A Personal Journey to Equitable Assessment of Intelligence: Measure Thinking not Knowing

WELCOME !

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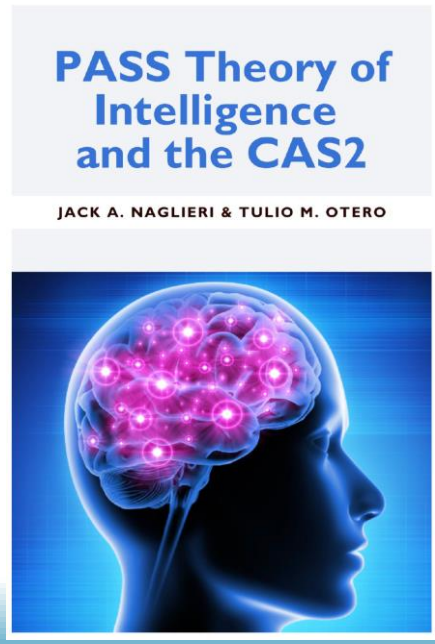

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PASS Theory of Intelligence and the CAS2

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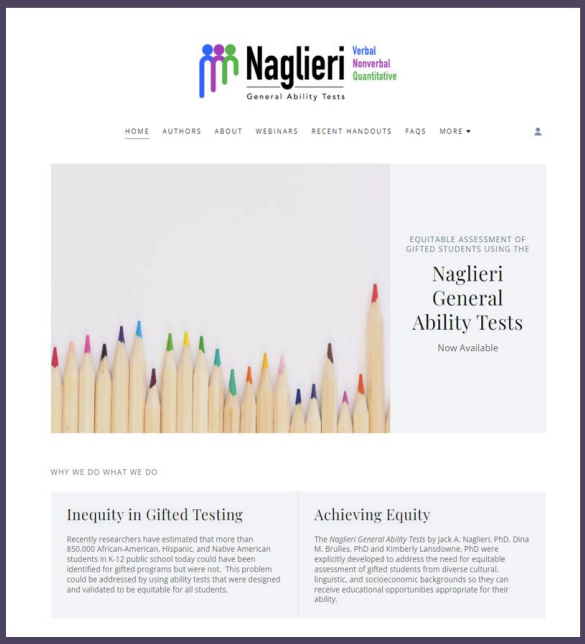

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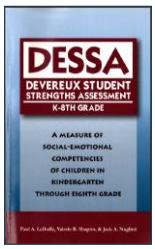
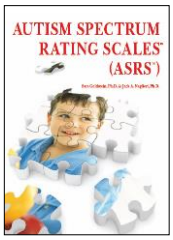
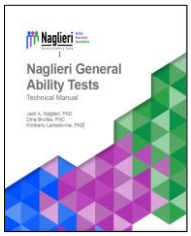
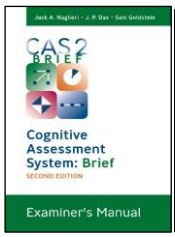
Disclosures

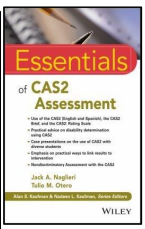
Executive Function | **SEL & Impairment** | **Autism** | **Gifted Identification** | **PASS Neurocognitive Theory: Assessment & Intervention Handouts**

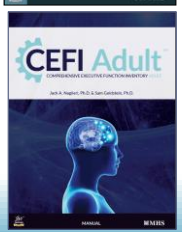


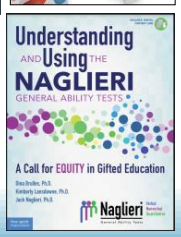


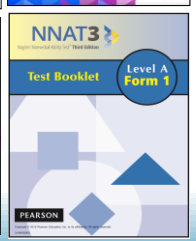


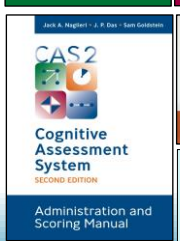


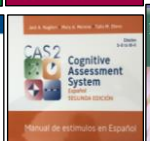












Coming 2023
CAS2 Online Administration & Scoring

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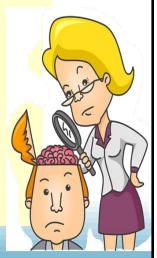
The BIG picture

- The comprehensive assessments we provide can alter the course of a student's life; making this one of the most important tasks we have.
- We want Intellectual assessment that
  - Informs teachers and students about academic strengths & weaknesses and interventions
  - Helps us understand cognitive variability and diagnosis SLD, ADHD, ID, etc.
  - Helps us understand WHY a student fails
  - Is fair for students from diverse populations
- These goals can be achieved if we use second-generation 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 and the Cognitive Assessment System-2nd Edition measures a student's ABILITY to think



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Ideas to Consider

My Professional Journey

- An Awakening About Traditional Intelligence Tests

A Theory Based on Brain Function

- Thinking vs Knowing and Social Justice

From PASS to CAS2

- A Different View of People

Research Update

- PASS and Equity – Measure Thinking not Knowing
- To *g* or not to *g*

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Did you Ever Wonder…

Who developed the intelligence tests we use today?

Why we have Vocabulary questions on an intelligence test?

Why do we have Arithmetic word problems on our intelligence tests

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Traditional IQ and Achievement Tests

- Working as a school psychologist in 1975 I noticed that items on the WISC we were VERY similar to parts of the achievement tests
  - The *Peabody Individual Achievement Test* (1970) had a General Information and Arithmetic subtests JUST LIKE THE WISC!
  - THAT DID NOT MAKE SENSE
  - In 1977 → UGA for Ph.D. With Alan Kaufman who said VIQ=achievement

1975 Charles Champagne Elementary, Bethpage, NY

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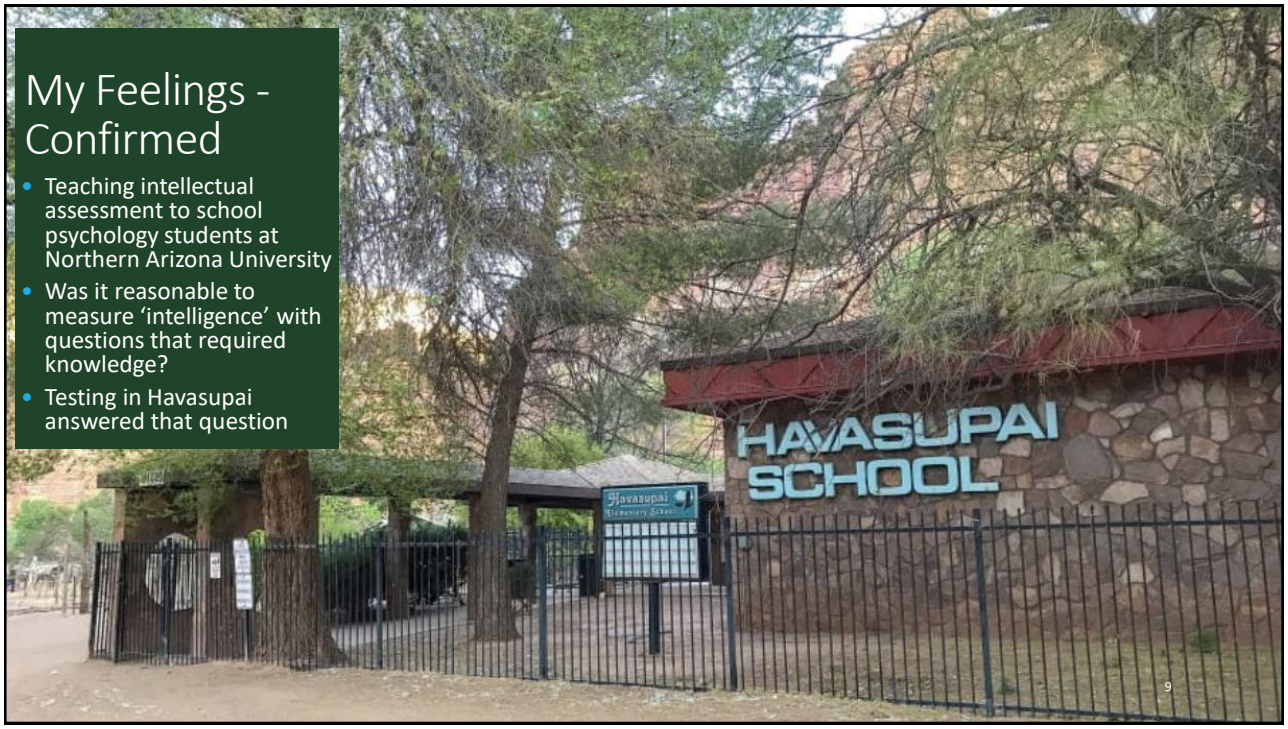

My Feelings - Confirmed

- Teaching intellectual assessment to school psychology students at Northern Arizona University
- Was it reasonable to measure 'intelligence' with questions that required knowledge?
- Testing in Havasupai answered that question

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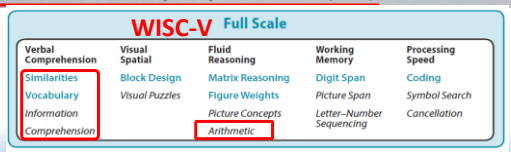
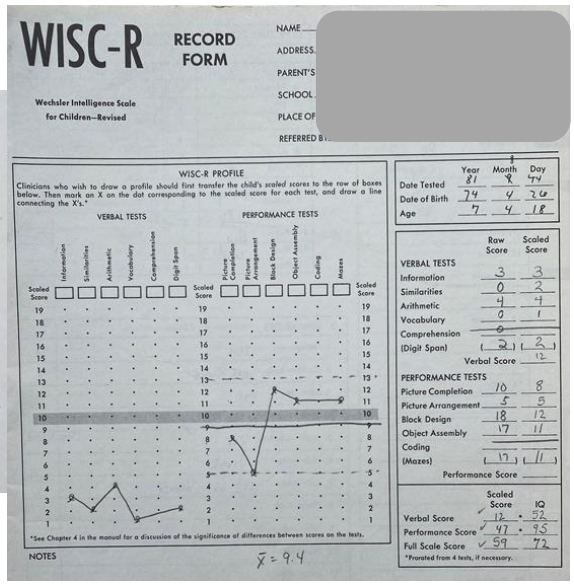
1981

Test Results and Interpretations:

On the WISC-R, Amanda earned a Performance IQ of 95±7 which falls in the average range of intelligence and at the 37th percentile rank in comparison to the children her age in the standardization sample. In contrast to this score of average non-verbal intelligence was her Verbal IQ of 52±7. This score is quite low and indicates that her level of facility with the English language falls at about the 1st percentile rank. This score can NOT be considered an estimate of verbal intelligence because Amanda speaks mostly Supai and little English. Due to the large difference between these scores, no Full Scale IQ was computed.

Within the WISC-R a clear pattern emerged: Amanda performed well on tasks that required little or no English language comprehension or expression, and poorly on all tasks which did require these linguistic skills. In fact, even if a task was visual and non-verbal, but required English language comprehension of instructions, she performed more poorly.





Naglieri, J. A. (1982). Does the WISC-R measure verbal intelligence for non-English speaking children? *Psychology in the Schools, 19*, 478-479.

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I realized that we should measure intelligence in a way that was not dependent on knowledge

My career as a test developer began with this goal

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Naglieri's Nonverbal Tests: 1985 to Present

➢ **Research on Six Versions of the Naglieri Nonverbal Tests**

MAT Short and Expanded Forms 1985 | Naglieri Nonverbal Ability Test 1997 | NNAT –Individual, 2003 | NNAT -2 2008 | NNAT3 2016

Each of these versions of the NNAT showed similar scores by RACE, ETHNICITY, & SEX and had strong correlation with achievement

This research convinced me that measuring intelligence using test questions that measured how well a student can think was a valid and equitable way to measure general intelligence 'g'.

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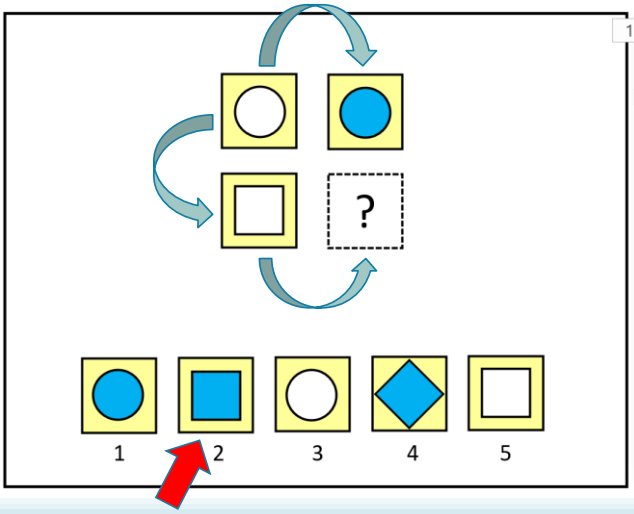
Tests that Measure Thinking or Knowing?



Girl is woman as boy is to man ?

3 is to 6 as 4 is to 8 ?

C^7 is to F as E^7 is to A ?

