

# Equitable Gifted Identification Using the Naglieri General Ability Tests: Verbal, Nonverbal & Quantitative

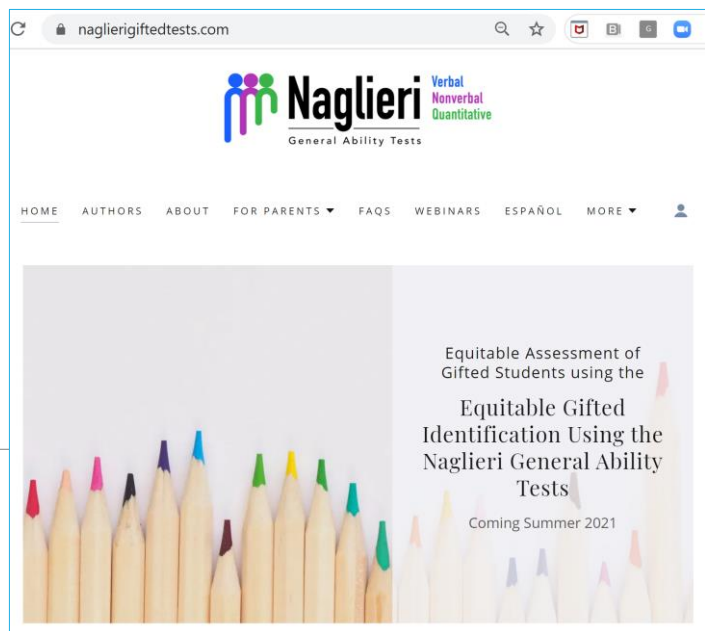
The need for equitable identification in gifted education is critically important. In this session, the magnitude of this problem and the impact ability tests have is explained. Practical solutions such as better tests and local norms will be suggested. New evidence of equity using the Naglieri General Ability Tests: Verbal, Nonverbal and Quantitative will be shown.



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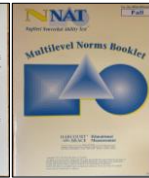


## How and Why...

- Working as a school psychologist in 1975 I noticed that items on the WISC we were VERY similar the achievement tests
- First year at NAU - 1982
  - Lecture on Navajo students
  - Testing on the Havasupai Reservation
- First Research Article
  - Naglieri, J. A. (1982). Does the WISC-R measure verbal intelligence for non-English speaking children? *Psychology in the Schools, 19*, 478-479.
- First Test - 1985
  - Matrix Analogies Tests Individual and Group administrations (1985)
- Met Dina and Kim in 2004
  - First Book on Gifted: Helping All Gifted Students Learn (Naglieri, Brulles & Lansdowne, 2009) with emphasis on equitable identification



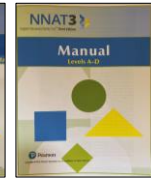
1985 MAT Short and Expanded



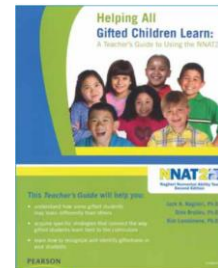
Naglieri Nonverbal Ability Test 1997



NNAT -2 2008



NNAT -3 2016



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## Dina and Kim

- Dina- Paradise Valley School District; Kim- Scottsdale School District
  - Perceived as competing districts
  - Both working on dissertations regarding underpenetrated populations in gifted
- Jack-history of advocating for minority students
- We came together for a common cause-“social justice warriors”

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## Ideas to Consider



# Gifted Identification

## Ability Tests' Content

## New General Ability Tests

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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."

**THE WALL STREET JOURNAL**  
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MONDAY, DECEMBER 29, 2003 • VOL. CXLXII NO. 126 • \$1.00

**Brain Drain**  
Initiative to Leave No Child Behind Leaves Out Gifted

Educators Divert Resources From Classes for Smartest To Focus on Basic Literacy

Blow to Bright Minority Kids

By DANIEL GOLDEN

SPRINGFIELD, Ill.—To make sure even the most disadvantaged students learn the three R's, Congress two years ago passed a law known as No Child Left Behind. National test scores suggest it is indeed helping the weakest students.

