

90 minutes 9:30 – 11:00 Sept 8th Thursday

Description of the PASS Neurocognitive Theory of Intelligence as Measured by the CAS2

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1



Who Is Here Today?

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Need to Get Ready to Learn? Mindful Breathing

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Disclosures of Tests & Books I have Published related to Equity (1985 – 2022)

Group Administered							
Individually Administered							

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The BIG Picture

- The results of an intelligence tests can change the course of a student's life!
- We need intelligence tests that
 - are fair for students from diverse populations
 - help us understand WHY a student fails
 - Inform us about intellectual strengths & weaknesses
 - Help us make a diagnosis and determine interventions
- We need to use 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 and LEARN

8

Ideas to Consider

My Journey

Historical Context

Testing My Hypothesis About Intelligence Tests

PASS Theory and Measurement

Closing remarks

Intelligence Redefined

Traditional IQ and Achievement Tests

- When I started working as a school psychologist in 1975...I noticed that parts of the intelligence tests we used were VERY similar to parts of the achievement tests
 - For example, the Achievement Test had a General Information and Arithmetic subtests JUST LIKE THE WISC!



1975 Charles Champagne Elementary, Bethpage, NY

It seemed wrong to measure 'intelligence' using questions that clearly measured 'achievement'

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10

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



11

1981

Test Results and Interpretation:
 In the WISC-R, Binet scores (Binet IQ of 80) fall in the average range of intelligence and on the 25th percentile rank to compare to the standard for age for the standardization sample. In contrast to this score of average non-verbal intelligence and for Binet IQ of 80, this score is well below the level of intelligence that our test of English language facts is above the 50th percentile rank. **Very low scores can not be considered an indicator of verbal intelligence because Binet scores were equal and Title's English. Due to the large difference between these scores, we felt that it was essential.**

WISC-R
 While the WISC-R is a more general measure of intelligence, it is not a test of English language comprehension or expression, and poorly on all tests which are specific to language skills. In fact, **one of a kind and novel and non-verbal, but required English language comprehension of instructions, the children were able to.**

WISC-V

Index	Score	Percentile	Age Equivalent
Verbal Comprehension	75	10	7.0
Block Design	85	25	7.5
Full Scale IQ	80	15	7.0



Naglieri, J. A. (1982). Does the WISC-R measure verbal intelligence for non-English speaking children? *Psychology in the Schools, 19*, 478-479.
 Naglieri, J. A. & Yazzie, C. (1983). Comparison of the WISC-R and PPVT-R with Navajo children. *Journal of Clinical Psychology, 39*, 598-600.

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12

Tests can Measure Thinking and/or Knowing?

This is a test of THINKING requiring minimal Knowing

These are tests of Knowing and Thinking

13

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

Naglieri's Nonverbal Tests: 1985 to Present

• First and Second Versions

- The goal was to provide efficient ways to evaluate *general ability* for ALL students and especially "intellectually gifted children from disadvantaged backgrounds (Naglieri, 1985, p. 3)." Two options: The MAT: Expanded Form for individual and the MAT: Short Form for group administration.

Validity Results:

- Males Females differences were trivial (< 1 point) on MAT:EF (452) & MAT:SF (N = 2,636)
- Differences by Race were trivial (< 1 point) on MAT:EF (N = 110) and MAT:SF (N = 672)
- MAT:SF correlations with reading and math achievement were substantial across grades K-12 (N = 3,022)

MAT Short and Expanded Forms 1985

Naglieri

Naglieri's Nonverbal Tests : 1985 to Present

• Third Version of the Naglieri Nonverbal Tests

- The MAT was rebranded as the Naglieri Nonverbal Ability Test Multilevel (NNAT) and released as a group administered test.