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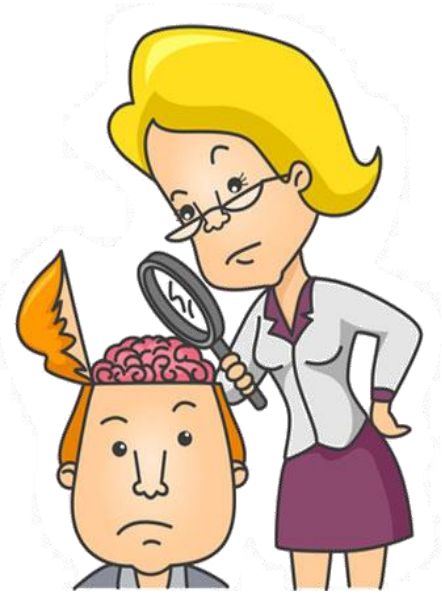
Why do we measure intelligence the way we do?

The History of IQ tests



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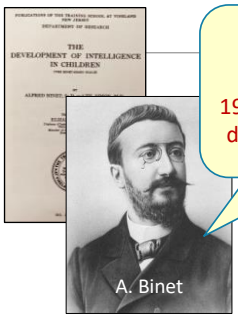
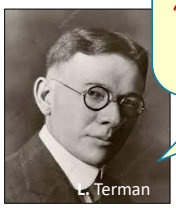
Binet→ Stanford-Binet → Army Mental Tests → WISC, CogAT, Olsat

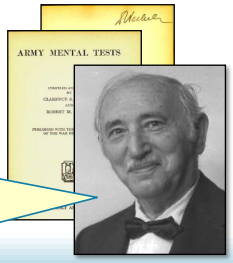


When working on the 1911 scale, Binet removed items from 1908 scale because 'they depended too much on school learning'



Terman added items dependent upon school learning in the 1916 Stanford-Binet because he believed 'intelligence at the verbal and abstract levels is the highest form of mental ability'.

Arthur Otis (Terman's student) was instrumental in the development of the U.S. Army Alpha (Verbal & Quantitative) and Beta (Nonverbal) and the Otis-Lennon Ability Test



Wechsler based his intelligence test on the U.S. Army Mental Tests (Verbal, Quantitative & Nonverbal)

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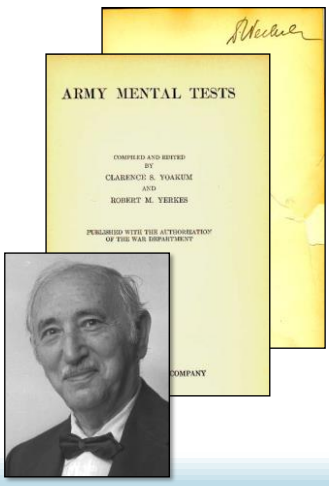
Alpha & Beta → Wechsler



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

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

Verbal & Quantitative IQ (Knowledge)

Nonverbal IQ (Thinking)

WISC, WJ CogAT & Otis-Lennon

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Binet was Right Terman was Wrong

Do NOT include questions that depend on school learning'

Terman added items dependent upon school learning - 'intelligence at the verbal and abstract levels is the highest form of mental ability'.

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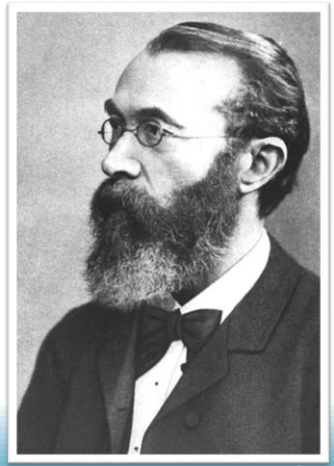
CONCEPT OF GENERAL INTELLIGENCE 61

The Criteria of a Test of Intelligence. — Influenced both by the theoretical discussion of general intelligence and by the empirical work of testing, we have arrived at certain requirements for a good test of intelligence, which we may discuss under the four following headings:

1. *Tests must be relatively new.* — A good intelligence test must avoid as much as possible anything that is commonly learned by the subjects tested. In a broad sense this rests upon a differentiation between knowledge and intelligence. To use as a test of intelligence something that is commonly taught in school is not desirable, because those children who have reached the particular grade in which this is generally taught have memorized this fact, whereas other children of equal or greater intelligence may have had no opportunity to learn this same fact, simply because they may not have reached this particular grade in their school work. To ask the question, "Who discovered America?" would be indicative of the school progress or general cultural environment of the child rather than of his general intelligence. Failure to answer might indeed be due to lack of intelligence in the case of school children of a certain grade in which this had been a matter of instruction, but on the other hand a very intelligent child might fail to answer owing to the fact of his not being in the grade in which this was taught.

Pintner
(Intelligence Testing, 1923)

- This is a social justice issue for those from disadvantaged communities and those with limited education



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Woodcock-Johnson Cognitive & Achievement Tests (CHC)

Very Similar Items on "Different" Tests

Cognitive: Oral Vocabulary #1 subtest has a question like this: Tell me another work for hot. Correct: Warm	Cognitive: Test #17B Reading Vocabulary-Antonyms subtest has a question like this: Tell me the opposite of up Correct: down
Achievement: Reading Vocabulary subtest #17 has a question like this: Tell me another work for Warm. Correct: Hot	Achievement Test #1C Verbal Comprehension-Antonyms has a question like this: Tell me the opposite of down. Correct: up

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Vocabulary by SES

Exposure to words increases with educational level of parents.

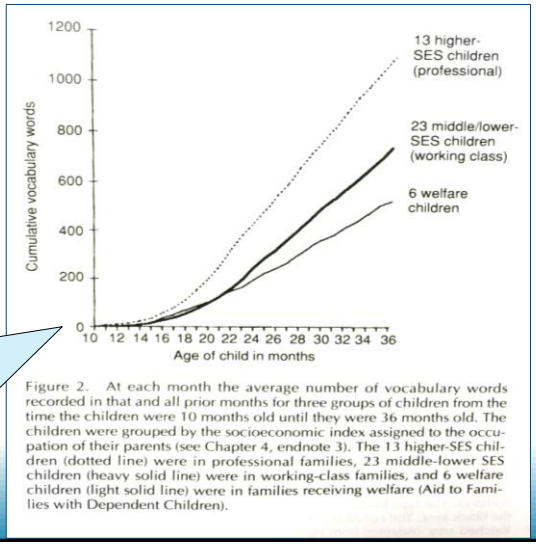
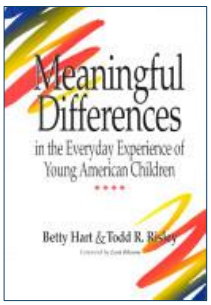


Figure 2. At each month the average number of vocabulary words recorded in that and all prior months for three groups of children from the time the children were 10 months old until they were 36 months old. The children were grouped by the socioeconomic index assigned to the occupation of their parents (see Chapter 4, endnote 3). The 13 higher-SES children (dotted line) were in professional families, 23 middle-lower SES children (heavy solid line) were in working-class families, and 6 welfare children (light solid line) were in families receiving welfare (Aid to Families with Dependent Children).



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Knowledge is Included in "Ability" Tests

Stanford-Binet-5	WISC-V	WJ-IV	KABC-II	OLSAT	CogAT
• Verbal • Knowledge • Quantitative Reasoning • Vocabulary • Verbal Analogies	• Verbal Comprehension Vocabulary, Similarities, Information & Comprehension • Fluid Reasoning Figure Weights, Arithmetic	• Comprehension Knowledge: Vocabulary & General Information • Fluid Reasoning: Number Series & Concept Formation • Auditory Processing: Phonological Processing	• Knowledge / GC • Riddles, • Expressive Vocabulary, • Verbal Knowledge	• Verbal • Following directions • Verbal Reasoning • Quantitative • Verbal Arithmetic Reasoning	• Verbal Scale • Analogies • Sentence Completion • Verbal Classification • Quantitative • 45 pages of oral instructions

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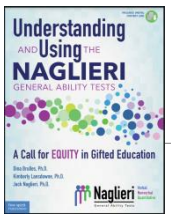
Race and Ethnic Differences for *Traditional* and *Second-Generation* Intelligence Tests



Note: Even though traditional intelligence tests may not show psychometric bias (Worrell, 2019) the large mean score differences suggest they are unfair (Brulles, et al., 2022).

	By Race	By Ethnicity
Tests that require knowledge	**Mn = 9.4**	**Mn =6.6**
Otis-Lennon School Ability Test (district wide)	13.6	
Stanford-Binet IV (normative sample)	12.6	
WISC-V (normative sample)	11.6	
WJ- III (normative sample)	10.9	10.7
CogAT7 Nonverbal	11.8	7.6
CogAT7 - Verbal	6.6	5.3
CogAT7-Quantitative	5.6	3.6
CogAT- Nonverbal	6.4	2.9
CogAT-Total (V, Q & NV)	7.0	4.5
K-ABC II Fluid-Crystallized Index	9.4	9.8
K-ABC II Mental Processing Index	8.1	8.2
WISC-V (statistical controls)	8.7	
Tests that require minimal knowledge	**Mn = 4.3**	**Mn = 2.9**
K-ABC (normative sample)	7.0	
K-ABC (matched samples)	6.1	
KABC-II (adjusted for gender & SES)	6.7	5.4
CAS-2 (normative sample)	6.3	4.5
CAS (statistical control normative data)	4.8	4.8
CAS-2 (statistical control normative data)	4.3	1.8
CAS-2 Brief (normative samples)	2.0	2.8
NNAT (matched samples)	4.2	2.8
Naglieri General Ability Test-Verbal	2.2	1.6
Naglieri General Ability Test-Nonverbal	1.0	1.1
Naglieri General Ability Test-Quantitative	3.2	1.3

Note: The results summarized here were reported for the Otis-Lennon School Ability Test by Avant and O'Neal (1986); Stanford-Binet IV by Wasserman (2000); Woodcock-Johnson III race differences by Edwards and Oakland (2006) and ethnic differences by Sotelo-Dynega, Ortiz, Flanagan, and Chaplin (2013); CogAT7 by Carman, Walther and Bartsch (2018) and Lohman (2016), WISC-V by Kaufman, Raiford, and Coalson (2016); Kaufman Assessment Battery for Children-II by Lichtenberger, Volker, Kaufman & Kaufman, (2006) and Scheiber, C., Kaufman, A.S. Which of the Three KABC-II Global Scores is the Least Biased?. Journal of Pediatric Neuropsychology 1, 21–35 (2015); CAS by Naglieri, Rojahn, Matto, and Aquilino (2005); CAS-2 and CAS2:Brief by Naglieri, Das, and Goldstein, 2014a and 2014b; Naglieri Nonverbal Ability Test by Naglieri and Ronning (2000), and Naglieri General Ability Tests by Naglieri, Brulles, and Lansdowne (2022).

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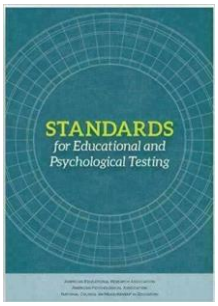
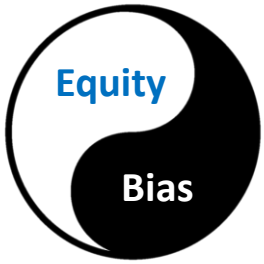
Test Bias vs Test Equity

According to the *Standards for Educational and Psychological Testing* (AERA, APA, NCME, 2014) Psychometric TEST BIAS and EQUITY are two different ways of measuring test fairness.



- … **if a person has had limited opportunities to learn the content in a test of intelligence, *that test may be considered unfair*** (because it penalizes students for not knowing the answers) **even if there is no evidence of psychometric test bias.**
- Evidence of EQUITY is examined by test content and mean score differences



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What is the Practical Impact of intelligence tests that are confounded by knowledge?

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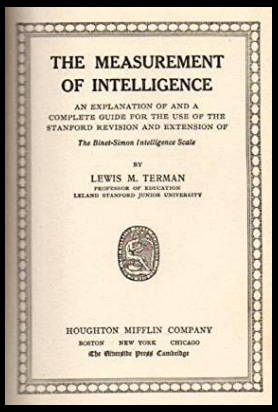
Lewis Terman 1916 Stanford-Binet

- Author of the Stanford-Binet predicted that the test would reveal "significant racial differences in general intelligence…which cannot be wiped out by any scheme of mental culture.

- His aim was identification of low intelligence children and adults who would be involuntarily institutionalized and sterilized for the improvement of society



Brookwood, M. (2021). The Orphans of Davenport. New York: Norton & Company. See Chapter 4.

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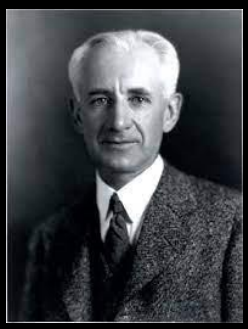
Robert Yerkes – Army Mental Tests 1920



- Robert Yerkes, of Harvard University was president of the American Psychological Association
- and leader of the Eugenics Section of the American Breeders' Association's Committee on the Inheritance of Mental Traits
- which advocated institutional segregation and sterilization for persons with low intelligence.
- Co-author of the Army Mental Tests

Brookwood, M. (2021). The Orphans of Davenport. New York: Norton & Company. See Chapter 4.