There's just one problem: It may be leaving behind some of the strongest.

The 2001 law, championed by the Bush administration, calls for all public-school students to be proficient in reading and math by 2014. Schools must make steady progress toward these goals. They face penalties if they don't continually raise their proficiency of proficient students, both overall and within various racial and other categories.

Schools that miss milestones can be required to pay for outside tutors and let parents transfer children elsewhere.

But a school faces no penalty if top students fail off as long as they remain prof-

**What's News**  
Business and Finance World-Wide

**THE PARMALAT SCANDAL** widened, with prosecutors saying company founder Calisto Tanzi is under investigation for misappropriating about \$60 million. An Italian court Saturday declared the dairy company insolvent. Prosecutors believe Parmalat's complex global financial structure was the means by which the firm was able to mask the alleged fraud for years.

Two Great Thornton employees are under scrutiny in connection with fraudulent documents related to their audits of a Cayman Islands-based Parmalat unit.

U.S. AND OTHER AID Poured into Iraq, Iraq's quake-blasted cities and villages. Such "earthquake diplomacy" can help unify a mass of irremediable rubble, swages and unrescued bodies along the coast's silk road. Parts of the complex coast took 2,000 years.

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**Project at Mint Draus Complaints From Many Quarters**

Commemorative State Coins, Meant to Spur Collecting, Inspire Free-for-Alls

By BROOKS BARNES

Heads, it's George Washington. Tails, it's trouble.

These days, a growing number of two-bit battles are rattling the sleepy U.S. Mint. The federal agency's commemorative quarters program, a pocket-change substitute to the 50 states, has pitted politicians, tourism officials and artists against each other in brawling battles, launched in 1999 as a benign patriotic

**Business Ties**  
Many Companies Transactions W

'Related Party' Deals Disclosed  
By 300 Large Corporations; Potential for Conflict

Legacy of Family Ownership

By JOHN R. ENSHWILLER

Before the midsize deals would shutter Enron Corp. came fully into focus, then-Chief Executive Kenneth Lay was asked in August 2001 about a sophisticated-looking arrangement: two partnerships run and partly owned by David Filan, Enron's Chief Financial Officer Andrew Fastow that did significant business with Enron itself.

Wasn't there a glaring conflict of interest in Mr. Fastow acting on behalf of the huge energy concern and his own partnership in business deals totaling hundreds of millions of dollars?

"Almost all big companies have related party transactions," Mr. Lay said.

He was right about that. Consider: At Lear Corp., a large Southfield, Mich.-based auto-parts supplier, 17 relatives of senior officials are employed by or have business ties to the company, or have business ties to the company, failed to report until late last year details of senior officials are employed by or have business ties to the company, failed to report until late last year details of senior officials are employed by or have business ties to the company, failed to report until late last year details of senior officials are employed by or have business ties to the company.

**The Wisconsin quarter (above) dour the Mint will issue next year. The design selected by a state panel (right) was minted at the 11th hour, prompting controversy.**

The question in Texas: Remember the Alamo or the now-banned, former president's likeness?

**North Korea confirmed it is willing to hold a fresh round of six-party talks with the U.S. and four other nations early in 2004. The agreement came in a weekend.**

**The chief U.S. atomic inspector led teams in searching for Libya's nuclear-related sites. Five fruits of Tripoli's renunciation of banned arms.**

**Pakistan will go ahead with next week's regional summit in Islamabad**

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## Wall Street Journal

- 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

What happened to Devion?

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## Devion Graduates High School



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# Obstacle to Equitable Identification

- Clarification of terms...
  - Gifted = very smart
  - Talented = very accomplished
- Identification procedures
  - Gifted/Talented students are often identified with traditional IQ tests comprised of subtests like Vocabulary, Similarities, Arithmetic, Comprehension which demand knowledge
  - Using a test of ability that demands knowledge of English and understanding verbal directions is not reasonable

Number of Students Missed = 848,402

848,400 non-White  
247,500 ELL gifted  
in grades K-12 not served

WHY are so many of these students missed?

