Moving Beyond IQ to More Effective Assessment of Cognitive Processes

NASP Annual Convention February 2020 @ 8:00 – 9:20 Feb 20

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Resources

FOR MORE INFORMATION
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Disclosures

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The BIG picture

- Our intelligence tests have been essentially the same for at least 100 years.
- We want Intellectual assessment that
  - Is consistent with IDEA and state regulations regarding SLD determination
  - Helps us understand WHY a student fails
  - Informs us about academic strengths & weaknesses and interventions
  - Is fair for students from diverse populations
- These goals can be achieved if we use second-generation intelligence tests that measure the way students THINK to LEARN
  - The definition of THINKING should be based on BRAIN function
  - PASS theory is a way of defining THINKING
  - Use the Cognitive Assessment System-2nd Edition to measure a student's ability to think

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Shift from Traditional To Second Generation Intelligence Tests

- Wechsler, et al
- **C**ognitive **A**ssessment **S**ystem 2nd Edition

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Intelligence as Neurocognitive Functions

- In my first working meeting with JP Das (February 11, 1984) we proposed that intelligence was better REinvented as neurocognitive processes andwe began development of the **C**ognitive **A**ssessment **S**ystem (Naglieri & Das, 1997).
- We conceptualized intelligence as Planning, Attention, Simultaneous, and Successive (PASS) neurocognitive processes based on Luria's concepts of brain function.

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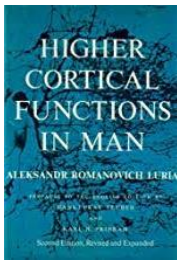
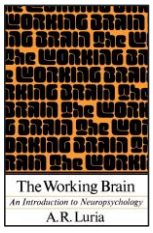
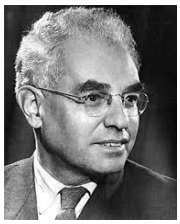
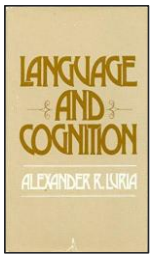
PASS Neurocognitive Theory









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

PASS = 'basic psychological processes'

NOTE: Easy to understand concepts!

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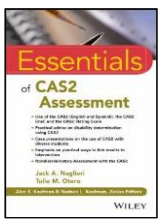
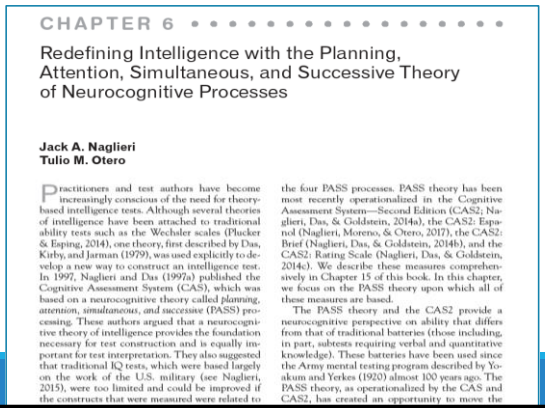
Neuropsychological Correlates of PASS

- Naglieri, J. A. & Otero, T. M. (2017). *Essentials of CAS2 Assessment*. New York: Wiley.
- Naglieri, J. A., & Otero, T. M. (2018). Redefining Intelligence as the PASS Theory of Neurocognitive Processes. In Flanagan, D. P., & Harrison, P. L. (Eds.), *Contemporary intellectual assessment: Theories, tests, and issues* (4th ed.). New York, NY: Guilford Press.





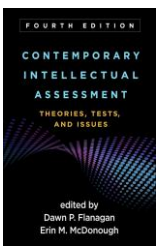
CHAPTER 6

Redefining Intelligence with the Planning, Attention, Simultaneous, and Successive Theory of Neurocognitive Processes

Jack A. Naglieri
Tulio M. Otero

Practitioners and test authors have become increasingly conscious of the need for theory-based intelligence tests. Although several theories of intelligence have been attached to traditional ability tests such as the Wechsler scales (Plucker & Esping, 2014), one theory, first described by Das, Kirby, and Jarman (1979), was used explicitly to develop a new way to construct an intelligence test. In 1997, Naglieri and Das (1997a) published the Cognitive Assessment System (CAS), which was based on a neurocognitive theory called *planning, attention, simultaneous, and successive* (PASS) processing. These authors argued that a neurocognitive theory of intelligence provides the foundation necessary for test construction and is equally important for test interpretation. They also suggested that traditional IQ tests, which were based largely on the work of the U.S. military (see Naglieri, 2015), were too limited and could be improved if the constructs that were measured were related to the four PASS processes. PASS theory has been most recently operationalized in the Cognitive Assessment System—Second Edition (CAS2; Naglieri, Das, & Goldstein, 2014a), the CAS2: Español (Naglieri, Moreno, & Otero, 2017), the CAS2: Brief (Naglieri, Das, & Goldstein, 2014b), and the CAS2: Rating Scale (Naglieri, Das, & Goldstein, 2014c). We describe these measures comprehensively in Chapter 15 of this book. In this chapter, we focus on the PASS theory upon which all of these measures are based.

The PASS theory and the CAS2 provide a neurocognitive perspective on ability that differs from that of traditional batteries (those including, in part, subtests requiring verbal and quantitative knowledge). These batteries have been used since the Army mental testing program described by Yoakum and Yerkes (1920) almost 100 years ago. The PASS theory, as operationalized by the CAS and CAS2, has created an opportunity to move the



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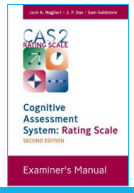
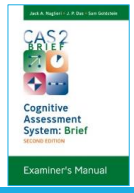
PASS Comprehensive System

(Naglieri, Das, & Goldstein, 2014)

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

CAS2 Rating Scale (4 subtests)	**CAS2 Brief** (4 subtests 20 minutes)	**CAS2 Core** (8 subtests 40 minutes)	**CAS2 Extended** (12 subtests 60 minutes)
Total Score Planning Simultaneous Attention Successive	Total Score Planning Simultaneous Attention Successive	Full Scale Planning Simultaneous Attention Successive	Full Scale Planning Simultaneous Attention Successive Supplemental Scales Executive Function Working Memory Verbal / Nonverbal Visual / Auditory Speed / Fluency





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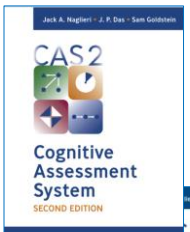
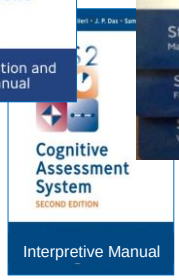
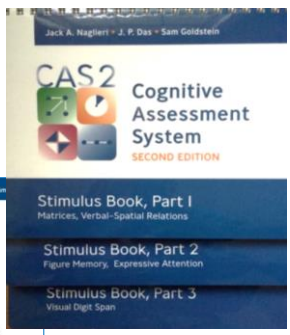
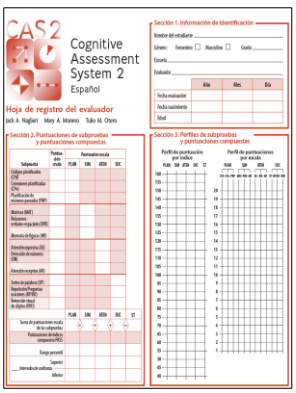
CAS2 for (Ages 5-18 yrs.)









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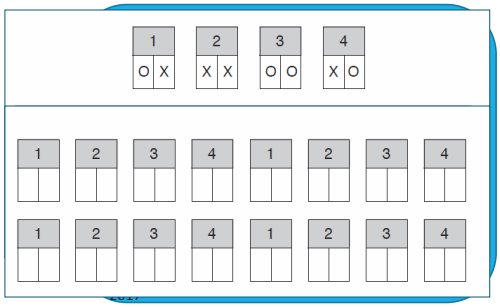
PASS Theory: Planning

- Planning is a term used to describe a neurocognitive function similar to metacognition and executive function
- Planning is needed for setting goals, making decisions, predicting the outcome of one's own and others actions, impulse control, strategy use and retrieval of knowledge
- Planning helps us make decisions about how to solve any kind of a problem from academics to social situations and life in general



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PASS Theory: Attention

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

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

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Modern Theory: Successive

- **Successive** processing is a basic psychological process we use to manage stimuli in a specific serial order
  - Stimuli form a chain-like progression
  - Word Series
  - Sentence Questions

- **Academic tasks**
  - Decoding words
  - Letter-sound correspondence
  - Phor gical tasks
  - Und nding the syntax of sentences
  - Sequence of words, sen ces, paragraphs
  - Remembering the sequence of events
  - Learning motor movements

Recall of Numbers in Order
Successive Processing

4	3	8	6	1

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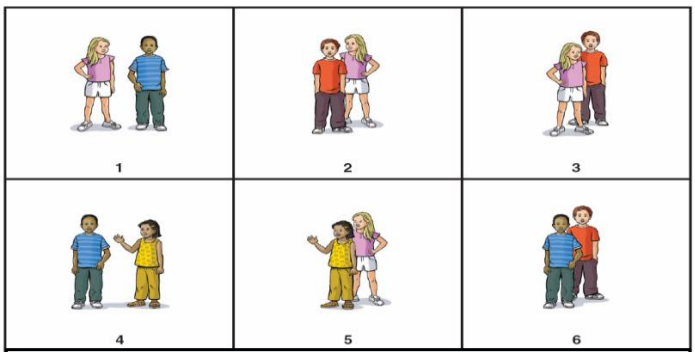
PASS Theory: Simultaneous

- **Simultaneous** processing is used to integrate stimuli into groups
  - Each piece must be related to the other
  - Stimuli are seen as a whole

- Academics:
  - Reading comprehension
  - geometry
  - math word problems
  - whole language
  - verbal concepts



Which picture shows a boy behind a girl?

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CAS2 Online Score & Report

http://www.proedinc.com/customer/ProductView.aspx?ID=7277

- Enter data at the subtest level or enter subtest raw scores
- Online program converts raw scores to standard scores, percentiles, etc. for all scales.
- A narrative report with graphs and scores is provided

CAS2: Online Scoring and Report System (1-Year Base Subscription) (14311)
This product requires a check of customer qualifications. Click here to download qualifications form. TO ORDER, CALL: 800-897-3202.

Price: $199.00

NEW

NOW AVAILABLE!

Ages: 5 through 18 years
Testing Time: 40 to 60 minutes
Administration: Individual

The new PC, Mac™, and iPad™ compatible *CAS2 Online Scoring and Report System* program is an efficient and easy way to obtain CAS2 scores and corresponding narrative.

ORDERING OPTIONS:
- CAS2: Online Scoring and Report System (Add-on 5-User License) **$69.00**
- CAS2: Online Scoring and Report System (Annual Renewal) **$69.00**

Use *CAS2 Online Scoring and Report System* for:
- converting CAS2 subtest raw scores into standard scores, percentile ranks, descriptive terms, and age equivalents;
- generating PASS and Full Scale composite scores;
- comparing CAS2 subtest and PASS scale scores to identify significant intra-individual differences;
- providing a pdf report of CAS2 performance; and
  - Sample Interpretive Report
  - Sample Score Summary
- providing intervention options.

Ordering options:
- *CAS2 Online Scoring and Report System* first-time base subscription provides one-year unlimited online scoring and report access for up to 5 users.
- Annual base subscription renewal provides one-year unlimited online scoring and report access for up to 5 users.

