

# Equitable Assessment of Intelligence Using the Naglieri General Ability Tests



Jack A. Naglieri



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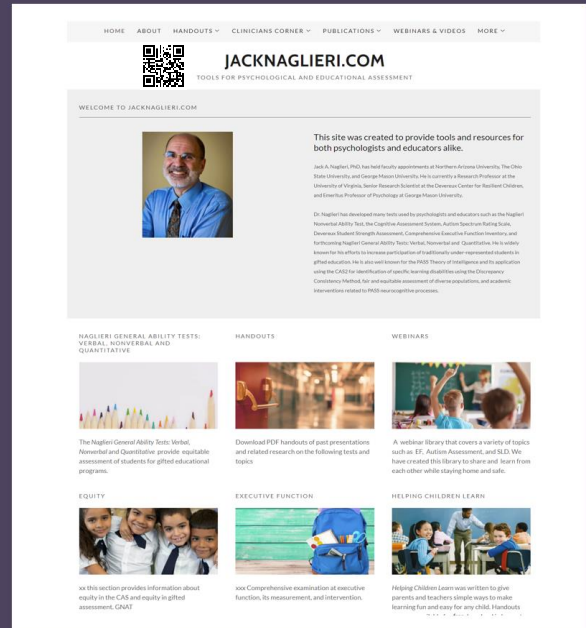
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FOR MORE [INFORMATION](#) PLEASE GO TO MY [WEB PAGES](#)



The screenshot shows the homepage of the Naglieri General Ability Tests website. At the top left is a QR code and the Naglieri logo, which includes the words 'Verbal', 'Nonverbal', and 'Quantitative' in different colors. Below the logo is a navigation menu with links for HOME, AUTHORS, ABOUT, WEBINARS, RECENT HANDOUTS, FAQs, and MORE. The main content area features a large image of colorful pencils and the text 'EQUITABLE ASSESSMENT OF GIFTED STUDENTS USING THE Naglieri General Ability Tests Now Available'. Below this, there is a section titled 'WHY WE DO WHAT WE DO' with two sub-sections: 'Inequity in Gifted Testing' and 'Achieving Equity'. The 'Inequity in Gifted Testing' section discusses research on the underrepresentation of African-American, Hispanic, and Native American students in gifted programs. The 'Achieving Equity' section explains how the tests were developed to address the needs of students from diverse cultural, linguistic, and socioeconomic backgrounds.



The screenshot shows the JACKNAGLIERI.COM website. At the top is a navigation menu with links for HOME, ABOUT, HANDOUTS, CLINICIANS CORNER, PUBLICATIONS, WEBINARS & VIDEOS, and MORE. Below the menu is a QR code and the website name 'JACKNAGLIERI.COM' with the tagline 'TOOLS FOR PSYCHOLOGICAL AND EDUCATIONAL ASSESSMENT'. A 'WELCOME TO JACKNAGLIERI.COM' section features a photo of Jack A. Naglieri and a welcome message. Below this is a bio for Dr. Naglieri, detailing his academic background and research interests. The main content area is a grid of featured articles and resources, including 'NAGLIERI GENERAL ABILITY TESTS: VERBAL, NONVERBAL AND QUANTITATIVE', 'HANDOUTS', 'WEBINARS', 'EQUITY', 'EXECUTIVE FUNCTION', and 'HELPING CHILDREN LEARN'. Each item includes a small image and a brief description.

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## Did you Ever Wonder...

- Why we have Vocabulary questions on an intelligence test?
- Why do we have Arithmetic word problems on our intelligence tests
- Shouldn't an intelligence test have different types of tests than an achievement test?

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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



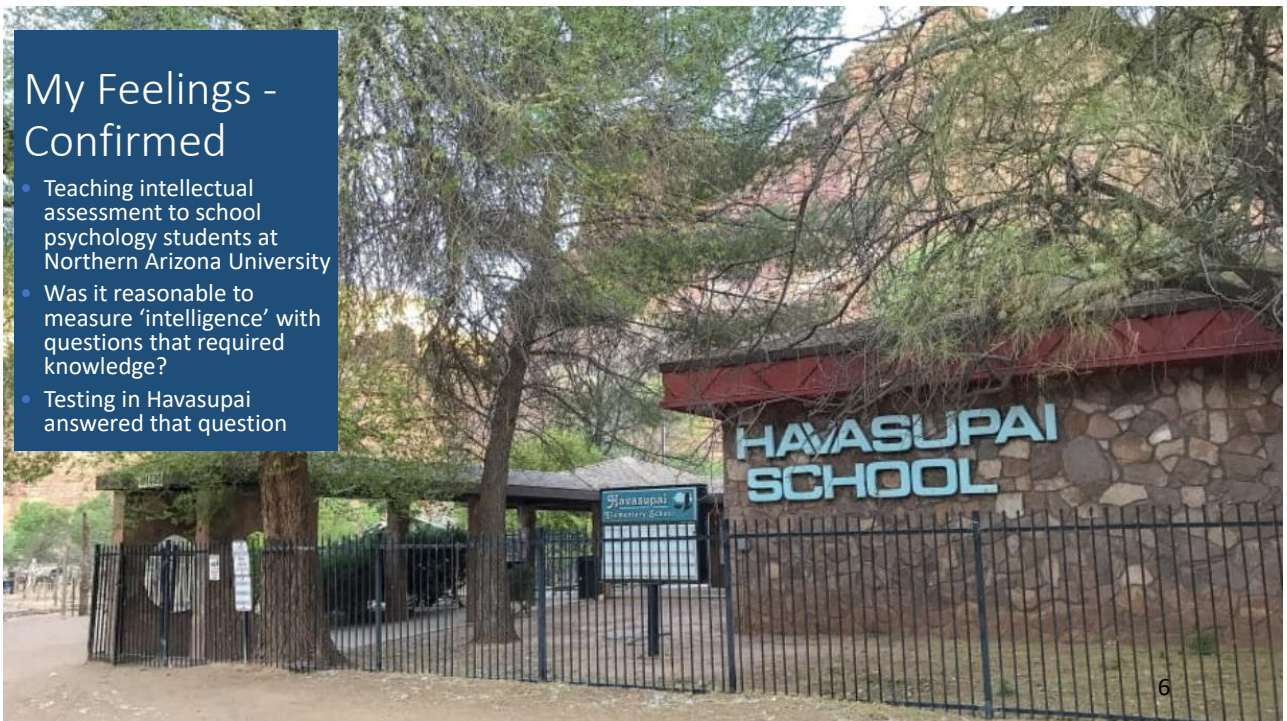
1975 Charles Champagne Elementary, Bethpage, NY

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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.

**WISC-R RECORD FORM**  
Wechsler Intelligence Scale for Children—Revised

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
PARENT'S \_\_\_\_\_  
SCHOOL \_\_\_\_\_  
PLACE OF \_\_\_\_\_  
REFERRED BY \_\_\_\_\_

Year 81 Month 4 Day 18  
Date Tested 79 ✓ 70  
Date of Birth 74 ✓ 20  
Age 7 4 18

**WISC-R PROFILE**  
Clinicians who wish to draw a profile should first transfer the child's scaled scores to the row of boxes below. Then mark an X on the dot corresponding to the scaled score for each test, and draw a line connecting the X's.

VERBAL TESTS					PERFORMANCE TESTS					
Information	Similarities	Arithmetic	Vocabulary	Comprehension	Digit Span	Block Design	Picture Arrangement	Object Assembly	Coding	Mazes
19	3	19	0	12	10	8	10	11	11	11
18	0	18	0	11	9	7	9	10	10	10
17	0	17	0	10	8	6	8	9	9	9
16	0	16	0	9	7	5	7	8	8	8
15	0	15	0	8	6	4	6	7	7	7
14	0	14	0	7	5	3	5	6	6	6
13	0	13	0	6	4	2	4	5	5	5
12	0	12	0	5	3	1	3	4	4	4
11	0	11	0	4	2	0	2	3	3	3
10	0	10	0	3	1	0	1	2	2	2
9	0	9	0	2	0	0	0	1	1	1
8	0	8	0	1	0	0	0	0	0	0
7	0	7	0	0	0	0	0	0	0	0
6	0	6	0	0	0	0	0	0	0	0
5	0	5	0	0	0	0	0	0	0	0
4	0	4	0	0	0	0	0	0	0	0
3	0	3	0	0	0	0	0	0	0	0
2	0	2	0	0	0	0	0	0	0	0
1	0	1	0	0	0	0	0	0	0	0

VERBAL TESTS Raw Score Scaled Score  
Information 3 3  
Similarities 0 2  
Arithmetic 4 4  
Vocabulary 0 1  
Comprehension 0  
(Digit Span) (2) (2)  
Verbal Score 12

PERFORMANCE TESTS Scaled Score IQ  
Picture Completion 10 8  
Picture Arrangement 5 5  
Block Design 18 12  
Object Assembly 17 11  
Coding (17) (11)  
(Mazes) (17) (11)  
Performance Score

Verbal Score 12 IQ 52  
Performance Score 17 95  
Full Scale Score 59 72  
\*Powered from 4 tests, if necessary.