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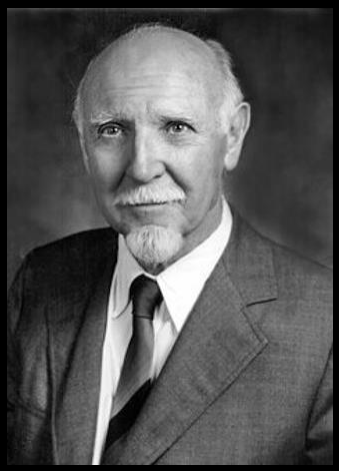
Raymond Cattell - 1933



- spoke out against race mixing, and he lobbied to overturn the 1954 Brown v. Board Education

Brookwood, M. (2021). The Orphans of Davenport. New York: Norton & Company. See Chapter 4.

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Practical Impact of intelligence tests

Psychologists who studied race were focused on ethnic differences and they attributed IQ test results to the **people** instead of the **tests**

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Numbers of Gifted Students Missed = 1,266,708

Gifted Enrollment by Race and Ethnicity as of 2020 (updated 2024).

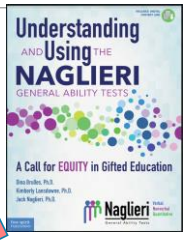
	N in Public Education K-12 in 2020	N Potentially Gifted (8%; 92 percentile)	N Students in gifted programs	Difference Between Potential and Identified
White	23,834,458	1,906,757	1,937,350	30,593
Black	7,754,506	620,360	330,774	-289,586
Hispanic	14,337,467	1,146,997	600,498	-546,499
Native Americans	748,000	59,840	26,700	-33,140
Two or More Races	1,641,817	131,345	105,371	-25,974
Total Non-Whites	24,481,790	1,958,543	1,063,343	**-895,200**

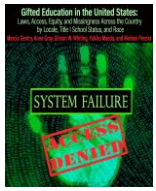
1. Representation Ratio formula: N in Gifted Education / Potential N in Gifted Education.
2. Total Enrollment data from Table 203.60. Enrollment and percentage distribution of enrollment in public elementary and secondary schools, by race/ethnicity and level of education: Fall 1999 through fall 2027. https://nces.ed.gov/programs/digest/d17/tables/dt17_203.60.asp
3. Gifted Enrollment data from Table 204.80. Number of public-school students enrolled in gifted and talented programs, by sex, race/ethnicity, and state: Selected years, 2004 through 2013–14. https://nces.ed.gov/programs/digest/d17/tables/dt17_204.80.asp
4. From: Brulles, D., Lansdowne, K. & Naglieri, J. A. (2022). *Understanding and Using the Naglieri General Ability Tests: A Call to Equity in Gifted Education.* Minneapolis, MN: Free Spirit Publishing.
5. Native American data from: Steven C. Haas, Associate Director, Indigenous Students Leap Ahead (ISLA) Project.

Percent of Schools that do not Identify	41.5%
Additional non-white gifted students = 41.5% of 895,200	N = 371,508
Total non-white gifted students missed	**N = 1,266,708**

895,200

371,508





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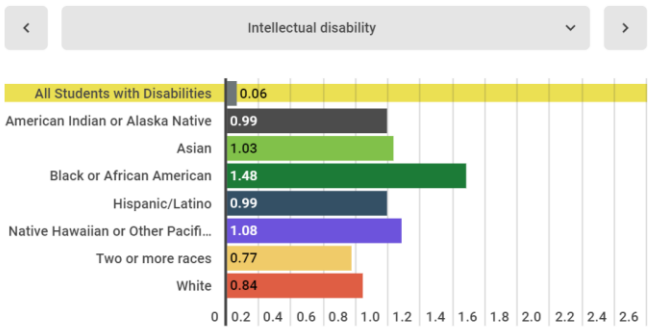
OSEP Office of Special Education Programs
Office of Special Education and Rehabilitative Services

OSEP Fast Facts: Race and Ethnicity of Children with Disabilities Served under IDEA Part B

For the purposes of this fact sheet, racial ethnic groups are defined in the IDEA Part B Child Count and Educational Environments for School Year 2019-2020, OSEP Data Documentation. https://www2.ed.gov/programs/osepidea/618-data/collection-documentation/data-documentation-files/part-b/child-count-and-educational-environment/idea-partb-childcountandedenvironment-2019-20.pdf

Risk Ratio of Students with Disabilities by Disability Category and by Specific Race and Ethnicity, Ages 5 (in kindergarten) through 21: SY 2019-20



The relative risk ratio of students with disabilities under IDEA by race and Ethnicity is the probability of a student with a disability being identified for intellectual disability. The higher the number, the larger the probability. Nationally, **Black Students are 1.48 times more likely to be identified with intellectual disability** compared to all students with disabilities.

https://sites.ed.gov/idea/osep-fast-facts-race-and-ethnicity-of-children-with-disabilities-served-under-idea-part-b/

https://ldaamerica.org/lda_today/disproportionate-identification-of-students-of-color-in-special-education/

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Measuring Thinking using CAS

- ***White*** children earned similar scores on the Verbal and Performance scales
- ***Black*** children earned lower VIQ than PIQ scores due to language / achievement tasks → low Full Scale
- ***Black*** children earned ***higher*** Full Scale scores on CAS than whites
- ***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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CASE by Tulio Otero: ALEJANDRO (C.A. 7-0 GRADE 1)

REASON FOR REFERRAL

- Does he have ID?
- 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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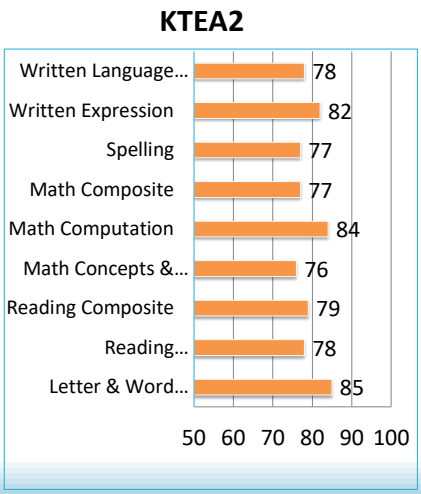
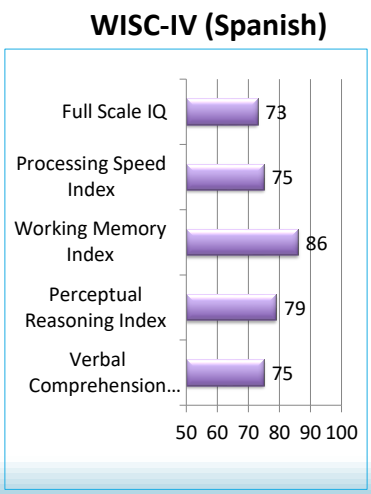
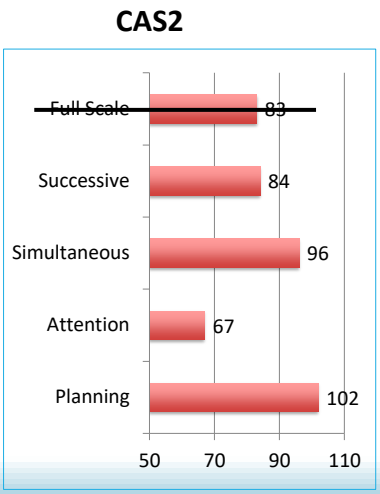
WISC-IV ASSESSMENT







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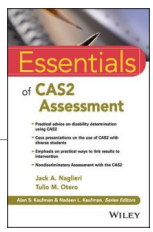
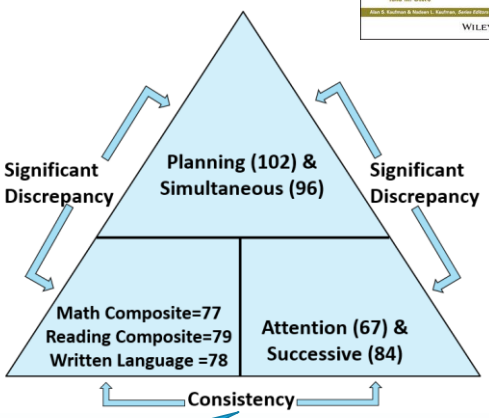
Alejandro and PASS (by Dr. Otero)



- Alejandro is not a slow learner.
- He has good processing scores:
  - Simultaneous = 96 and Planning = 102
- He has a "disorder in one or more of the basic psychological processes"
  - Attention = 67 and Successive = 84
- Using the **Discrepancy Consistency Method** (1999, 2017) he meets criteria for SLD (see Naglieri & Otero, 2017).
- Evidence of Dyslexia (low Successive) and Inattentive Type of ADHD (low Attention)



The Consistency portion of the triangle answers the question: "Why does the student fail?"

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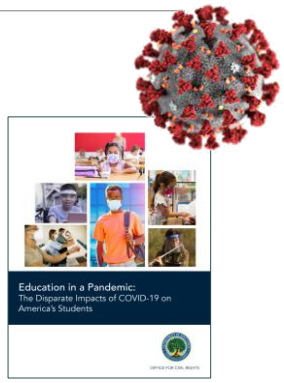
Academic Learning Loss & COVID

- COVID-19 has increased the impact of disparities in access and opportunity for students of color and they are even further behind than they were before.
- Their **scores on traditional intelligence tests** which demand knowledge **are even more inaccurate.**
- **Solutions**:
  - For traditional tests, use post-COVID norms only.
  - Use intelligence tests that are not dependent upon knowledge



Education in a Pandemic: The Disparate Impacts of COVID-19 on America's Students. US Dept. of Ed- Office of Civil Rights. June, 21, 2021. https://www2.ed.gov/about/offices/list/ocr/docs/20210608-impacts-of-covid19.p

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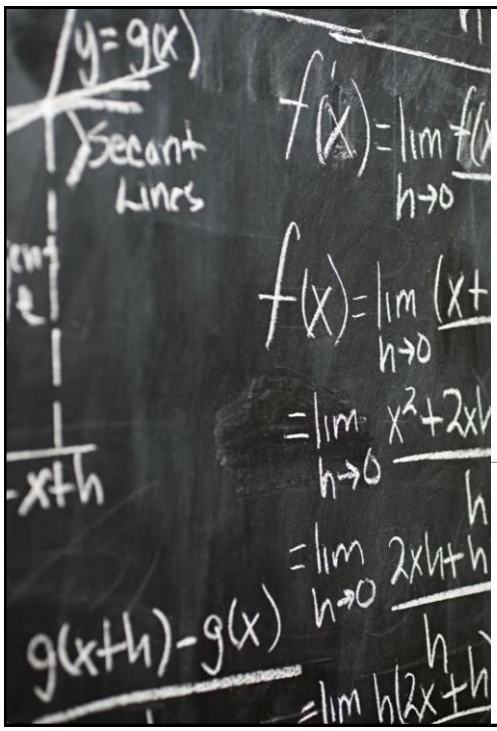

How Can we Test the Hypothesis that Knowledge Confounds the Measurement of General Intelligence?

CREATE GENERAL INTELLIGENCE TESTS THAT DO NOT RELY ON KNOWLEDGE!

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Measuring General Ability Equitably Using the Naglieri General Ability Tests: Verbal, Nonverbal and Quantitative

(Naglieri, Brulles & Lansdowne, 2022)

Jack A. Naglieri, Ph.D. jnaglieri@gmail.com

Dina Brulles, Ph.D. dbrulles@gmail.com

Kim Lansdowne, Ph.D. Kimberly.Lansdowne@asu.edu

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Naglieri General Ability Tests

- We **explicitly made tests for equitable identification** of students from diverse cultural, linguistic, or socioeconomic backgrounds
- We used the traditional Verbal, Nonverbal and Quantitative formats to **measure general ability** and to ensure equity we used:
  - Test questions that do not require academic knowledge,
  - Verbal and Quantitative test questions that can be solved using any language,
  - Animated instructions remove the need for comprehension of directions,
  - A multiple-choice response removes the need for verbal expression.
  - Universal assessment using local and national norms