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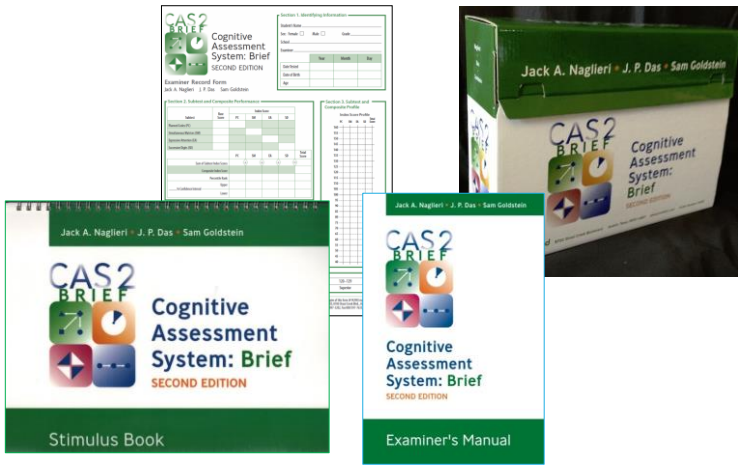
CAS2: Brief for Ages 4-18 years

For special educators and others with some assessment training

- 4 subtests (20 minutes)
- PASS and Total Scales provided



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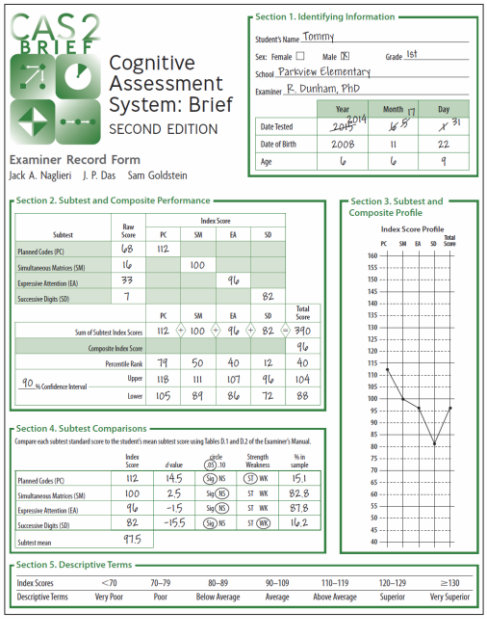
CAS2 BRIEF

Cognitive Assessment System: Brief

SECOND EDITION

Examiner Record Form

Jack A. Naglieri J. P. Das Sam Goldstein

Section 1. Identifying Information

Student's Name Tommy

Sex: Female ☐ Male ☒ Grade 1st

School Parkview Elementary

Examiner R. Dunham, PhD

	Year	Month	Day
Date Tested	2019	6	31
Date of Birth	2008	11	22
Age	6	6	9

Section 2. Subtest and Composite Performance

Subtest	Raw Score	Index Score PC	SM	EA	SD
Planned Codes (PC)	68	112			
Simultaneous Matrices (SM)	16		100		
Expressive Attention (EA)	33			96	
Successive Digits (SD)	7				82

	PC	SM	EA	SD	Total Score
Sum of Subtest Index Scores	112	100	96	82	390
Composite Index Score					96
Percentile Rank	79	50	40	12	40
90 % Confidence Interval Upper	118	111	107	96	104
Lower	105	89	86	72	88

Section 3. Subtest and Composite Profile

Index Score Profile

Section 4. Subtest Comparisons

Compare each subtest standard score to the student's mean subtest score using Tables D.1 and D.2 of the Examiner's Manual.

	Index Score	d value	Circle (SR) .10	Strength Weakness	% in sample
Planned Codes (PC)	112	14.5	Sig .05	S WK	15.1
Simultaneous Matrices (SM)	100	2.5	Sig .05	S WK	82.8
Expressive Attention (EA)	96	-1.5	Sig .05	S WK	87.8
Successive Digits (SD)	82	-15.5	Sig .05	S WK	16.2
Subtest mean	97.5				

Section 5. Descriptive Terms

Index Scores	<70	70–79	80–89	90–109	110–119	120–129	≥130
Descriptive Terms	Very Poor	Poor	Below Average	Average	Above Average	Superior	Very Superior

Figure 3.1. Example of page 1 of the CAS2: Brief Examiner Record Form, completed for Tommy.

CAS2: Brief

- Give in 20 minutes
- Yields PASS and Total standard scores (Mn 100, SD 15)
- Directions for administration are in the Record Form
- All items are different from CAS2
  - Planned Codes
  - Simultaneous Matrices
  - Expressive Attention
  - Successive Digits (forward only)

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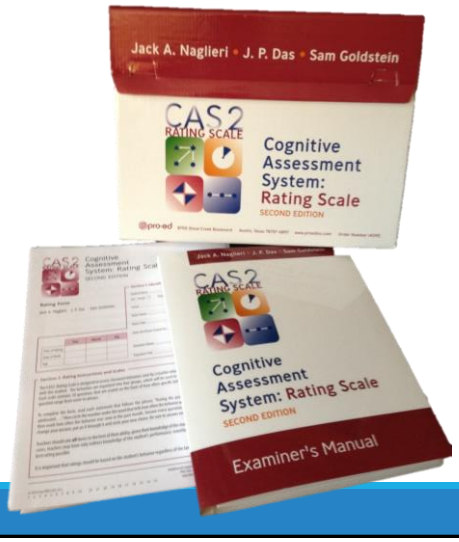
CAS2 Rating Scales (Ages 4-18 yrs.)

- The CAS2: Rating measures behaviors associated with PASS constructs
- Completed by teachers and can be used by psychologists, special educators and regular educators



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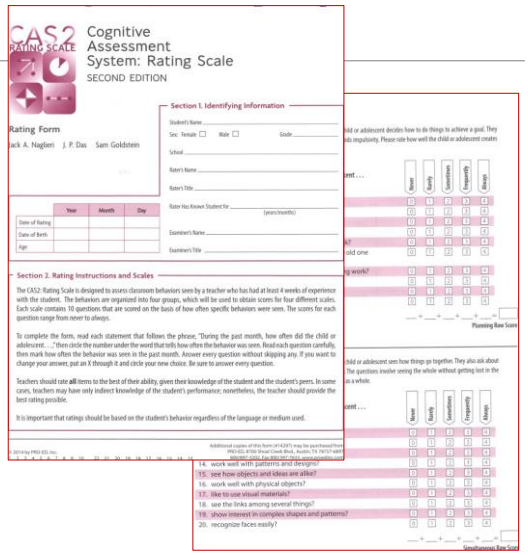
CAS2 Rating Scales

- The CAS2: Rating form contains 40 items
- 10 items for each PASS scale
- PASS and Total scales are set to have a mean of 100 and standard deviation of 15



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Ideas to Consider

What we Have Today
- 100 Years of Intelligence Testing

Elephant in the Room
- Thinking vs Knowing

Social Justice
- Test Bias

Research Update
- To *g* or not to *g*

Eligibility Determination
- What to use

Reasons To Change
- Validity of PASS Theory

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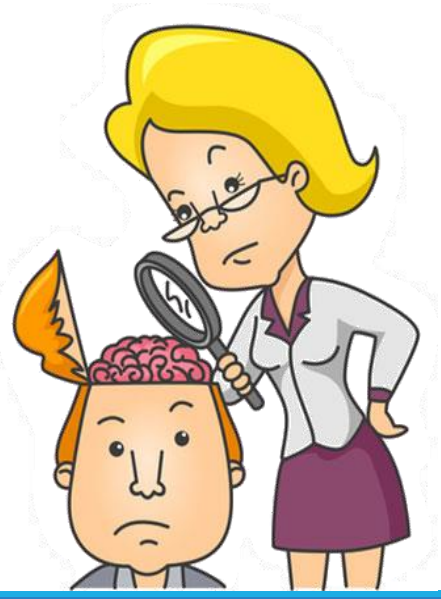
Why do we measure intelligence the way we do?

The History of IQ tests



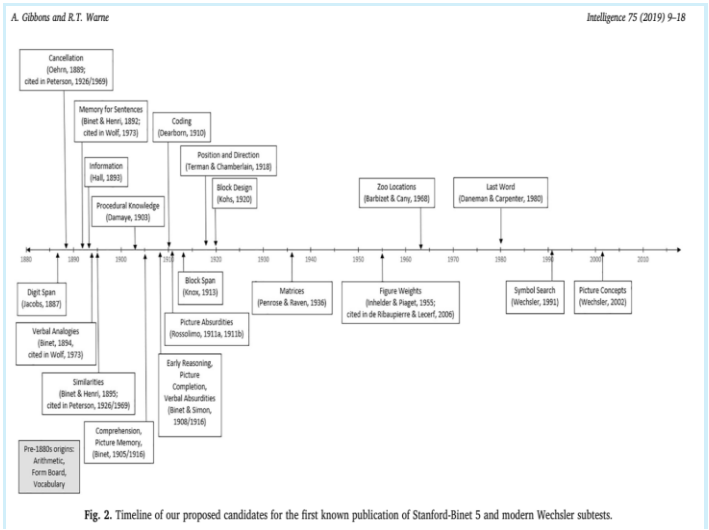
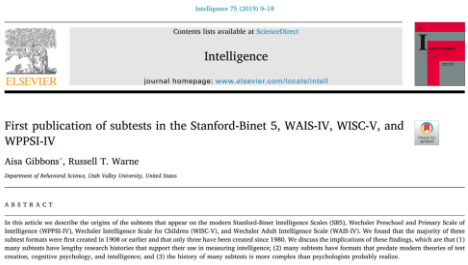
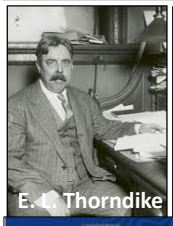


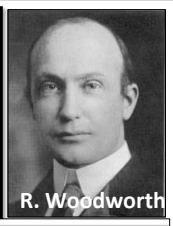
Fig. 2. Timeline of our proposed candidates for the first known publication of Stanford-Binet 5 and modern Wechsler subtests.

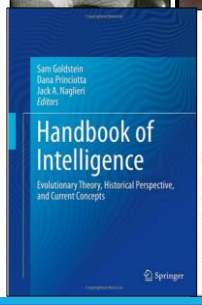


'The majority of subtests [in traditional intelligence tests] were first created in 1908 or earlier and only three have been created since 1980' (Gibbons & Warne, 2019)

Evolution of IQ http://www.jacknaglieri.com/cas2.html








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

Jack A. Naglieri

Context

- A group of psychologists met at Harvard in April of 1917 to construct an ability test to help the US military evaluate recruits (WWI)
- By July 1917 their research showed that the Army Alpha (Verbal & Quantitative) and Beta (Nonverbal) 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).
- This was the foundation of the Wechsler Scales – Verbal, Performance (Nonverbal) and Quantitative subtests as well as the Otis-Lennon and CogAT

Alpha/Beta

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

Verbal & Quantitative questions demand knowledge

- Army Beta
  - Maze
  - Cube Imitation
  - Cube Construction
  - Digit Symbol
  - Pictorial Completion
  - Geometrical Construction

Nonverbal typically demand much less knowledge

The US Army Alpha Test (Verbal)

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

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

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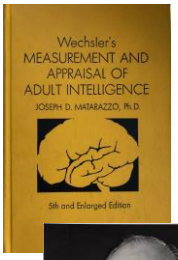
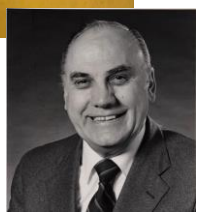
The Problem with Verbal and Quantitative tests

- When English is required in a vocabulary test of general ability this disadvantages ELL students and those with limited educational opportunity.
- Matarazzo (1972) wrote about he Wechsler Scales
  - "…Vocabulary is necessarily influenced by … education and cultural opportunities (p. 218)"
  - when referring to the Arithmetic subtest, "…its merits are lessened by the fact that it is influenced by education (p. 203)."
- The tests we use vary based on the amount of English language skills, and general verbal knowledge, required





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Tests That Demand Knowledge

Is that why there was a Beta test?