NOTES  $\bar{x} = 9.4$

**WISC-V Full Scale**

Verbal Comprehension	Visual Spatial	Fluid Reasoning	Working Memory	Processing Speed
Similarities	Block Design	Matrix Reasoning	Digit Span	Coding
Vocabulary	Visual Puzzles	Figure Weights	Picture Span	Symbol Search
Information		Picture Concepts	Letter-Number Sequencing	Cancellation
Comprehension		Arithmetic		

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



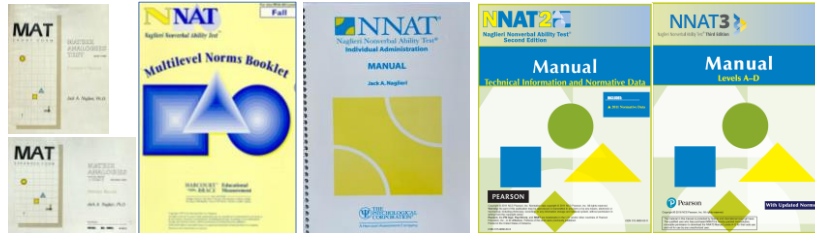
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# Naglieri's Nonverbal Tests: 1985 to Present

## • 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 with Equity as a Goal 1985-Present

Traditional Tests

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*. San Antonio, TX: Pearson.
5. Naglieri, J. A. (2003). *Naglieri Nonverbal Ability Test - Individual Form*. San Antonio, TX: Pearson.
6. Wechsler, D., & Naglieri, J. A. (2006). *Wechsler Nonverbal Scale of Ability*. San Antonio, TX: Pearson.
7. Naglieri, J. A. (2008). *Naglieri Nonverbal Ability Test – 2nd Edition*. San Antonio, TX: Pearson.
8. Naglieri, J. A. (2016). *Naglieri Nonverbal Ability Test – Third Edition*. San Antonio, TX: Pearson.

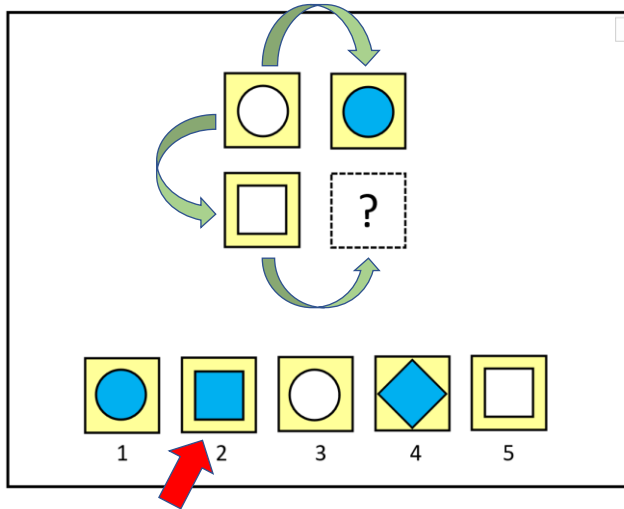
Second Generation

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.
13. Naglieri, J. A. (2022). *Naglieri General Ability Test: Nonverbal*. Markham, Canada: MHS.
14. Naglieri, J. A. & Brulles, D. (2022). *Naglieri Ability Test: Verbal*. Markham, Canada: MHS.
15. Naglieri, J. A. & Lansdowne, K. (2022). *Naglieri Ability Test: Quantitative*. Markham, Canada: MHS.

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## Tests that Measure Thinking or Knowing?



Girl is woman as  
boy is to man ?

3 is to 9 as  
5 is to 25 ?

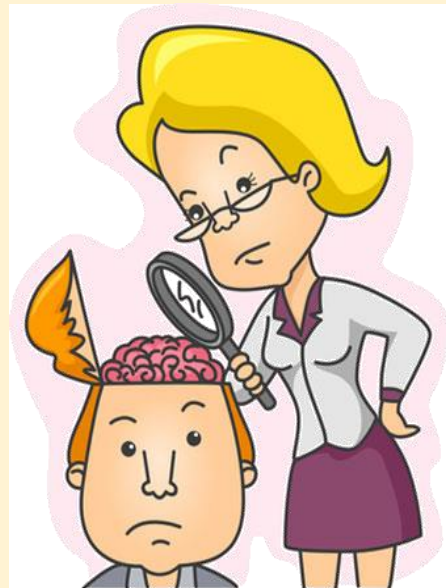
C<sup>7</sup> is to F as  
E<sup>7</sup> is to A ?

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Why do we  
measure  
intelligence the  
way we do?

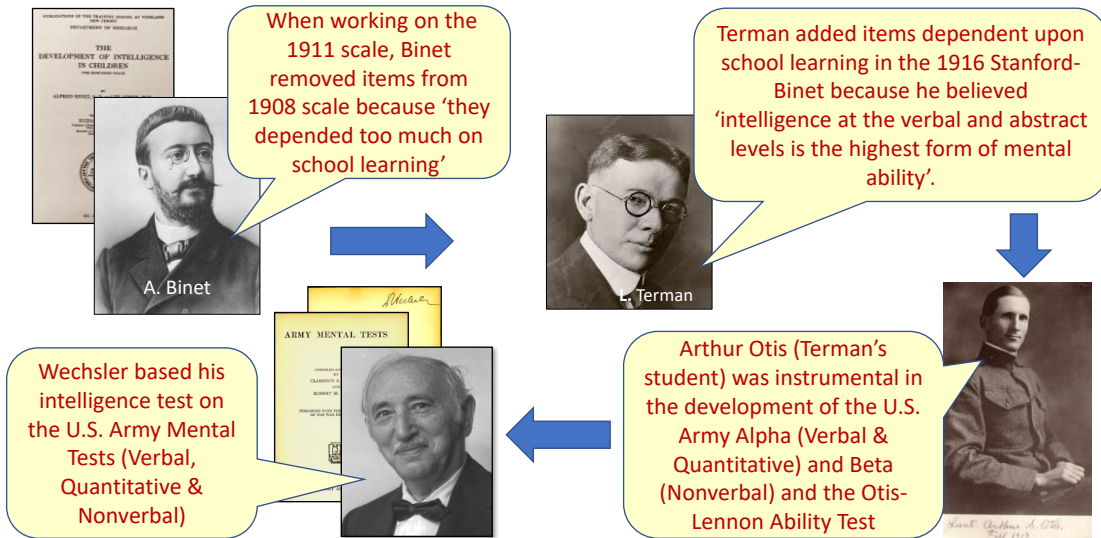
The History of IQ tests



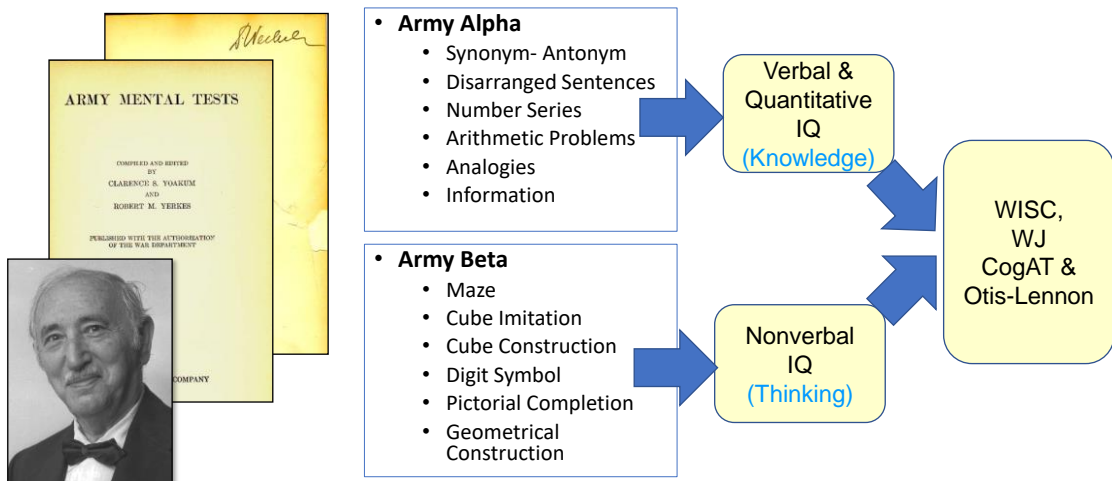
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Binet → Stanford-Binet → Army Mental Tests → WISC, CogAT, Olsat