Initial Research Findings:

- Naglieri, J. A., & Ronning, M. E. (2000). The Relationships between General Ability Using the NNAT and SAT Reading Achievement. *Journal of Psychoeducational Assessment*, 18, 230-239. STRONG CORRELATION WITH ACHIEVEMENT
- Naglieri, J. A., & Ronning, M. E. (2000). Comparison of White, African-American, Hispanic, and Asian Children on the Naglieri Nonverbal Ability Test. *Psychological Assessment*, 12, 328-334. TRIVIAL DIFFERENCES BY RACE AND ETHNICITY
- Naglieri, J., & Ford, D. Y. (2003). Addressing Under-representation of Gifted Minority Children Using the Naglieri Nonverbal Ability Test (NNAT). *Gifted Child Quarterly*, 47, 155-160. SIMILAR % OF BLACK, WHITE & HISPANICS FOUND USING THE NNAT

MAT Short and Expanded Forms 1985

Naglieri Nonverbal Ability Test 1997

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Naglieri's Nonverbal Tests : 1985 to Present

• **Fifth** Version of the Naglieri Nonverbal Tests



The NNAT2 Validity:

- Strong correlation with OLSAT8 ($r = .67, N = 592$)
- Strong correlation with Reading & Math (SAT10) ($r = .65, N = 2,552$)
- Small differences by race, ethnicity, or language
- Strong correlation with the Wechsler Nonverbal Scale ($r = .74$).

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Tests Designed to measure Thinking not Knowing

1. Naglieri, J. A. (1985). *Matrix Analogies Test - Expanded Form*. San Antonio: The Psychological Corporation.
2. Naglieri, J. A. (1985). *Matrix Analogies Test - Short Form*. San Antonio: The Psychological Corporation.
3. Naglieri, J. A. (1997). *Naglieri Nonverbal Ability Test*. San Antonio, TX: The Psychological Corporation.
4. Naglieri, J. A., & Bardos, A. N. (1997). *General Ability Scale for Adults*. The Psychological Corporation.
5. Naglieri, J. A. (2003). *Naglieri Nonverbal Ability Test - Individual*. The Psychological Corporation.
6. Wechsler, D., & Naglieri, J. A. (2006). *Wechsler Nonverbal Scale of Intelligence*. The Psychological Corporation.
7. Naglieri, J. A. (2008). *Naglieri Nonverbal Ability Test - 2nd Edition*. The Psychological Corporation.
8. Naglieri, J. A. (2016). *Naglieri Nonverbal Ability Test - Third Edition*. The Psychological Corporation.
9. Naglieri, J. A. (2022). *Naglieri General Ability Test: Nonverbal*. The Psychological Corporation.
10. Naglieri, J. A., & Brulles, D. (2022). *Naglieri Ability Test: Verbal*. The Psychological Corporation.
11. Naglieri, J. A., & Lansdowne, K. (2022). *Naglieri Ability Test: Quantitative*. Markham, Canada: MHS.

“Nonverbal Tests of ‘General Ability’”

Nonverbal tests are fine to measure *general ability*; but psychologists typically need to measure MORE than ‘g’. I recommend a multi-dimensional theory of intelligence based on brain function (PASS).

9. Naglieri, J. A., & Das, J. P. (1997). *Cognitive Assessment System*. Austin: ProEd
10. Naglieri, J. A., Das, J. P., Goldstein, S. (2014). *Cognitive Assessment System Second Edition*. Austin, ProEd.
11. Naglieri, J. A., Das, J. P., & Goldstein, S. (2014). *Cognitive Assessment System Second Edition - Brief*. Austin, ProEd.
12. Naglieri, J. A., Moreno, M. A., & Otero, T. M. (2017). *Cognitive Assessment System - Español*. Austin, ProEd.