		WJ-IV and Batería-IV (including Cross Battery)	K-ABC-II
	Arithmetic	• Comprehension Knowledge: Vocabulary & General Information • Fluid Reasoning: Number Series & Concept Formation • Auditory Processing: Phonological Processing	• Knowledge / GC: Riddles, Expressive Vocabulary, Verbal Knowledge

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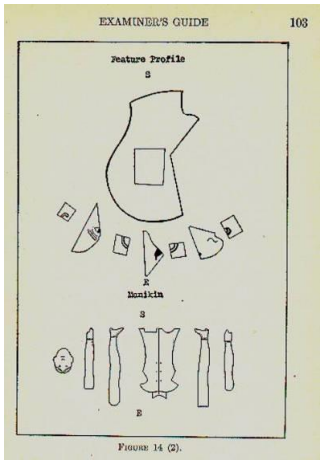
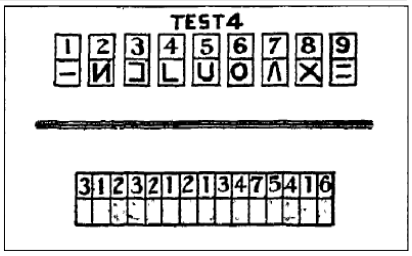
The US Army Beta Test (Nonverbal)



- Wechsler's Performance tests were taken from the Army Beta
- **BUT WHY were nonverbal test included?**



Test 7.—Digit Symbol

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

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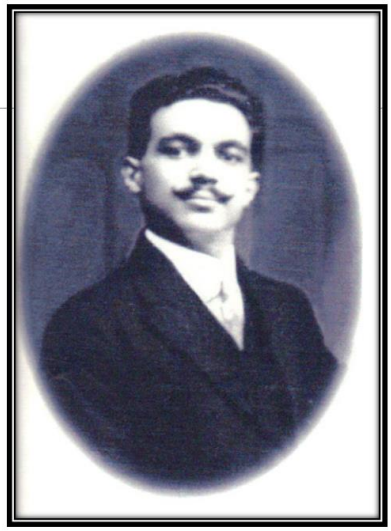
Antonino Mirenda - 1906



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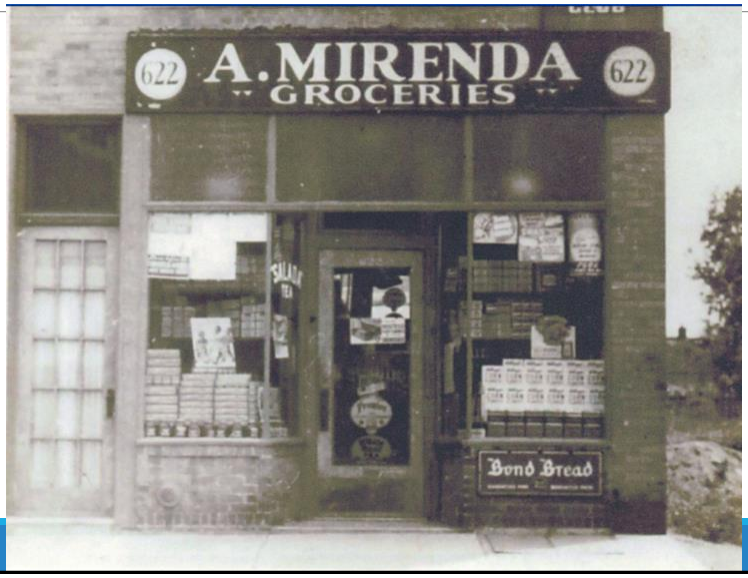
A. Mirenda Groceries
622 Ave X, Brooklyn, NY



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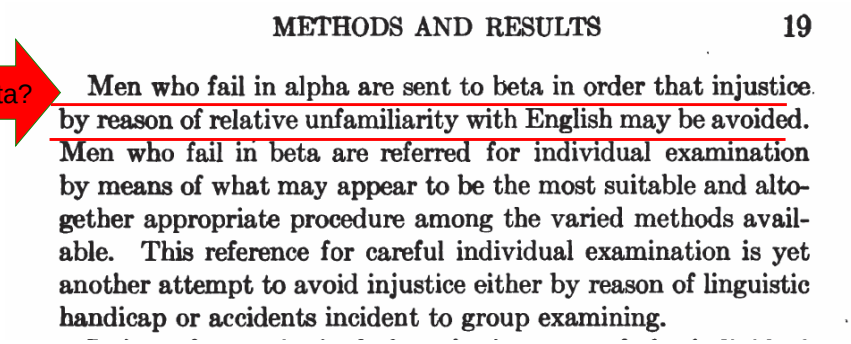
1920 Army Testing (Yoakum & Yerkes)

Note there is no mention of measuring verbal and nonverbal intelligences – **it was a social justice issue.**

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.

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Alpha Beta 1917 → What we Have Today

Thus**, July 20, 1917** is the birth date of the verbal, quantitative, nonverbal test format -- **Traditional group and individually administered ability tests.**

- 100 Years and 5th editions of the same tests…we need to change!

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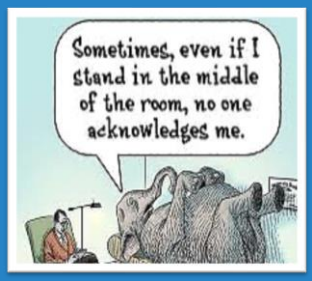
Ideas to Consider



- What we Have Today
  - 100 Years of Intelligence Testing
- Elephant in the Room
  - Thinking vs Knowing
- Social Justice
  - Test Bias
- Research Update
  - To *g* or not to *g*
- Eligibility Determination
  - What to use
- Reasons To Change
  - Validity of PASS Theory

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Elephant in the room

- Traditional intelligence tests require too much knowledge
  - We should be measuring THINKING (intelligence) in a way that is not dependent upon academic skills like vocabulary and arithmetic
- Traditional intelligence tests were not developed on the basis of a theory of intelligence (i.e. the definition of thinking)
  - Theory defines what a test of intelligence should test
  - Theory provides the basis of test interpretation
  - It is the test authors' responsibility to inform the user how to interpret the intelligence test scores NOT the user
- **Does all this really matter?**

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Thinking and Knowing Continuum

Cognitive Assessment System–2 Wechsler Nonverbal Scale of Ability	Kaufman Assessment Battery for Children-2	Wechsler Intelligence Scale for Children-5	Woodcock-Johnson Cognitive-4	Feifer Assessment of Reading & Math	Stanford Achievement Test Kaufman Test Educational Achievement-3

- The obvious connection between educational opportunity and vocabulary and arithmetic subtests was noted by Matarazzo (1972) when he wrote: "a man's vocabulary is necessarily influence by his education and cultural opportunities (p. 218)" and when referring to the Arithmetic subtest, "its merits are lessened by the fact that it is influenced by education (p. 203)".
  The impact of education on intelligence tests was clearly understood yet our interpretations of these scores have not adequately recognized the threat to validity.

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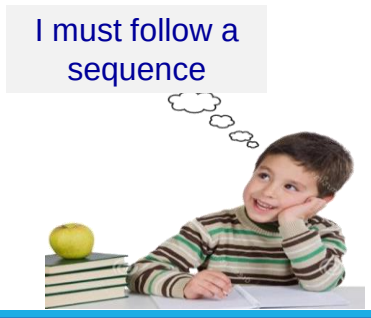
Intelligence Tests Should Measure Thinking not Knowing

- What does the student have to ***know*** to complete a task?
  - ***This is dependent on educational opportunity (e.g., Vocabulary, Arithmetic, phonological skills, etc.)***

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

This is dependent on the brain's neurocognitive processes



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CASE by Tulio Otero: ALEJANDRO (C.A. 7-0 GRADE 1)

REASON FOR REFERRAL

- Academic:
  - Could not identify letters/sounds
  - October. Could only count to 39
  - All ACCESS scores of 1
- Behavior:
  - Difficulty following directions
  - Attention concerns
  - Refusal/defiance

Note: this is not a picture of Alejandro

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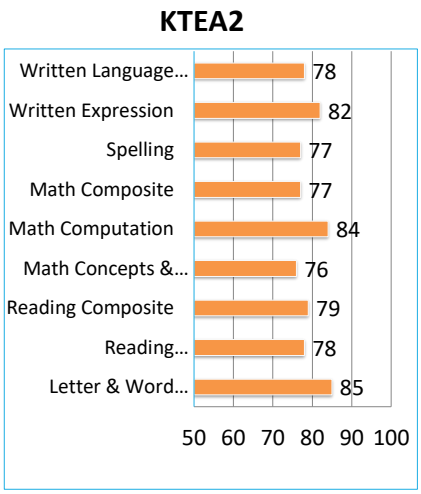
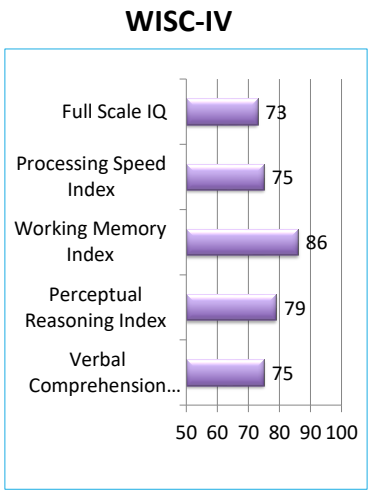
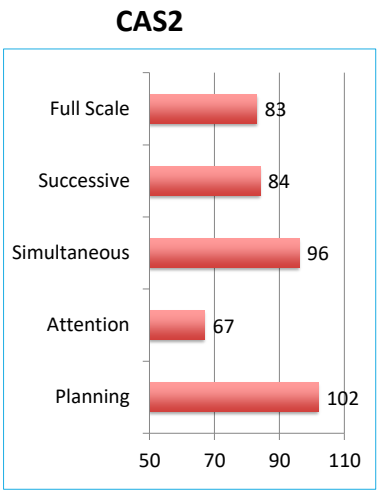
WISC-IV ASSESSMENT







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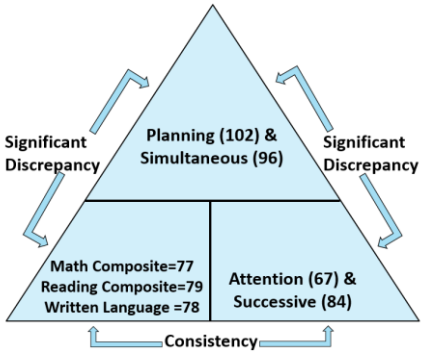
Alejandro and PASS (by Dr. Otero)

- Alejandro is not a slow learner.
- He has good scores in basic psychological processes:
  - Simultaneous = 96 and Planning = 102
- He has a "disorder in one or more of the basic psychological processes"
  - Attention = 67 and Successive = 84
- And he has academic failure which equals an SLD determination.



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Illinois School District U-46

Main question: Does the District's gifted program unlawfully discriminate against Hispanic Students?

The district with 42% Hispanics but only 2% of students in gifted were Hispanic.