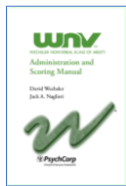


Alpha & Beta → Wechsler



## Wechsler's View of General ability

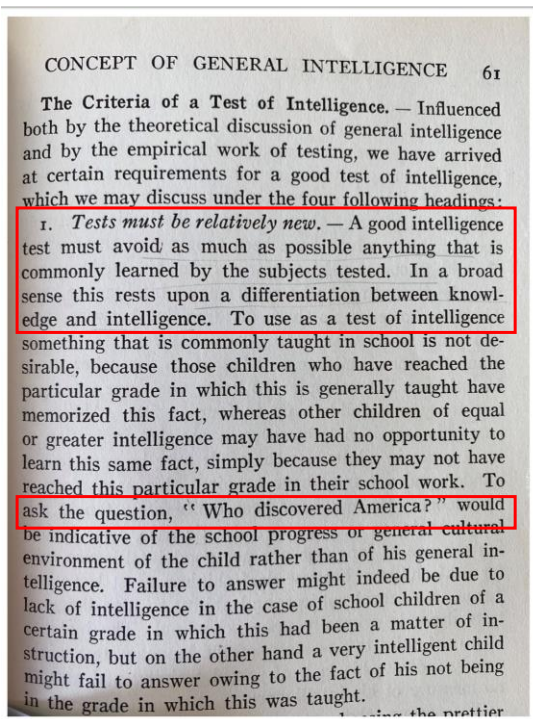
- Wechsler “believed that his Verbal and Performance Scales represented different ways to access **g (general ability)**”, but **he never believed [in verbal and] nonverbal intelligence** as being separate from g. Rather he saw the **Performance Scale as the most sensible way** to measure the general intelligence of people with ... limited proficiency in English. (Kaufman, 2008)



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

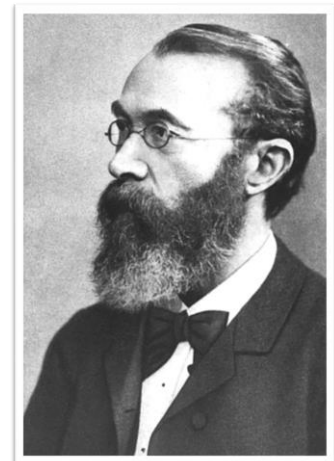


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## Pintner (Intelligence Testing, 1923)

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



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## Knowledge is Included in “Ability” Tests

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

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## Woodcock-Johnson Cognitive & Achievement Tests (CHC)

**Very Similar Items on “Different” Tests**

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

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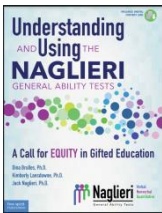


# What is the Practical Impact of intelligence tests that are confounded by knowledge?

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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).

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-Dynga, Ortiz, Flanagan, and Chaplin (2013); CogAT7 by Carman, Walther and Bartsch (2018) and Lohman (2016); WISC-V by Kaufman, Raiford, and Coakson (2016); Kaufman Assessment Battery for Children-II by Lichtenberger, Volker, Kaufman & Kaufman, (2009) and Scheiber, C., Kaufman, A.S. (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).

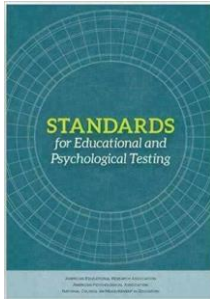
	By Race	By Ethnicity
<b>Tests that require knowledge</b>	<b>Mn = 9.4</b>	<b>Mn =6.6</b>
Otis-Lennon School Ability Test (district wide)	13.6	
Stanford-Binet IV (normative sample)	12.6	
WISC-V (normative sample)	11.6	
WJ- III (normative sample)	10.9	10.7
CogAT7 Nonverbal	11.8	7.6
CogAT7 - Verbal	6.6	5.3
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	
<b>Tests that require minimal knowledge</b>	<b>Mn = 4.3</b>	<b>Mn = 2.9</b>
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

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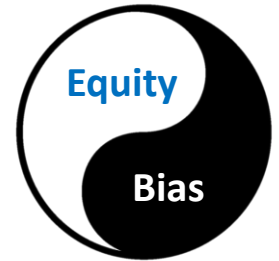
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# Test Bias vs Test Equity

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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## American Psychological Association Apology

- 'APA recognizes the roles of psychology in promoting...racism, and the harms that have been inflicted on communities of color ...'
- 'Psychologists created and promoted the widespread application of psychological tests that have been used to disadvantage many communities of color'
- 'APA and its leadership failed to take action in response to calls from Black psychologists for an end to the misuse of tests developed by psychologists that perpetuated racial inequality...'
- the ways measurement of intelligence has been systemically used to create the ideology of White supremacy'

APA apologizes to communities of color for longstanding contributions to systemic racism [Read more](#)

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Home / About APA / Council Policy Manual / Apology to People of Color for APAs

### Apology to People of Color for APA's Role in Promoting, Perpetuating, and Failing to Challenge Racism, Racial Discrimination, and Human Hierarchy in U.S.

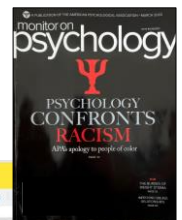
Resolution adopted by the APA Council of Representatives on October 29, 2021

The American Psychological Association failed in its role leading the discipline of psychology, was complicit in contributing to systemic inequities, and hurt many through racism, racial discrimination, and denigration of people of color, thereby falling short on its mission to benefit society and improve lives. APA is profoundly sorry, accepts responsibility for, and owns the actions and inactions of APA itself, the discipline of psychology, and individual psychologists who stood as leaders for the organization and field.

The governing body within APA should have apologized to people of color before today. APA, and many in psychology, have long considered such an apology, but failed to accept responsibility. APA previously engaged in unsuccessful efforts to issue apologies in the past, including an apology to Indigenous peoples. The work done to make this apology to people of color a reality was led by the people and voices of a broad cross-section of today's APA—members, APA's elected and appointed leaders, and staff—in a shared commitment to not only truly assess the harms and the harmed, but also to take responsibility and commit to taking those collective learnings and direct them into an apology that will affect true change. It is informed by listening with intention to the voices of the past—as outlined in a stunning chronology of psychology's history—and especially informed by the voices of today, the lived experience of psychologists of color, Ethnic Psychological Associations, and those

APA Council of Representatives resolutions

- Apology to People of Color for APA's Role in Promoting, Perpetuating, and Failing to Challenge Racism, Racial Discrimination, and Human Hierarchy in U.S.
- Role of Psychology and APA in Dismantling Systemic Racism Against People of Color in U.S.
- Advancing Health Equity in Psychology



Let's look at the early history of intelligence testing

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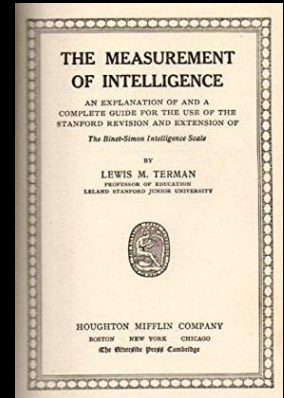
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## Lewis Terman 1916 Stanford-Binet

- 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

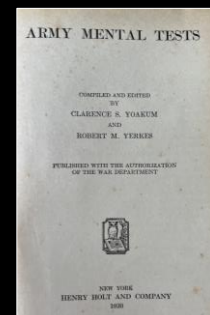
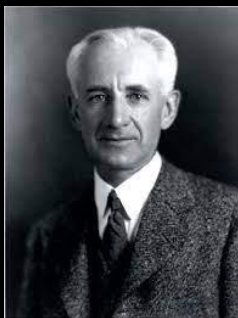


Brookwood, M. (2021). The Orphans of Davenport. New York: Norton & Company. See Chapter 4.