Table 1. Number of Students in US Public Schools Grades K-12 in 2018

	US Population	Potentially Gifted (8%) of US Population	Actual Numbers of Students in Gifted & Talented Programs	Numbers of students Not Identified
White	26,822,930	2,145,834	2,065,366	80,468
Black	8,530,756	682,460	366,823	315,637
Hispanic	15,888,681	1,271,094	778,545	492,549
Native American	572,330	45,786	25,183	20,603
Two or More Races	1,782,991	142,639	123,026	19,613
<b>Total non-White</b>	<b>26,774,758</b>	<b>2,141,979</b>	<b>1,293,577</b>	<b>848,402</b>

English language learner (ELL) students enrolled in public elementary and secondary schools in 2015 by Race and Ethnicity

	N of ELL in Public Ed	N Potentially Gifted (8%)	N students Identified	N Missed (% Missed)
White	294,763	23,581	8,548	15,033 (64%)
Black	178,141	14,251	5,166	9,085 (64%)
Hispanic	3,772,633	301,811	109,406	192,404 (64%)
Asian	511,703	40,936	14,839	26,097 (64%)
Pacific Islander	26,992	2,159	783	1,377 (64%)
Native Am./ Alaska Native	38,792	3,103	1,125	1,978 (64%)
Two or More Races	31,136	2,491	903	1,588 (64%)
<b>Total</b>	<b>4,854,160</b>	<b>388,333</b>	<b>140,771</b>	<b>247,562 (64%)</b>



Conclusion: Test content does not define a type of ability

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Questions or thoughts

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Ideas to Consider:

Who conceived the content of our IQ tests

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Gifted Identification

Ability Tests' Content –  
WHERE DID IT COME FROM?

New General Ability Tests

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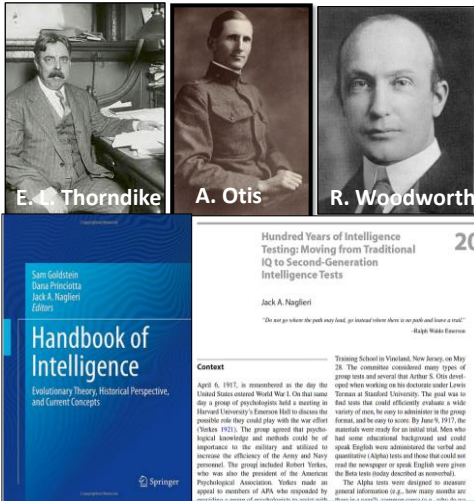
"The hardest part of learning something new is not embracing new ideas, but letting go of old ones."

- Todd Rose, *The End of Average*

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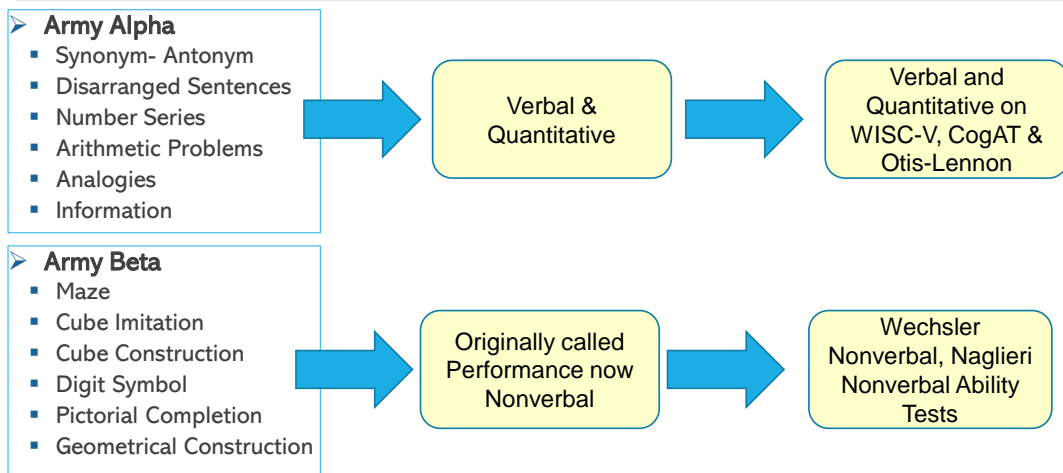
# Army Mental Testing (Yoakum & Yerkes)

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



- A group of psychologists met at Harvard in April of 1917 to construct an ability test to help the US military evaluate recruits (WWI) for responsible positions
- Their goal was to develop a workable set of tests called the Army Alpha & Beta
- That became Verbal & Performance on WISC

## From Alpha & Beta to Wechsler IQ



## Army Testing (Yoakum & Yerkes, 1920) & Pintner (1923)

### METHODS AND RESULTS

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Why Beta?