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

DANIEL, DINAH and DEANNA MCFADDEN, minors, by their parent and next friend, Tracy McFadden; KAREN, RODOLFO and KIARA TAPIA, minors, by their parent and next friend, Mariela Montoya; JOCELYN BURCIAGA, minor, by her parent and next friend, Griselda Burciaga; and KASHMIR IVY, minors, by their parent and next friend, Beverly Ivy; KRISTIANNE SIFUENTES, minors, by her parent and next friend, Irma Sifuentes,

Plaintiffs,

v.

BOARD OF EDUCATION FOR ILLINOIS SCHOOL DISTRICT U-46,

Defendant.

No. 05 C 0760

Judge Robert W. Gettleman

On July 11, 2013, Judge Robert Gettlemen issued a decision holding that District U-46 *intentionally* discriminated against Hispanic students specific in their gifted programming (placement), and found problems with policies and instruments for

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The Court's decision renewed the *Brown v. Board of Education* (1954) principle that 'separate is inherently unequal'.

... The court finds the District's method of identifying gifted Minority Students was flawed and resulted in an obvious disparate impact on those students by separating them from their gifted White peers.... By singling out most[ly] all Hispanic students for the segregated SET/SWAS program, the District deprived these children of that educational opportunity based on their ethnicity (p. 27).

Judge Gettlemen found discrimination

regarding (a) tests for screening and for identification, (b) designated cutoff scores for screening and identification, (c) use of both verbal and math scores at arbitrary designated levels for screening and for identification, (d) use of weighted matrix, as well as content and criteria in weighted matrices that favored achievement and traditional measures, (e) too little reliance on a nonverbal test (Naglieri Nonverbal Ability Test) for admission to SWAS, (f) re-testing Hispanic students for middle school gifted program, (g) timing of testing, (h) use of parental referrals, and (i) use of teacher referrals (see Table 2).

Judge Gettleman's Decision

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Wechsler vs CAS for Students with ID

- ***WISC-III***
  - ***White*** children earned the same mean scores on WISC-III and CAS
  - ***Black*** children earned *lower* VIQ than PIQ scores due to language / achievement tasks resulting in Full Scale scores low enough to qualify as ID
- ***CAS***
  - ***Black*** children earned ***higher*** scores on CAS than on the WISC-III
  - ***Fewer*** Black children would be identified as having intellectual disability based on Full Scale scores using CAS than WISC-III
- *THIS IS A SOCIAL JUSTICE ISSUE.*

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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Elephant in the Room

- Intelligence tests require *too much knowledge*
- This is an obstacle for diverse populations
- Students are being hurt by intelligence tests that demand knowledge
- The lack of a THEORY of intelligence leads to reliance on 100 year old ideas of how to measure cognitive ability
- We can remedy this by using a neurocognitive approach such as the PASS theory as measured by the CAS2

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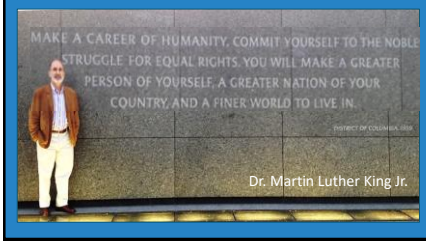
Ideas to Consider



- **What we Have Today**
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  - Validity of PASS Theory

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How Psychometric Bias is Studied (e.g., Jensen's Bias in Mental Tests)

- reliability of internal consistency of items
- reliability of test/retest scores
- rank order of item difficulties
- item intercorrelations
- factor structure of test
- magnitude of the factor loadings

- slope & intercept of the regression line
- correlation of raw scores with age
- item characteristic curve
- frequencies of choice of error distracters
- interaction of test items by group membership

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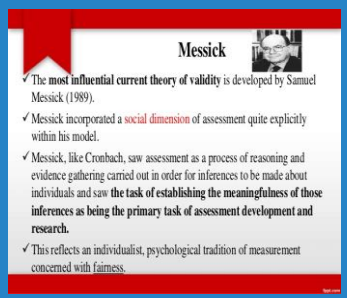
Test Validity and Social Justice



- Validity is an overall evaluative judgment of the degree to which empirical evidence and theoretical rationales support the adequacy … *of interpretations* … based on test scores (Messick, 1989).

  Validity is not a property of the test or assessment as such, but rather of the *meaning* of the test scores.

  A study of "Consequential validity" evaluates the value of the implications of score interpretations as well as the actual and potential consequences of test use; especially in regard to sources of invalidity related to issues of bias, fairness, and distributive justice (Messick, 1980, 1989)."

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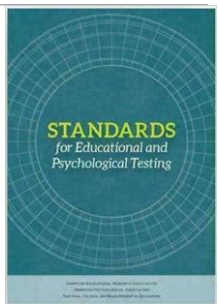
Differences in Mean Scores = Impact

- According to the *Standards for Educational and Psychological Testing* (AERA, APA, NCME, 2014), **equitable assessment** provides examinees *an equal opportunity to display one's ability* and … 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 not knowing the answers **even if the norming data do not demonstrate test bias.**



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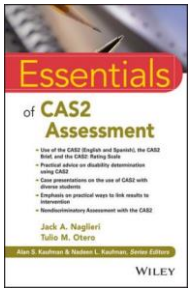
Race & IQ

- Traditional intelligence tests yield large differences



Mean Score Differences in Total scores by Race by Intelligence Test.

Traditional IQ tests	
SB-IV (matched samples)	12.6
WISC-V (normative sample)	11.6
WISC–IV (normative sample)	11.5
WJ- III (normative sample)	10.9
WISC–IV (matched samples)	10.0
WISC-V (statistical controls normative sample)	8.7
RIAS-2 (normative sample)	8.0

Note: The data for these results are reported for the Stanford-Binet IV from Wasserman (2000); Woodcock-Johnson III from Edwards & Oakland (2006); Kaufman Assessment Battery for Children from Naglieri (1986); Kaufman Assessment Battery for Children-II from (Lichenberger, Sotelo-Dynega & Kaufman, 2009); CAS from Naglieri, Rojahn, Matto & Aquilino (2005); CAS-2 from Naglieri, Das & Goldstein, 2014; Wechsler Intelligence Scale for Children – IV (WISC-IV) from O'Donnell (2009), WISC-V from Kaufman, Raiford & Coalson (2016), Reynolds Intellectual Assessment Scale -2 Reynolds, C. R., & Kamphaus, R. W. (2015)

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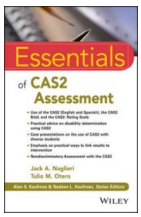
Race & IQ

- Neurocognitive tests yield smaller differences
- CAS and CAS2 have the smallest differences



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WISC-V (statistical controls normative sample)	8.7
RIAS-2 (normative sample)	8.0
Second Generation Intelligence Tests	
K-ABC (normative sample)	7.0
K-ABC (matched samples)	6.1
KABC-2 (matched samples)	5.0
CAS-2 (normative sample)	6.3
CAS (statistical controls normative sample)	4.8
CAS-2 (statistical controls 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 & Oakland (2006); Kaufman Assessment Battery for Children from Naglieri (1986); Kaufman Assessment Battery for Children-II from (Lichenberger, Sotelo-Dynega & Kaufman, 2009); CAS from Naglieri, Rojahn, Matto & Aquilino (2005); CAS-2 from Naglieri, Das & Goldstein, 2014; Wechsler Intelligence Scale for Children – IV (WISC-IV) from O'Donnell (2009), WISC-V from Kaufman, Raiford & Coalson (2016), Reynolds Intellectual Assessment Scale -2 Reynolds, C. R., & Kamphaus, R. W. (2015)

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Naglieri, Rojahn, Matto (2007)

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

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

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

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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

PASS scores – English and Spanish

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

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

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George Mason University
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Columbia College, Elgin Campus
Brianna DeLauder
George Mason University
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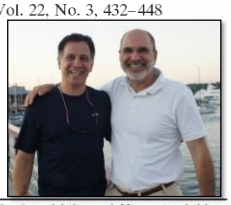
Virginia Commonwealth University



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

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

- Very similar scores in both versions
- >90% agreement between PASS weakness & strengths using English and Spanish CAS

Otero, Gonzales, Naglieri (2013)

- Very similar PASS scores when giving the CAS English and Spanish versions
- >90% agreement between PASS weakness & strengths using English and Spanish CAS

APPLIED NEUROPSYCHOLOGY: CHILD, 0: 1–9, 2012
Copyright © Taylor & Francis Group, LLC
ISSN: 2162-2965 print/2162-2973 online
DOI: 10.1080/21622965.2012.670547

Psychology Press

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.

CAS in Italy

Using US norms, Italian sample (N = 809) CAS Full Scale was 100.9 and matched US sample (N = 1,174) was 100.5 and factorial invariance was found

Psychological Assessment

1040-3590/12/$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

Jack A. Naglieri
University of Virginia and Devereux Center for Resilient Children

Stefano Taddei
University of Florence

Kevin 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.

In order to achieve social justice and equity we should select intelligence tests that allow us to measure thinking with minimal influence of knowing.

The best choice would be to move away from traditional intelligence tests and move toward those designed to measure thinking

Neurocognitive processing tests are much preferred to traditional tests because processing tests used to measure the PASS theory measure thinking

Socially Just Measures Should be Used

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Ideas to Consider

- **What we Have Today**
  - 100 Years of Intelligence Testing
- **Elephant in the Room**
  - Thinking vs Knowing
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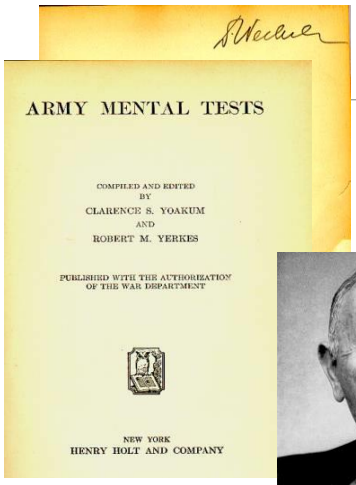
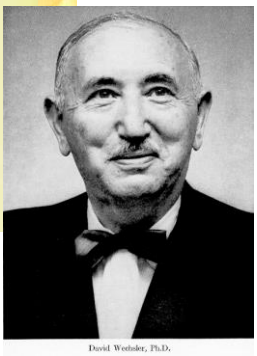
Wechsler (1939)





David Wechsler, Ph.D.

- His 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)"**

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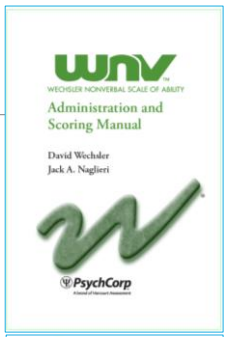
Wechsler & Spearman's *g*

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.

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



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Canivez, Gary L.,Watkins, Marley W.,Dombrowski, Stefan C.