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Two Questions:

1. Why do we measure ability the way we do?
2. Do the tests measure thinking or knowing?



The early history of IQ tests

19

Ideas to Consider

- My Journey
- Historical Context
- Testing My Hypothesis About Intelligence Tests
- PASS Theory and Measurement
- Closing remarks



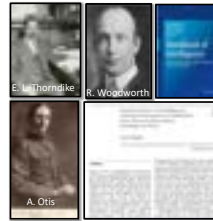
Stanford-Binet → Army Mental Tests → WISC



- Binet scale in 1905 (30 items), 1908 (59 items)
- Binet scale in 1911 was modified "a number of items in the 1908 scale were omitted...because they seemed to depend too much on school learning" (Freeman, 1955, p. 110)
- Terman's 1916 Stanford-Binet contained many items that were dependent upon school learning:
 - Vocabulary
 - Ability to read and comprehend text
 - Similarities between words
 - Arithmetic problems
- Terman's scale was criticized - too heavily weighted with verbal - penalizing (those) who had been handicapped in developing...the English language (Freeman, p. 127)
 - Terman's response: "intelligence at the verbal and abstract levels is the highest form of mental ability" (Freeman, p. 127)
- Terman's student Arthur Otis & Army Alpha Beta

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Stanford-Binet → Army Mental Tests → WISC

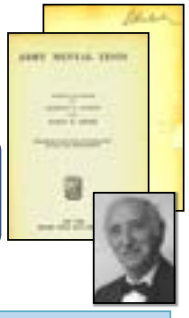
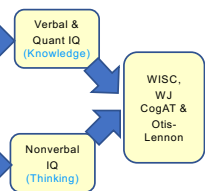


- April of 1917 Otis and other psychologists met to construct a test for the US military recruits (WWI)
- July 1917 their research showed that the Army Alpha (Verbal & Quantitative for literates) and Beta (Nonverbal for illiterates) tests could
 - "aid in segregating and eliminating the mentally incompetent, classify men according to their mental ability; and assist in selecting competent men for responsible positions" (p. 19, Yerkes, 1921).
- The Verbal, Nonverbal and Quantitative test content was and still used in the Wechsler, Otis-Lennon, CogAT and other intelligence tests.

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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



23

IQ Tests and General Ability

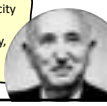


"we did not start with a clear definition of general intelligence... [but] borrowed from every-day life a vague term implying all-round ability and... we [are] still attempting to define it more sharply and endow it with a stricter scientific connotation" (p. 53, *Intelligence Testing: Methods and Results*, Pintner, 1923)".

- Wechsler "believed that his Verbal and Performance scales represented different ways to access *g* (general ability)", but he never believed [in verbal and] nonverbal intelligence as being separate from *g* (Kaufman, 2008; in Wechsler Nonverbal Manual; Wechsler & Naglieri, 2006)

General Ability not verbal or nonverbal intelligences !

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



Pintner (Intelligence Testing, 1923)

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

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Very Similar Items on "Different" Tests

Including Knowledge in "Ability" Tests & Equity

Stanford-Binet-5	WISC-V	WJ-IV	KABC-II	OLSAT	CogAT
<ul style="list-style-type: none"> • Verbal • Knowledge • Quantitative Reasoning • Vocabulary • Verbal Analogies 	<ul style="list-style-type: none"> • Verbal Comprehension • Vocabulary, Similarities, Information & Comprehension • Fluid Reasoning: Figure Weights, Arithmetic 	<ul style="list-style-type: none"> • Comprehension Knowledge: Vocabulary & General Information • Fluid Reasoning: Number Series & Concept Formation • Auditory Processing: Phonological Processing 	<ul style="list-style-type: none"> • Knowledge / GC • Riddles, Expressive Vocabulary, Verbal Knowledge 	<ul style="list-style-type: none"> • Verbal • Following directions • Verbal Reasoning • Quantitative • Verbal Arithmetic Reasoning 	<ul style="list-style-type: none"> • Verbal Scale • Analogies • Sentence Completion • Verbal Classification • Quantitative • 45 pages of oral instructions

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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 the norming data do not demonstrate test bias.**
- Evidence of EQUITY is examined by test content and mean score differences

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Race and Ethnic Average Score Differences by Ability Test



