The Myth of IQ: The Effects of 100 Years of Misconception

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jacknaglieri.com

- Copies of this and other presentations are available on my web site as are articles, 10-minute solutions and PASS score analyzers

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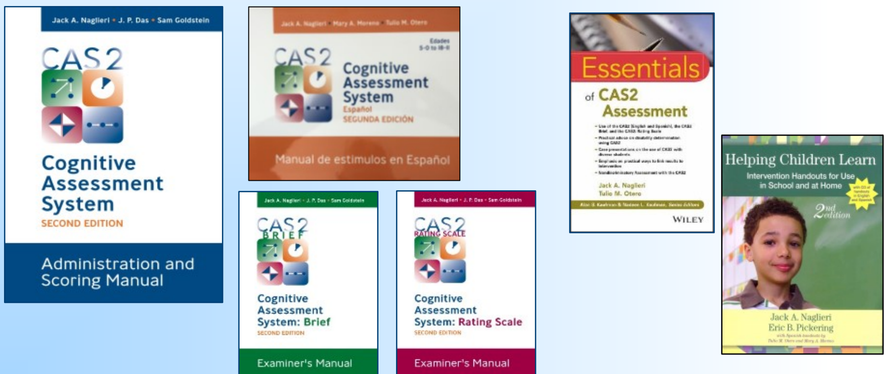
Disclosures

- I will be speaking about my work to reinvent intelligence based on the theory of basic psychological processes called PASS (Naglieri & Das, 1997) as measured by the Cognitive Assessment System (1997; 2nd Ed 2014).



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Traditional IQ and Achievement Tests

- When I conducted my comprehensive evaluations, I noticed that parts of the WISC were VERY similar to parts of the achievement test I was giving
  - In fact the Peabody Individual Achievement Test (1970) had a General Information and Arithmetic subtests JUST LIKE THE WISC!
- That is still true today…which brings us to Myth #1

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Presentation Outline

- Introduction
- Myth 1 - IQ and achievement tests are different
  - Yes and no
- Myth 2 – IQ tests measure verbal & nonverbal abilities
  - Not according to Wechsler
- Myth 3 – Factor analysis is a good way to develop a theory
  - Brain science is a good solution
- Myth 4 – Lack of psychometric bias means a test is fair
  - Mean score differences
- Myth 5 – Verbal and Quantitative tests are needed to predict academic strengths and weaknesses
  - Correlations to achievement and PSW for SLD and ADHD

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WHY DO WE MEASURE IQ THE WAY WE DO?

A SHORT HISTORY

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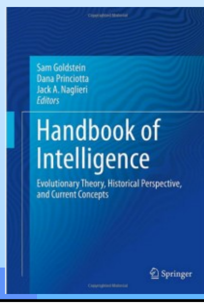
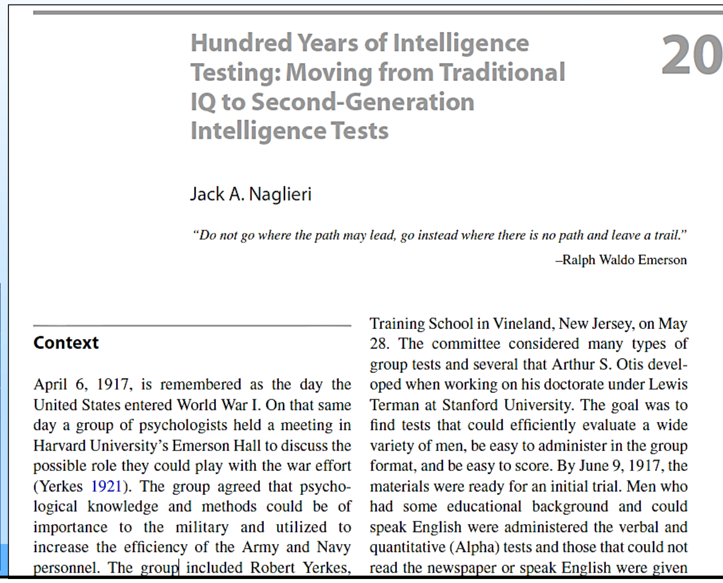
Evolution of IQ

http://www.jacknaglieri.com/cas2.html





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

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Jack A. Naglieri

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

–Ralph Waldo Emerson

Context

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

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

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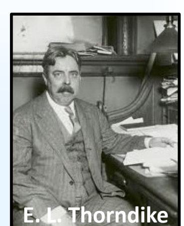
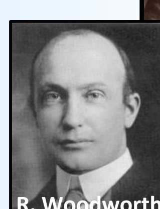
Origins of Traditional IQ

- A group of psychologists met in May of 1917 to construct an ability test to help the military evaluate recruits (WWI)
- By July of 1917 they concluded that the Army Alpha and Beta tests could
  - "aid in segregating and eliminating the mentally incompetent, classify men according to their mental ability; and assist in selecting competent men for responsible positions" (p. 19, Yerkes, 1921).
- They summarized their findings…





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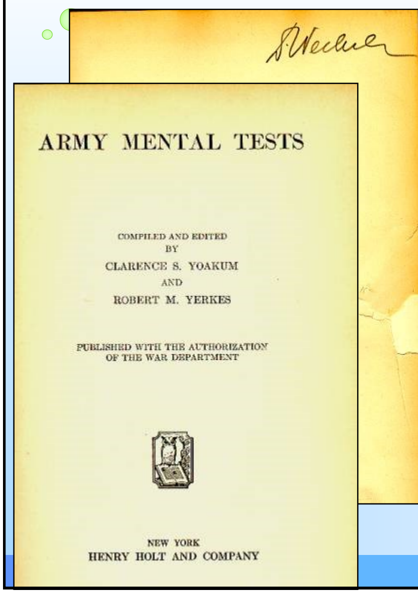
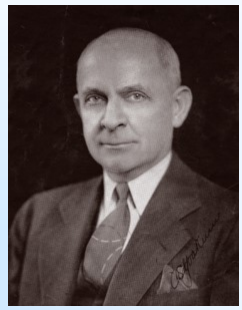
From Alpha/Beta to Wechsler IQ

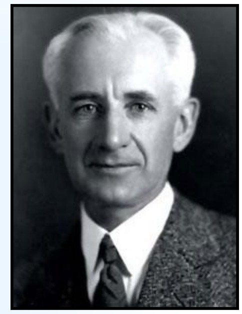

ARMY MENTAL TESTS

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

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From Alpha/Beta to Wechsler IQ

- 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

Verbal & Quantitative

Nonverbal

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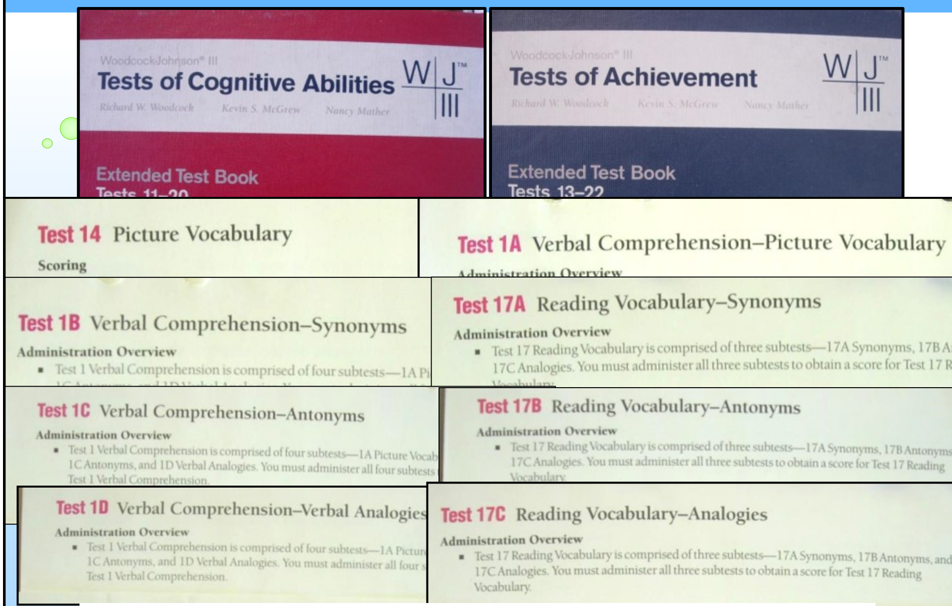

Which is Ability and which is Achievement?