Men who fail in alpha are sent to beta in order that injustice by reason of relative unfamiliarity with English may be avoided.

Men who fail in beta are referred for individual examination by means of what may appear to be the most suitable and altogether appropriate procedure among the varied methods available. This reference for careful individual examination is yet another attempt to avoid injustice either by reason of linguistic handicap or accidents incident to group examining.

### INTELLIGENCE TESTING METHODS AND RESULTS

BY  
RUDOLF PINTNER, Ph.D.  
PROFESSOR OF EDUCATION IN TEACHERS COLLEGE  
COLUMBIA UNIVERSITY

I. *Tests must be relatively new.* — A good intelligence test must avoid as much as possible anything that is commonly learned by the subjects tested. In a broad sense this rests upon a differentiation between knowledge and intelligence. To use as a test of intelligence

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## Our Tests Demand Knowledge

### Stanford-Binet 5

- Verbal
- Knowledge
- Quantitative Reasoning
- Vocabulary
- Verbal Analogies

### WISC-V

- Verbal Comprehension: Vocabulary, Similarities, Information & Comprehension
- Fluid Reasoning: Figure Weights, Arithmetic

### WJ-IV and Bateria-IV (including Cross Battery)

- Comprehension Knowledge: Vocabulary & General Information
- Fluid Reasoning: Number Series & Concept Formation
- Auditory Processing: Phonological Processing

### K-ABC-II

- Knowledge / GC: Riddles, Expressive Vocabulary, Verbal Knowledge

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WJ-IV Items from Cognitive and Achievement Tests:

Cognitive: Oral Vocabulary Subtest 1

**Sample Items**

Point to *near* on subject's page and say: **Another word that means *near* is *close*** (pronounced klos, not kloz).

A. Point to *big* on subject's page and say: **Tell me another word for *big*.**  
 ▲ **Correct:** large, gigantic, huge

◆ **A: Error or No Response**  
 Score item 0. Say: **Another word for *big* is *large*.** Repeat Sample Item A.

B. Point to *nap* and say: **Tell me another word for *nap*.**  
 ▲ **Correct:** sleep, rest, snooze

◆ **B: Error or No Response**  
 Score item 0. Say: **Another word for *nap* is *sleep*.** Repeat Sample Item B.

Very Similar Items on "Different" Tests

Achievement: Reading Vocabulary-Synonyms Subtest 17

**Sample Items**

Point to *street* on subject's page and say: **Another word that means *street* is *road*.**

A. Point to *large* on subject's page and say: **Tell me another word for *large*.**  
 ▲ **Correct:** big, enormous, gigantic, huge

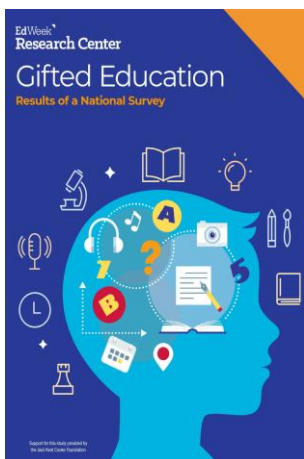
◆ **A: Error or No Response**  
 Score item 0 and say: **Another word for *large* is *big*.** Repeat Sample Item A.