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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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# Florence Goodenough 1926

Stanford-Binet "IQ by Racial Stock"



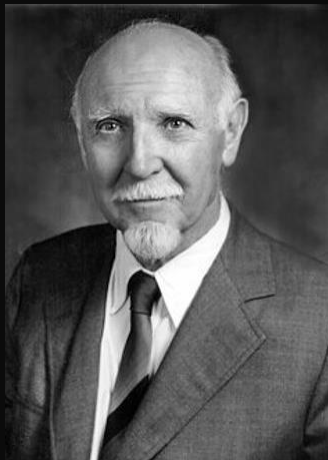
**RACIAL DIFFERENCES IN THE INTELLIGENCE OF SCHOOL CHILDREN**  
 BY FLORENCE L. GOODENOUGH  
*Institute of Child Welfare, University of Minnesota*

**TABLE II**  
 DISTRIBUTION OF INTELLIGENCE QUOTIENTS BY RACIAL STOCK

IQ	American	Armenian	Italian	Spanish-Mexican	California Negroes	Southern Negroes	Hoopla Valley Indians	Jewish	Chinese	Japanese	Germans	Portuguese	English and Scotch	French and Swiss	Danish, Swedish and Norwegian	Assyrian, Slavonian and Serbian
Total cases ... ..	500	123	456	367	69	613	79	55	25	42	29	11	14	14	31	29
Mdn. ....	100.3	91.8	87.5	87.2	82.7	76.5	85.6	66.3	103.1	99.5	98.8	93.3	99.5	92.8	104.5	94.5
Mean.....	101.5	92.3	89.1	88.5	85.8	78.7	85.6	66.1	104.1	101.9	101.1	94.5	100.2	94.5	103.5	92.8
S.D.....	18.3	15.6	16.0	17.5	18.7	17.5	14.1	16.2	18.0	18.0	19.3	16.5	16.8	19.6	17.8	18.8
Coeff. of var.....	18.0	16.9	18.0	19.8	21.8	22.2	16.5	15.3	17.2	17.7	19.1	17.5	16.8	20.7	17.2	20.3

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# Raymond Cattell - 1933



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



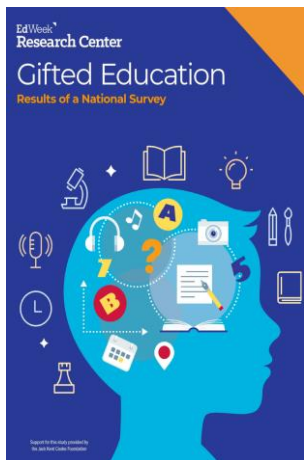
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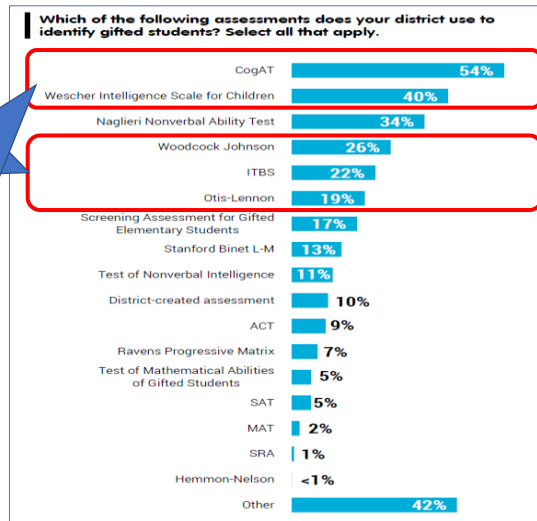


Psychologists who studied race were focused on ethnic differences and they attributed IQ test results to the **people** instead of the **tests**

## National Survey of Gifted Education



These tests have verbal and quantitative questions and lengthy verbal directions

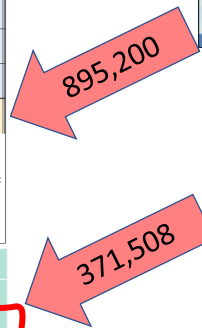
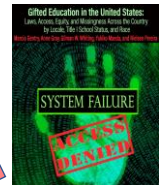
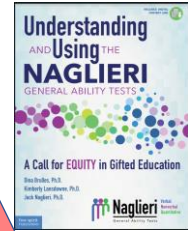


# Numbers of Gifted Students Missed = 1,266,708

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
<b>Total Non-Whites</b>	<b>24,481,790</b>	<b>1,958,543</b>	<b>1,063,343</b>	<b>-895,200</b>

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/ipeds/data/ipeds-tables/ipeds20360.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/ipeds/data/ipeds-tables/ipeds20480.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
<b>Total non-white gifted students missed</b>	<b>N = 1,266,708</b>

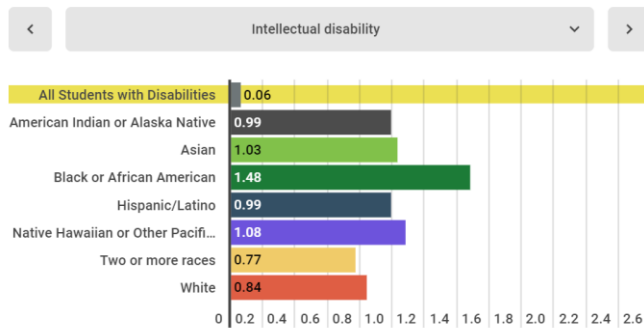


OSEP
Office of Special Education Programs  
Office of Special Education and Rehabilitative Services

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://daamerica.org/lda\\_today/disproportionate-identification-of-students-of-color-in-special-education/](https://daamerica.org/lda_today/disproportionate-identification-of-students-of-color-in-special-education/)

# 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

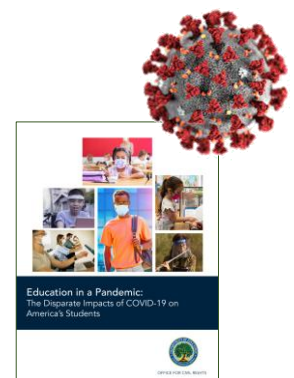
Johannes Rojahn  
The Ohio State University

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## 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