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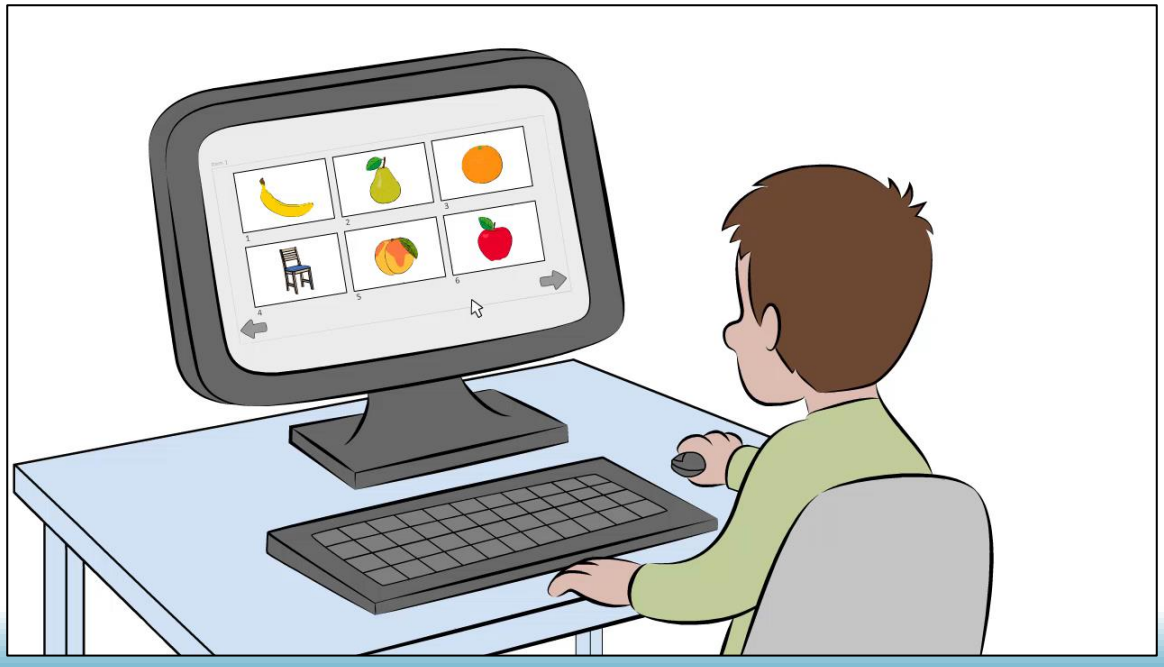

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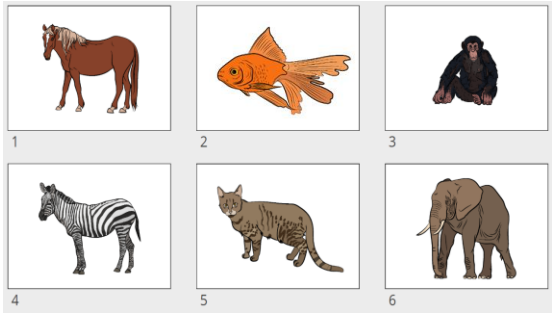
Naglieri General Ability Test – Verbal
(Naglieri & Brulles, 2022)

The **Naglieri–V measures general ability** using pictures of objects representing verbal concepts. The items are comprised of universally recognized pictures that do not rely on knowledge acquired in academic settings.

The student's task is to identify which of the six pictures does *not* represent the verbal concept shared by the other five.

The test items require close examination of *the relationships among the pictures*.

Naglieri General Ability Tests | Verbal



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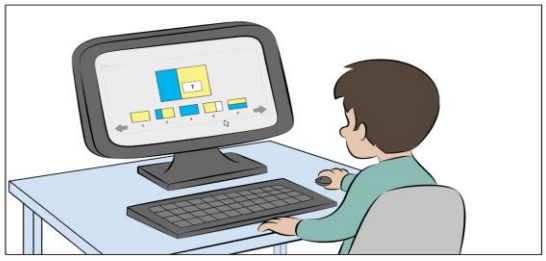
Naglieri General Ability Test - Nonverbal

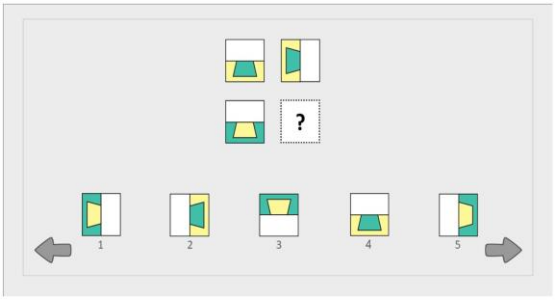
(Naglieri, 2022)

The **Naglieri–NV measures general ability** using questions that require a student to recognize the relationships among the shapes.

The structure of the items varies, but all items require that the student decipher the logic behind *the relationships among the shapes*, sequences, spatial orientations, patterns, and other distinguishing characteristics.

This nonverbal test is conceptually similar to the NNAT3 but it contains many NEW kinds of items not included before.





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Naglieri General Ability Test – Quantitative

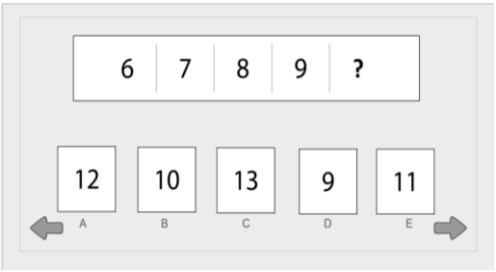
(Naglieri & Lansdowne)

The Naglieri–Q **measures general ability** using numbers and/or symbols. Students must decipher the logic behind *the relationships among the numbers and symbols* to identify the answer.

Items require the student to determine equivalency of simple quantities, analyze a matrix of numbers and solve mathematical sequences,

Items require minimal academic knowledge, and the calculation requirements are simple.

The items have no verbal requirements (i.e., no math word problems) so that they can be solved regardless of the language used by the student.



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Research Evidence of Equity

Selvamenan, M., Paolozza, A., Solomon, J., Naglieri, J. A., & Schmidt, M. T. (submitted for publication, Nov. 2020). Race, Ethnic, Gender, and Parental Education Level Differences on Verbal, Nonverbal, and Quantitative Naglieri General Ability Tests: Achieving Equity.

NONVERBAL TEST

- N= 3,630 Sample closely matches the US population on key demographics
- **No GENDER differences** found between **males** and **females** for raw score across all forms
- **No RACE/ETHNICITY differences** among **White, Black, & Hispanic** for raw score across all forms
- **No PARENTIAL EDUCATIONAL differences** among five education levels (No high school diploma; High School graduate; Some college/Associate's degree; Bachelor's degree; Graduate/professional degree) for raw score across all forms

VERBAL TEST

- N= 2,482 Sample closely matches the US population on key demographics
- **No GENDER differences** found between **males** and **females** for raw score across all forms
- **No RACE/ETHNICITY differences** among **White, Black, & Hispanic** for raw score across all forms
- **No PARENTIAL EDUCATIONAL differences** among five education levels (No high school diploma; High School graduate; Some college/Associate's degree; Bachelor's degree; Graduate/professional degree) for raw score across all forms

QUANTITATIVE TEST

- N= 2,841 Sample closely matches the US population on key demographics
- **No GENDER differences** found between **males** and **females** for raw score across all forms
- **No RACE/ETHNICITY differences** among **White, Black, & Hispanic** for raw score across all forms
- **No PARENTIAL EDUCATIONAL differences** among five education levels (No high school diploma; High School graduate; Some college/Associate's degree; Bachelor's degree; Graduate/professional degree) for raw score across all forms

43[43]

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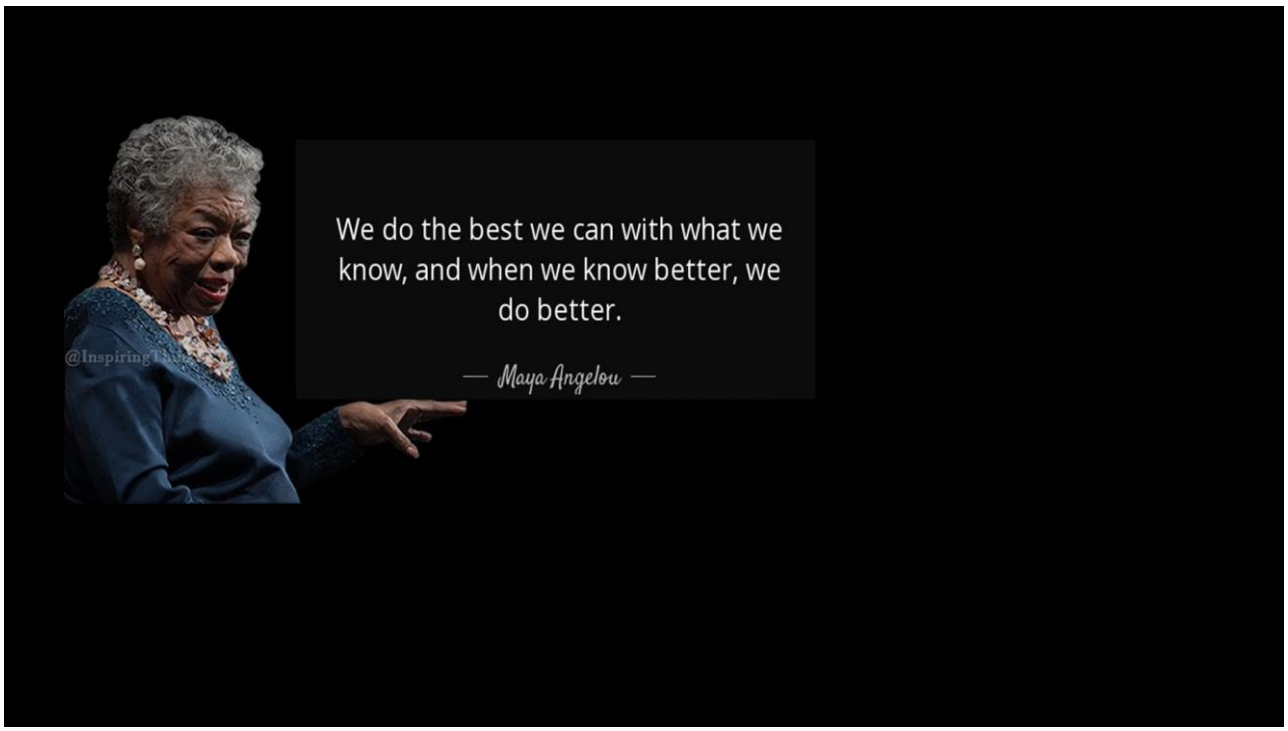

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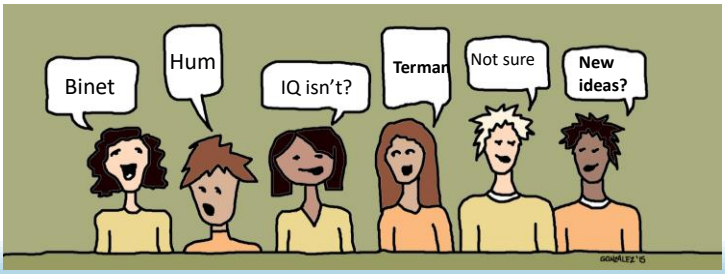
Core Group Discussion → Deeper Learning

- **DISCUSS – What thoughts do you have regarding this summary of the history of intelligence tests and the suggestion that knowledge confounds the measurement of ability?**



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Ideas to Consider

My Professional Journey

- An Awakening About Traditional Intelligence Tests

A Theory Based on Brain Function

- Thinking vs Knowing and Social Justice

From PASS to CAS2

- A Different View of People

Research Update

- PASS and Equity – Measure Thinking not Knowing
- To *g* or not to *g*

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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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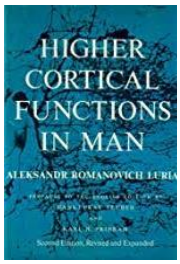
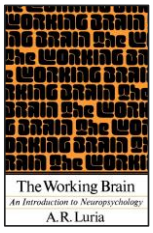
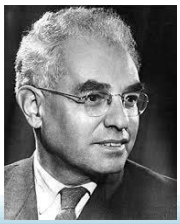
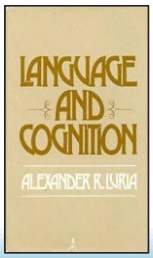
PASS Neurocognitive Theory









- **P**lanning = THINKING ABOUT HOW YOU DO WHAT YOU DECIDE TO DO
- **A**ttention = FOCUSED THINKING AND RESISTANCE TO DISTRACTIONS
- **S**imultaneous = THINKING ABOUT HOW THINGS GO TOGETHER
- **S**uccessive = THINKING ABOUT THE SEQUENCE OF THINGS

PASS = 'basic psychological processes'

NOTE: Easy to understand concepts!

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PASS is Easy to Understand

- Frankie was struggling in school at age 11
- Referred by parents after a history of reading and self esteem problems
- High level of anxiety
  - he was too anxious to look closely at the words
  - he rushed to get tasks completed
  - Frankie could not attend to the details of the sequence of letters for correct spelling, and the order of sound–symbol associations

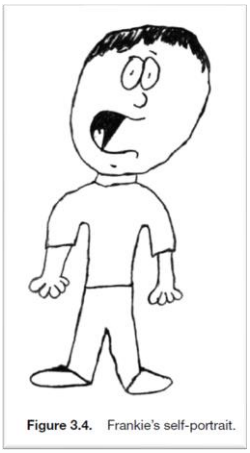

Figure 3.4. Frankie's self-portrait.