Canivez, G. L., Watkins, M. W., & Dombrowski, S. C. (2017). Structural validity of the Wechsler Intelligence Scale for Children–Fifth Edition: Confirmatory factor analyses with the 16 primary and secondary subtests. *Psychological Assessment, 29*(4), 458–472. https://doi.org/10.1037/pas0000358

The factor structure of the Wechsler Intelligence Scale for Children-Fifth Edition (WISC-V; Wechsler, 2014a) standardization sample (N = 2,200) was examined using confirmatory factor analyses (CFA) with maximum likelihood estimation for all reported models from the WISC-V *Technical and Interpretation Manual* (Wechsler, 2014b). Additionally, alternative bifactor models were examined and variance estimates and model-based reliability estimates (ω coefficients) were provided. Results from analyses of the 16 primary and secondary WISC-V subtests found that all higher-order CFA models with 5 group factors (VC, VS, FR, WM, and PS) produced model specification errors where the Fluid Reasoning factor produced negative variance and were thus judged inadequate. Of the 16 models tested, the bifactor model containing 4 group factors (VC, PR, WM, and PS) produced the best fit. Results from analyses of the 10 primary WISC-V subtests also found the bifactor model with 4 group factors (VC, PR, WM, and PS) produced the best fit. Variance estimates from both 16 and 10 subtest based bifactor models found dominance of general intelligence (g) in accounting for subtest variance (except for PS subtests) and large ω-hierarchical coefficients supporting general intelligence interpretation. The small portions of variance uniquely captured by the 4 group factors and low ω-hierarchical subscale coefficients likely render the group factors of questionable interpretive value independent of g (except perhaps for PS). Present CFA results confirm the EFA results reported by Canivez, Watkins, and Dombrowski (2015); Dombrowski, Canivez, Watkins, and Beaujean (2015); and Canivez, Dombrowski, and Watkins (2015). (PsycINFO Database Record (c) 2019 APA, all rights reserved)

Support for 'g'

- BUT…The small portions of variance uniquely captured by [subtests]… render the group factors [scales]of questionable interpretive value independent of g
- Present CFA results confirm the EFA results (Canivez, Watkins, & Dombrowski, 2015); Dombrowski, Canivez, Watkins, & Beaujean (2015); and Canivez, Dombrowski, & Watkins (2015).

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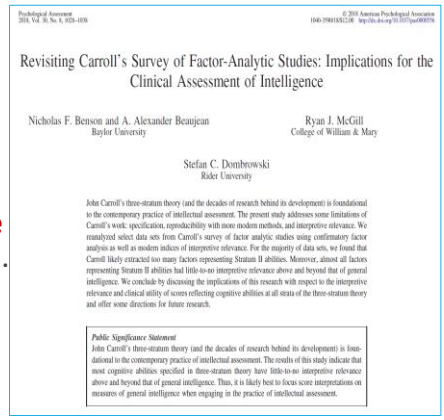
Support for 'g': Research on CHC

- John Carroll's three-stratum theory … is foundational to the contemporary practice of intellectual assessment.
- **The results of this study indicate that most cognitive abilities specified in three-stratum theory have little-to-no interpretive relevance above and beyond that of general intelligence.**
- Thus, it is likely **best to focus score interpretations on measures of *general intelligence* when engaging in the practice of intellectual assessment.**



Revisiting Carroll's Survey of Factor-Analytic Studies: Implications for the Clinical Assessment of Intelligence

Nicholas F. Benson and A. Alexander Beaujean
Baylor University

Ryan J. McGill
College of William & Mary

Stefan C. Dombrowski
Rider University

John Carroll's three-stratum theory (and the decades of research behind its development) is foundational to the contemporary practice of intellectual assessment. The present study addresses some limitations of Carroll's work: specification, reproducibility with more modern methods, and interpretive relevance. We reanalyzed select data sets from Carroll's survey of factor analytic studies using confirmatory factor analysis as well as modern indices of interpretive relevance. For the majority of data sets, we found that Carroll likely extracted too many factors representing Stratum II abilities. Moreover, almost all factors representing Stratum II abilities had little-to-no interpretive relevance above and beyond that of general intelligence. We conclude by discussing the implications of this research with respect to the interpretive relevance and clinical utility of scores reflecting cognitive abilities at all strata of the three-stratum theory and offer some directions for future research.

Public Significance Statement
John Carroll's three-stratum theory (and the decades of research behind its development) is foundational to the contemporary practice of intellectual assessment. The results of this study indicate that most cognitive abilities specified in three-stratum theory have little-to-no interpretive relevance above and beyond that of general intelligence. Thus, it is likely best to focus score interpretations on measures of general intelligence when engaging in the practice of intellectual assessment.

60

Research Supports 'g' but little More

Benson, N. F., Beaujean, A. A., McGill, R. J, & Dombrowski, S. C. (2018). Revisiting **Carroll's Survey of Factor-Analytic Studies**: Implications for the Clinical Assessment of Intelligence. *Psychological Assessment,* 30, 8, 1028–1038.

Canivez, G. L., Watkins, M. W., & Dombrowski, S. C. (2017). Structural validity of the **Wechsler Intelligence Scale for Children–Fifth Edition:** Confirmatory factor analyses with the 16 primary and secondary subtests. *Psychological Assessment, 29,* 458-472.

Canivez, G. L., & McGill, R. J. (2016). Factor structure of the **Differential Ability Scales–Second Edition**: Exploratory and hierarchical factor analyses with the core subtests. *Psychological Assessment, 28,* 1475-1488. http://dx.doi.org/10.1037/pas0000279

Canivez, G. L., & McGill, R. J. (2016). Factor structure of the **Differential Ability Scales-Second Edition**: Exploratory and hierarchical factor analyses with the core subtests. Psychological Assessment, 28, 1475–1488. https://doi.org/10.1037/pas0000279

Canivez, G. L. (2008). Orthogonal higher order factor structure of the **Stanford-Binet Intelligence Scales-Fifth Edition** for children and adolescents. School Psychology Quarterly, 23, 533–541.

Dombrowski, S. C., **Canivez, G. L.,** & Watkins, M. W. (2017, May). Factor structure of the 10 **WISC–V** primary subtests across four standardization age groups. *Contemporary School Psychology.* Advance online publication.

Dombrowski, S. C., McGill, R. J., & Canivez, G. L. (2017). Exploratory and hierarchical factor analysis of the **WJ IV Cognitive** at school age. *Psychological Assessment, 29,* 394-407.

McGill, R. J., & **Canivez, G. L.** (2017, October). Confirmatory factor analyses of the **WISC–IV Spanish** core and supplemental Subtests: Validation evidence of the Wechsler and CHC models. *International Journal of School and Educational Psychology*. Advance online publication.

Watkins, M. W., Dombrowski, S. C., & **Canivez, G. L.** (2017, October). Reliability and factorial validity of the **Canadian Wechsler Intelligence Scale for Children–Fifth Edition**. *International Journal of School and Educational Psychology*.

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Implications of … only measure 'g'

- The Scales on our intelligence tests (with one exception) are irrelevant!
  - That is, because 'g' is the only empirically supported score, we should not interpret the different scales on the WISC-V nor on the WJ, DAS, SB5
  - WHY do we have this problem?
    - The tests we use are based on 100 year-old concept of Alpha and Beta
    - THERE WAS and REMAINS NO THEORETICAL conceptualization that drove the creation of traditional intelligence tests

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School Psychology Quarterly
2011, Vol. 26, No. 4, 305–317

1045-3830/11/$12.00 DOI: 10.1037/a0025973

Hierarchical Factor Structure of the Cognitive Assessment System: Variance Partitions From the Schmid–Leiman (1957) Procedure

Gary L. Canivez
Eastern Illinois University

Orthogonal higher-order factor structure of the Cognitive Assessment System (CAS; Naglieri & Das, 1997a) for the 5–7 and 8–17 age groups in the CAS standardization sample is reported. Following the same procedure as recent studies of other prominent intelligence tests (Dombrowski, Watkins, & Brogan, 2009; Canivez, 2008; Canivez & Watkins, 2010a, 2010b; Nelson & Canivez, 2011; Nelson, Canivez, Lindstrom, & Hatt, 2007; Watkins, 2006; Watkins, Wilson, Kotz, Carbone, & Babula, 2006), three- and four-factor CAS exploratory factor extractions were analyzed with the Schmid and Leiman (1957) procedure using MacOrtho (Watkins, 2004) to assess the hierarchical factor structure by sequentially partitioning variance to the second- and first- order dimensions as recommended by Carroll (1993, 1995). Results showed that greater portions of total and common variance were accounted for by the second-order, global factor, but compared to other tests of intelligence CAS subtests measured less second-order variance and greater first-order Planning, Attention, Simultaneous, and Successive (PASS) factor variance.

Keywords: CAS, construct validity, hierarchical exploratory factor analysis, Schmid–Leiman higher-order analysis, structural validity

Support for PASS Scales

- "…compared to the WISC–IV, WAIS–IV, SB–5, RIAS, WASI, and WRIT, the CAS subtests had less variance apportioned to the higher-order general factor (g) and *greater proportions of variance apportioned to first-order (PASS…) factors*.
- This is consistent with the subtest selection and construction in an attempt to measure PASS dimensions linked to PASS theory … and neuropsychological theory (Luria)." (p. 311)

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Research Update

- We have been taught to OVER interpret scores obtained from scales and subtests on our intelligence tests
- We have been taught
  - If the total score isn't helpful look at the profile of scales
  - If the scale profile is not helpful look at the subtests
  - If the subtest profile is not helpful look at the items
- There is another answer…
- Look at the RESEARCH on another way to conceptualize and measure intelligence (aka PASS)

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PASS

- Given that PASS scales CAN be interpreted it is important to know
  - if these scales yield PROFILES that can be used in a Pattern of Strengths and Weaknesses approach to eligibility determination AND
  - do PASS scores relate to achievement more than traditional intelligence tests?

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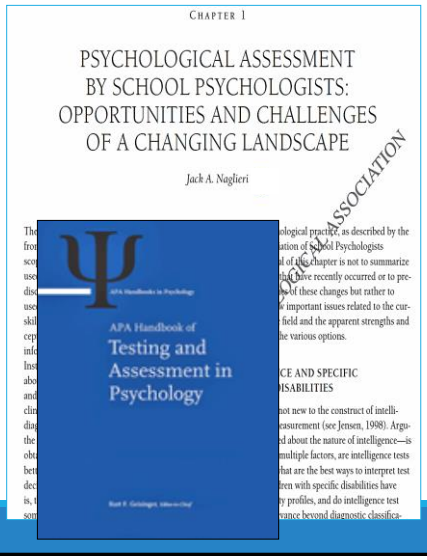
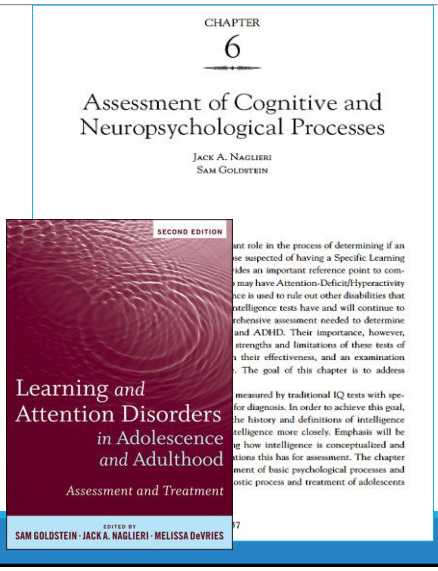
PASS Scales can be Interpreted and SHOULD be: Profiles