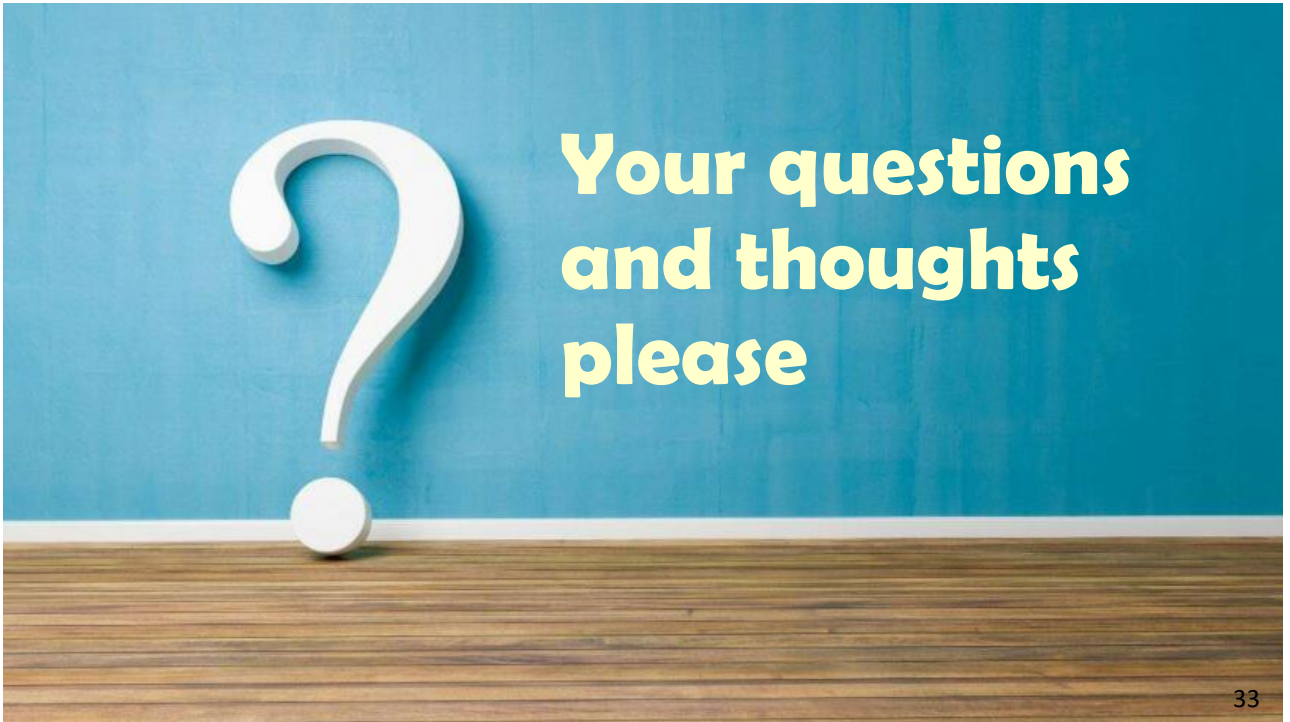


Education in a Pandemic: The Disparate Impacts of COVID-19 on America's Students. US Dept. of Ed- Office of Civil Rights. June, 21, 2021. <https://www2.ed.gov/about/offices/list/ocr/docs/20210608-impacts-of-covid19.p>

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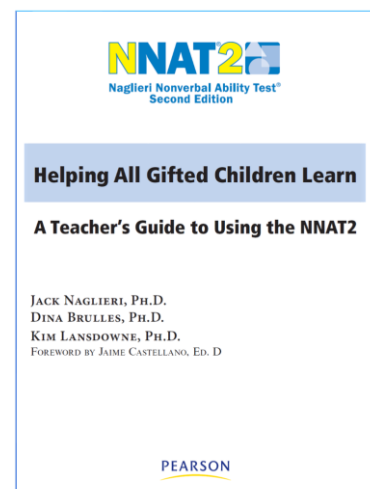
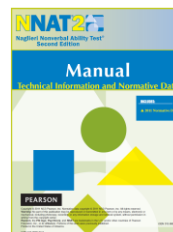
33

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## A Chance Meeting

- Naglieri, J. A. (2004). Reducing Under-representation of Minority Children in Gifted Education. SENG Conference, July 9-11, Arlington, VA.
- By 2008 we published our first book on Gifted Identification

2008



2008

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# The Naglieri General Ability Tests: Verbal, Nonverbal and Quantitative

Jack A. Naglieri, Ph.D. [jnaglieri@gmail.com](mailto:jnaglieri@gmail.com)

Dina Brulles, Ph.D. [dbrulles@gmail.com](mailto:dbrulles@gmail.com)

Kim Lansdowne, Ph.D. [kimberly.Lansdowne@asu.edu](mailto:kimberly.Lansdowne@asu.edu)

Publisher: MHS

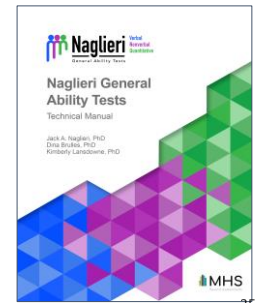
Contact: [Debbie.Roby@MHS.com](mailto:Debbie.Roby@MHS.com)

Phone: 214.908.7769



Learn More

[NaglieriGiftedTests.com](http://NaglieriGiftedTests.com)



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## 2016 – 2022 Developmental Process

### *Naglieri General Ability Tests* Verbal Nonverbal Quantitative

- 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** using:
  - 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.
  - Online (and paper) administration for group or individual assessment
  - Universal assessment using local and national norms

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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 Test – Verbal  
(Naglieri & Brulles)*

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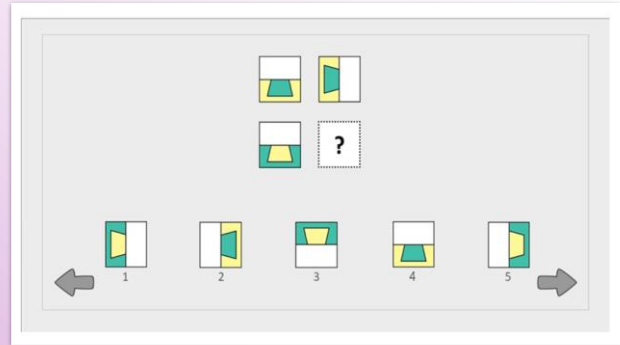
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The **Naglieri-NV** measures **general ability** using questions that require a student to recognize the relationships among the shapes.

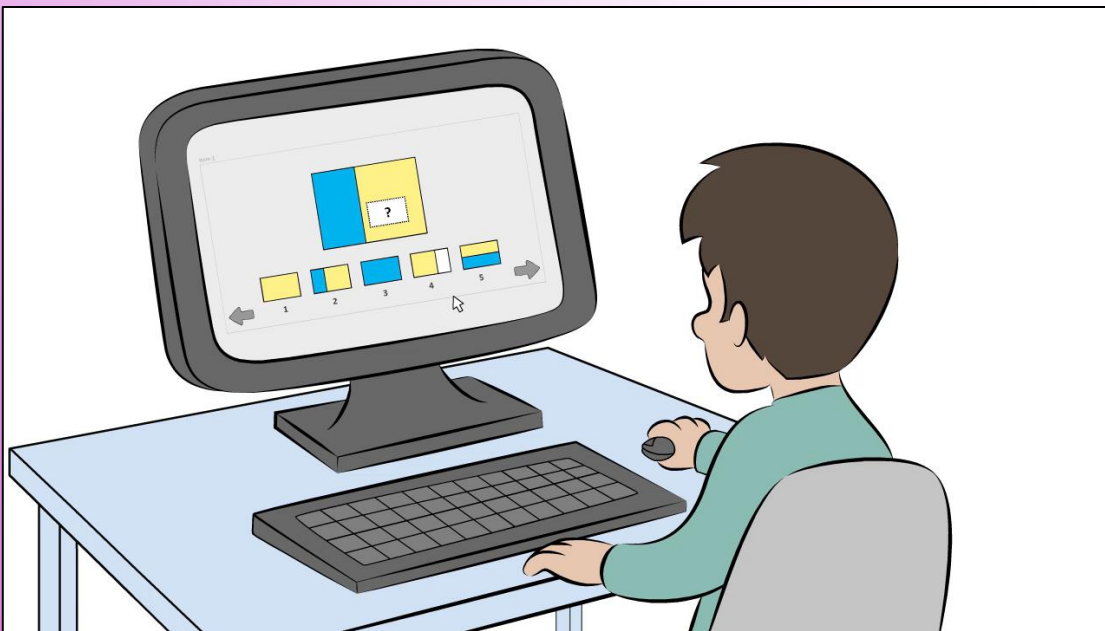
The structure of the items varies, but all items require that the student decipher the logic behind *the relationships among the shapes*, sequences, spatial orientations, patterns, and other distinguishing characteristics.

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



*Naglieri General Ability Test –  
Nonverbal (Naglieri)*

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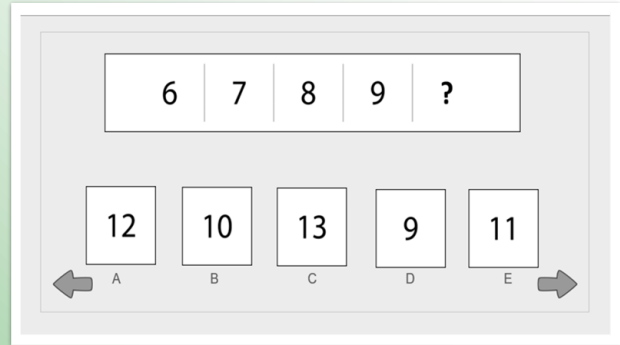


The **Naglieri-Q** measures **general ability** using numbers and/or symbols. Students must decipher the logic behind the relationships among the numbers and symbols to identify the answer.