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Thinking vs Knowing

- IQ tests are confounded by knowledge
  - WISC-V
    - Verbal Comprehension:
      - Vocabulary, Similarities, Information & Comprehension
    - Fluid Reasoning:
      - Figure Weights, Picture Concepts, Arithmetic
  - WJ-IV
    - Comprehension Knowledge:
      - Vocabulary & General Information
    - Fluid Reasoning:
      - Number Series & Concept Formation
    - Auditory Processing:
      - Phonological Processing

Why NOT measure intelligence with tests that demand knowledge?

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The First IQ TEST: Alpha (Verbal)

1. Bull Durham is the name of — **tobacco**
2. The Mackintosh Red is a kind of — **fruit**
3. The Oliver is a — **typewriter**
4. A passenger locomotive type is the — **Mogul**
5. Stone & Webster are well know — **engineers**
6. The Brooklyn Nationals are called — **Superbas**
7. Pongee is a — **fabric**
8. Country Gentleman is a kind of — **corn**
9. The President during the Spanish War was — **Mckinley**
10. Fatima is a make of — **cigarette**

From: Psychological Examining the United States Army (Yerkes, 1921, p. 213)

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Intelligence or Knowledge?

- Intelligence is more efficiently measured if we evaluate THINKING rather than KNOWING
- What does the student have to **know** to complete a task?
  - This is dependent on *instruction*
- How does the student have to **think** to complete a task?
  - This is dependent on the *brain* – ***'basic psychological processes'***

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Examples of Tests that Measure Thinking

- Nonverbal Tests such as
  - Universal Intelligence Test (UNIT)
  - Naglieri Nonverbal Ability Test (NNAT)
  - General Ability Measure for Adults (GAMA)
  - Wechsler Nonverbal Scale (WNV)
- More comprehensive tests such as
  - Kaufman Assessment Battery for Children (excluding the CHC interpretation)
  - Cognitive Assessment System (CAS2)

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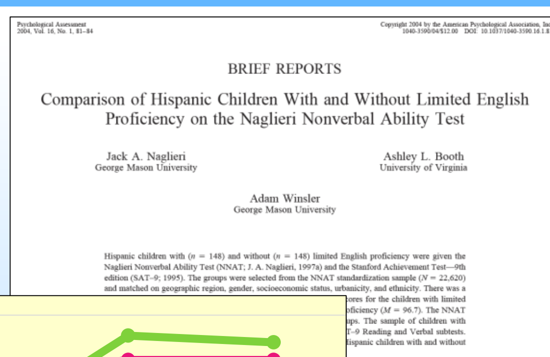
An Example


Psychological Assessment
2004, Vol. 16, No. 1, 81–84

Copyright 2004 by the American Psychological Association, Inc.
1040-3590/04/$12.00 DOI: 10.1037/1040-3590.16.1.81

BRIEF REPORTS

Comparison of Hispanic Children With and Without Limited English Proficiency on the Naglieri Nonverbal Ability Test

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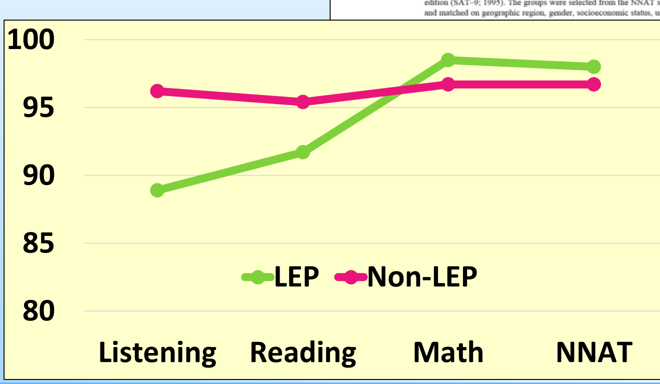
George Mason University

Ashley L. Booth
University of Virginia

Adam Winsler
George Mason University

Hispanic children with (n = 148) and without (n = 148) limited English proficiency were given the Naglieri Nonverbal Ability Test (NNAT; J. A. Naglieri, 1997a) and the Stanford Achievement Test—9th edition (SAT–9; 1995). The groups were selected from the NNAT standardization sample (N = 22,620) and matched on geographic region, gender, socioeconomic status, urbanicity, and ethnicity. There was a ... cores for the children with limited ... oficiency (M = 96.7). The NNAT ... ups. The sample of children with ... T–9 Reading and Verbal subtests. ... ispanic children with and without



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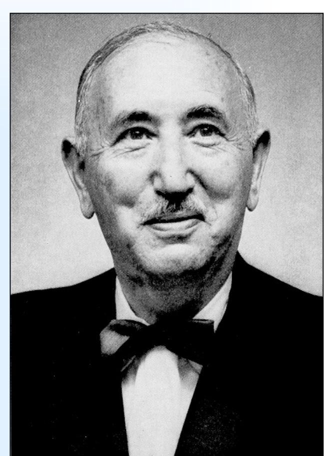
Wechsler's Definition

- 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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What a Nonverbal Test Measures

(Naglieri, Brulles, & Lansdown, 2008)

Helping All Gifted Children Learn: A Teacher's Guide to Using the NNAT2

It is important to understand that even though Wechsler's intelligence (IQ) tests were organized into verbal and nonverbal sections, he did not mean that verbal and nonverbal are different types of ability. Wechsler (1958) explicitly stated that the organization of subtests into verbal and performance scales did *not* indicate that two distinctive types of intelligence were being measured. In fact, he

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What a Nonverbal Test Measures

(Naglieri, Brulles, & Lansdown, 2008)

wrote: "the subtests are *different measures of intelligence*, not *measures of different kinds of intelligence*" (p. 64). Similarly, Naglieri (2003) further clarified that "the term nonverbal refers to the content of the test, not a type of ability" (p. 2). Thus, tests may differ in their content or specific demands, but still measure the concept of general intelligence.

Spearman's 'indifference of the indicator'

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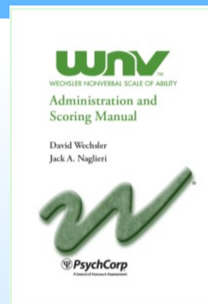
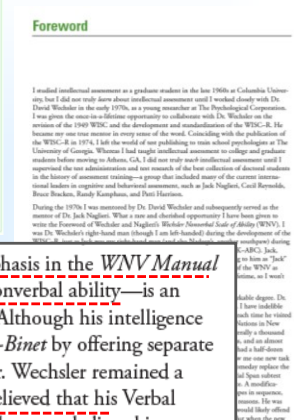
Spearman's *g*





Alan S. Kaufman, PhD
Clinical Professor of Psychology
Yale Child Study Center
Yale University School of Medicine

of nonverbal assessment many paces forward. 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.

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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, making the test more appropriate for a wider variety of people
- **Why NONVERBAL** ?

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The First IQ Test: Beta (Nonverbal)

Why Beta?

METHODS AND RESULTS 19

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.

- There is no mention of measuring verbal and nonverbal intelligences
- Verbal tests posed a **social justice issue**

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Solutions

- SOLUTION – Use so called 'nonverbal' tests of general Ability
  - But these do not measure intelligence broadly enough for in depth analysis (e.g. SLD)
- **RE**invent understanding of intelligence based on the brain
  - Measure brain function, not IQ
  - Measure ***thinking*** not ***knowledge***

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Intelligence in the 21st century should be conceptualized as brain function

Our Amazing Brains !

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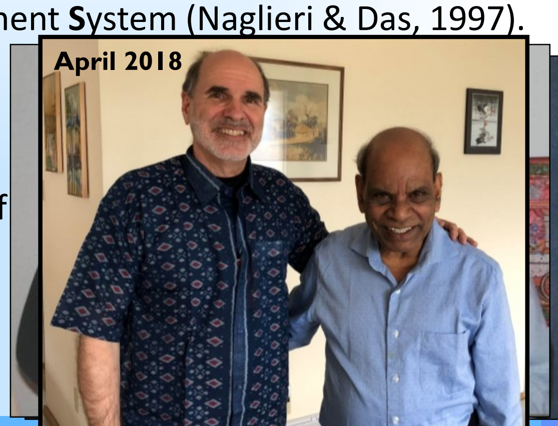
Intelligence as Neurocognitive Abilities

- In Das and Naglieri's first meeting (February 11, 1984) they proposed that intelligence was better REinvented as PASS processes and began development of the **C**ognitive **A**ssessment **S**ystem (Naglieri & Das, 1997).