Traditional tests that include knowledge and 2nd-Generation Ability Tests that minimize knowing


Test	White	Black	Hispanic	Asian	Other
IQ	115.0	105.0	108.0	112.0	110.0
Verbal	118.0	108.0	110.0	115.0	112.0
Quantitative	112.0	102.0	105.0	110.0	108.0
Reading	116.0	106.0	108.0	112.0	110.0
Writing	114.0	104.0	106.0	110.0	108.0
Math	110.0	100.0	102.0	108.0	106.0
Science	112.0	102.0	104.0	108.0	106.0
History	114.0	104.0	106.0	110.0	108.0
Art	116.0	106.0	108.0	112.0	110.0
Music	118.0	108.0	110.0	115.0	112.0
Physical Education	110.0	100.0	102.0	108.0	106.0
Foreign Language	112.0	102.0	104.0	108.0	106.0
Health	114.0	104.0	106.0	110.0	108.0
Technology	116.0	106.0	108.0	112.0	110.0
Environmental Studies	118.0	108.0	110.0	115.0	112.0
Other	110.0	100.0	102.0	108.0	106.0

See Brulles, D., Lansdowne, K., & Nagleri, J. A. (2022). Understanding and Using the Nagleri General Ability Tests: A Call to Equity in Gifted Education. Minneapolis, MN: Free Spirit Publishing for more details.


Note: Even though a test may not show psychometric bias these tests with academic content that show large mean score differences are not equitable and are unfair.

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Academic Learning Loss & COVID



- COVID-19 has deepened the impact of disparities in access and opportunity for students of color and they are even further behind than they were before the pandemic
- These students' intellectual scores on traditional tests will reflect that larger learning gap related to COVID because the norms for intelligence tests that demand knowledge are no longer accurate.



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/oc/20210608-impacts-of-covid19>.


CASE by Tulio Otero: Alex (C.A. 6-7 GRADE 1)

REASON FOR REFERRAL

Is classified as *Intellectual Disability* but teachers want more information so they can better understand how he learns

Re-evaluation was conducted

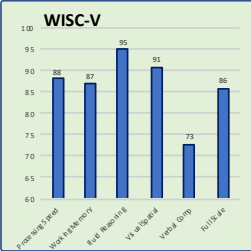
- Academic:
 - Limited skill to identify letters sounds
 - Possible ASD?
- Conversationally Bilingual
- Behavior:
 - Difficulty following directions
 - Attention concerns



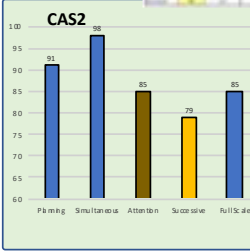
Note: this is not a picture of Alex

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WISC-V & CAS2: Alex (6 ½ yrs. Gr. 1)

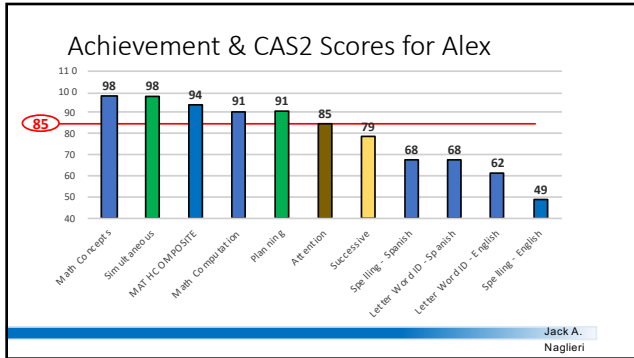


Index	Score
Verbal Comprehension	88
Block Design	87
Fluid Reasoning	95
Visual Spatial	91
Working Memory	73
Full Scale	86