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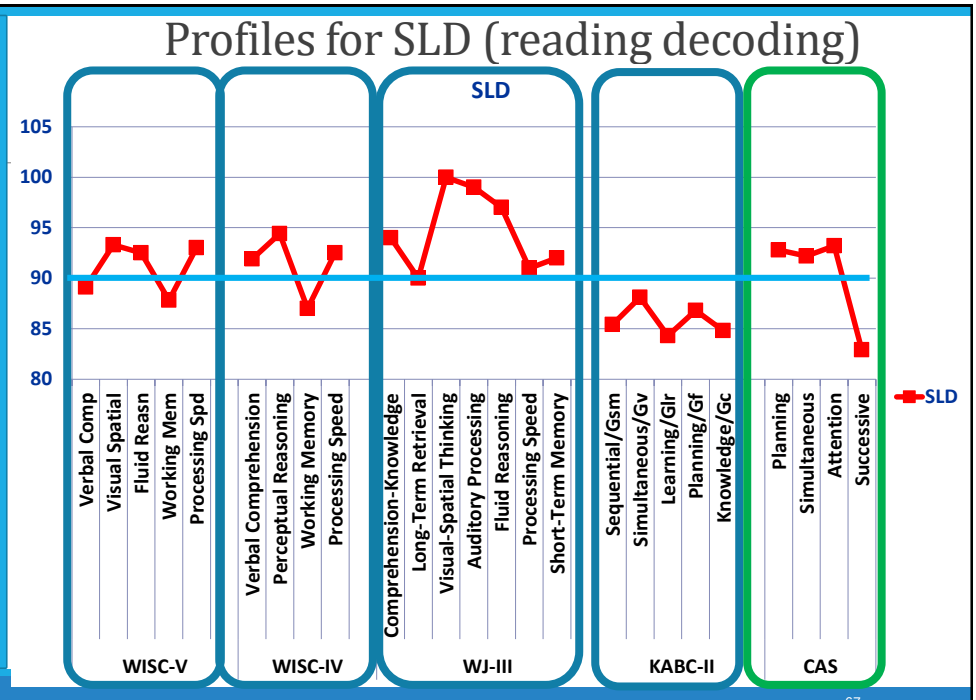
Profiles on all these widely used ability tests show that PASS scores from the CAS are sensitive to the cognitive component that underlies READING DECODING failure (Successive Processing)



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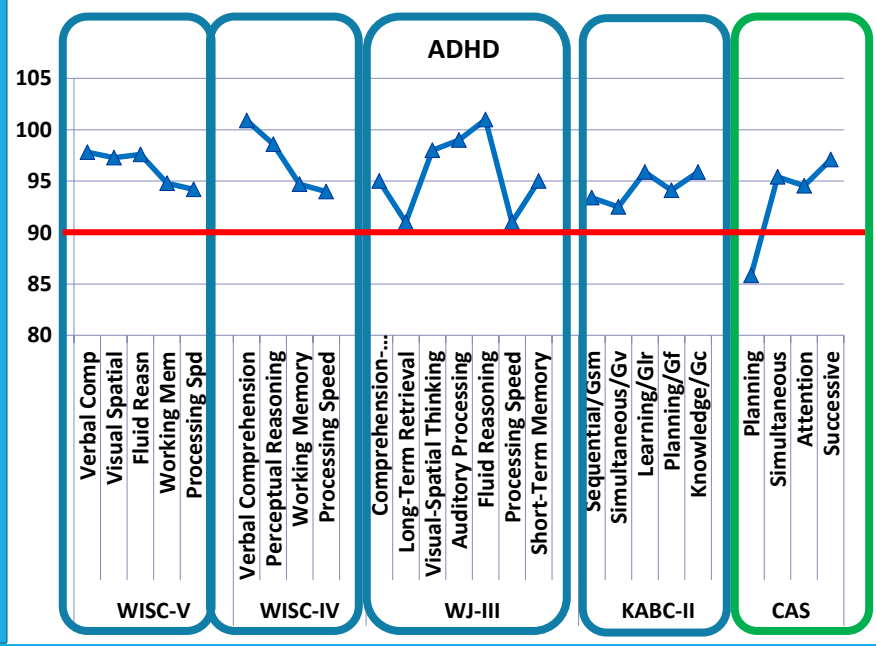
Profiles on all these widely used ability tests show that PASS scores from the CAS are sensitive to the cognitive component of ADHD Hyperactive / Combined Type (Planning)



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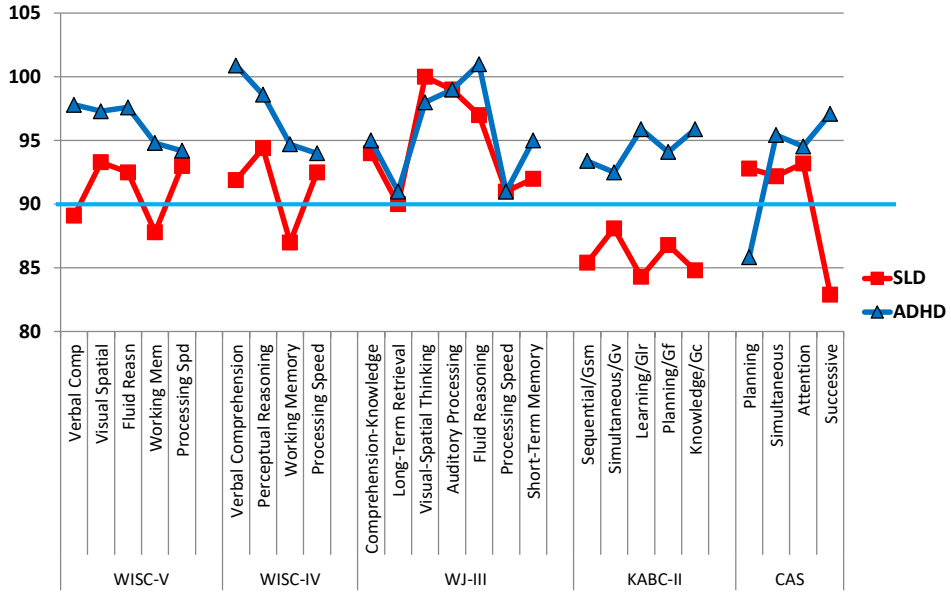
Looking at SLD and ADHD profiles on all these tests is very revealing…PASS works

Profiles for SLD (reading decoding) & ADHD



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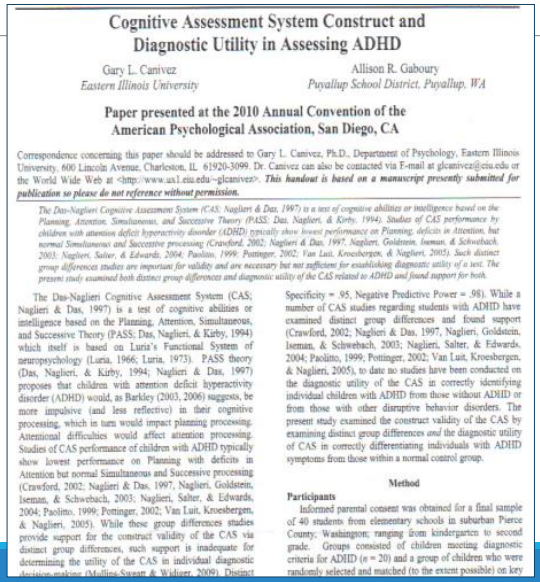
Canivez & Gaboury (2010)

- "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

Gary L. Canivez
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>.

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 (Mollins-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

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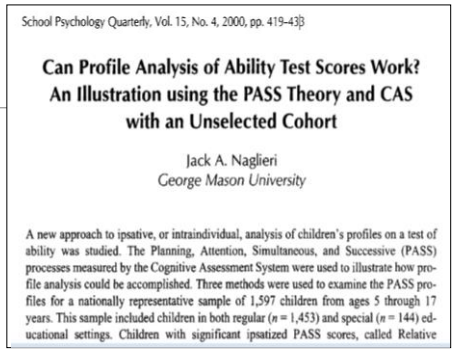
Research on PASS Profiles

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

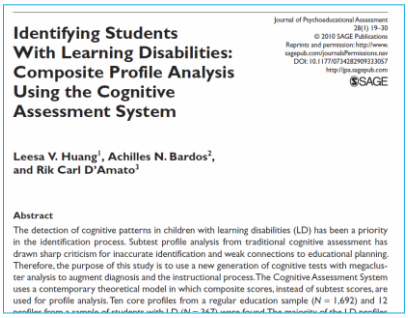


School Psychology Quarterly, Vol. 15, No. 4, 2000, pp. 419–433

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



Identifying Students With Learning Disabilities: Composite Profile Analysis Using the Cognitive Assessment System

Journal of Psychoeducational Assessment
28(1) 19-30
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DOI: 10.1177/0734282909333057
http://jpa.sagepub.com
SAGE

Leesa V. Huang[1], Achilles N. Bardos[2], and Rik Carl D'Amato[3]

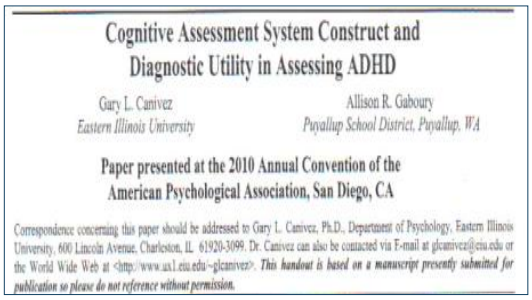
Abstract

The detection of cognitive patterns in children with learning disabilities (LD) has been a priority in the identification process. Subtest profile analysis from traditional cognitive assessment has drawn sharp criticism for inaccurate identification and weak connections to educational planning. Therefore, the purpose of this study is to use a new generation of cognitive tests with megacluster analysis to augment diagnosis and the instructional process. The Cognitive Assessment System uses a contemporary theoretical model in which composite scores, instead of subtest scores, are used for profile analysis. Ten core profiles from a regular education sample (N = 1,692) and 12

"Ten core profiles from a regular education sample (N = 1,692) and 12 profiles from a sample of students with LD (N = 367) were found.

Research on PASS Profiles

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



Cognitive Assessment System Construct and Diagnostic Utility in Assessing ADHD

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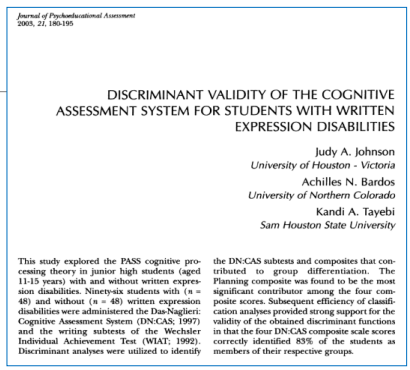
Correspondence concerning this paper should be addressed to Gary L. Canivez, Ph.D., Department of Psychology, Eastern Illinois University, 600 Lincoln Avenue, Charleston, IL 61920-3099. Dr. Canivez can also be contacted via E-mail at glcanivez@eiu.edu or the World Wide Web at <http://www.ux1.eiu.edu/~glcanivez>.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



Journal of Psychoeducational Assessment
2005, 23, 180-195

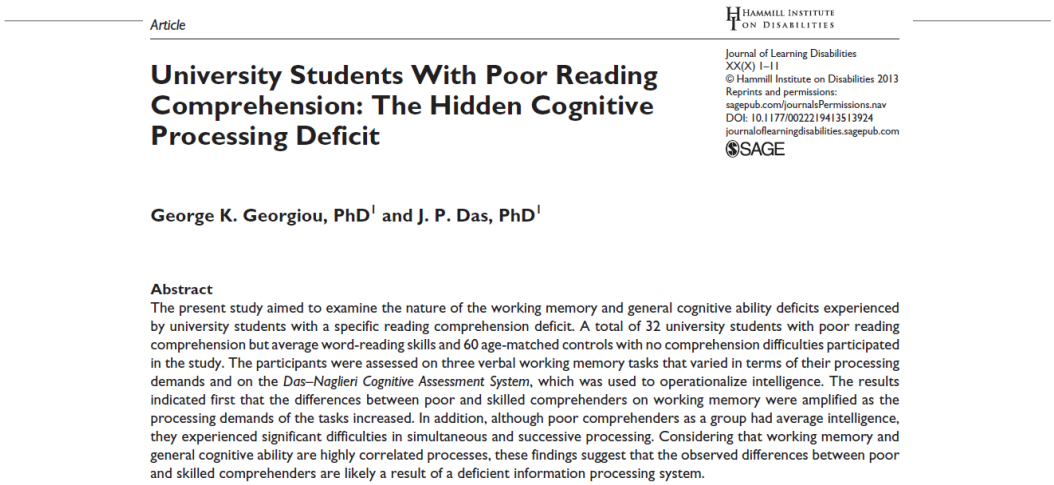
DISCRIMINANT VALIDITY OF THE COGNITIVE ASSESSMENT SYSTEM FOR STUDENTS WITH WRITTEN EXPRESSION DISABILITIES

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 85% of the students as members of their respective groups.