- The CAS was the first intelligence *test* to be built on a specific *theory* of intelligence; and one defined as brain function



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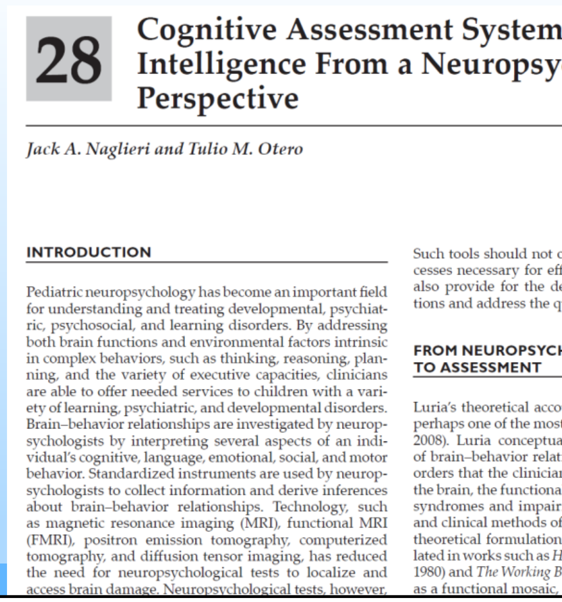
Intelligence as Neurocognitive Abilities


28 Cognitive Assessment System: Redefining Intelligence From a Neuropsychological Perspective

Jack A. Naglieri and Tulio M. Otero

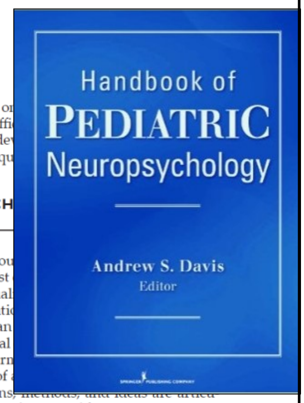
INTRODUCTION

Pediatric neuropsychology has become an important field for understanding and treating developmental, psychiatric, psychosocial, and learning disorders. By addressing both brain functions and environmental factors intrinsic in complex behaviors, such as thinking, reasoning, planning, and the variety of executive capacities, clinicians are able to offer needed services to children with a variety of learning, psychiatric, and developmental disorders. Brain–behavior relationships are investigated by neuropsychologists by interpreting several aspects of an individual's cognitive, language, emotional, social, and motor behavior. Standardized instruments are used by neuropsychologists to collect information and derive inferences about brain–behavior relationships. Technology, such as magnetic resonance imaging (MRI), functional MRI (FMRI), positron emission tomography, computerized tomography, and diffusion tensor imaging, has reduced the need for neuropsychological tests to localize and access brain damage. Neuropsychological tests, however,

Such tools should not 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 impairn
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-



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PASS Neurocognitive Theory

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

- **PASS theory** is a way to measure neuro-cognitive abilities related to brain function

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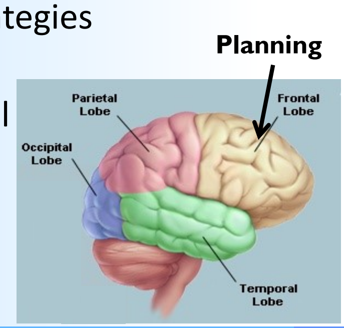
PASS Theory: Planning

- **Planning** is a neurocognitive process that a person uses to determine, select, and use efficient solutions to problems
  - problem solving
  - developing plans and using strategies
  - retrieval of knowledge
  - impulse control and self-control
- AKA, executive function, metacognition, strategy use



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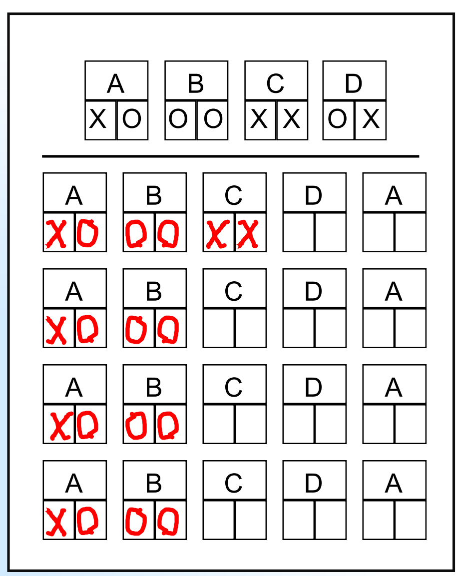
Planned Codes 1

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



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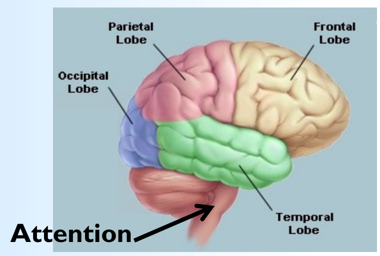
PASS Theory: Attention

- **Attention** is a basic psychological process we use to selectively attend to some stimuli and ignores others
  - This is critical for all activates, especially those that require
  - focused cognitive activity
  - selective attention
  - resistance to distraction

RED

BLUE



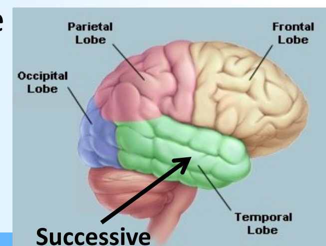
CAS2 Expressive Attention

- The child says the color not the word
- Score is time and number correct

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

PASS Theory: Successive

- **Successive** processing is used when information is in a specific serial order
  - Remembering the sequence of events in a story
  - Sequence of words, sentences, paragraphs
  - Comprehension of written instructions
  - Understanding the syntax of sentences
  - Letter-sound correspondence
  - Decoding words
  - Phonological tasks



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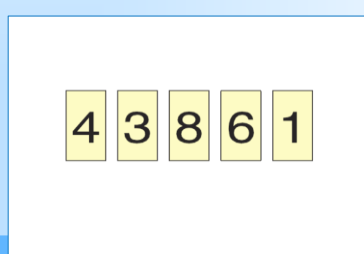
Successive Subtests

- Word Recall
  - Man Cow Key
  - Book Shoe Girl Dog Car
- Visual Digit Span



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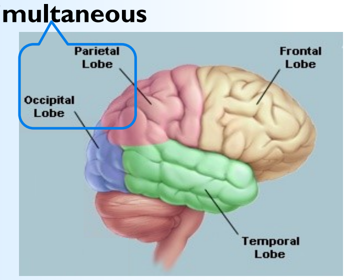
PASS Theory: Simultaneous

- **Simultaneous** processing is used to integrate stimuli into groups
  - Stimuli are seen as a whole
  - Each piece must be related to the other
  - Whole language
  - Seeing word as a whole
  - Verbal concepts
  - Geometry, math word problems

Simultaneous



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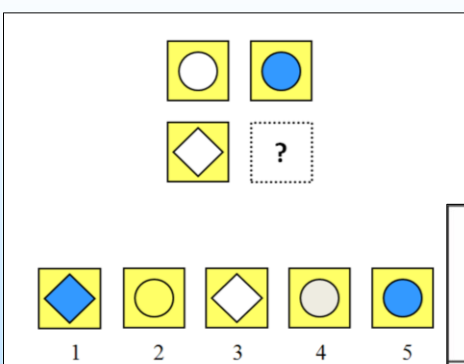
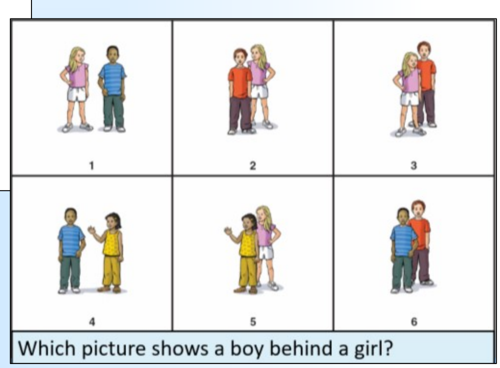
Simultaneous Subtests





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PASS Neurocognitive Theory

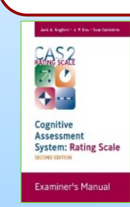
- When we have a test built on a specific theory, the level of interpretation is at the PASS level, not the subtest level
  - It is the responsibility of the authors to determine what the scales measure, in this case Planning, Attention, Simultaneous and Successive processes corresponding to the functional units described by A. R. Luria
  - There is no need for the user to determine what the subtests measure, that has been established by the authors over years of research.