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

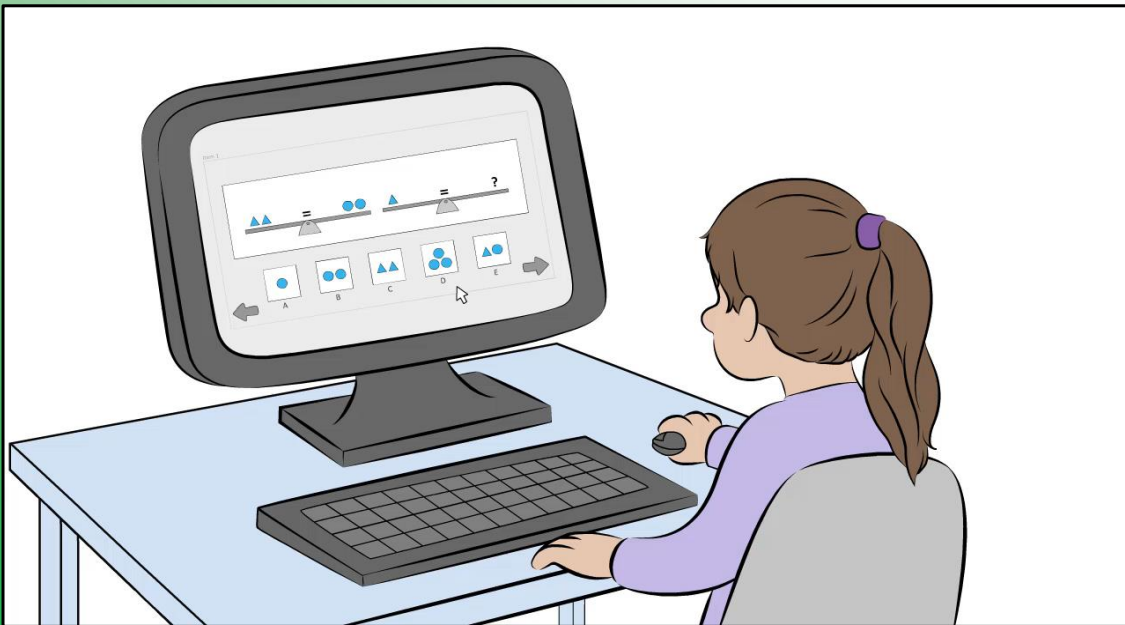
Items require minimal academic knowledge, and the calculation requirements are simple.

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.



*Naglieri General Ability Test – Quantitative  
(Naglieri & Lansdowne)*

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## How do *different* tests use the *same* ability?

- Even though the tests have different content (shapes, words, numbers) they all rely on **general ability ('g')**
- They all require understanding relationships among things or ideas

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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.

<b>NONVERBAL TEST</b> 	<b>VERBAL TEST</b> 	<b>QUANTITATIVE TEST</b> 
<ul style="list-style-type: none"> <li>• N= 3,630 Sample closely matches the US population on key demographics</li> <li>• <b>No GENDER differences</b> found between <b>males</b> and <b>females</b> for raw score across all forms</li> <li>• <b>No RACE/ETHNICITY differences</b> among <b>White, Black, &amp; Hispanic</b> for raw score across all forms</li> <li>• <b>No PARENTIAL EDUCATIONAL differences</b> 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</li> </ul>	<ul style="list-style-type: none"> <li>• N= 2,482 Sample closely matches the US population on key demographics</li> <li>• <b>No GENDER differences</b> found between <b>males</b> and <b>females</b> for raw score across all forms</li> <li>• <b>No RACE/ETHNICITY differences</b> among <b>White, Black, &amp; Hispanic</b> for raw score across all forms</li> <li>• <b>No PARENTIAL EDUCATIONAL differences</b> 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</li> </ul>	<ul style="list-style-type: none"> <li>• N= 2,841 Sample closely matches the US population on key demographics</li> <li>• <b>No GENDER differences</b> found between <b>males</b> and <b>females</b> for raw score across all forms</li> <li>• <b>No RACE/ETHNICITY differences</b> among <b>White, Black, &amp; Hispanic</b> for raw score across all forms</li> <li>• <b>No PARENTIAL EDUCATIONAL differences</b> 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</li> </ul>

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The test you choose determines the results you receive, the decisions you make, and the future of your students

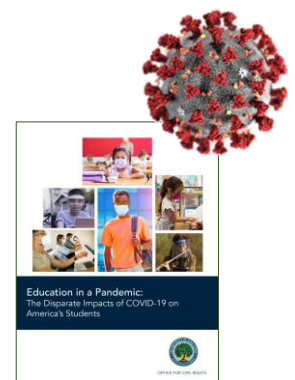
That is the *Practical Impact* of test selection

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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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## Naglieri General Ability Tests: V, NV, Q

- **CAUTION:** All tests that require knowledge which were normed before COVID are likely impacted by the learning loss that has occurred
- These three tests are the **ONLY** measures of general ability that were normed on a post covid population
- It is best to do *universal testing of all students*
- **LOCAL NORMS** and **NATIONAL NORMS** options

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## National and Local Norms



**Naglieri** Verbal Nonverbal Quantitative  
General Ability Tests

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NORMS

National and Local Norms of the Naglieri General Ability Tests with Dr. Kimberly Lansdowne



National and Local Norms with co-author Dr. Kimberly Lansdowne

**WATCH NOW**

@NaglieriGeneralAbilityTests  
#NaglieriGeneralAbilityTests  
#GiftedandTalented  
#EquityinIdentification

**National and Local Norms**

We use local and national norms in gifted identification to compare students to their peers of the same age or grade on a local and/or national level. Norms are essential for ensuring fair and accurate assessment of a student's ability; they play a crucial role in the process of identifying gifted individuals.

### National Norms

A **national norm** is established using a large sample of students who match the country's demographics, including age, gender, race, ethnicity, region, and socioeconomic status. These norms are used and research demonstrates their effectiveness in schools which reflect national diversity.

**Use national norms when...**

- Your district represents the national demographic.
- You successfully identify the top percent of the students in your school who need specialized services.
- You are testing students using a universal testing program.
- Or, a student is new to the school or district and was unable to be tested with their grade-peers as part of a local norm sample.

### Local Norms

**Local norms** calibrate a student's performance in relation to their fellow students within the same building or district. This method ensures scores are derived from a comparison group closely aligned with the local community's demographics. It's proven effective in identifying underrepresented students in gifted education.

**Use local norms...**

- In school settings that are not representative of the US population
- When universal testing of all students in a particular grade level in the district is conducted
- When norming by school building, (i.e. all students in a school or particular grade level) is desired.
- When norming by a specific group (i.e. students are from a specific demographic) is desired.

### Equity in Gifted Identification

With both national norms and local norming processes available, administrators of gifted programs can better identify those students who would benefit from advanced educational services resulting in increased equity in gifted identification. The option of using either national norms or local norms expands schools' ability to identify potential.

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# POST COVID National Norms

Grade-based National Norms 1,000 students pre grade (K to grade 5).

Table 1. National Norm Sample Characteristics.

Demographic		N	%	U.S. Census (%)	Difference (%)
Race/Ethnicity	Asian	235	3.9	4.7	-0.8
	Black	919	15.3	12.9	2.4
	Hispanic	1,261	21.0	23.3	-2.3
	White	2,914	48.6	46.1	2.5
	Other	671	11.2	12.9	-1.7
U.S. Region	Northeast	804	13.4	15.9	-2.5
	Midwest	1,270	21.2	20.2	1.0
	South	2,328	38.8	38.1	0.7
	West	1,598	26.6	25.7	0.9
Total National Norm Sample		6,000	100.0		

Note. U.S. population derived from the 2019 American Community Survey.<sup>4</sup>

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## Reliability and Validity

- Internal consistency (as measured by coefficient omega,  $\omega_6$ ) ranged from .85 to .93 across all grade levels and across all three tests.
  - Values greater than .80 are considered highly reliable.
  - Median  $\omega$  for Naglieri–V = .89; Naglieri–NV = .90; Naglieri–Q = .92
- Confirmatory factor analysis models supported the measurement of broad factor of general ability for
  - each of the V, NV, and Q test
  - AND for the combination of all three 3 tests across forms
- Bifactor model fit met or exceeded recommended guidelines (broadly, CFI values close to 1, RMSEA values close to .07), and factor loadings were statistically significant and positive.