Index	Score
Phrasing	91
Simultaneous	98
Attention	85
Sequential	79
Full Scale	85

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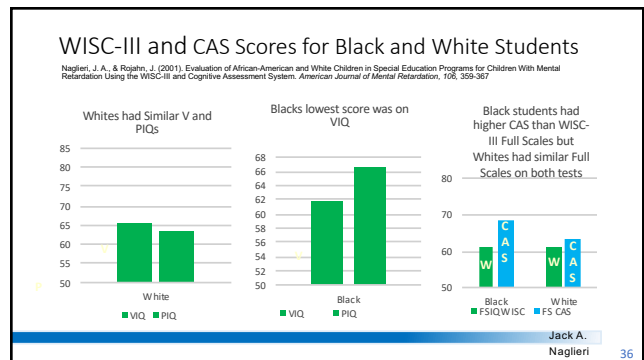
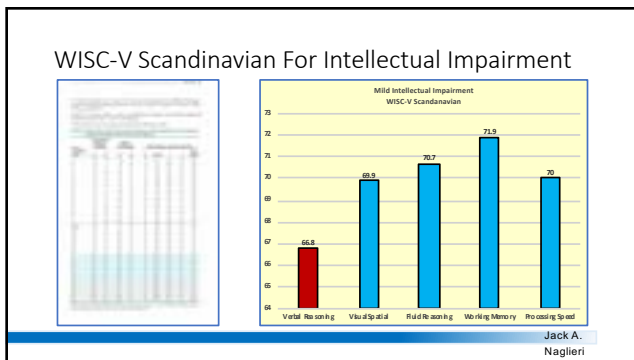


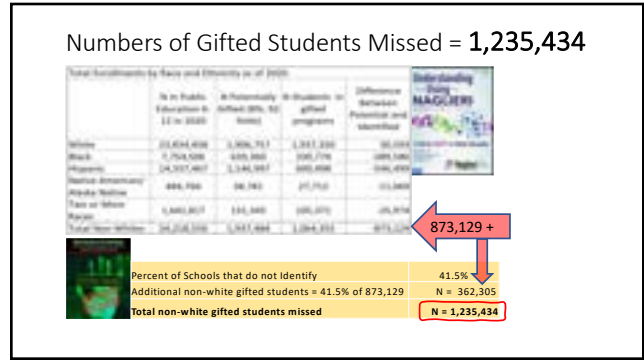
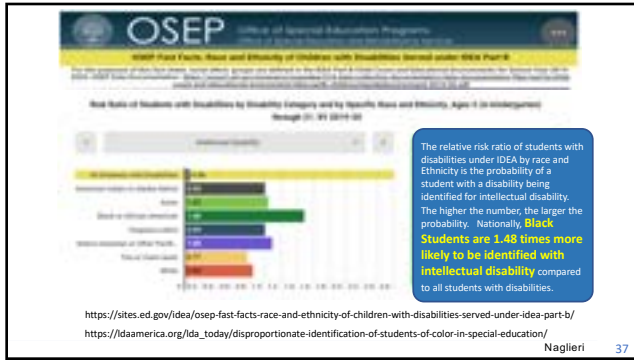
Alex and PASS (by Dr. Otero)

- ▶ Alex's profile is revealing
- ▶ He has good processing scores:
 - ▶ Simultaneous = 91 and Planning = 98
- ▶ He has a disorder in one or more of the basic psychological processes
 - Attention = 85 and Successive = 79
- ▶ Using the Discrepancy Consistency Method (1999, 2017) he meets criteria for a learning disability (see Naglieri & Otero, 2017).



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What is the Practical Impact?

The test you choose determines the results you receive, the decisions you make, and the future of that student.

Your Questions Your Thoughts

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Ideas to Consider

My Journey

Historical Context

Testing My Hypothesis About Intelligence Tests

Research support for PASS

Closing remarks

Intelligence Redefined


Can Traditional Intelligence Test of General Ability be Equitable?