PASS Comprehensive System

(Naglieri, Das, & Goldstein, 2014; Naglieri, Moreno & Otero (2017)

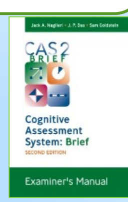
CAS2 Rating Scale (4 subtests)

Total Score
Planning
Simultaneous
Attention
Successive



CAS2 Brief (4 subtests)

Total Score
Planning
Simultaneous
Attention
Successive



CAS2 Core (8 subtests)

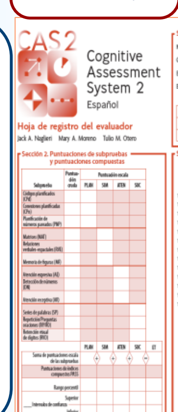
Full Scale
Planning
Simultaneous
Attention
Successive

CAS2 Extended (12 subtests)

Full Scale
Planning
Simultaneous
Attention
Successive

Supplemental
Executive Function
Working Memory
Verbal / Nonverbal
Visual-Auditory
Speed/Fluency

CAS2 Spanish (12 & 8 subtests)



The Case of Alejandro

Putting everything in perspective

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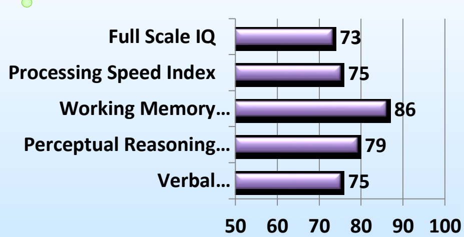
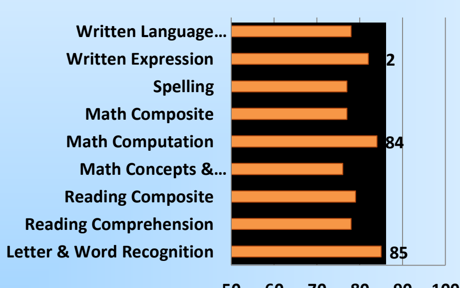
Alejandro's Results

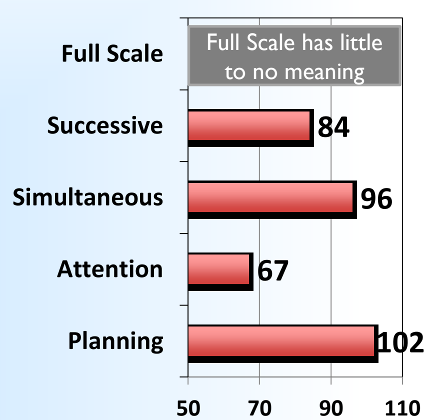
Traditional IQ





PASS Neurocognitive Processing

CAS2



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Alejandro's Discrepancy Consistency Results

- Alejandro is not a 'slow learner'
- He as a specific learning disability
  - Basic psychological processing disorders in Attention and Successive processing with academic failure
  - He has good scores in Planning and Simultaneous processing
  - He has had adequate educational instruction
- How would we identify his SLD?

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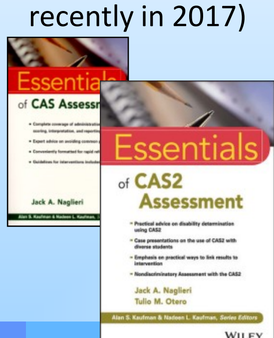
Discrepancy Consistency Method (DCM)

- The Discrepancy Consistency Method (DCM) was first introduced in 1999 (most recently in 2017)



Pattern of Strengths and Weaknesses Using the Discrepancy/Consistency Method for SLD Determination

Three methods for detecting a pattern of strengths and weaknesses (PSW) that can be used as part of the process of identifying a student with a specific learning disability (SLD) have been suggested by Naglieri in 1999, Hale and Fiorello in 2004, and by Flanagan, Ortiz, and Alfonso in 2007. These authors share the same goal: to present a procedure to detect a PSW in scores that can be used to identify an SLD (sometimes referred to as a third option; Zirkel & Thomas, 2010). Despite differences in the composition of the scores used and the definitions of what constitutes a basic psychological process, these methods all rely on finding a combination of differences as well as similarities in scores across academic and cognitive tests. Our approach to operationalizing a PSW is called the Discrepancy/Consistency Method (DCM) for the identification of SLD. Determining SLD is essentially based on the combination of PASS and achievement test scores. The method involves a systematic examination of variability of PASS and academic

DON'T FORGET 3.5

The essence of the Discrepancy/Consistency Method is two discrepancies and one consistency.

Discrepancy 1:
Significant variability among the PASS scores indicating a weakness in one or more of the basic psychological processes

Discrepancy 2:
Significant difference between high PASS scores and low achievement test scores

Consistency:
No significant difference between low PASS scores and low achievement

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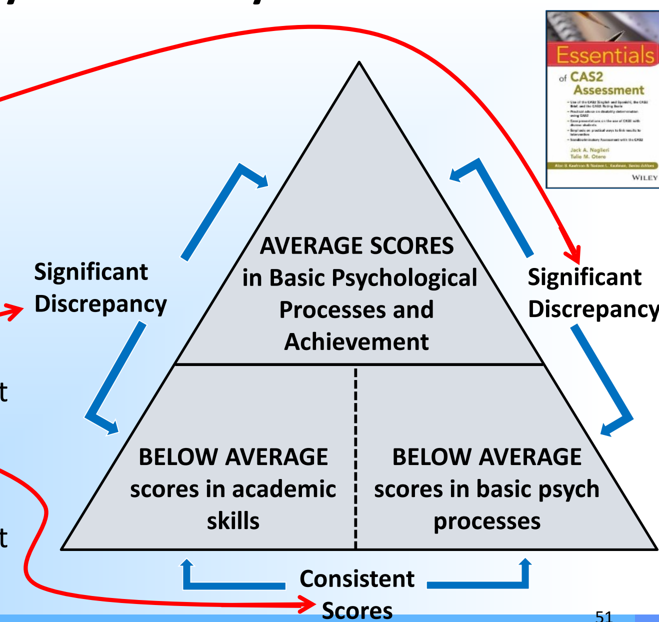
Discrepancy Consistency Method for SLD

- **Discrepancy #1** between high and low processing scores
- **Discrepancy #2** between high processing and low achievement
- **Consistency** between low processing and low achievement



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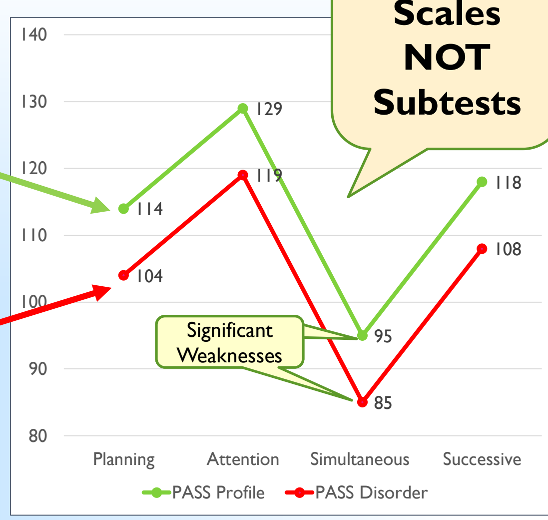
How to Determine a Disorder

PASS Scales NOT Subtests

- Two sets of PASS scores were studied
  - Significant variation in relation to student's average has *instructional relevance*
  - Significant variation in relation to student's average AND a standard score less than 90 (< 25th %tile) *supports designation as SLD*



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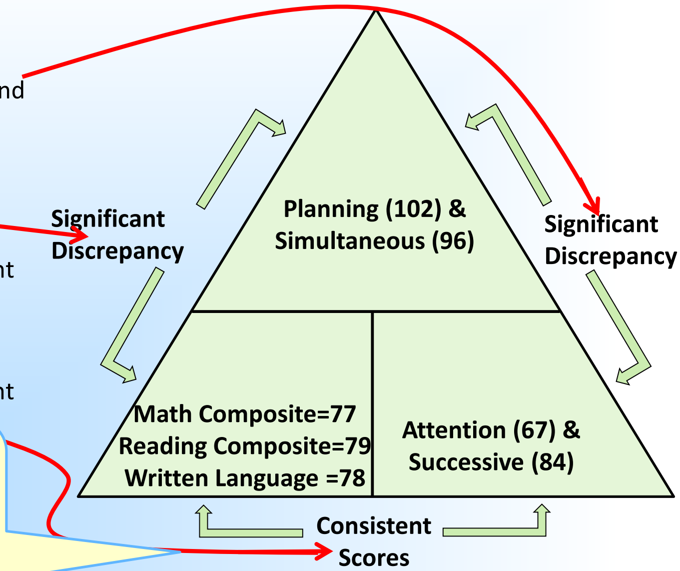
Alejandro's Discrepancy Consistency Method

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



The consistency between low cognitive processing and low achievement **answers the question: WHY the student fails**