B. Point to *sleep* and say: **Tell me another word for *sleep*.**  
 ▲ **Correct:** nap, doze, rest, snooze

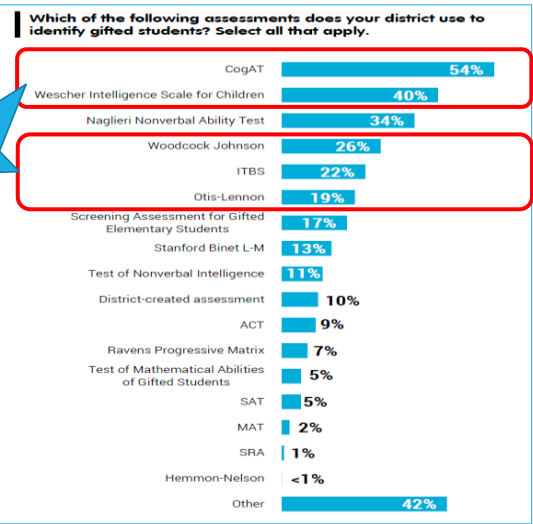
◆ **B: Error or No Response**  
 Score item 0 and say: **Another word for *sleep* is *nap*.** Repeat Sample Item B.

Do not read any other items or tell subject any other words during this test.

# National Survey of Gifted Education



These tests have verbal and quantitative questions and lengthy verbal directions



## Race and Ethnic Differences in Ability Tests used in Identification of Gifted and Twice Exceptional Students

Note: Even though these tests may not show psychometric bias (Worrell, 2019) some do yield mean score differences.

Mean Score Differences in Intelligence Test Scores by Race & Ethnicity.		
	Race	Ethnicity
<b>Tests that require knowledge</b>		
Otis-Lennon School Ability Test (school system)	13.6	
Stanford-Binet IV (normative sample)	12.6	
WISC-V (normative sample)	11.6	9.1
WJ- III (normative sample)	10.9	10.7
CogAT7 (Nonverbal scale)	11.8	7.6
WISC-V (statistical controls normative sample)	8.7	5.4
<b>Tests that require minimal knowledge</b>		
CAS-2 (normative sample)	6.3	4.5
CAS (statistical controls normative sample)	4.8	4.8
CAS-2 (statistical controls normative sample)	4.5	1.8
NNAT (matched samples)	4.2	2.8

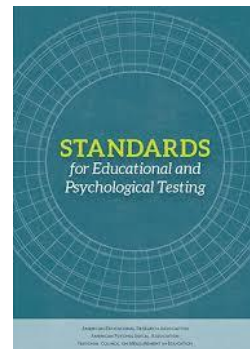
Citations: For the Otis-Lennon School Ability Test by Avant and O'Neal (1986); Stanford-Binet IV from Wasserman (2000); Woodcock-Johnson III race differences from Edwards & Oakland (2006) and ethnic differences from Sotelo-Dynega, Ortiz, Flanagan & Chaplin (2013); CogAT7 from Carman, Walther and Bartsch (2018); WISC-V from Kaufman, Raiford & Coalson (2016); CAS from Naglieri, Rohahn, Matto & Aquilino (2005); CAS-2 from Naglieri, Das & Goldstein, 2014; Naglieri Nonverbal Ability Test (Naglieri & Ronning, 2000).

From: Brulles, D., Lansdowne, K. & Naglieri, J. A. (2022). Ensuring Equity: Identifying and Serving All Gifted Students Using the Naglieri Tests of General Ability. Minneapolis, MN: Free Spirit Publishing. And Naglieri, J. A. & Otero, T. M. (2017). Essentials of CAS2 Assessment. New York: Wiley.

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## Opportunity to learn and Equity