How to measure 'Thinking' with minimal influence of 'Knowing'




Measure General Ability Equitably Using the Naglieri General Ability Tests: Verbal, Nonverbal and Quantitative (Naglieri, Brulles & Lansdowne, 2022)


42

Naglieri General Ability Tests 
 Jack A. Naglieri, Dina Brulles & Kimerly Lansdowne (2022)


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



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Naglieri General Ability Tests 

- The three tests of general ability measure how well a student can **think** through problems to arrive at the answer rather than what they **know**.



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Three Research Studies (2022)

Selvameen, M., Paolozza, A., Solomon, J., Naglieri, J. A., & Schmidt, M. T. (submitted for publication, 2022). Race, Ethnic, Gender, and Parental Education Level Differences on Verbal, Nonverbal, and Quantitative Naglieri General Ability Tests: Achieving Equity.

- VERBAL SAMPLE**
 - 2,482 That closely matches the US population on key demographics
- GENDER**
 - No differences between males and females for raw score across all forms
- RACE/ETHNICITY**
 - No differences among White, Black, & Hispanic for raw score across all forms
- PARENTAL EDUCATION LEVEL**
 - No 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
- NONVERBAL SAMPLE**
 - 3,630 That closely matches the US population on key demographics
- GENDER**
 - No differences between males and females for raw score across all forms
- RACE/ETHNICITY**
 - No differences among White, Black, & Hispanic for raw score across all forms
- PARENTAL EDUCATION LEVEL**
 - No 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 SAMPLE**
 - 2,841 That closely matches the US population on key demographics
- GENDER**
 - No differences between males and females for raw score across all forms
- RACE/ETHNICITY**
 - No differences among White, Black, & Hispanic for raw score across all forms
- PARENTAL EDUCATION LEVEL**
 - No 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

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Race and Ethnic Differences by Ability Test

Tests of General Ability Using Verbal, Nonverbal and Quantitative test items

Group	Verbal	Nonverbal	Quantitative
White	10.0	10.0	10.0
Black	9.5	9.5	9.5
Hispanic	9.0	9.0	9.0
Other	8.5	8.5	8.5

See 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 for more details.

Note: Even though a test may not show psychometric bias those tests with academic content that show large mean score differences are not equitable and are unfair.

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WE CAN DO BETTER

Your Thoughts or Questions

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Ideas to Consider

- My Journey
- Historical Context
- Testing My Hypothesis About Intelligence Tests
- PASS Theory and Measurement**
- Closing remarks


Intelligence Redefined

Intelligence must be measured using tests that require little knowledge

AND – we need MORE than tests of General Ability

Intelligence as Neurocognitive Functions


- In the meeting with JP Das (February 11, 1984) we proposed that intelligence was better defined as neurocognitive processes, and we began development of the Cognitive Assessment System (Naglieri & Das, 1997).
- We conceptualized intelligence as Planning, Attention, Simultaneous, and Successive (PASS) neurocognitive processes based on Luria's concepts of brain function.



50


We Wanted to measure Thinking (PASS) not Knowing

- What does the student have to **know** to complete a task?
 - This is dependent on educational opportunity (e.g., Vocabulary, Arithmetic, reading 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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PASS Neurocognitive Theory



- P**lanning = THINKING ABOUT HOW TO DO WHAT YOU DECIDE TO DO
- A**ttention = BEING ALERT AND RESISTING DISTRACTIONS
- S**imultaneous = UNDERSTANDING THE RELATIONSHIPS AMONG THINGS AND IDEAS
- S**uccessive = WORKING WITH INFORMATION IN A SEQUENCE

PASS = 'basic psychological processes'

NOTE: Easy to understand concepts!

