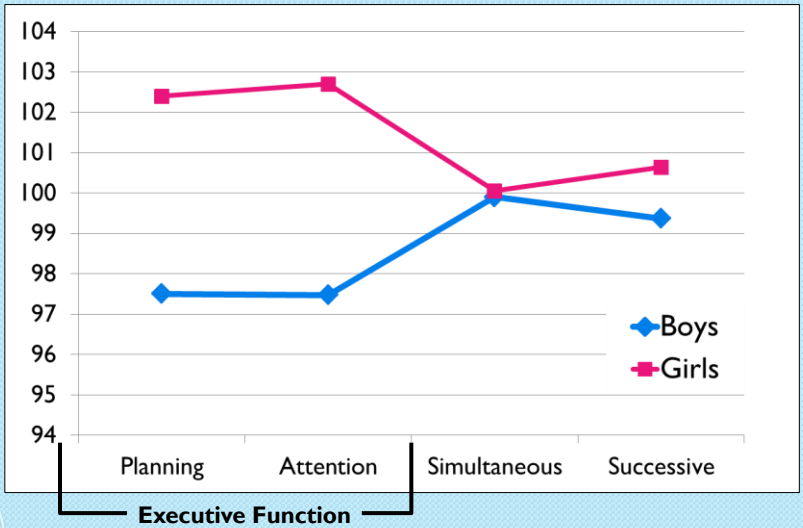
Gender differences in ability and achievement have been studied for some time and have been conceptualized along verbal, quantitative, and visual–spatial dimensions. Researchers recently have called for a theory-based approach to studying these differences. This study examined 1,100 boys and 1,100 girls 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



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Presentation Outline

- Making Connections between IQ, Intelligence, Executive Function, and Instruction
  - What is IQ?
  - What is Intelligence?
  - What is EF?
  - Instruction and IQ, Intelligence & EF
- Conclusions

EF
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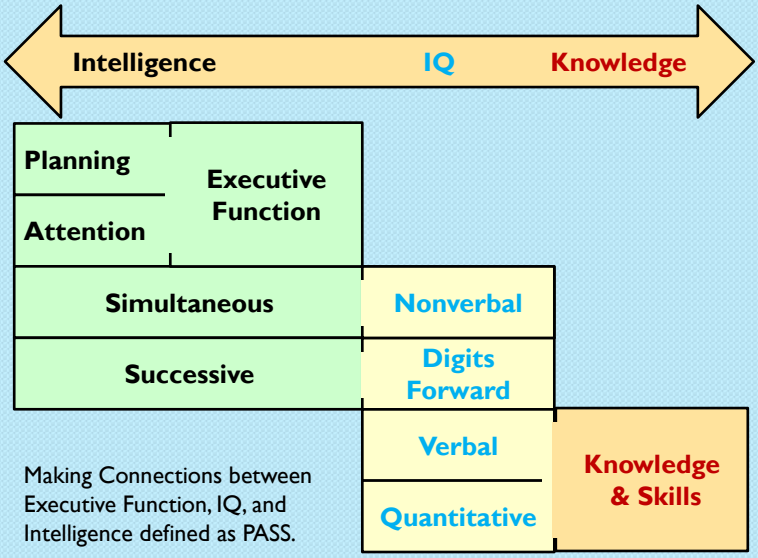
IQ

Take Away Message: Intelligence Achievement Continuum



Making Connections between Executive Function, IQ, and Intelligence defined as PASS.

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Conclusions

- The concept of **EF is NOT** related to traditional IQ tests
- The concept of **EF IS** related to intelligence as defined by PASS neurocognitive theory
- The concept of EF is related to academic scores .51 but all four PASS scores better predict academics (.71)

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Conclusions

- We need to recognize the limitations of traditional IQ tests – especially the problem of verbal and quantitative knowledge being used as a means of evaluating intelligence
- The PASS neurocognitive theory of ability offers many advantages, not the least of which is that it provides a way of including EF as part of intelligence

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Thank you for attending.

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