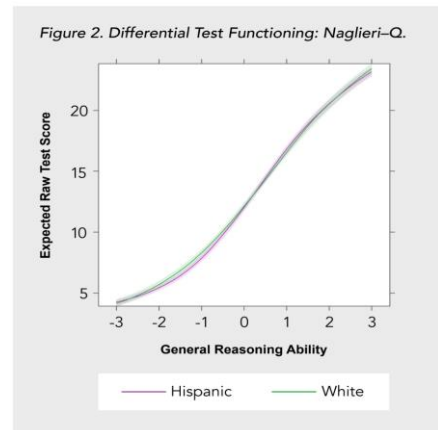
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## Measurement Bias

- No evidence of measurement bias detected.
  - That is, a student's score on the test is a true reflection of their ability and not a reflection of race or ethnicity when examining scores from White, Black, and Hispanic students.
  - Test performance was evaluated for all three tests and all forms using differential test functioning. An example of what was found is provided in Figure 2.
- Test characteristic curves were nearly perfectly overlapping for the groups across all forms and all grades.
- This provides strong evidence that the tests operate identically for all groups.



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## No Sex Differences in Means

Demographic Variables		N	%	US Census
Grade	Kindergarten-Lower	500		
	Kindergarten-Upper	500		
	Grade 1-Lower	500		
	Grade 1-Upper	500		
	Grade 2	1,000		
	Grade 3	1,000		
Sex	Female	3,000		
	Male	2,999		
	Other	1		
Race and Ethnic	Asian	235	3.9	4.7
	Black	919	15.3	12.9
	Hispanic	1261	21.0	23.3
	White	2,914	48.6	46.1
	Other	671	11.2	12.9
Region	Northeast	804	13.4	15.9
	Midwest	1,270	21.2	20.2
	South	2,328	38.8	38.1
	West	1,598	26.6	25.7
Primary Language	English	3,142	52.4	
	No	446	7.4	
Total		6,000		

Table 2

*Cohen's d Measures of Effect Size and Variance Ratios of Males to Females for the Naglieri General Ability Tests: Verbal Nonverbal Quantitative and Total*

		Verbal	Nonverbal	Quantitative	Total
Males	N	3,000	3,000	3,000	3,000
	Mn	99.0	99.4	101.3	99.9
	SD	15.2	15.3	15.4	15.3
Females	N	3,000	3,000	3,000	3,000
	Mn	100.9	100.5	98.7	100.1
	SD	14.7	14.7	14.4	14.7
Effect Size		-0.13	-0.08	0.17	-0.01
Variance Ratio		1.03	1.04	1.07	1.04

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## Summary: Equitable Assessment of Intelligence

- **Equitable evaluation of intelligence** demands test questions that can be solved regardless of the amount of academic knowledge and facility with language a student has
- We have shown that
  - General ability (*g*) **can be measured equitably** across Verbal, Quantitative and Nonverbal content if the tests do not require academic knowledge
- Verbal, Quantitative and Nonverbal are a **description of the content of the tests'** questions **NOT** different types of intelligence
- Equitable tests measure THINKING in a manner that is minimally influenced by KNOWING

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# What is the Practical Impact?

Services can be provided for those who otherwise would not have been identified

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## Gifted & Talented

**Clarification: We CAN find gifted students regardless of their academic skills**

*Gifted* \* Very Smart

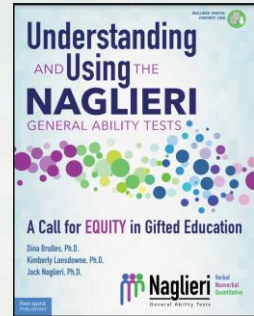
*Talented* \* Very Accomplished

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# Programming and Instruction

- Following identification, how can we create more equitable and **inclusive gifted programs and services?**
- See Brulles, Lansdowne & Naglieri (2022) which covers these and other topics:
  - Logistical Considerations
  - Understanding and Using Test Scores
  - Achieving Equity in Gifted Programming
  - Culturally Responsive Approaches for Reaching and Teaching All Gifted Learners
  - Local and National Norms



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## Devion

- Devion lived with his mother and father and two siblings in Springfield, Illinois
- The family has an annual income of \$12,000
- At home, Devion often reads or does word puzzles while his friends play outside.
- He is writing a book of several chapters using the family's 10-year-old computer, which was bought second-hand for \$100. It has a broken mouse.
- "I like to read books all day long,"
- He says, "I'm the only one I know that writes stories. It's a special secret I keep."





## Wall Street Journal (2003) What happened to Devion?

- He scored **141** out of a possible 150 on the *Naglieri Nonverbal Ability Test*
- Devion's high *Naglieri* score brought him an invitation to attend the magnet school last year
- He was the only African-American at his elementary school to qualify for gifted services
- But there were problems
- Devion is NOT getting good grades in school
- He is uncooperative
  - Devion's teacher recently told the class to write to Mickey Mouse, congratulating the cartoon character on his 75th birthday. "Second-graders have to learn how to write a friendly letter," she said.
  - Devion said the assignment bored him. He said: "I could write 100 pages about Pokemon. A whole book."
- His teacher did not think he should be in the gifted program

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Devion  
Graduated High  
School  
and got an  
advanced  
degree



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## Gifted Ed CAN Make a Difference



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We do the best we can with what we know, and when we know better, we do better.

— Maya Angelou —

Change Demands Courage to Think Differently

**Socially just identification of gifted students requires self-reflection and self-correction in response to current research**

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Journal Information  
Journal TOC

PsycoARTICLES: Journal Article

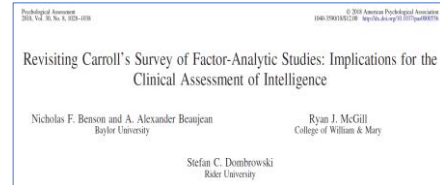
Structural validity of the Wechsler Intelligence Scale for Children—Fifth Edition: Confirmatory factor analyses with the 16 primary and secondary subtests.

Request Permissions

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

- ...The 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).

## Support for 'g'



- 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.

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

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## 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.”

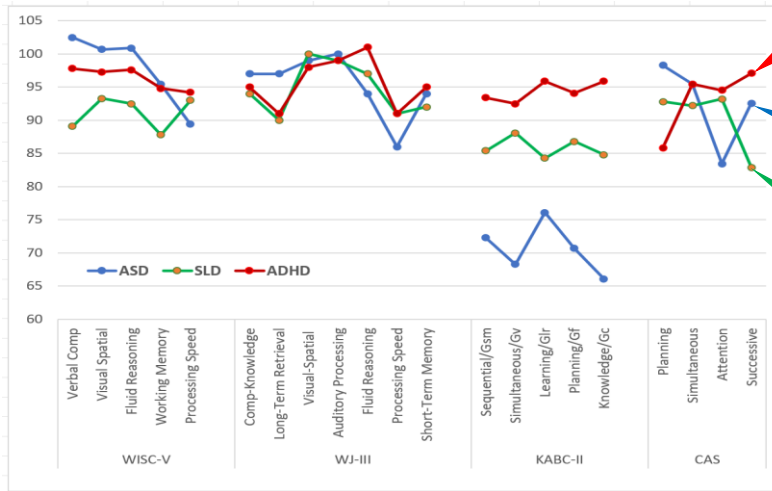
- **Abstract:** Intelligence, a subject of profound interest within psychology, has seen extensive exploration of its psychological and psychometric foundations. This study delves into the multifaceted nature of intelligence, using advanced structural equation modeling techniques to examine theory-driven 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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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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## Research on PASS Profiles

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

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

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

Jack A. Naglieri  
George Mason University

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

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

Leesa V. Huang<sup>1</sup>, Achilles N. Bardos<sup>2</sup>, and Rik Carl D'Amato<sup>1</sup>

**Abstract**  
The detection of cognitive patterns in children with learning disabilities (LD) has been a priority in the identification process. Subtest profile analysis from traditional cognitive assessment has drawn sharp criticism for inaccurate identification and weak connections to educational planning. Therefore, the purpose of this study is to use a new generation of cognitive tests with megacluster analysis to augment diagnosis and the instructional process. The Cognitive Assessment System uses a contemporary theoretical model in which composite scores, instead of subtest scores, are used for profile analysis. Ten core profiles from a regular education sample (N = 1,692) and 12 profiles from a sample of students with LD (N = 367) were found. The majority of the LD profiles