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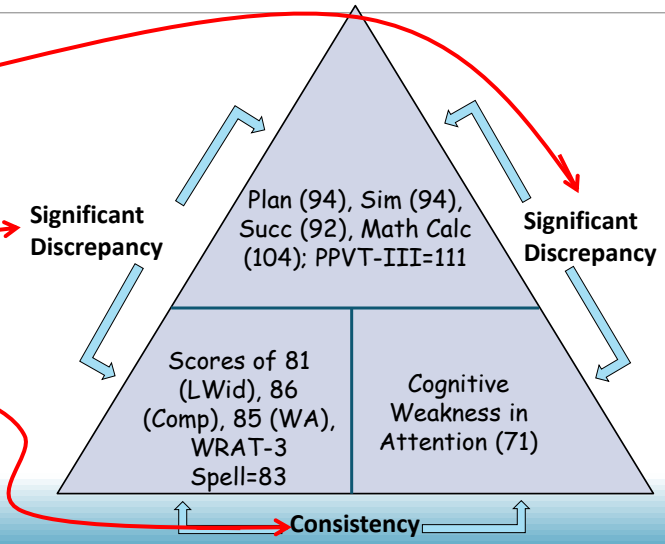
Frankie's Discrepancy Consistency Results

- **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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Frankie: Then and Now

- I informed Frankie of his PASS scores, and everything changed
- He learned to manage his attention problem by using good Planning which helped him
  - recognize when he is off task
  - Think of possible ways to manage his attention
  - recognize when he needed a change in the environment to reduce distractions
- Perhaps most importantly: He was given hope – that he could succeed

- Frankie graduated High School and went to college
- Is married with children
- He is a graphic designer
- He uses his good Planning, Simultaneous and Successive processing to manage any obstacles he may still have with attention

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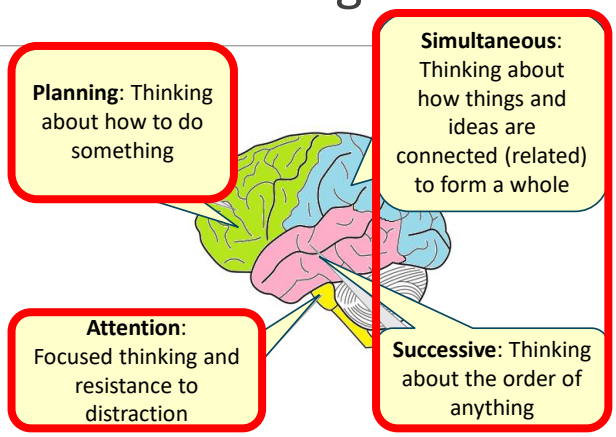
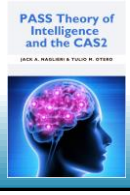
A Neuropsychological view of Intelligence

- being alert and focused is the first step
- The second step is deciding how to achieve the goal
- The third step is applying all four abilities to solve a task





From: *Essentials of CAS2 Assessment*. Naglieri & Otero, 2017 Figure 1.2 Functional Units from A. R. Luria

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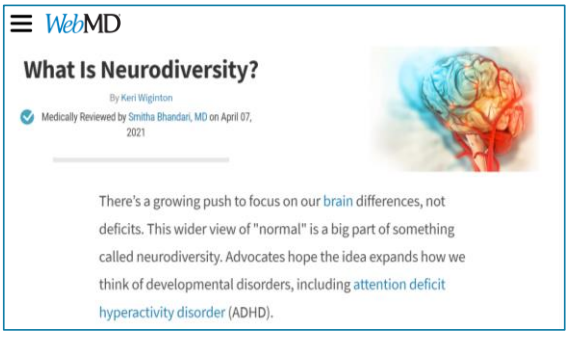
PASS and Neurodiversity



WebMD

What Is Neurodiversity?

By Keri Wiginton

Medically Reviewed by Smitha Bhandari, MD on April 07, 2021

There's a growing push to focus on our brain differences, not deficits. This wider view of "normal" is a big part of something called neurodiversity. Advocates hope the idea expands how we think of developmental disorders, including attention deficit hyperactivity disorder (ADHD).

Research on Neurodiversity using PASS scores shows that 33% of children aged 5-18 in the CAS2 standardization sample have significant variability (Strengths and/or Weaknesses) across their four PASS scores.

My Neurodiversity Podcast with Emily Kircher-Morris

'Neurodiversity' is a concept that implies that neurological difference is best understood as an inherent and valuable part of the range of human variation, rather than a pathological form of difference. Dyck E., Russell G. (2020) Challenging Psychiatric Classification: Healthy Autistic Diversity and the Neurodiversity Movement. In: Taylor S., Brumby A. (eds) Healthy Minds in the Twentieth Century. Mental Health in Historical Perspective. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-27275-3_8

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PASS Theory Based on Brain Function – Planning, Attention, Simultaneous and Successive Neurocognitive processes

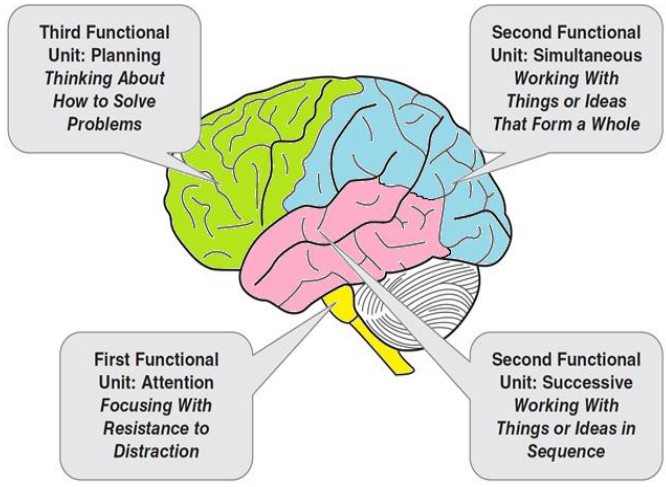

Figure 1.2 Three Functional Units and Associated Brain Structures

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

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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 refers to **THINKING ABOUT HOW TO SOLVE ANY KIND OF A PROBLEM** from academics to social situations and life in general
- Math calculation, written expression, etc

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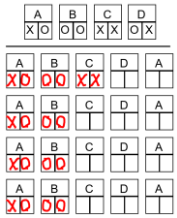
Planning Subtests

Planned Codes



Planned Connections

1

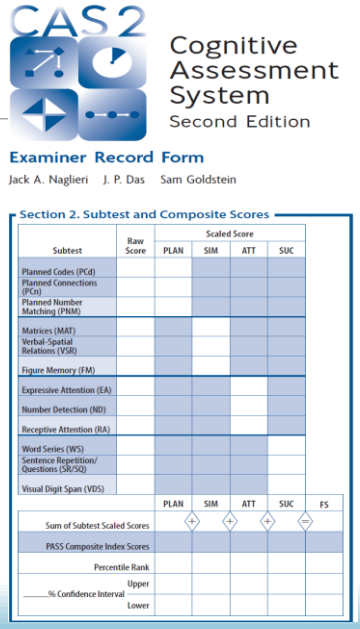
4

2

Planned Number Matching

3

5176	5761	5167	1576	5176	1567



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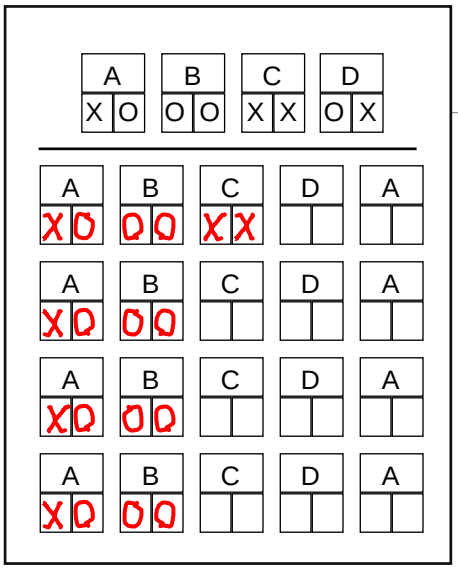

Planned Codes Page 1

- Jack Jr. at age 5
- Child fills in the codes in the empty boxes
- After being told the test requirement, examinees are told: “You can do it any way you want”

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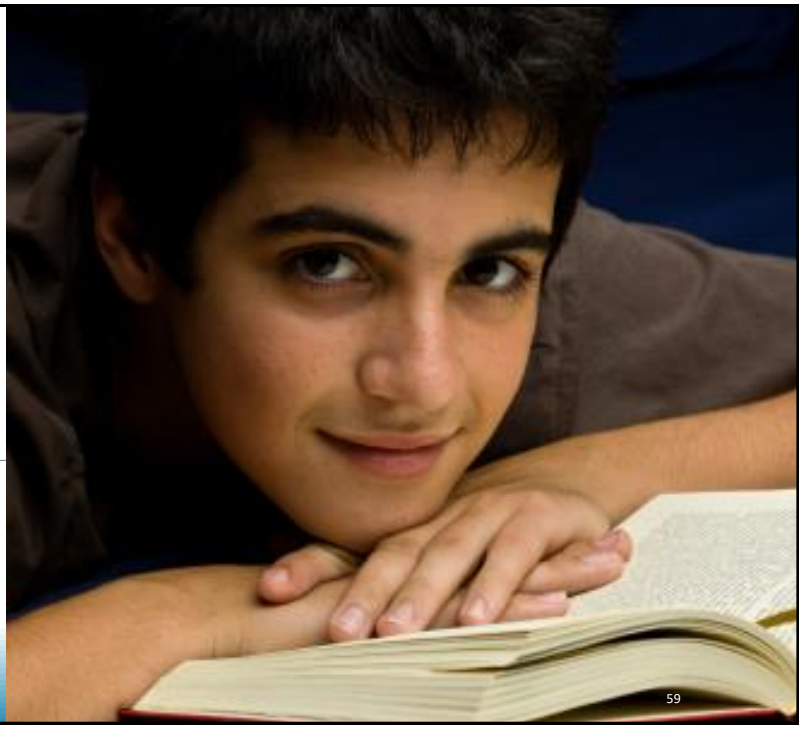
The Case of Rocky

Strengths with Specific Learning Disability and

ADHD



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The case of Rocky

- Rocky[1] went to school in a large middle-class district
- In first grade Rocky was significantly below grade benchmarks in reading, math, and writing.
  - He received group reading instruction weekly and six months of individual reading instruction but minimal progress →retained
- By the middle of his second year in first grade he still struggling
  - decoding, phonics, and sight word vocabulary; math problems, addition, problem solving activities and focusing and paying attention."
- After two years of special team meetings and special reading instruction he is now working two grade levels below his peers in reading, writing, and math

Note: This child's name and other potentially revealing data have been changed to protect his identity.

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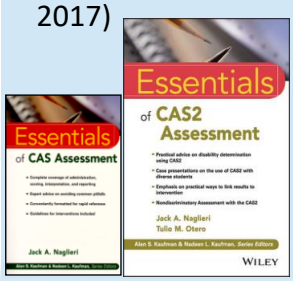
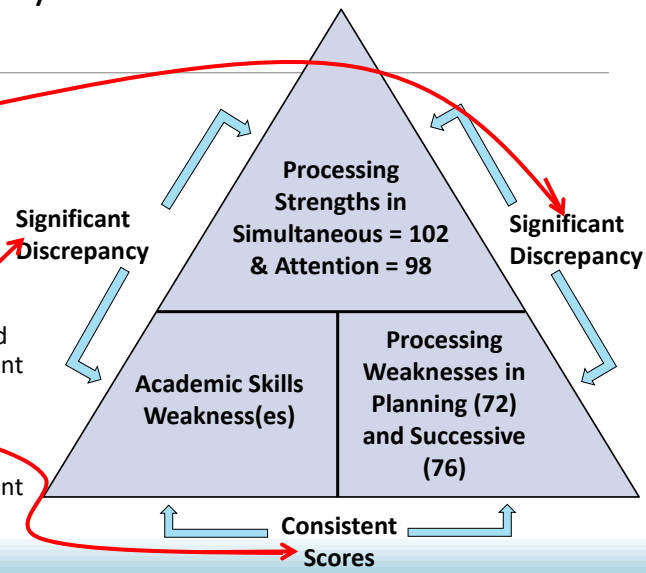
Answering the Question: Why the student fails?

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



- 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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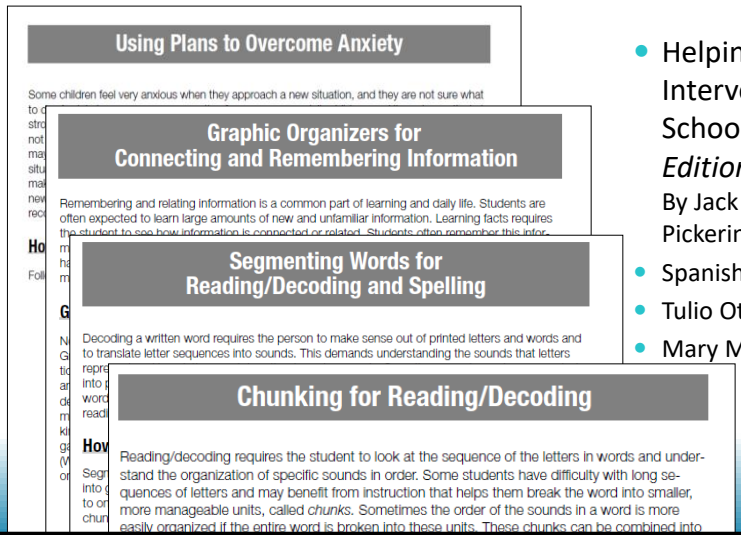
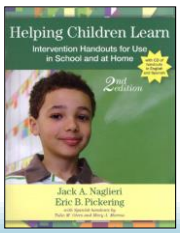
Interventions for Rocky



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



62

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Hammill Institute on Disabilities
Journal of Learning Disabilities
44(2) 184–195

DOI: 10.1177/0022219410391190
http://journaloflearningdisabilities.sagepub.com
SAGE

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

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

Abstract

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

Planning Facilitation for Math Calculation

Math calculation is a complex activity that involves recalling basic math facts, following procedures, working carefully, and checking one's work. Math calculation requires a careful (i.e., planful) approach to follow all of the necessary steps. Children who are good at math calculation can move on to more difficult math concepts and problem solving with greater ease than those who are having problems in this area. For children who have trouble with math calculation, a technique that helps them approach the task planfully is likely to be useful. Planning facilitation is such a technique.