53

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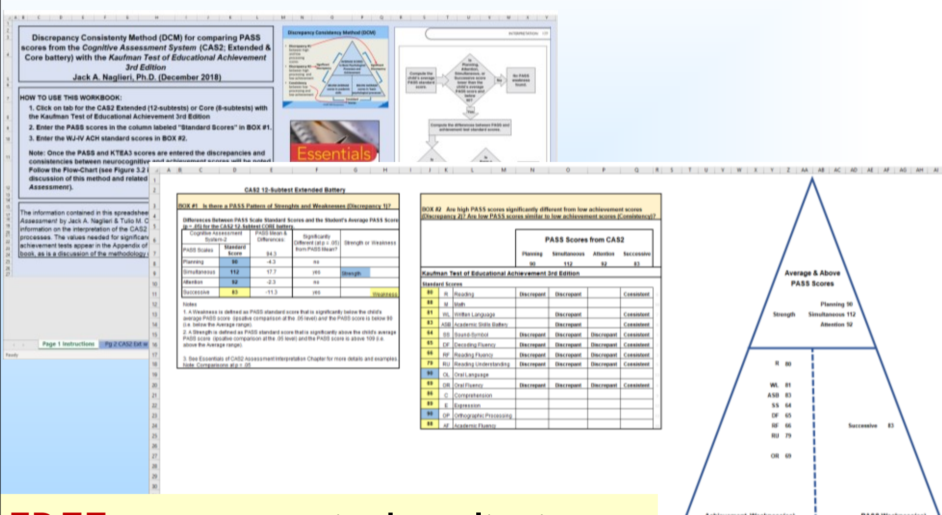
CAS2 DCM (FAR, FAM, WJ-4, KTEA3) Analyzer



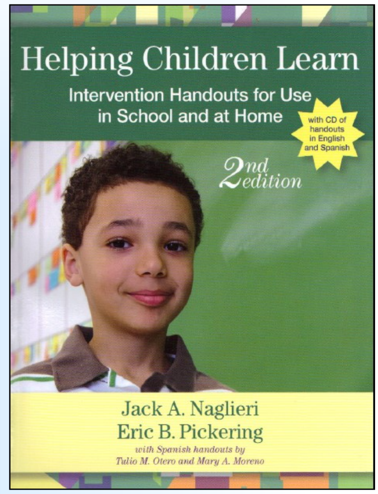
FREE – on www.jacknaglieri.com

54

54

Interventions

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



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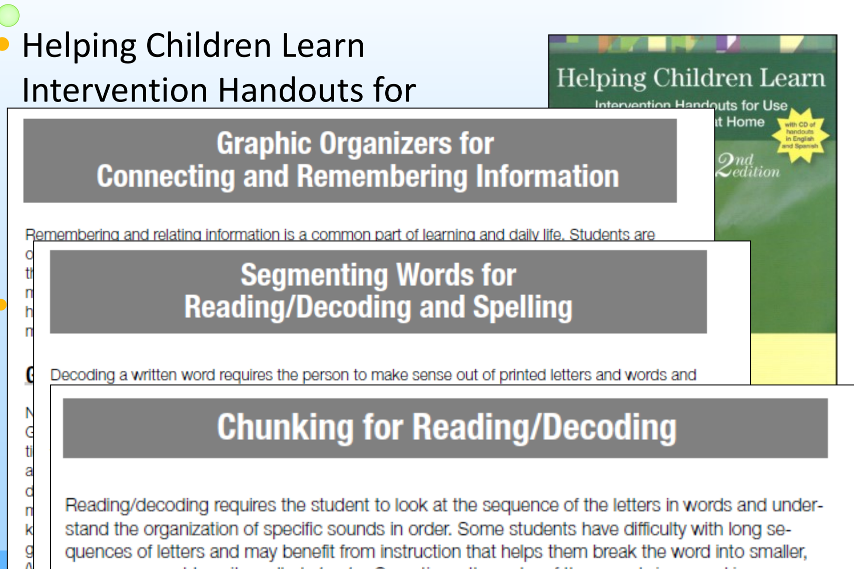
Interventions for Alejandro

- Helping Children Learn Intervention Handouts for



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Presentation Outline

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  - Correlations to achievement and PSW for SLD and ADHD

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Factor Analysis

- Factor analysis has been used with all the major intelligence tests for many years
- This method is good to see if the subtest to scale structure has support

- It does NOT tell us
  - What the factors measure
  - If the test is effective for the purpose it was intended – THAT is a validity question

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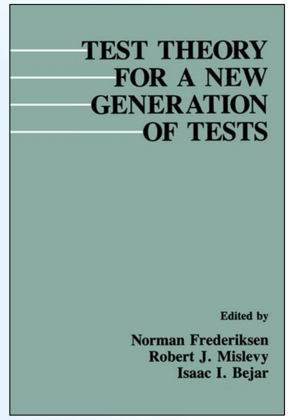
Developing a Theory of Intelligence

- Develop a theory of intelligence from factor analysis?
  - *"a research program dominated by factor analyses of test intercorrelations is incapable of producing an explanatory theory of human intelligence"* (Lohman & Ippel, 1993, p. 41)



Presentation Outline

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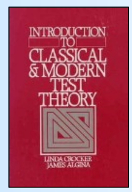
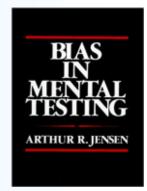
  - Correlations to achievement and PSW for SLD and ADHD

Definitions of Test Bias

- reliability of internal consistency of items
- reliability of test/retest scores
- rank order of item difficulties
- item intercorrelations
- factor structure
- magnitude of the factor loadings
- slope & intercept of the regression line
- Achievement correlations
- correlation of raw scores with age
- item characteristic curve
- frequencies of choice of error distracters
- interaction of test items by group membership





See: Crocker & Algina (1986) *Introduction to Classical & Modern Test Theory;* Nunnally & Ira Bernstein (1994) *Psychometric Theory;* Jensen (1980) *Bias in Mental Testing*

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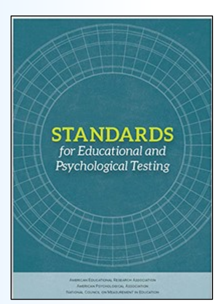
Differences in mean scores?

- Standards for Educational and Psychological Testing (AERA,APA & NCME, 2014)
  - **equitable assessment provides examinees an equal opportunity …** a fair chance to achieve the same level as others with equal ability on a construct being measured.
- The Standards also remind us that if a person has had limited opportunities to learn the content in a test of intelligence, that test may **be considered unfair** if it penalizes students for knowing the answers **even if the norming data do not demonstrate test bias.**
- **Mean score differences matter !**



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IDEA 2004

"(3) ADDITIONAL REQUIREMENTS.—Each local educational agency shall ensure that—

"(A) assessments and other evaluation materials used to assess a child under this section—

"(i) are selected and administered so as not to be discriminatory on a racial or cultural basis;

"(ii) are provided and administered in the language and form most likely to yield accurate information on what the child knows and can do academically, developmentally, and functionally, unless it is not feasible to so provide or administer;

"(iii) are used for purposes for which the assessments or measures are valid and reliable;

"(iv) are administered by trained and knowledgeable personnel; and

"(v) are administered in accordance with any instructions provided by the producer of such assessments;

"(B) the child is assessed in all areas of suspected disability;

"(C) assessment tools and strategies that provide relevant information that directly assists persons in deter-

non discriminatory assessments

valid and reliable assessment

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Naglieri & Ford (2001; N = 19,210 grades k-12)

GIFTED IDENTIFICATION

Addressing Underrepresentation of Gifted Minority Children Using the Naglieri Nonverbal Ability Test (NNAT)

Jack A. Naglieri
George Mason University

Donna Y. Ford
The Ohio State University

ABSTRACT

A persistent problem in education is the underrepresentation of diverse students in gifted education programs. Many educators attribute the poor participation of diverse students in gifted programs to the ineffectiveness of standardized tests in capturing the ability of these students. Thus, a primary agenda of school selection committees is to find more culturally sensitive measures. This study examined the effectiveness of the Naglieri Nonverbal Ability Test (NNAT) in identifying gifted Black and Hispanic students in comparison to White students. The sample was comprised of

attribute the problem to standardized tests, contending that these tests fail to assess the strengths and abilities of culturally, ethnically, and linguistically diverse populations (e.g., Frazier et al., 1995). Support for this assertion comes from reports showing that Black, Hispanic, and Native American students consistently score lower than White students on traditional standardized tests (Brody, 1992; Sattler, 1988).