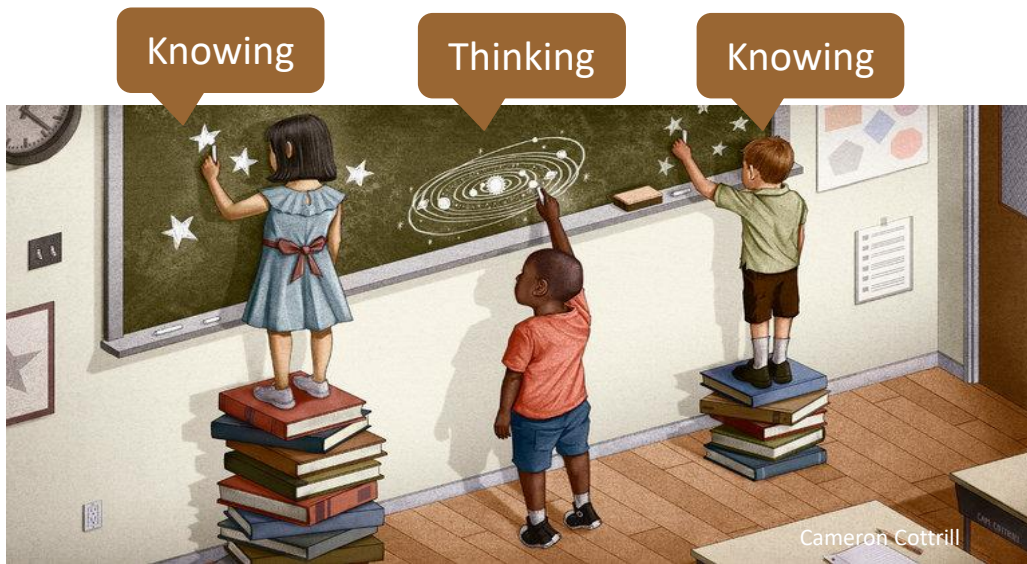
- According to the *Standards for Educational and Psychological Testing* (AERA, APA & NCME, 2014), if a person has had limited opportunities to learn the content in a test of intelligence, that test may be considered **unfair because** it penalizes students for not having learned the content
- **Equitable assessment** can be achieved if all examinees have equal opportunity to perform
- The Standards also remind us that **even if the norming data do not demonstrate psychometric bias tests can still be considered unfair.**



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Why Talented Black and Hispanic Students Can Go Undiscovered  
By SUSAN DYNARSKI APRIL 8, 2016

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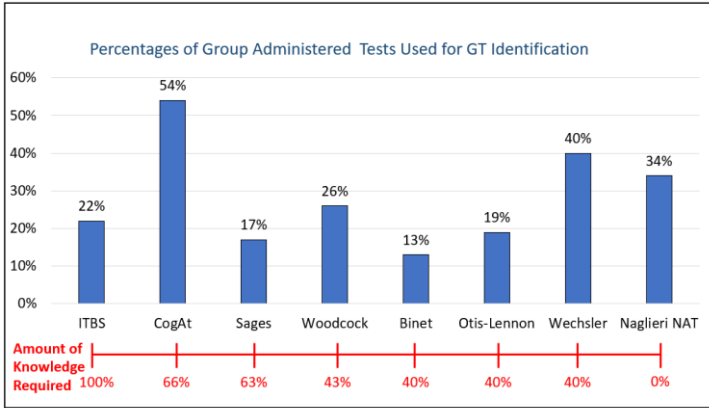
## Gifted Identification

- This presentation is about children who may not have good grades, or the academic skills or command of English, yet they are very smart – **gifted**
- These children can become very **talented** given the opportunity to learn
- How do we evaluate students for gifted education?

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# Thinking and Knowing Continuum



Usage data from: Kurtz, H., Harwin, A., Chen, V. & Furuya, Y. (2019). *Gifted education: Results of a national survey*. Bethesda, MD: Education Week Research Center.

The two most widely used measures of ability (CogAT and Wechsler) have the most amount of knowledge in the test questions and long verbal directions that demand verbal comprehension, knowledge of verbal concepts and working memory.

# Hispanic Children

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

Jack A. Naglieri  
George Mason University

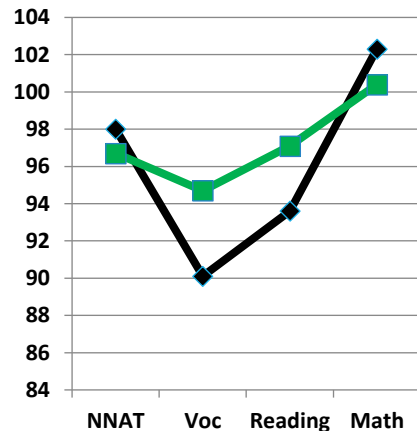
Ashley L. Booth  
University of Virginia