- "the present study demonstrated the potential of the CAS to correctly identify students who demonstrated behaviors consistent with ADHD diagnosis."

Research on PASS Profiles



Article

HAMMILL INSTITUTE ON DISABILITIES

University Students With Poor Reading Comprehension: The Hidden Cognitive Processing Deficit

Journal of Learning Disabilities
XX(X) 1–11

DOI: 10.1177/0022219413513924
journaloflearningdisabilities.sagepub.com
SAGE

George K. Georgiou, PhD[1] and J. P. Das, PhD[1]

Abstract

The present study aimed to examine the nature of the working memory and general cognitive ability deficits experienced by university students with a specific reading comprehension deficit. A total of 32 university students with poor reading comprehension but average word-reading skills and 60 age-matched controls with no comprehension difficulties participated in the study. The participants were assessed on three verbal working memory tasks that varied in terms of their processing demands and on the *Das–Naglieri Cognitive Assessment System*, which was used to operationalize intelligence. The results indicated first that the differences between poor and skilled comprehenders on working memory were amplified as the processing demands of the tasks increased. In addition, although poor comprehenders as a group had average intelligence, they experienced significant difficulties in simultaneous and successive processing. Considering that working memory and general cognitive ability are highly correlated processes, these findings suggest that the observed differences between poor and skilled comprehenders are likely a result of a deficient information processing system.

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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 neurocognitive processes do not have academic content
- This is good for fair assessment, but does it limit the power of processing scores to predict achievement?

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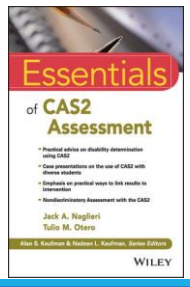
Correlations: We can do better!

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

Note: WJ-IV Scales Comp-Know= Vocabulary and General Information; Fluid Reasoning = Number 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.

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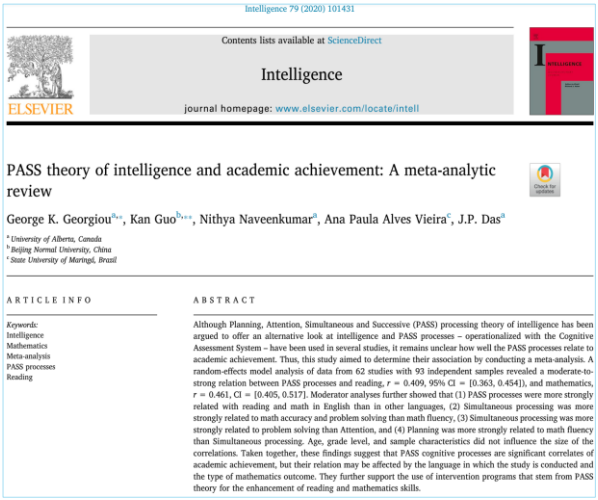

Intelligence 79 (2020) 101431

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

PASS theory of intelligence and academic achievement: A meta-analytic review

George K. Georgiou[a,*], Kan Guo[b,**], Nithya Naveenkumar[a], Ana Paula Alves Vieira[c], J.P. Das[a]

[a] University of Alberta, Canada
[b] Beijing Normal University, China
[c] State University of Maringá, Brasil

ARTICLE INFO

Keywords:
Intelligence
Mathematics
Meta-analysis
PASS processes
Reading

ABSTRACT

Although Planning, Attention, Simultaneous and Successive (PASS) processing theory of intelligence has been argued to offer an alternative look at intelligence and PASS processes – operationalized with the Cognitive Assessment System – have been used in several studies, it remains unclear how well the PASS processes relate to academic achievement. Thus, this study aimed to determine their association by conducting a meta-analysis. A random-effects model analysis of data from 62 studies with 93 independent samples revealed a moderate-to-strong relation between PASS processes and reading, $r = 0.409$, 95% CI = [0.363, 0.454]), and mathematics, $r = 0.461$, CI = [0.405, 0.517]. Moderator analyses further showed that (1) PASS processes were more strongly related with reading and math in English than in other languages, (2) Simultaneous processing was more strongly related to math accuracy and problem solving than math fluency, (3) Simultaneous processing was more strongly related to problem solving than Attention, and (4) Planning was more strongly related to math fluency than Simultaneous processing. Age, grade level, and sample characteristics did not influence the size of the correlations. Taken together, these findings suggest that PASS cognitive processes are significant correlates of academic achievement, but their relation may be affected by the language in which the study is conducted and the type of mathematics outcome. They further support the use of intervention programs that stem from PASS theory for the enhancement of reading and mathematics skills.

Georgiou, G., Guo, K., Naveenkumar, N., Vieira, A. P. A., & Das, J. P. (2019) PASS theory of intelligence and academic achievement: A meta-analytic review. *In press Intelligence.*

PASS Research

- "The results clearly show that when CAS Full Scale is used it correlates **.60 with reading** and **.61 with mathematics**."
- "**These correlations are significantly stronger … than the correlations reported in previous meta-analysis for other measures of intelligence** (e.g., Peng et al., 2019; Roth et al., 2015)…(e.g., WISC) that include tasks (e.g., Arithmetic, Vocabulary)…"
- "if we conceptualize intelligence as … cognitive processes that are linked to the functional organization of the brain" it leads to significantly higher relations with academic achievement."
  - "and these processes have direct implications for instruction and intervention…"

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Ideas to Consider

- **What we Have Today**
  - 100 Years of Intelligence Testing
- **Elephant in the Room**
  - Thinking vs Knowing
- **Social Justice**
  - Test Bias
- **Research Update**
  - To *g* or not to *g*
- **Eligibility Determination**
  - What to use
- **Reasons To Change**
  - Validity of PASS Theory

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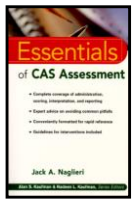
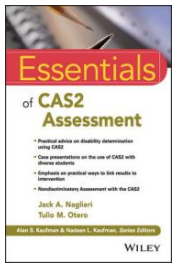
Discrepancy Consistency Method (DCM)

- 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

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:

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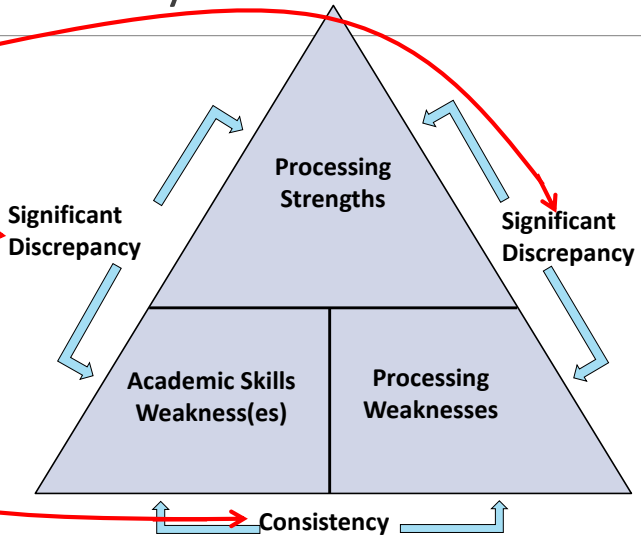
Discrepancy Consistency Method for SLD

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



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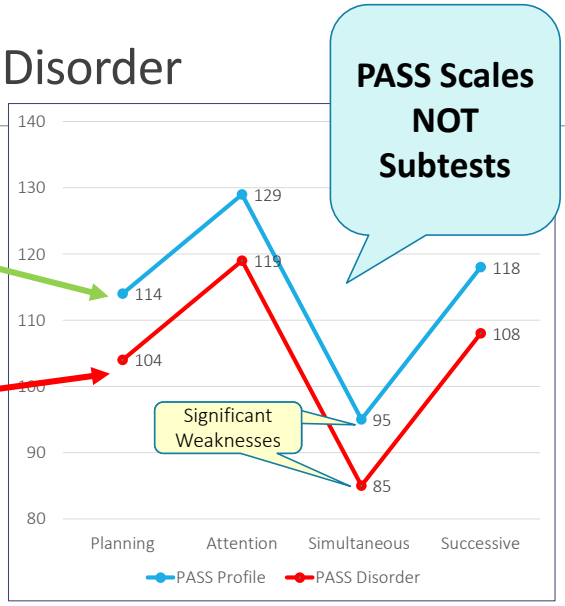
How to Determine a Disorder

- Two criteria for a disorder
  - 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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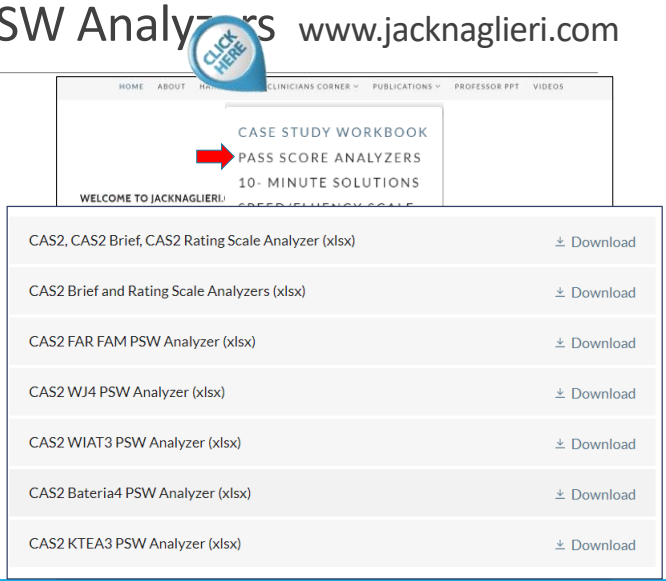
CAS2 Achievement PSW Analyzers www.jacknaglieri.com

- Discrepancy Consistency Method (DCM) is a conceptual approach I introduced in 1999
- This method can be used with any ability and achievement tests
- I provide ***free*** excel worksheets that analyze the relationships between the CAS2 with the Feifer Assessments of Reading, Math and Writing as well as with the WJ4, KTEA3, WIAT4 and Bateria.