Despite the fact that intelligence tests such as the Wechsler Intelligence Scale for Children–Third Edition

PUTTING THE RESEARCH TO USE

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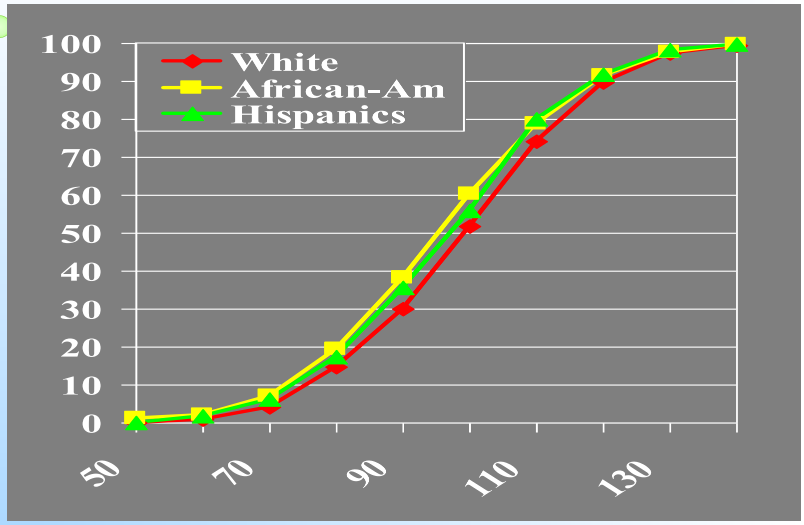
Naglieri & Ford (2001; N = 19,210 grades k-12)



NNAT standard scores (mean of 100, SD 15)

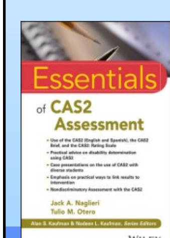
66

Race Differences

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

Test	Difference
Traditional IQ Tests	
SB-IV (matched samples)	12.6
WISC-IV (normative sample) WISC-V (normative sample) = 11.6	11.5
WJ-III (normative sample)	10.9
WISC-IV (matched samples) WISC-V (Sex PEL adjusted) = 8.7	10.0
Nontraditional Tests	
K-ABC (normative sample)	7.0
K-ABC (matched samples)	6.1
KABC-II (matched samples)	5.0
CAS2 (normative sample)	6.3
CAS (demographic controls of normative sample)	4.8
CAS2 (demographic controls of normative sample)	4.3

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



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Naglieri, Rojahn, Matto (2007)

Available online at www.sciencedirect.com
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Intelligence 35 (2007) 568 – 579
INTELLIGENCE

Hispanic and non-Hispanic children's performance on PASS cognitive processes and achievement☆

Jack A. Naglieri [a,*], Johannes Rojahn [a], Holly C. Matto [b]

[a] Center for Cognitive Development, George Mason University, Department of Psychology, MS# 2C6, United States
[b] Virginia Commonwealth, United States

Received 16 May 2006; received in revised form 6 November 2006; accepted 6 November 2006
Available online 8 January 2007

Abstract

Hispanics have become the largest minority group in the United States. Hispanic children typically come from working class homes with parents who have limited English language skills and educational training. This presents challenges to psychologists who assess these children using traditional IQ tests because of the considerable verbal and academic (e.g., quantitative) content. Some researchers have suggested that intelligence conceptualized on the basis of psychological processes may have utility for assessment of children from culturally and linguistically diverse populations because verbal and quantitative skills are not included. This study examined Hispanic children's performance on the Cognitive Assessment System (CAS; [Naglieri, J.A., and Das, J.P. (1997). Cognitive Assessment System. Itasca, IL: Riverside.]) which is based on the Planning, Attention, Simultaneous, and Successive (PASS) theory of intelligence. The scores of Hispanic (N=244) and White (N=1956) children on the four PASS processes were obtained and the respective correlations between PASS and achievement compared. Three complementary sampling methodologies and data analysis strategies were chosen to compare the Ethnic groups. Sample size was maximized using nationally representative groups and demographic group differences were minimized using smaller matched samples. Small differences between Hispanic and non-Hispanic children were found when ability was measured with tests of basic PASS processes. In addition, the correlation between the PASS constructs and achievement were substantial for both Hispanic and non-Hispanic children and were not significantly different between the groups.
Published by Elsevier Inc.

Hispanic White difference on CAS Full Scale of 4.8 standard score points (matched)

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PASS scores – English and Spanish

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

This study compared the performance of re on the Planning, Attention, Simultaneous, S sured by English and Spanish versions of (CAS; Naglieri & Das, 1997a). The results su on both English and Spanish versions of the CAS, the bilingual children earned their low regardless of the language used during test ences were noted between the means of the E Simultaneous and Successive processing scale were similar. Specific subtests within the Simultaneous and Successive scales

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English & Spanish CAS

Means, *SDs*, *d*-ratios, Obtained and Correction Correlations Between the English a

Spanish Version of the CAS (*N* = 55).

	CAS English		CAS Spanish		*d*-ratio	Correlations	
	Mean	*SD*	Mean	*SD*	*d*	Obtained	Corrected
Planning	92.6	13.1	92.6	13.4	.00	.96	.97
Simultaneous	89.0	12.8	93.0	13.7	-.30	.90	.93
Attention	94.8	13.9	95.1	13.9	-.02	.98	.98
Successive	78.0	13.1	83.1	12.6	-.40	.82	.89
Full Scale	84.6	13.6	87.6	13.8	-.22	.96	.97

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Otero, Gonzales, Naglieri (2012)

- SLD and PASS scores

APPLIED NEUROPSYCHOLOGY: CHILD, *0*: 1–9, 2012

ISSN: 2162-2965 print/2162-2973 online
DOI: 10.1080/21622965.2012.670547

Psychology Press
Taylor & Francis Group

The Neurocognitive Assessment of Hispanic English-Language Learners With Reading Failure

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Lauren Gonzales
George Mason University, Fairfax, Virginia

Jack A. Naglieri
University of Virginia, Fairfax, Virginia

This study examined the performance of referred Hispanic English-language learners (*N* = 40) on the English and Spanish versions of the *Cognitive Assessment System* (CAS; Naglieri & Das, 1997). The CAS measures basic neuropsychological processes based on the Planning, Attention, Simultaneous, and Successive (PASS) theory (Naglieri & Das, 1997; Naglieri & Otero, 2011c). Full Scale (FS) scores as well as PASS processing scale scores were compared, and no significant differences were found in FS scores or in any of the PASS processes. The CAS FS scores on the English (*M* = 86.4, *SD* = 8.73) and Spanish (*M* = 87.1, *SD* = 7.94) versions correlated .94 (uncorrected) and .99 (corrected for range restriction). Students earned their lowest scores in Successive processing regardless of the language in which the test was administered. PASS cognitive profiles were similar on English and Spanish versions of the PASS scales. These findings suggest that students scored similarly on both versions of the CAS and that the CAS may be a useful measure of these four abilities for Hispanic children with underdeveloped English-language proficiency.

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American Journal on Mental Retardation, 2001, Vol. 106, No. 4, 359–367

Intellectual Classification of Black and White Children in Special Education Programs Using the WISC-III and the Cognitive Assessment System

Jack A. Naglieri
George Mason University

Johannes Rojahn
The Ohio State University

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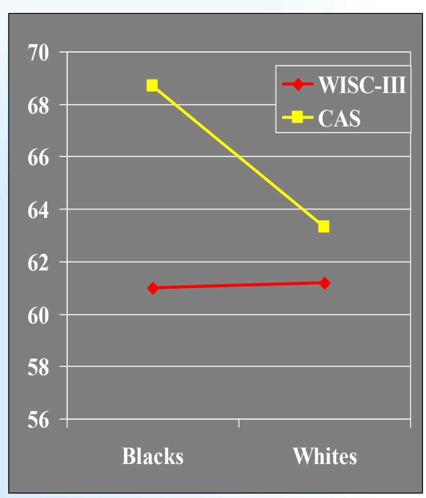
Naglieri & Rojahn (2001)

- WISC-III Full Scale means were similar for African-American and Whites
- Significantly lower VIQ (62) than PIQ (67) for African-Americans but *not* whites (V=65, P=63)
- African-Americans were more likely to be *incorrectly* labeled ID because of lower Verbal IQ scores



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Intelligence Tests and Prediction

- Intelligence tests are one of the primary tools for identifying children with Intellectual disability, specific learning disabilities, and giftedness
  - The goal is to determine if there is a cognitive explanation for academic successes or failure
- The correlations between intelligence and achievement tests and the profiles of scores these tests measure tell us the value these test scores have for both predication and explanation of specific academic success and failure

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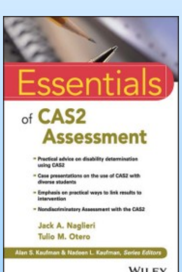
Correlation with Achievement

- When studying the relationships between intelligence tests and achievement there is a confounding factor…
  - Traditional tests have achievement in them !
  - That is called criterion contamination
- Measures of PASS neurocognitive processes do not have academic content
  - This is good for fair assessment, but might it limit the power of PASS scores to predict?