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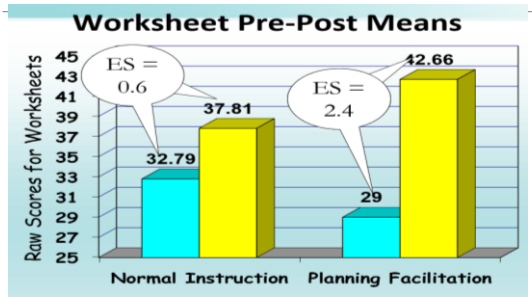
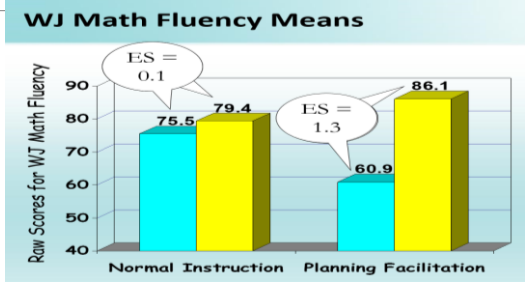
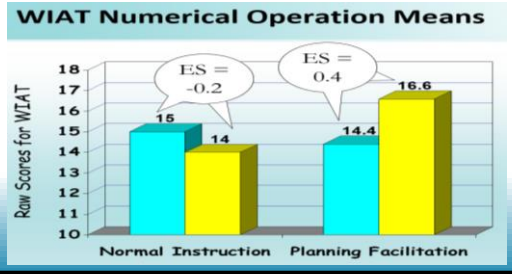
Pre-Post Means and Effect Sizes for the Students with LD and ADHD







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

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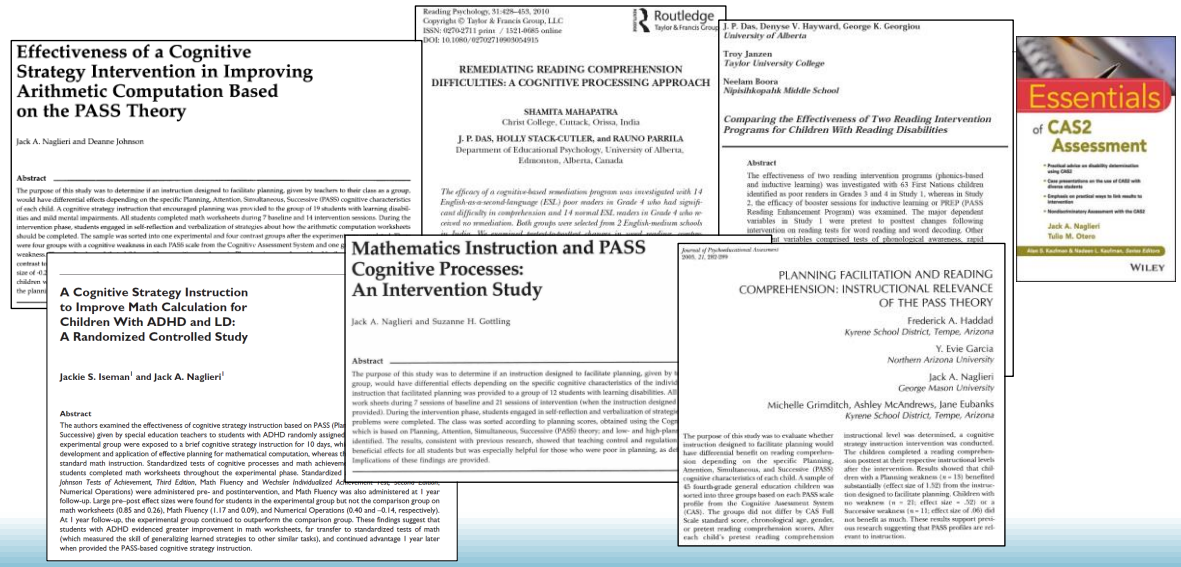
Summary of PASS Intervention Research in Essentials of CAS2



PASS Theory Based on Brain Function -– Attention

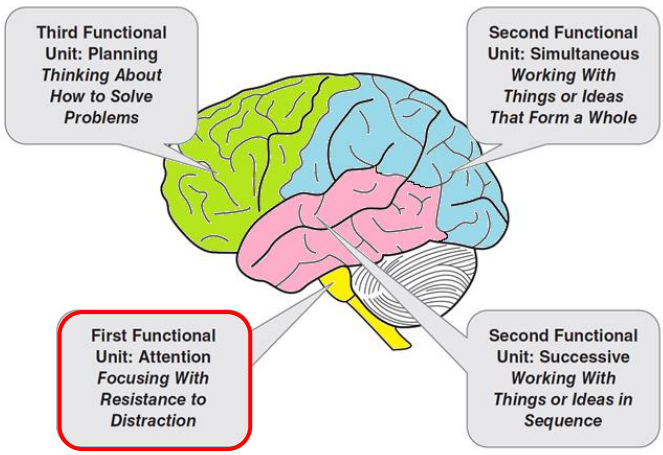


Figure 1.2 Three Functional Units and Associated Brain Structures

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

Attention Subtests

Expressive Attention

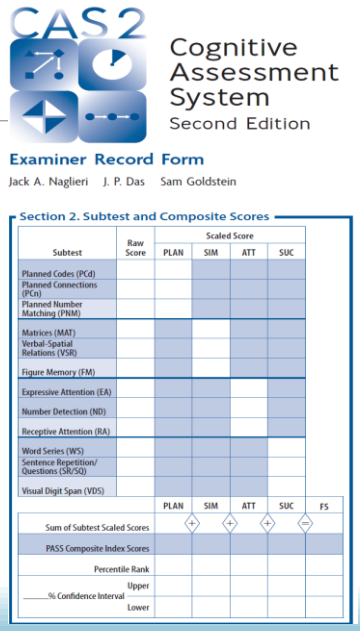
RED	RED	BLUE
YELLOW	YELLOW	RED
BLUE	RED	YELLOW
BLUE	BLUE	BLUE
YELLOW	BLUE	YELLOW

Number Detection

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

Receptive Attention

N n	T r	b t
TR	n b	A a



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PASS Theory: Attention

- Attention is a basic psychological process we use to
  - **THINKING THAT INVOLVES ATTENDING AND RESISTING DISTRACTION**
  - Selectively attend to some stimuli and ignoreing 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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Jose: Age 10, 5th Grade, Bilingual Student
by Tulio M. Otero, Ph.D.

Jose reading problems and the teacher these concerns:

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

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

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

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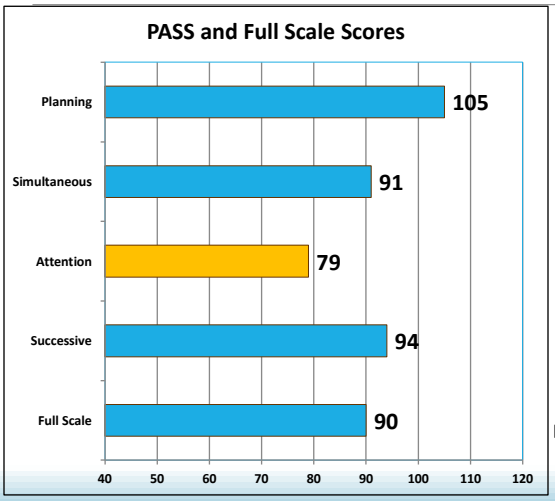
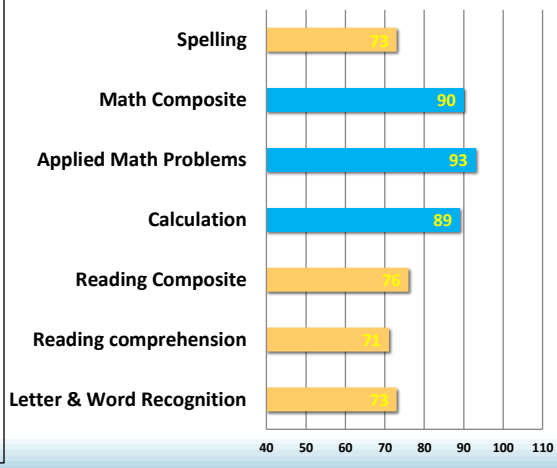
CAS2 and KTEA-III Scores (January 2020)





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Jose was given this simple intervention

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

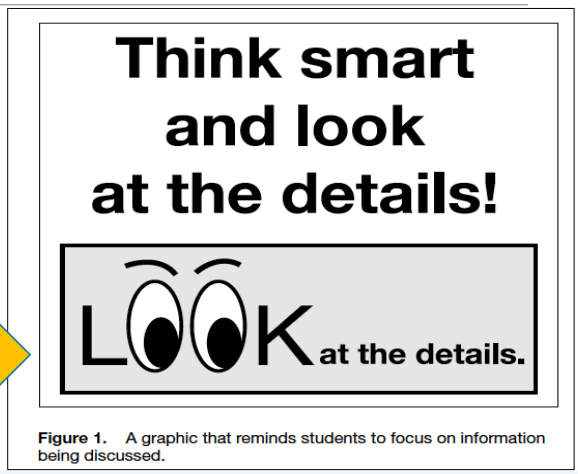

Figure 1. A graphic that reminds students to focus on information being discussed.

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

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Two weeks later!

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

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PASS Theory Based on Brain Function - Simultaneous Processing

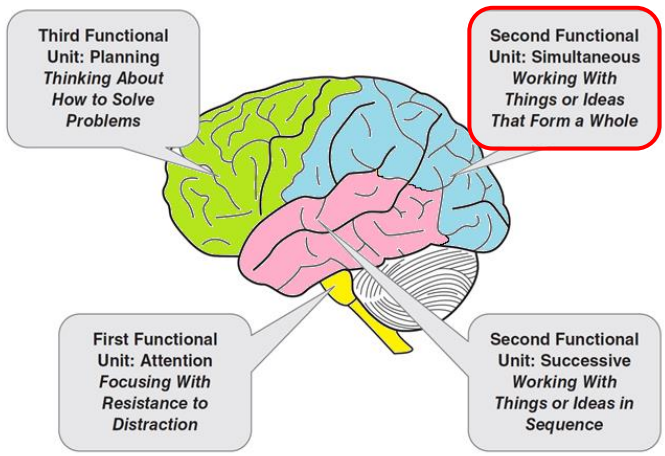

Figure 1.2 Three Functional Units and Associated Brain Structures

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

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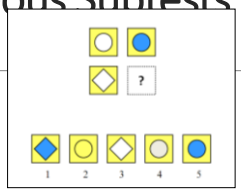
Simultaneous Subtests

Matrices



Verbal Spatial Relations

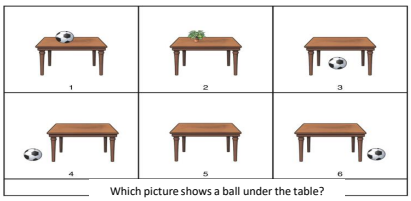
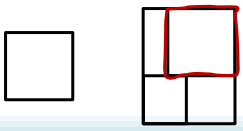
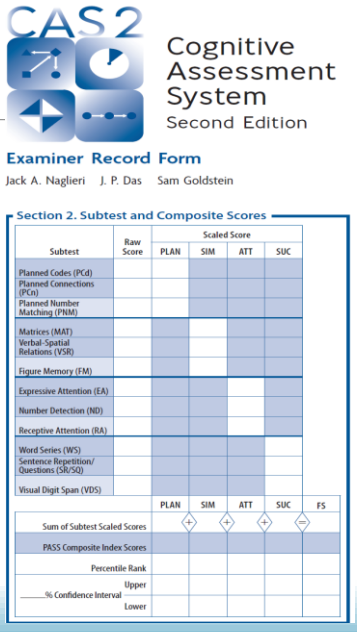


Figure Memory





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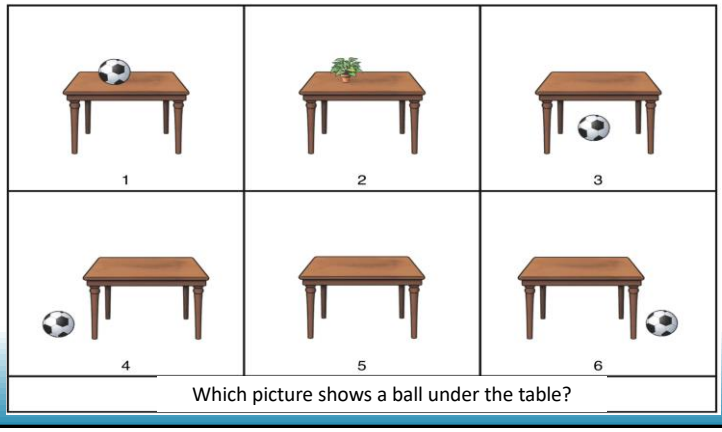
PASS Theory: Simultaneous

- **Simultaneous** processing is used to integrate stimuli into groups
  - **THINKING ABOUT HOW THINGS OR IDEAS ARE INTER-RELATED**
  - 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



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Case of Alexandra (Tulio Otero)

- Alex is 8-years-old in the 3rd grade.
- Her home language is primarily Spanish, although she speaks English with siblings
- Alex has difficulty when encountering most reading and written language tasks.
- Alex was previously evaluated for special education
  - The test results indicated her overall cognitive abilities were in the Low Average range (WISC5).
  - Significant difficulty with reading fluency and automatic word recognition skills
  - Has strong decoding and phonological skills.
  - Spanish literacy achievement results in word reading and spelling fell within the Average range.
  - Her struggles were ascribed to attention problems stemming from ADHD and not a specific learning disability.
- She continues to have significant reading and writing difficulties, limited self-confidence, and struggles to complete her work.