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

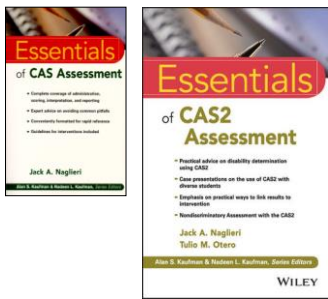
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# Discrepancy Consistency Method (DCM)

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



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

Three methods for detecting a pattern of strengths and weaknesses (PSW) that can be used as part of the process of identifying a student with a specific learning disability (SLD) have been suggested by Naglieri in 1999, Hale and Fiorello in 2004, and by Flanagan, Ortiz, and Alfonso in 2007. These authors share the same goal: to present a procedure to detect a PSW in scores that can be used

#### DON'T FORGET 3.5

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

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

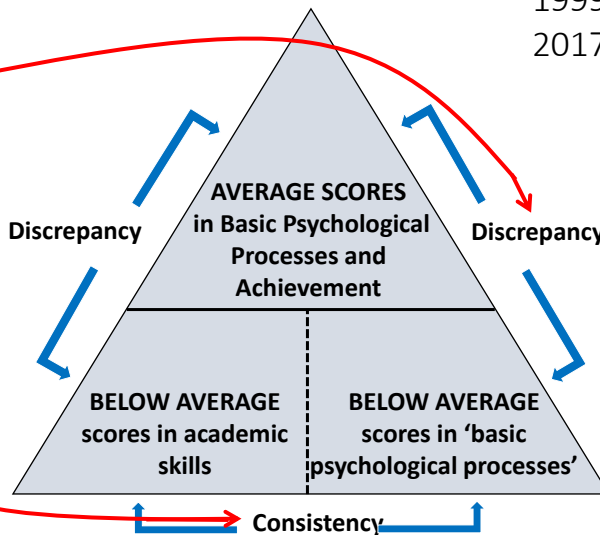
**Discrepancy 2:**  
Significant difference between high PASS scores and low achievement test scores

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

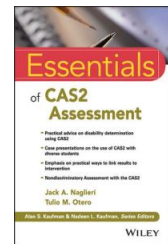
to identify an SLD (sometimes referred to as a third option; Zirkel & Thomas, 2010). Despite differences in the composition of the scores used and the definitions of what constitutes a basic psychological process, these methods all rely on finding a combination of differences as well as similarities in scores across academic and cognitive tests. Our approach to operationalizing a PSW is called the Discrepancy/Consistency Method (DCM) for the identification of SLD. Determining SLD is essentially based on the combination of PASS and achievement test scores. The method involves a systematic examination of variability of PASS and academic

## Discrepancy Consistency Method (DCM)

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



- DCM was first introduced in 1999 (again in 2017)



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

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

**HOW TO USE THIS WORKBOOK:**

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

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

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

**Discrepancy Consistency Method (DCM)**

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

Figure 3.2 Steps for Using the Discrepancy/Consistency Method

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

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

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

**CAS2 12-Subtest Extended Battery**

**BOX #1: Is there a PASS Pattern of Strengths and Weaknesses (Discrepancy)?**

Cognitive Assessment System	PASS Mean & SD	Significantly Different (p < .05) from PASS Mean?	Strength or Weakness
Planning	98	0.5	no
Simultaneous	111	13.5	yes
Attention	102	6.5	no
Successive	79	18.5	yes

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

Feifer Assessment of READING	Discrepant	Discrepant	Discrepant	Consistent
77 PI Phonological Index	Discrepant	Discrepant	Discrepant	Consistent
69 PA Precursive Awareness	Discrepant	Discrepant	Discrepant	Consistent
71 WSD Word-Sound Decoding	Discrepant	Discrepant	Discrepant	Consistent
79 ISD Isolated Word Reading Fluency	Discrepant	Discrepant	Discrepant	Consistent
80 ORF Oral Reading Fluency	Discrepant	Discrepant	Discrepant	Consistent
82 PS Processing Speed	Discrepant	Discrepant	Discrepant	Consistent
108 PI Planning Index				
99 RAN Rapid Automatic Naming				
98 VP Verbal Fluency				
115 LP Visual Discrimination				
102 WJ4 Word Reading Fluency				
122 CRF Comprehension Fluency				
91 WI Word Index				
104 CI Comprehension Index				
106 SC Semantic Contrasts				
83 WJ4 Word Recall	Discrepant	Discrepant	Discrepant	Consistent
99 PK Post Knowledge				
98 WJ4 Word Reading				
100 SP Spelling				
101 WJ4				

**Strengths**

**PASS Strengths & Weaknesses Identified**

**Discrepancies & consistencies Identified**

**PASS and Achievement Weaknesses**

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

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## A Study of Gifted Students

- N = 142
  - Similar numbers of girls and boys in Grade 4, 5 and 6.
  - all native speakers of English
  - came from families of middle to upper-middle socioeconomic background
- Gifted definition:
  - “Giftedness is exceptional potential and/or performance across a wide range of abilities in one or more of the following areas: general intellectual, specific academic, creative thinking, social, musical, artistic and kinesthetic” (Alberta Education, 2012, p. 6).
- Tests given
  - WASI –II (Vocabulary and Matrix Reasoning)
  - Woodcock-Johnson III Broad Reading score from: Letter-Word Identification, Reading Fluency, and Passage Comprehension
  - Cognitive Assessment System (CAS; Naglieri & Das, 1997) to measure PASS neurocognitive processes

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## A Study of Gifted Students

**CAS Full Scale scores correlated significantly higher with WJ-III achievement scores than the WASI-II**

Table 2  
Pearson Correlations of WASI-II FSIQ, Cognitive As

	WASI-II FSIQ	CAS FS
Broad Reading	.24	.53
Broad Math	.34	.50
Mean WJ-III	.34	.62

Table 1  
Descriptive Statistics for WASI-II, WJ-III Achievement, and Cognitive Assessment System (CAS) Scores (N = 142)

Variable	Mean	SD	Min	Max
<b>WJ-III Achievement</b>				
Broad Reading	125	14	97	166
Broad Math	116	13	91	162
Mean WJ	117	10	94	152
WASI-II FSIQ	123	8	105	145
CAS Full Scale	118	12	91	148
Planning	110	12	77	146
Simultaneous	121	16	88	152
Attention	113	13	79	141
Successive	111	11	81	137

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## A Study of Gifted Students

- 54% of gifted students had a **PASS score that was significantly different from that student's average PASS score**
  - That means the students has a specific neurocognitive processing strength or weakness (i.e., learning profile)

Table 3.

Percentages of Gifted Students with Significant Variability in PASS Standard Scores (N = 142).

		Planning	Simultaneous	Attention	Successive	PASS
PASS Weakness	n	25	6	18	28	77
	%	18%	4%	13%	20%	54%
PASS Strength	n	7	58	13	12	90
	%	5%	41%	9%	8%	63%

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## A Study of Gifted Students

- The number of gifted students who have a **PASS score that is significantly different from that student's average PASS score AND the PASS and achievement test scores were < 90.**

Percentages of Gifted Students with Significant Variability in PASS and Achievement Test Scores (N = 142).

		Planning	Simultaneous	Attention	Successive	PASS
PASS <90	n	4	0	4	4	12
	%	3%	0%	3%	3%	8%
PASS & Skills <90	n	3	0	2	1	6
	%	2%	0%	1%	1%	4%

These students have a specific PASS processing weakness less than 90; suggesting instructional modifications

These students with low PASS scores AND low WJ-III achievement suggests a Specific Learning Disability

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# QUESTIONS

**Thank  
You !**

**Naglieri** Verbal  
Nonverbal  
Quantitative  
General Ability Tests

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EQUITABLE ASSESSMENT OF GIFTED STUDENTS USING THE  
**Naglieri General Ability Tests**  
Now Available

WHY WE DO WHAT WE DO

**Inequity in Gifted Testing**  
Recently researchers have estimated that more than 850,000 African-American, Hispanic, and Native American students in K-12 public school today could have been identified for gifted programs but were not. This problem could be addressed by using ability tests that were designed and validated to be equitable for all students.

**Achieving Equity**  
The Naglieri General Ability Test by Jack A. Naglieri, PhD, Gina M. Butler, PhD and Kimberly Landisbane, PhD were explicitly developed to address the need for equitable assessment of gifted students from diverse cultural, linguistic, and socioeconomic backgrounds so they can receive educational opportunities appropriate for their ability.