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PASS Provides a Common Language

- Psychologists, teachers, **parents, and students** can all use a common language to describe these four abilities with **easy-to-understand concepts of intelligence**



Figure 1.1 Three Functional Skills and Associated Brain Structures
From: *Essentials of CAS2 Assessment*. Naglieri & Otero, 2017

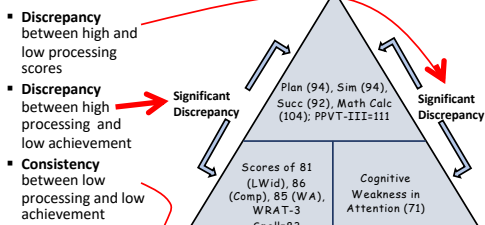
Frankie was struggling in school at age 11



- 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, and he would rather get the task completed and move on.
 - Frankie could not attend to the details of the sequence of letters for correct spelling, and the order of sound-symbol associations



Frankie's Discrepancy Consistency Results



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

Neuropsychological Correlates of PASS

Naglieri, J. A., & Otero, T. M. Redefining Intelligence as the PASS Theory of Neurocognitive Processes.



PASS Theory Based on Brain Function – Planning



Figure 1.3 Three Functional Units and Associated Brain Structures
From: Essentials of CAS2 Assessment. Naglieri & Otero, 2017

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
- Math calculation, written expression, etc

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Planning Behaviors

Directions for Item 1-10: You are given one hour and 15 minutes to complete this test. You are not to use a calculator. You are to use the test booklet for writing your answers. You are to use the test booklet for writing your answers.

Planning Behaviors (Use the circles below to indicate):

Item	1	2	3	4	5	6	7	8	9	10
1. Identify a goal or objective to be achieved										
2. Identify a strategy to be used										
3. Identify a plan to be followed										
4. Monitor progress and adjust the plan as needed										
5. Identify a strategy to be used to solve the problem										
6. Identify a strategy to be used to solve the problem										
7. Identify a strategy to be used to solve the problem										
8. Identify a strategy to be used to solve the problem										
9. Identify a strategy to be used to solve the problem										
10. Identify a strategy to be used to solve the problem										


60

Planning Subtests

Planned Codes

Planned Connections

Planned Number Matching



5176 5761 5167 1576 5176 1567

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Planned Codes Page 1

A	B	C	D
X	O	X	O

A	B	C	D	A
X	O	X		
A	B	C	D	A
X	O			
A	B	C	D	A
X	O			
A	B	C	D	A
X	O			

- ▶ Jack Jr. at age 5
- ▶ He filled in the codes in the empty boxes A's then B's then C
- ▶ Note, examinees are told: "You can do it any way you want"


Planned Codes Page 2

Jack Jr. age 10



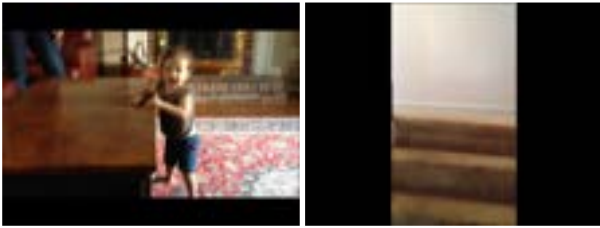
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20 Years Later Planning is the Key to Success



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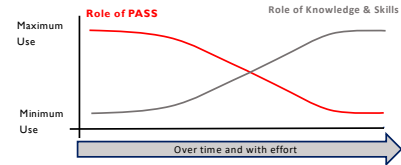
A 13 month old's Plan At 19 months Planning & Knowledge



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Planning Learning Curves

- Learning depends upon many factors especially PASS
- When a task is practiced and learned it requires less thinking (PASS) and becomes a skill
- At first, PASS plays a major role in learning



Note: A skill is the ability to do something well with minimal effort (thinking)

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Planning (EF) and Skills

- Given that Planning (EF) demands intentionality, that means that planning processing is something that occurs over time and with effort.
- Skills are things we do with very little thinking. Automatic actions do not afford the time for thinking (planning) but rather immediate responding.
- Therefore, Planning and EF should not be described as 'skills'

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Math strategies stimulate thinking



This work sheet encourages the child to use strategies (plans) in math such as: "If $8 + 8 = 16$, then $8 + 9$ is 17"