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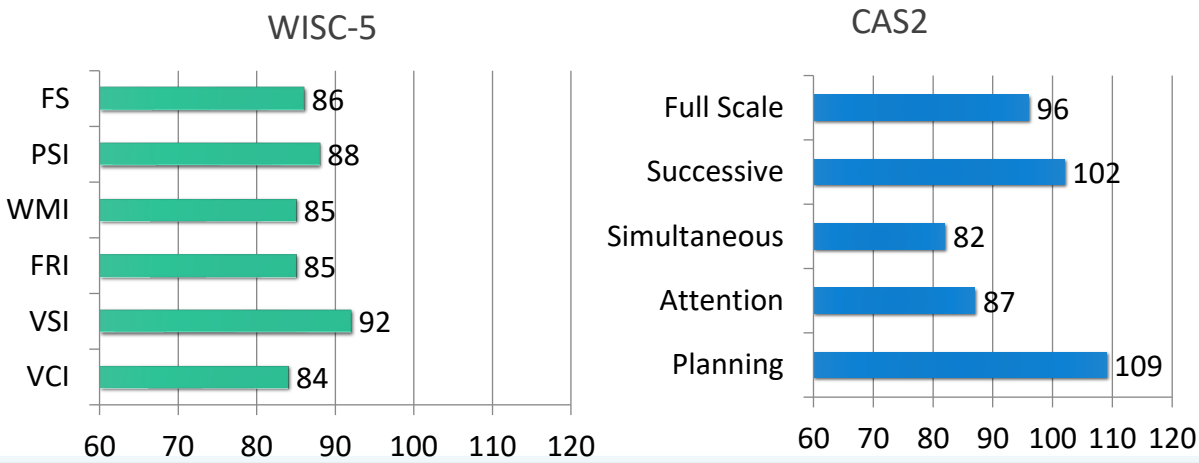
Case of Alexandra



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Case of Alexandra - SLD

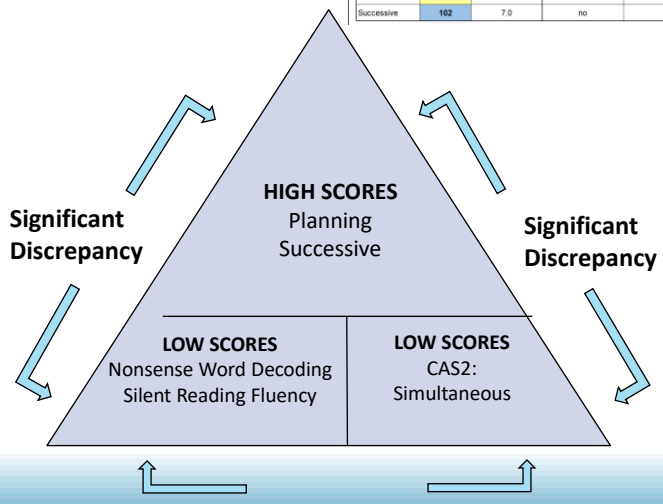
Composite/Subtest	Standard Scores	Percentile Rank
Reading Composite	105	63
Letter & Word Recognition	111	77
Reading Comprehension	99	47
Nonsense Word Decoding	80	9
Silent Reading Fluency	82	12
Math Composite	90	25
Math Concepts & Applications	88	21
Math Computation	95	37
Spelling	98	45

CAS2 8-Subtest CORE 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 CORE battery.

Cognitive Assessment System-2		PASS Mean & Differences:		
PASS Scales	Standard Score	95.0	Significantly Different (at p = .05) from PASS Mean?	Strength or Weakness
Planning	109	14.0	yes	
Simultaneous	82	-13.0	yes	Weakness
Attention	87	-8.0	no	
Successive	102	7.0	no	



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PASS Theory Based on Brain Function – Successive Processing

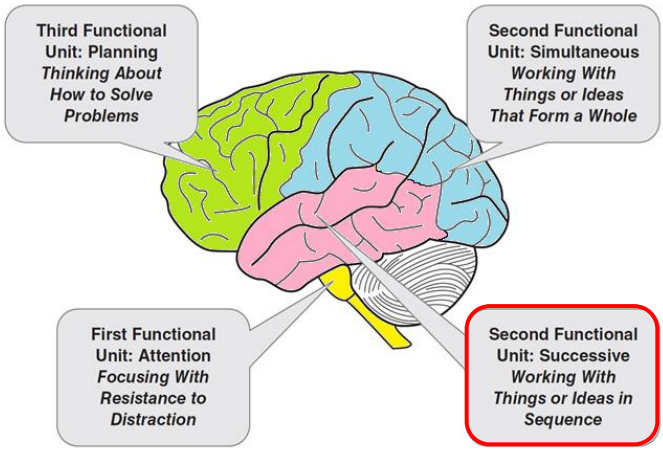

Figure 1.2 Three Functional Units and Associated Brain Structures

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

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Successive Subtests

Word Series

Repeat: **Man Book Car**

Sentence Repetition

The Blue Grayed the Green

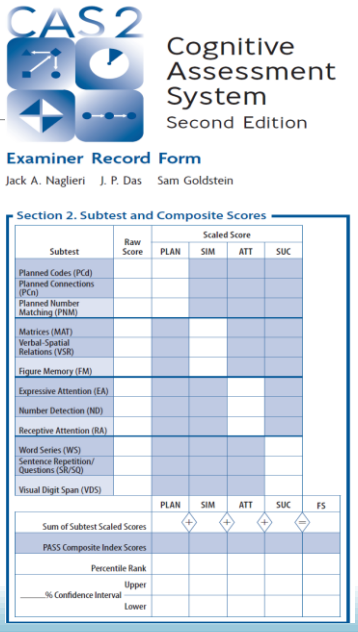
or Sentence Questions

What did the Blue do?

Visual Digit Span

Recall of Numbers in Order
Successive Processing

4 3 8 6 1



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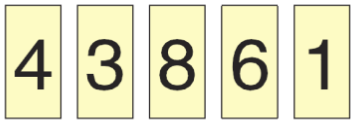
PASS Theory: Successive

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

Recall of Numbers in Order
Successive Processing



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Successive and Syntax

➢ Sentence Repetition
- Child repeats sentences exactly as stated by the examiner such as:
- ***The red greened the blue with a yellow.***

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

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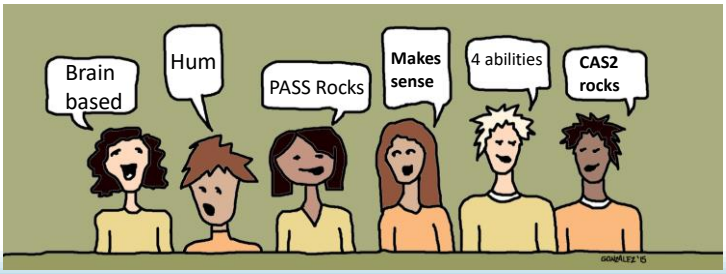
Core Group Discussion → Deeper Learning

- **DISCUSS – What reactions do you have regarding this new way to conceptualize and measure intelligence as neurocognitive abilities**



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Ideas to Consider

My Professional Journey

- An Awakening About Traditional Intelligence Tests

A Theory Based on Brain Function

- Thinking vs Knowing and Social Justice

From PASS to CAS2

- A Different View of People

Research Update

- PASS and Equity – Measure Thinking not Knowing
- To *g* or not to *g*

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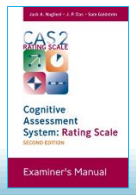
How to Measure PASS with CAS2

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

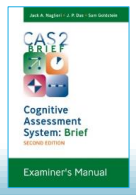
CAS2 Rating Scale
(4 subtests)

Total Score
Planning
Simultaneous
Attention
Successive



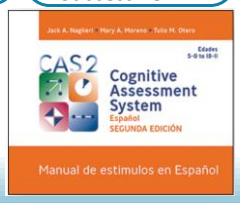
CAS2 Brief
(4 subtests
20 minutes)

Total Score
Planning
Simultaneous
Attention
Successive



CAS2 Core
(8 subtests
40 minutes)

Full Scale
Planning
Simultaneous
Attention
Successive



CAS2 Extended
(12 subtests
60 minutes)

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

CAS2 Digital (English & Spanish) coming in 2022

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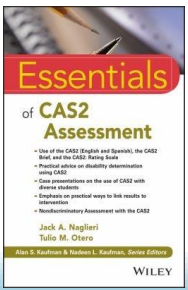
CAS2, CAS2 Online Score and Report Writer, CAS2-Espanol, CAS2: Brief, CAS2 Rating Scale, CAS2 Digital

- This book is the most complete discussion of PASS theory and its measurement
- Chapters cover all versions of the CAS2 as well as the online scoring and report writer
- Administration, scoring, interpretation
- Reliability, validity (PASS profiles, evidence of test fairness,
- Discrepancy Consistency Method for SLD
- Intervention planning and clinical case studies



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Change Demands Courage to Think Differently

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CAS2 is Different

- **My Professional Journey**
  - An Awakening About Traditional Intelligence Tests
- **A Theory Based on Brain Function**
  - Thinking vs Knowing and Social Justice
- **From PASS to CAS2**
  - A Different View of People
- **Research Update**
  - PASS and Equity – Measure Thinking not Knowing
  - To *g* or not to *g*
- **Administration and Interpretation Issues**
  - Test order, subtest interpretation, etc.
- **Reasons To Change**
  - Validity of PASS Theory

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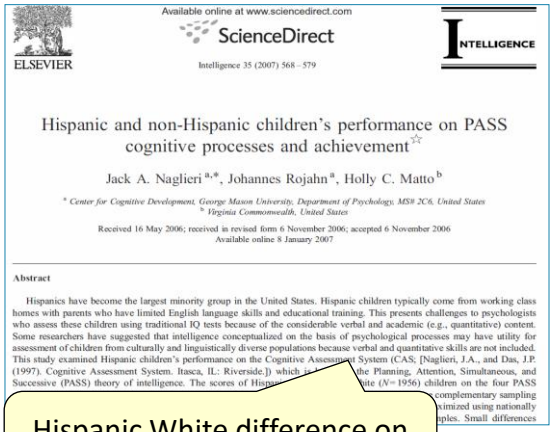
PASS Scores for Hispanics

Naglieri, Rojahn, Matto (2007)



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INTELLIGENCE

Intelligence 35 (2007) 568–579

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

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

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

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

Abstract

Hispanics have become the largest minority group in the United States. Hispanic children typically come from working class homes with parents who have limited English language skills and educational training. This presents challenges to psychologists who assess these children using traditional IQ tests because of the considerable verbal and academic (e.g., quantitative) content. Some researchers have suggested that intelligence conceptualized on the basis of psychological processes may have utility for assessment of children from culturally and linguistically diverse populations because verbal and quantitative skills are not included. This study examined Hispanic children's performance on the Cognitive Assessment System (CAS; [Naglieri, J.A., and Das, J.P. (1997). Cognitive Assessment System. Itasca, IL: Riverside.]) which [illegible] the Planning, Attention, Simultaneous, and Successive (PASS) theory of intelligence. The scores of Hispa[illegible]ite (N = 1956) children on the four PASS [illegible] complementary sampling [illegible]eximized using nationally [illegible]ples. Small differences

Hispanic White difference on CAS Full Scale of **4.8**

WJ-III and ELL Hispanic Students

(Sotelo-Dynega, Ortiz, Flanagan & Chaplin, 2013)

Table 1

WJ III GIA and Test Performance Differences Between LEPs and the WJ III Standardization Sample Mean

WJ III Test	Sample M	Sample SD	WJ III Sample M	WJ III Sample SD	Difference	t	d
General Intellectual Ability	89.34	11.78	100	15	−10.64	−7.07**	−.90
Verbal Comprehension	80.38	14.09	100	15	−19.62	−10.87***	−1.40
Concept Formation	87.16	12.20	100	15	−12.84	−8.22***	−1.05
Numbers Reversed	95.23	12.46	100	15	−4.77	−2.96*	−0.38
Visual-Auditory Learning	95.62	14.56	[illegible]	15	−4.38	−2.35*	−0.30
Sound Blending	97.82	11.57	[illegible]	15	−2.18	−1.47	−0.19
Visual Matching	[illegible]	[illegible]	[illegible]	[illegible]	−1.07	−0.85	−0.11
Spatial Relations	[illegible]	[illegible]	[illegible]	[illegible]	−0.82	−0.758	−0.10

*p < .05. **p < .01. ***p [illegible]

11-point mean score difference in GAI

Table 2

Differences Among the NYSESLAT Proficiency Group's WJ III, GIA Mean Score, and the WJ III Standardization Sample Mean

NYSESLAT Proficiency Group	Sample M	Sample SD	WJ III Sample M	WJ III Sample SD
Beginner	71.75	3.95	100	[illegible]
Intermediate	82.29	8.66	[illegible]	[illegible]
Advanced	89.55	9.17	100	[illegible]
Proficient	101	9.23	100	[illegible]

*p < .001.