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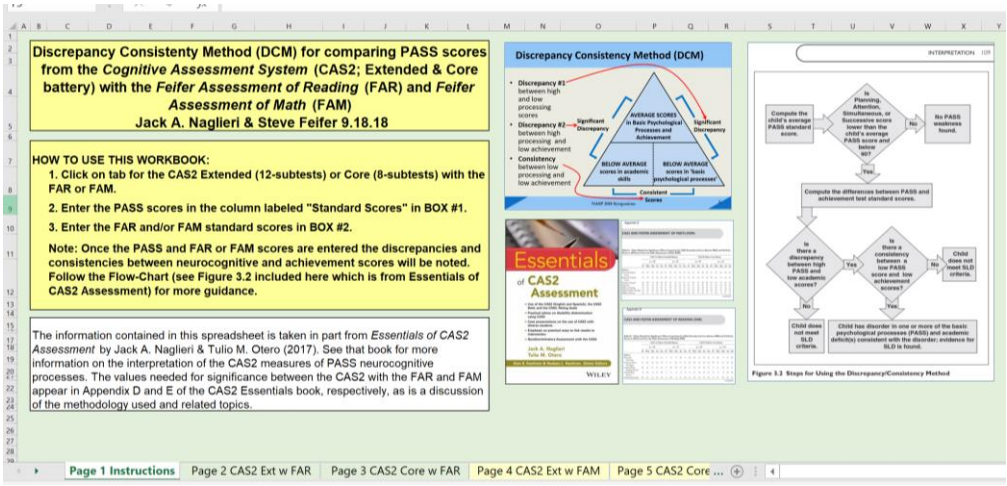
FREE CAS2 PSW Analyzers for FAR, FAM, & FAW, WJ4, KTEA3, WIAT4



Discrepancy Consistenty Method (DCM) for comparing PASS scores from the *Cognitive Assessment System* (CAS2; Extended & Core battery) with the *Feifer Assessment of Reading* (FAR) and *Feifer Assessment of Math* (FAM)
Jack A. Naglieri & Steve Feifer 9.18.18

HOW TO USE THIS WORKBOOK:
1. Click on tab for the CAS2 Extended (12-subtests) or Core (8-subtests) with the FAR or FAM.
2. Enter the PASS scores in the column labeled "Standard Scores" in BOX #1.
3. Enter the FAR and/or FAM standard scores in BOX #2.

Note: Once the PASS and FAR or FAM scores are entered the discrepancies and consistencies between neurocognitive and achievement scores will be noted. Follow the Flow-Chart (see Figure 3.2 included here which is from Essentials of CAS2 Assessment) for more guidance.

The information contained in this spreadsheet is taken in part from *Essentials of CAS2 Assessment* by Jack A. Naglieri & Tulio M. Otero (2017). See that book for more information on the interpretation of the CAS2 measures of PASS neurocognitive processes. The values needed for significance between the CAS2 with the FAR and FAM appear in Appendix D and E of the CAS2 Essentials book, respectively, as is a discussion of the methodology used and related topics.

Discrepancy Consistency Method (DCM)

Page 1 Instructions | Page 2 CAS2 Ext w FAR | Page 3 CAS2 Core w FAR | Page 4 CAS2 Ext w FAM | Page 5 CAS2 Core ...

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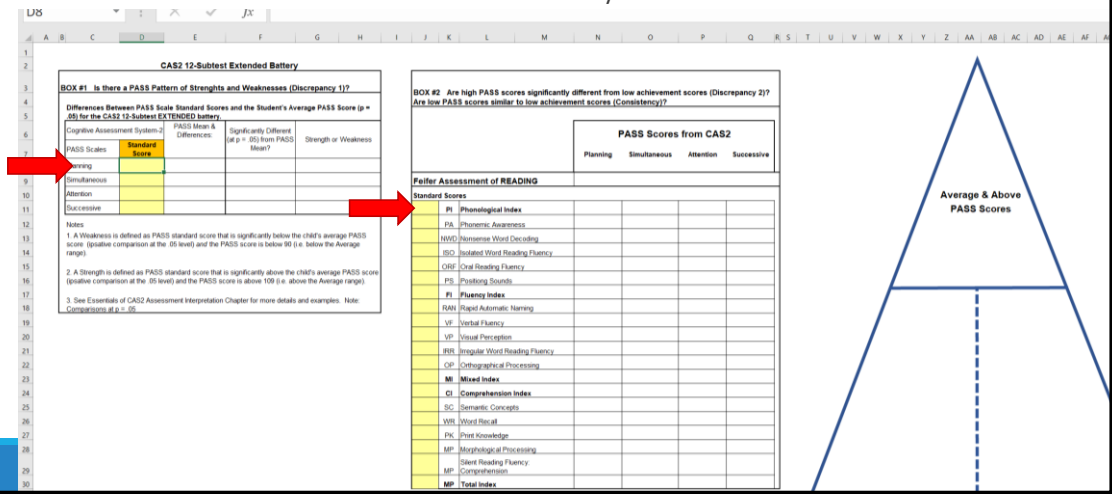
CAS2, FAR & FAM PSW Analyzer

- CAS2 Extended and FAR analysis on Page 2
  - Enter PASS and FAR standard scores in the yellow boxes



CAS2 12-Subtest Extended Battery

BOX #1 Is there a PASS Pattern of Strenghts and Weaknesses (Discrepancy 1)?

Differences Between PASS Scale Standard Scores and the Student's Average PASS Score (p = .05) for the CAS2 12-Subtest EXTENDED battery.

Cognitive Assessment System-2 PASS Scales	Standard Score	PASS Mean & Differences:	Significantly Different (at p = .05) from PASS Mean?	Strength or Weakness
Planning				
Simultaneous				
Attention				
Successive				

Notes
1. A Weakness is defined as PASS standard score that is significantly below the child's average PASS score (ipsative comparison at the .05 level) and the PASS score is below 90 (i.e. below the Average range).
2. A Strength is defined as PASS standard score that is significantly above the child's average PASS score (ipsative comparison at the .05 level) and the PASS score is above 109 (i.e. above the Average range).
3. See Essentials of CAS2 Assessment Interpretation Chapter for more details and examples. Note: Comparisons at p = .05

BOX #2 Are high PASS scores significantly different from low achievement scores (Discrepancy 2)? Are low PASS scores similar to low achievement scores (Consistency)?

		PASS Scores from CAS2			
		Planning	Simultaneous	Attention	Successive
Feifer Assessment of READING					
Standard Scores					
	PI	**Phonological Index**			
	PA	Phonemic Awareness			
	NWD	Nonsense Word Decoding			
	ISO	Isolated Word Reading Fluency			
	ORF	Oral Reading Fluency			
	PS	Positiong Sounds			
	FI	**Fluency Index**			
	RAN	Rapid Automatic Naming			
	VF	Verbal Fluency			
	VP	Visual Perception			
	IRR	Irregular Word Reading Fluency			
	OP	Orthographical Processing			
	MI	**Mixed Index**			
	CI	**Comprehension Index**			
	SC	Semantic Concepts			
	WR	Word Recall			
	PK	Print Knowledge			
	MP	Morphological Processing			
	MP	Silent Reading Fluency: Comprehension			
	MP	**Total Index**			

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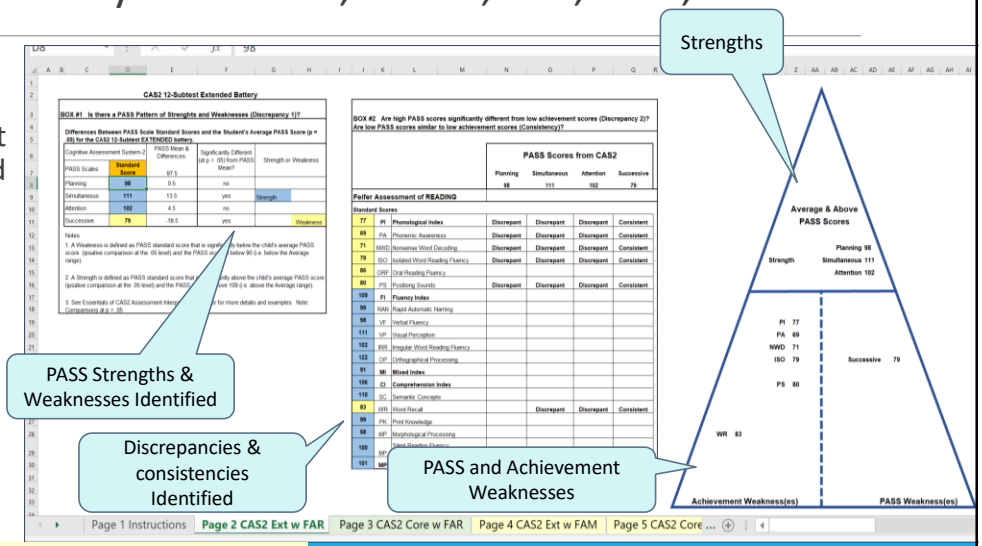
CAS2 PSW Analyzer for WJ4, KTEA3, FAR, FAM, Bateria

- Enter PASS and Achievement test standard scores and all comparisons are evaluated



FREE – on www.jacknaglieri.com

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CAS2 Analyzers

- Free CAS2 Analyzers are available for the WIAT-3, WJ-4, KTEA-3 and Bateria on www.jacknaglieri.com
- But WHY do I suggest the combination of PASS scores from CAS2 with the FAR and FAM?
  - FAR and FAM are elegantly inter-related to the CAS2 because PASS processes underlie reading and math skills
    - For example, when you determine if a student is using a strategy when doing reading comprehension on the FAR you can tie that to the CAS2 Planning score
    - Or when a student struggles with decoding words you can connect that to the CAS2 Successive processing score
    - The connection between low scores on the FAR and/or FAM with PASS is so important because it explains WHY student struggles AND what to do about it

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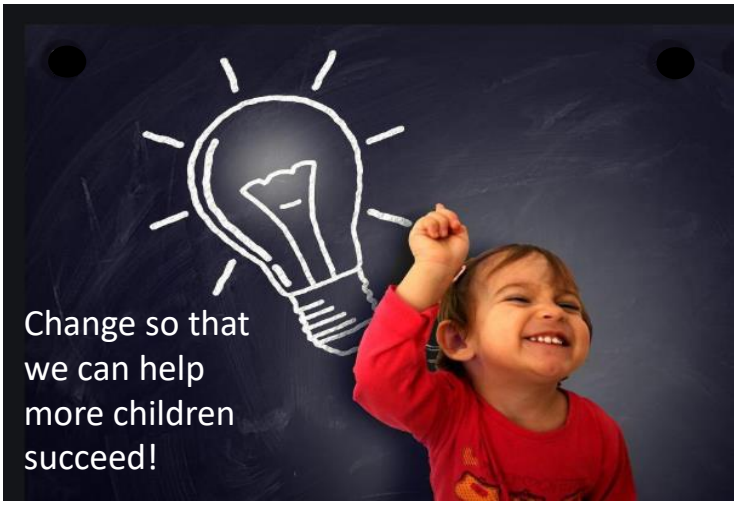

Ideas to Consider

Reasons To Change

- Validity of PASS Theory

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Summary: PASS theory and CAS2 (see Naglieri & Otero, 2017)

1. The PASS scales on the CAS2 measure *thinking* (i.e. basic psychological processing) rather than *knowing* (e.g., vocabulary, arithmetic etc.), making the test good for assessment of diverse populations and those with limited educational opportunity.
2. PASS scores can be easily obtained in 20 minutes (using the 4-subtest CAS2 Brief), 40 minutes (using the 8-subtest Core Battery) or 60 minutes (using the 12-subtest Extended Battery). Scoring and narrative reports are easily obtained using online program.
3. PASS results are easy for teachers, parents and the students themselves to understand because the concepts can be explained in non-technical language.
4. The PASS theory and the CAS2 provide a way to both define and assess 'basic psychological processes' so that practitioners can obtain scores that are consistent with state and federal IDEA guidelines.
5. The PASS scores are strongly correlated to achievement, show distinct patterns of strengths and weaknesses, are very useful for intervention planning, and the most equitable test
6. The CAS2 in combination with achievement (especially the FAR, FAM and/or FAW) provides examiners with a reliable and defensible Discrepancy Consistency Method to identify students with SLD.
7. Research has shown that PASS scores have relevance to instruction and intervention.

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Moving Forward

- WE CAN DO BETTER !
  - Measure thinking not knowing
  - Ensure Equitable Assessment
  - Start with a brain based theory
  - CAS2 is efficient and easy to administer

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THANK YOU

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