Adam Winsler  
George Mason University

Hispanic children with ( $n = 148$ ) and without ( $n = 148$ ) limited English proficiency were given the Naglieri Nonverbal Ability Test (NNAT; J. A. Naglieri, 1997a) and the Stanford Achievement Test—9th edition (SAT-9; 1995). The groups were selected from the NNAT standardization sample ( $N = 22,620$ ) and matched on geographic region, gender, socioeconomic status, subsatency, and ethnicity. There was a very small difference ( $d$  ratio = 0.1) between the NNAT standard scores for the children with limited English proficiency ( $M = 98.0$ ) and those without limited English proficiency ( $M = 96.7$ ). The NNAT correlated moderately and similarly with achievement for the 2 groups. The sample of children with limited English proficiency earned considerably lower scores on SAT-9 Reading and Verbal subtests. Results suggest that the NNAT may be useful for the assessment of Hispanic children with and without limited English proficiency.

Assessment of intelligence for persons with limited English language skills has been an important issue since the familiar verbal-nonverbal organization of tests was initially made popular in the Army Alpha and Beta tests (Yerkes & Yerkes, 1920). The value of a nonverbal test for evaluation of diverse populations was noted by Yerkes and Yerkes more than 80 years ago: "Men who fail in alpha [the verbal tests] are sent to beta [the nonverbal tests] in order that injustice by reason of relative unfamiliarity with English may be avoided" (p. 19). The Beta tests and other similar nonverbal tests have, therefore, served an important role in effective assessment of diverse populations because their content is

Recent research on the nonverbal approach to measuring general ability has shown that the Naglieri Nonverbal Ability Test (NNAT; Naglieri, 1997a) can be an effective way to assess general ability, yields small race and ethnic group differences, and shows good prediction of achievement. Naglieri and Romming (2000a) provided a detailed study of mean score differences between matched samples of White ( $n = 2,300$ ) and Black ( $n = 2,306$ ), White ( $n = 1,176$ ) and Hispanic ( $n = 1,176$ ), and White ( $n = 466$ ) and Asian ( $n = 466$ ) children on the NNAT. Only small differences were found between the NNAT scores for the White and Black samples. Graham et al.



# NNAT's Small Race & Ethnic Differences

	N	Mean	Diff
White	2,306	99.3	
Black	2,306	95.1	4.2
White	1,176	101.4	
Hispanic	1,176	98.6	2.8
White	466	103.6	
Asian	446	103.0	0.3

Psychological Assessment  
2000, Vol. 12, No. 3, 328-334

Copyright 2000 by the American Psychological Association, Inc.  
0893-3200/00/\$12.00 DOI: 10.1037/1082-989X.12.3.328

## Comparison of White, African American, Hispanic, and Asian Children on the Naglieri Nonverbal Ability Test

Jack A. Naglieri and Margaret E. Ronning  
Ohio State University

This study examined differences between 3 matched samples of White ( $n = 2,306$ ) and African American ( $n = 2,306$ ), White ( $n = 1,176$ ) and Hispanic ( $n = 1,176$ ), and White ( $n = 466$ ) and Asian ( $n = 446$ ) children on the Naglieri Nonverbal Ability Test (NNAT; J. A. Naglieri, 1997a). The groups were selected from 22,620 children included in the NNAT standardization sample and matched on geographic region, socioeconomic status, ethnicity, and type of school setting (public or private). There was only a small difference between the NNAT scores for the White and African American samples ( $d$  ratio = .25) and minimal differences between the White and Hispanic ( $d$  ratio = .17) and between the White and Asian ( $d$  ratio = .02) groups. The NNAT was moderately correlated with achievement for the total sample and correlated similarly with achievement for the White and ethnic minority groups. The median correlation of NNAT with reading was .52 and NNAT with math was .63 across the samples. Results suggest that the NNAT scores have use for fair assessment of White and minority children.