As English skills go down so does the GAI

Consistency of PASS scores: English & 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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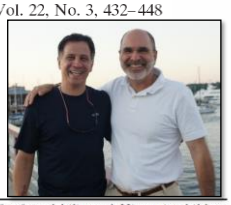
Holly Matto
Virginia Commonwealth University



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 [illegible]ences were noted between the [illegible] Simultaneous and Successive [illegible] were similar. Specific subtests [illegible] were found to contribute to [illegible] versions of the CAS. Compar[illegible] ness on both versions of the [illegible] sistently despite the language

Keywords: bilingual assessment, [illegible] tem, non-biased assessment

APPLIED NEUROPSYCHOLOGY: CHILD, 0: 1–9, 2012
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DOI: 10.1080/21622965.2012.670547

Psychology Press

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

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George Mason University, Fairfax, Virginia
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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, [illegible] scores as well as PASS processing scale [illegible]rences were found in FS scores or in any of [illegible] English (M = 86.4, SD = 8.73) and Spanish [illegible] (uncorrected) and .99 (corrected for range [illegible]s in Successive processing regardless of the [illegible]. PASS cognitive profiles were similar on [illegible]cales. These findings suggest that students [illegible] and that the CAS may be a useful measure [illegible]n with underdeveloped English-language

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

Journal Information
Journal TOC

PsycARTICLES: Journal Article

Structural validity of the Wechsler Intelligence Scale for Children–Fifth Edition: Confirmatory factor analyses with the 16 primary and secondary subtests.

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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

Support for 'g'

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

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

- **The results of this study indicate that most cognitive abilities specified in** John Carroll's **three-stratum theory have little-to-no interpretive relevance above and beyond that of general intelligence**.

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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.

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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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CAS2 Factor Analytic Study (in review 2024)

Unravelling the Multifaceted Nature of Intelligence: A Correlated Factor Model Approach with Insights from the PASS Theory

Papadopoulos, Spanoudis, Naglieri and Das concluded: "Our results unambiguously support the notion is not a unidimensional entity but a composite of distinct cognitive processes…planning, attention, simultaneous and successive processing."

- **Abstract**: Intelligence, a subject of profound interest within psychology, has seen extensive exploration of its psychological and psychometric foundations. This study delves into the multifaceted nature of intelligence, using advanced structural equation modeling techniques to examine theory-driven conceptualizations of the construct. We tested g factor models, including unidimensional, correlated, higher-order, and bifactor symmetrical and asymmetrical models. To enhance the reliability and generalizability of the findings, we used a large and diverse cohort based on the PASS (Planning, Attention, Simultaneous, Successive) theory and the Cognitive Assessment System 2 (CAS2), which was standardized in the US. Results showed that the correlated factor model, which posits separate cognitive domains, offers the most fitting representation of intelligence. This outcome aligns with the PASS theory's theoretical foundations, emphasizing intelligence's multifaceted nature. Also, our exploration of gender invariance underscores the importance of considering gender-related differences in cognitive processes. By endorsing a correlated factor model, our study encourages a nuanced understanding of intelligence that acknowledges the diversity and interconnectedness of cognitive processes, with potential implications for education and clinical assessment practices.

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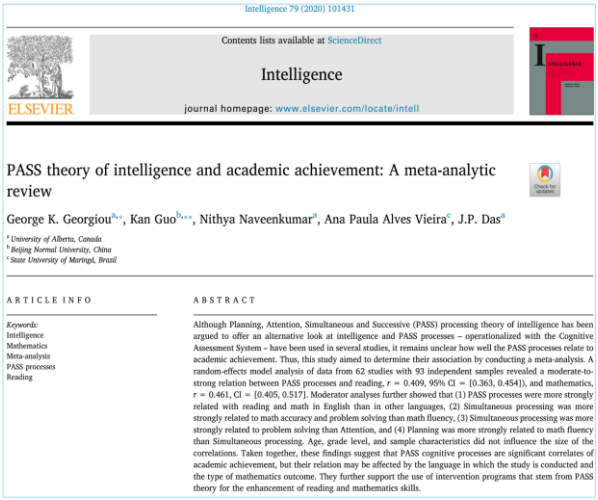

Intelligence 79 (2020) 101431

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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]

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

ARTICLE INFO

Keywords:
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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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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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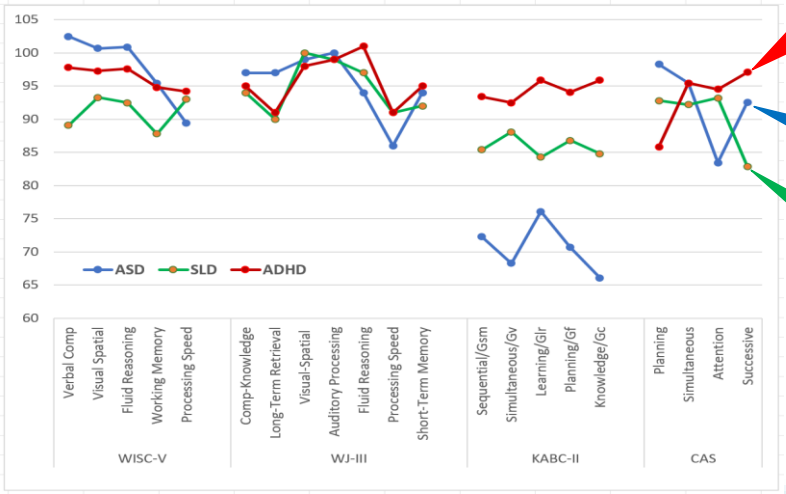
These profiles across tests is very revealing - PASS works (Naglieri & Otero, 2023)

Patterns of Strengths & Weaknesses



ADHD (Low Planning)

ASD – Low Attention

Dyslexia – Low Successive

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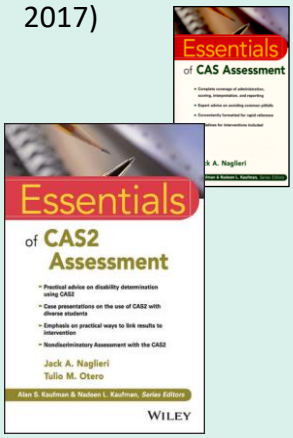
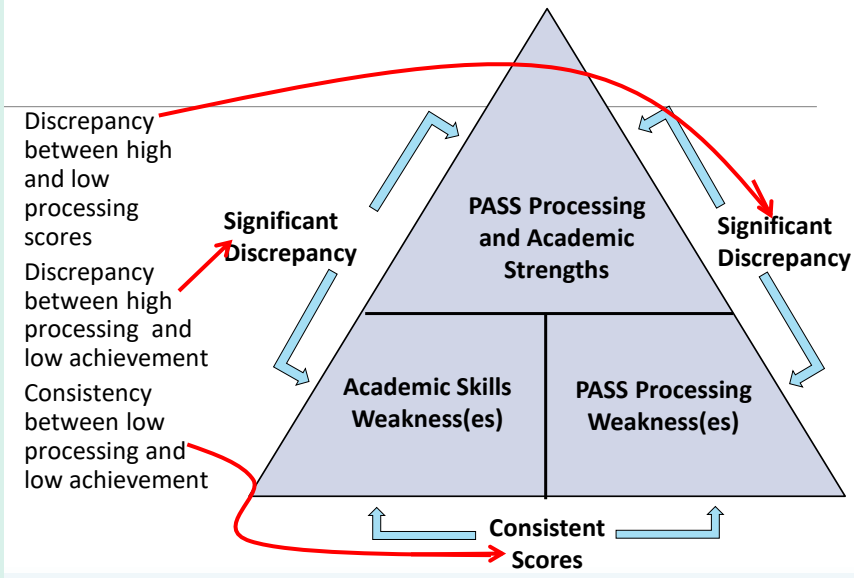
- The Discrepancy Consistency Method (DCM) was first introduced in 1999 (most recently in 2017)





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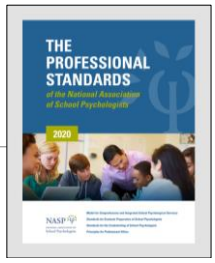
NASP Professional Standards 2020



NASP 2020 Professional Standards

GUIDING PRINCIPLE I.3 FAIRNESS, EQUITY, AND JUSTICE

In their words and actions, school psychologists promote fairness and social justice. They use their expertise to cultivate school climates that are safe, welcoming, and equitable to all persons regardless of actual or perceived characteristics, including race, ethnicity, color, religion, ancestry, national origin, immigration status, socioeconomic status, primary language, gender, sexual orientation, gender identity, gender expression, disability, or any other distinguishing characteristics.

Standard I.3.2 Correcting Discriminatory Practices

School psychologists strive to ensure that all children and youth have equal opportunity to participate in and benefit from school programs and that all students and families have access to and can benefit from school psychological services. They work to correct school practices that are unjustly discriminatory or that deny students or others their legal rights. School psychologists take steps to foster a school climate that is supportive, inclusive, safe, accepting, and respectful toward all persons, particularly those who have experienced marginalization in educational settings.

School psychologists function as change agents, using their skills in communication, collaboration, and consultation to advocate for necessary change at the individual student, classroom, building, district, state, and national levels.

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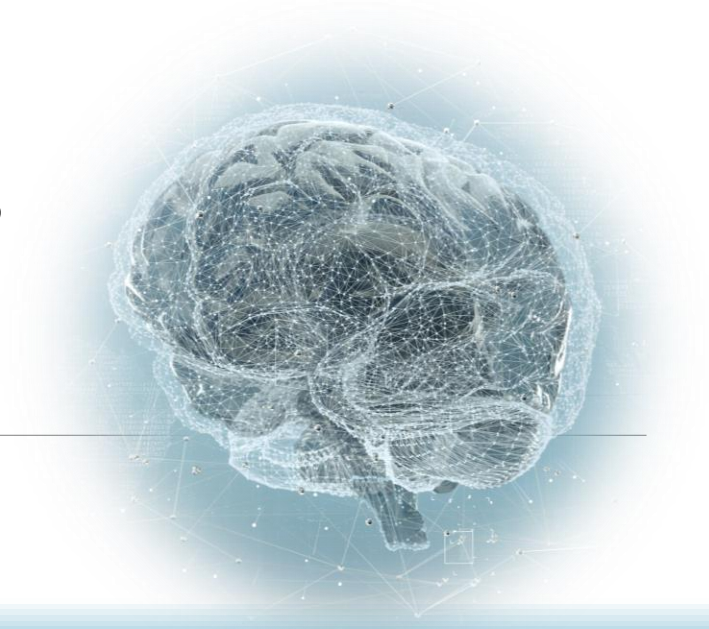
Final Questions and Reactions



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Change Demands Courage to Think Differently

Socially just assessment requires self-reflection and self-correction in response to current research.

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WE CAN DO BETTER

We Must do Better

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QR Codes

Download Free E-Book

CAS2 Digital Norming Study

CAS2 Free Access for Univ Professors

Neurodiversity Podcast

The goal of this e-book is to describe the context in which the PSS Theory of Intelligence was conceived and explain why it guided the construction of the Cognitive Assessment System and its subsequent versions, including the second edition.

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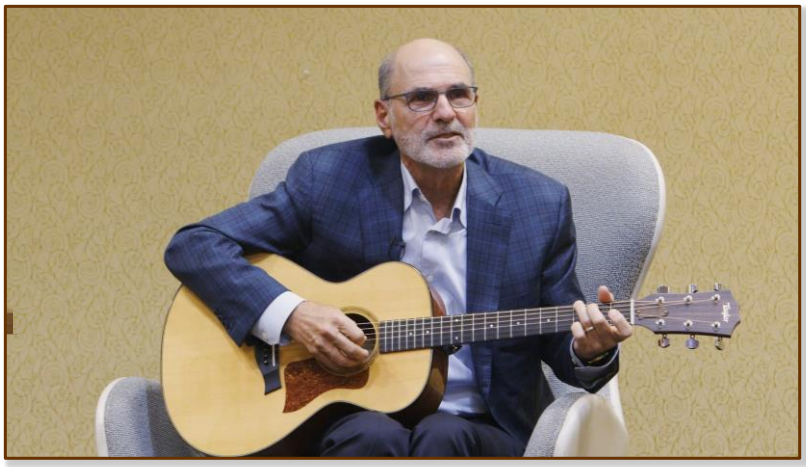

Maybe It's Time to Let the Old Ways Die

NYASP 2022 Legends in School Psychology Award Interview

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