Correlations: We can do better

- Average correlations between IQ Scales with total achievement scores from *Essentials of CAS2 Assessment* Naglieri & Otero (2017)



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

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

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

Prediction of Achievement

- ➢Correlation of PASS with achievement = **.71**

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

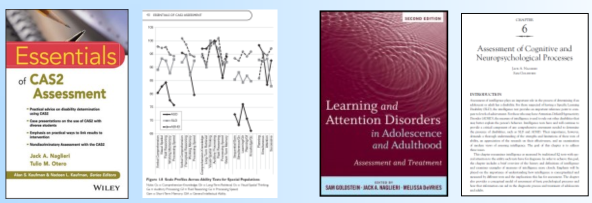
The relationship among Planning, Attention, Simultaneous, and Successive (PASS) processing scores of the Cognitive Assessment System (CAS) and the Woodcock–Johnson Revised Tests of Achievement (WJ-R) were examined with a sample of 1,559 students aged 5–17 years. Participants were part of the CAS standardization 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.

Why does PASS Correlate so Highly

- ➢Even though PASS theory is measured using tests that do not require knowledge (i.e. there is no Vocabulary, Information, Similarities, Arithmetic, number series, phonological skills, etc.) PASS scores are highly correlated with achievement because
  - PASS scores influence acquisition of knowledge
  - That is, **PASS basic psychological processes are the foundation of learning**.

ADHD Profiles by Ability Tests

- Understanding academic success and failure requires analysis of intellectual profiles.
  - Subtest profile analysis has been shown to be ineffective (see McDermott, Fantuzzo, Glutting, 1990; Canivez & Watkins, 2016 review of WISCV)
- To avoid problems with SUBTEST analysis I looked at SCALE profiles in two studies using data from respective test manuals and book chapters



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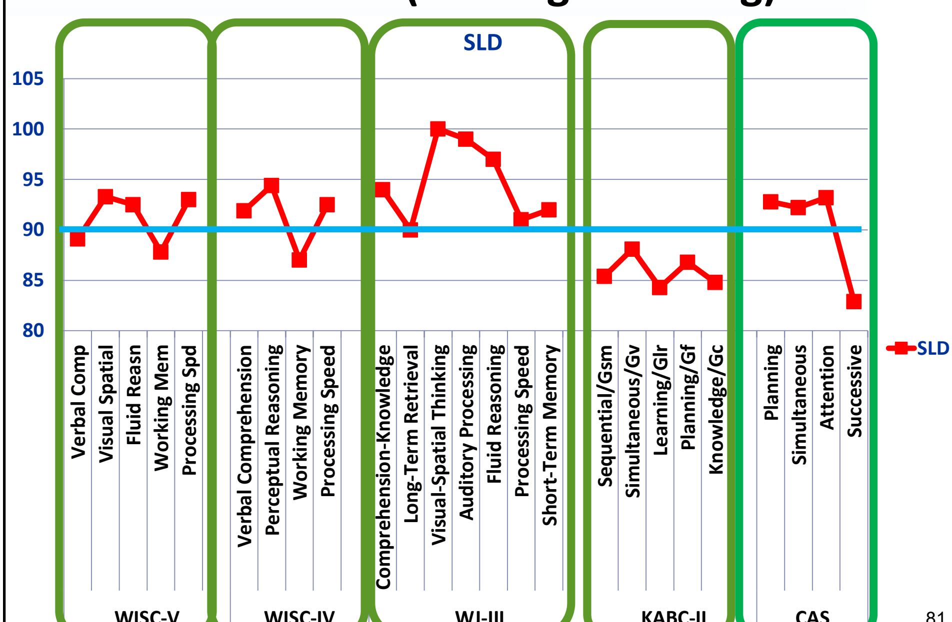
Profiles for SLD (reading decoding)



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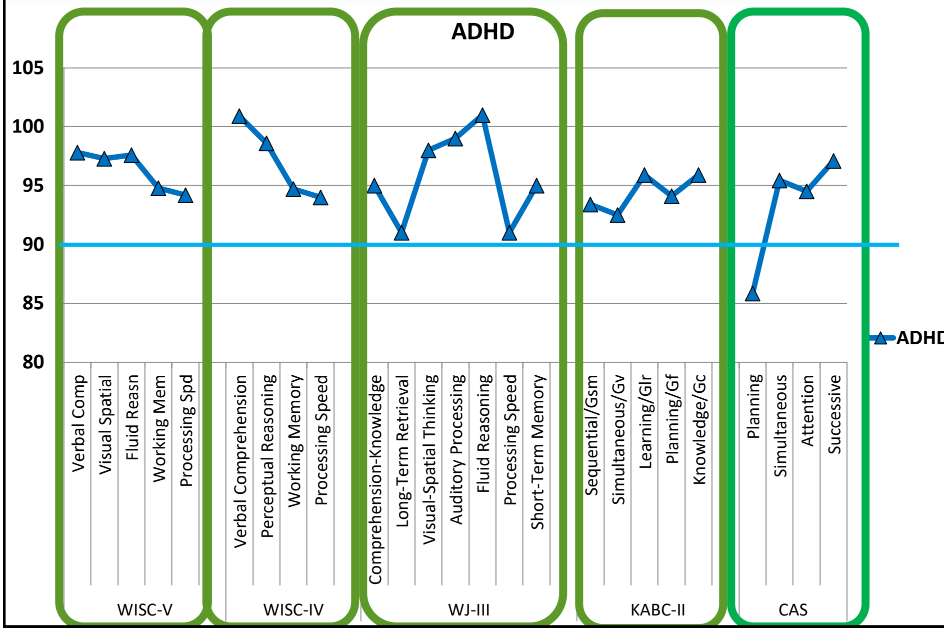
Profiles for students with ADHD



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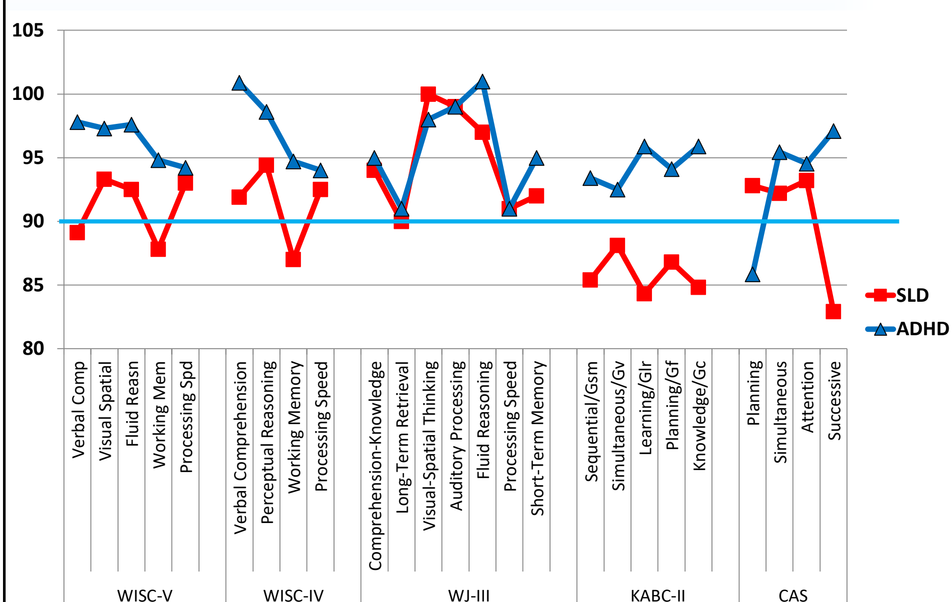
Profiles for SLD (reading decoding) & ADHD



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Canivez & Gaboury (2010)

- “the present study demonstrated the potential of the CAS to correctly identify students who demonstrated behaviors consistent with ADHD diagnosis.” glcanivez@eiu.edu