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

68

PASS Theory Based on Brain Function – Attention

Figure 1.1 Three Functional States and Associated Brain Structures
From: *Essentials of CAS2 Assessment*, Naglieri & Otero, 2017

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 or hearing

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Behaviors about Attention

Expressive Attention and Number Detection

Find the numbers that look like this: 1 2 3

1	2	3	4	5	6
2	1	5	4	1	4
3	3	5	1	2	5
2	3	5	1	4	3
4	5	1	4	1	3
5	1	3	4	2	3
5	1	3	5	2	5
3	5	3	1	5	5

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Attention and Knowing are being measured

Attention is needed to overcome the similarity of the options

75

MOVE TO PART 2 or 1

ALEHANDRO

Planning for Interventions

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).

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Alejandro's Intervention Plan

1. **Be Intentional and Transparent**
 - Teach Alejandro about his brain and his PASS strengths and challenges
2. **Encourage Motivation and Persistence (Mindsets)**
 - Teach Alejandro about Growth Mindsets.
 - Discuss what will he say to himself when learning gets hard.
3. **Strategies to Build on His Strengths to Manage Challenges (Skill Sets)**
 - Use his Planning and Simultaneous Strengths to support his learning challenges
 - Develop strategies to manage challenges in Attention and Successive processing
4. **Encourage independence and self-efficacy**
 - Have Alejandro self assess regularly and note what's working and what he needs to do differently.

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PASS Theory Based on Brain Function - Simultaneous Processing

Figure 1.1 Three Functional Units and Associated Brain Structures
From: *Essentials of CAS2 Assessment*. Naglieri & Otero, 2017

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

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Simultaneous Processing Behaviors

Simultaneous Subtests

- Matrices
- Verbal Spatial Relations
- Figure Memory

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Figure Memory

- These two subtests measure Simultaneous processing in different ways

Verbal Spatial Relations

Which picture shows a ball under the table?

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And Consider this...

- Even though the tasks were different in content (shapes, words, numbers & musical notations) and modality (auditory and visual), they required **Simultaneous** processing!

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PASS Theory Based on Brain Function – **Successive Processing**

Figure 1.1 Three Functional Units and Associated Brain Structures
From: *Essentials of CAS2 Assessment*. Naglieri & Otero, 2017

PASS 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
 - Recall a series of words
 - Decoding words
 - Letter-sound correspondence
 - Phonological tasks
 - Understanding the syntax of sentences
 - Comprehension of written instructions

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Successive Processing Behaviors

Instructions for Item 31-36: The person will be asked to read a sentence and then repeat it. The number of words in the sentence will vary. The person will be asked to repeat the sentence exactly as they heard it.

Item 31-36: Recall of Numbers in Order

Item	Score
31	100
32	100
33	100
34	100
35	100
36	100

85

Successive Subtests

Word Series
Sentence Repetition or
Recall of Numbers in Order

Recall of Numbers in Order
Successive Processing

4 3 8 6 1

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86

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?***

87

PASS and Handwriting

- Acquisition of handwriting demands Successive processing

Process	Score
Planning	90
Simultaneous	93
Attention	103
Successive	55

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And Again...

Different modality but the same PASS process

- Even though the Successive processing subtests were different in content (single words **heard**, a sentence heard, and numbers **seen**) they required **Successive** processing!

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Heteromodal Association Cortex (Goldberg, 2006)

- Our brains **merge stimuli** coming in from the senses (unimodal association cortex) into one stream of information in the **Heteromodal association cortex**
- (green areas)

https://goo.gl/images/cyphg7
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Your Thoughts

- Let's take this time to clarify any questions you may have before we examine the Validity and Practical utility of the PASS Theory of intelligence.

Attention Simultaneous Successive

Ideas to Consider

- My Journey
- Historical Context
- Testing My Hypothesis About Intelligence Tests
- PASS Theory and Measurement
- Closing remarks

Intelligence Redefined