Cognitive Assessment System Construct and Diagnostic Utility in Assessing ADHD

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Eastern Illinois University

Allison R. Gaboury
Puyallup School District, Puyallup, WA

Paper presented at the 2010 Annual Convention of the American Psychological Association, San Diego, CA

Correspondence concerning this paper should be addressed to Gary L. Canivez, Ph.D., Department of Psychology, Eastern Illinois University, 600 Lincoln Avenue, Charleston, IL 61920-3099. Dr. Canivez can also be contacted via E-mail at glcanivez@eiu.edu or the World Wide Web at <http://www.ux1.eiu.edu/~glcanivez>. ***This handout is based on a manuscript presently submitted for publication so please do not reference without permission.***

The Das-Naglieri Cognitive Assessment System (CAS; Naglieri & Das, 1997) is a test of cognitive abilities or intelligence based on the Planning, Attention, Simultaneous, and Successive Theory (PASS; Das, Naglieri, & Kirby, 1994). Studies of CAS performance by children with attention deficit hyperactivity disorder (ADHD) typically show lowest performance on Planning, deficits in Attention, but normal Simultaneous and Successive processing (Crawford, 2002; Naglieri & Das, 1997, Naglieri, Goldstein, Iseman, & Schwebach, 2003; Naglieri, Salter, & Edwards, 2004; Paolitto, 1999; Pottinger, 2002; Van Luit, Kroesbergen, & Naglieri, 2005). Such distinct group differences studies are important for validity and are necessary but not sufficient for establishing diagnostic utility of a test. The present study examined both distinct group differences and diagnostic utility of the CAS related to ADHD and found support for both.

The Das-Naglieri Cognitive Assessment System (CAS; Naglieri & Das, 1997) is a test of cognitive abilities or intelligence based on the Planning, Attention, Simultaneous, and Successive Theory (PASS; Das, Naglieri, & Kirby, 1994) which itself is based on Luria's Functional System of neuropsychology (Luria, 1966; Luria, 1973). PASS theory (Das, Naglieri, & Kirby, 1994; Naglieri & Das, 1997) proposes that children with attention deficit hyperactivity disorder (ADHD) would, as Barkley (2003, 2006) suggests, be more impulsive (and less reflective) in their cognitive processing, which in turn would impact planning processing. Attentional difficulties would affect attention processing. Studies of CAS performance of children with ADHD typically show lowest performance on Planning with deficits in Attention but normal Simultaneous and Successive processing (Crawford, 2002; Naglieri & Das, 1997, Naglieri, Goldstein, Iseman, & Schwebach, 2003; Naglieri, Salter, & Edwards, 2004; Paolitto, 1999; Pottinger, 2002; Van Luit, Kroesbergen, & Naglieri, 2005). While these group differences studies provide support for the construct validity of the CAS via distinct group differences, such support is inadequate for determining the utility of the CAS in individual diagnostic decision-making (Mullins-Sweatt & Widiger, 2009). Distinct

Specificity = .95, Negative Predictive Power = .98). While a number of CAS studies regarding students with ADHD have examined distinct group differences and found support (Crawford, 2002; Naglieri & Das, 1997, Naglieri, Goldstein, Iseman, & Schwebach, 2003; Naglieri, Salter, & Edwards, 2004; Paolitto, 1999; Pottinger, 2002; Van Luit, Kroesbergen, & Naglieri, 2005), to date no studies have been conducted on the diagnostic utility of the CAS in correctly identifying individual children with ADHD from those without ADHD or from those with other disruptive behavior disorders. The present study examined the construct validity of the CAS by examining distinct group differences *and* the diagnostic utility of CAS in correctly differentiating individuals with ADHD symptoms from those within a normal control group.

Method

Participants

Informed parental consent was obtained for a final sample of 40 students from elementary schools in suburban Pierce County, Washington; ranging from kindergarten to second grade. Groups consisted of children meeting diagnostic criteria for ADHD (n = 20) and a group of children who were randomly selected and matched (to the extent possible) on key

PASS Profiles and Educational Placement

Students receiving special education were more than four times as likely to have at least one PASS weakness and a comparable academic weakness than those in regular education

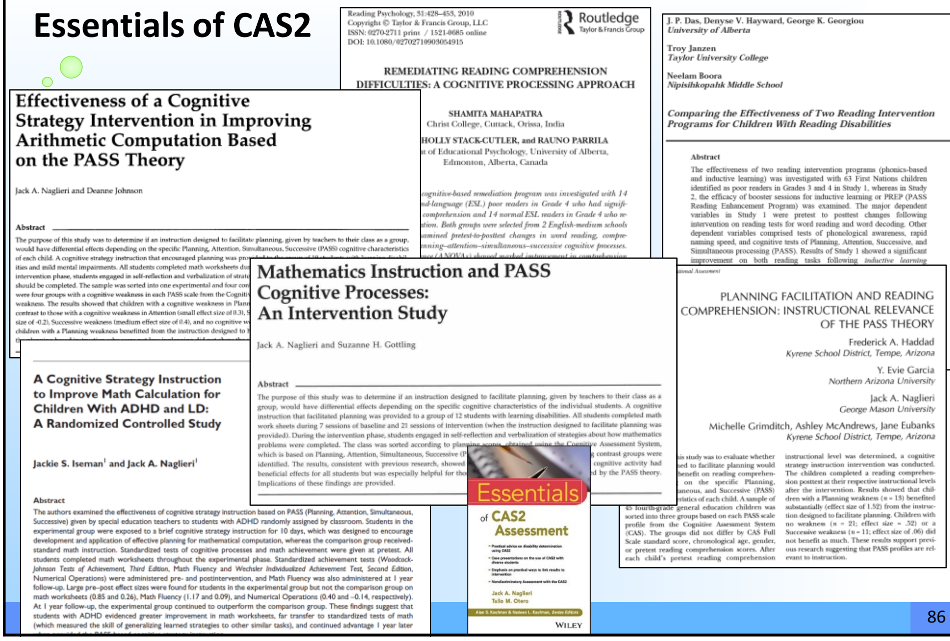
School Psychology Quarterly, Vol. 15, No. 4, 2000, pp. 419–433

Can Profile Analysis of Ability Test Scores Work? An Illustration using the PASS Theory and CAS with an Unselected Cohort

Jack A. Naglieri
George Mason University

A new approach to ipsative, or intraindividual, analysis of children's profiles on a test of ability was studied. The Planning, Attention, Simultaneous, and Successive (PASS) processes measured by the Cognitive Assessment System were used to illustrate how profile analysis could be accomplished. Three methods were used to examine the PASS profiles for a nationally representative sample of 1,597 children from ages 5 through 17 years. This sample included children in both regular (n = 1,453) and special (n = 144) educational settings. Children with significant ipsatized PASS scores, called Relative

Summary of PASS Intervention Research in Essentials of CAS2



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WE CAN DO BETTER

- We can **RE**invent intelligence and get…
  - PASS scores that are strongly correlated with achievement test scores
  - PASS profiles that are different for SLD, ADHD, ASD, etc. supporting the Discrepancy Consistency Method to answer “WHY the student fails?”
  - The fairest way to test diverse groups
  - Connectivity between PSAS scores and instruction
  - PASS scores that are easily measured in 40-60 minutes

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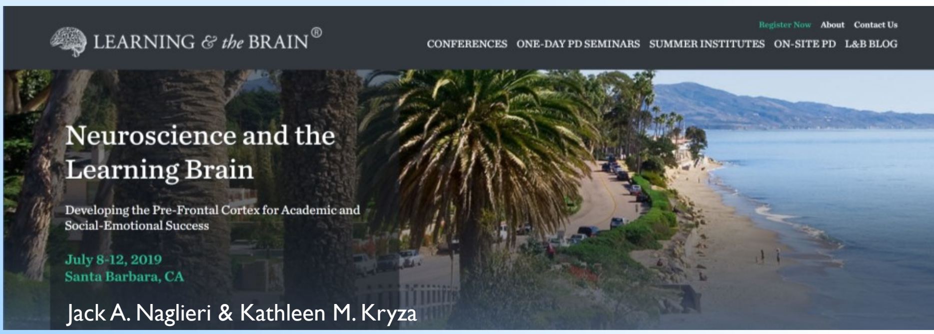
Learning & the Brain Summer Institute 2019

July 8-12 by Naglieri & Kryza

https://www.learningandthebrain.com/Event-395/Neuroscience-and-the-Learning-Brain/

In this Institute, you will learn about the four PASS neurocognitive abilities that are critical to students' academic and social-emotional success and how to match those abilities to specific instructional methods. You will leave with readily implementable strategies to teach students to effectively self-regulate their own academic and social-emotional lives.



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THANK YOU !

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