# NNAT Identified Equal Percentages

**Table 2**  
NNAT Scores

	White		Black		Hispanic		Expected %
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
120 & above	1,571	10.3	269	9.4	190	9.5	9.0
125 & above	906	5.6	145	5.1	88	4.4	5.0
130 & above	467	2.5	75	2.6	46	2.3	2.0
135 & above	190	1.1	42	1.5	18	0.9	1.0
140 & above	90	0.6	19	0.6	9	0.4	0.4
Total Sample <i>n</i>	14,141		2,863		1,991		

Note. Expected percentage values are those associated with normal curve probabilities.

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

Jack A. Naglieri  
George Mason University

Donna Y. Ford  
The Ohio State University

### ABSTRACT

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

attribute the problem to standardized tests, contending that these tests fail to assess the strengths and abilities of culturally, ethnically, and linguistically diverse populations (e.g., Frazer et al., 1995). Support for this assertion comes from reports showing that Black, Hispanic, and Native American students consistently score lower than White students on traditional standardized tests (Brody, 1992; Sinker, 1988). Despite the fact that intelligence tests such as the Wechsler Intelligence Scale for Children—Third Edition

### PUTTING THE RESEARCH TO USE

Very Similar percentages of Black, White and Hispanic students earned a standard score of 125 (95<sup>th</sup> percentile) or above

# Card & Giuliano (2017)

[www.pnas.org/cgi/doi/10.1073/pnas.1605043113](http://www.pnas.org/cgi/doi/10.1073/pnas.1605043113)

- Effects of universal assessment (including the NNAT) to all students in years 2006 and 2007 (N = 79,650)

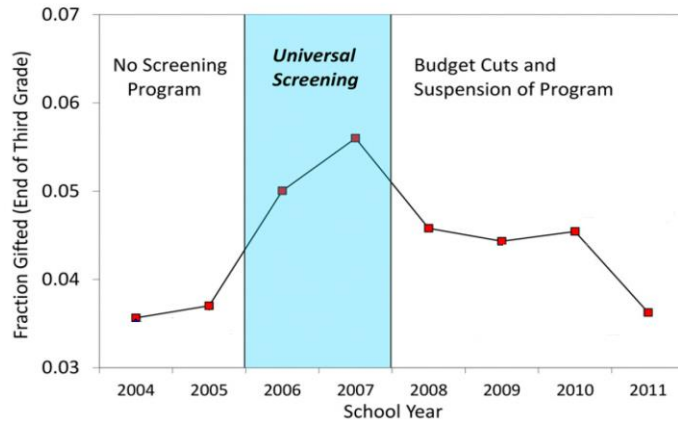


Fig. 1. Fraction gifted by end of third grade,

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Conclusion: Taking the knowledge out of ability tests improves equity

Questions?  
Reactions?

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## *Equitable Identification of Gifted Students*

### ➤ CONCLUSIONS

- Tests typically used to identify gifted/talented students require too much language and information:
  - language used in the **directions** (V, NV, Q)
  - Verbal and math knowledge required in the **questions** (V & Q)
  - Verbal expression to **answer** verbal questions(V)
- Students who come from low income families, are culturally different, or limited English skills are at disadvantage
- Many Hispanic and Black students are denied entry to gifted education and therefore they don't reach their potential
- **BUT...WE CAN and MUST DO BETTER especially NOW!**

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Ideas to  
Consider



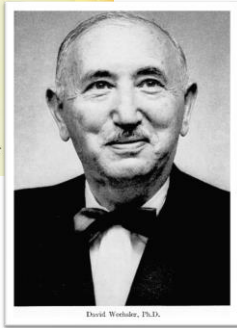
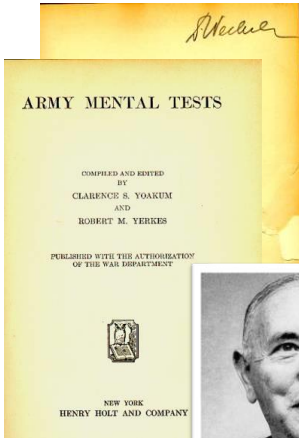
## Gifted Identification

## Ability Tests' Content

## New General Ability Tests

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# Wechsler (1939)

- His definition of intelligence
  - “The aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment (1939)”
  - Yet his tests have had multiple scales

# Wechsler & Spearman's *g*

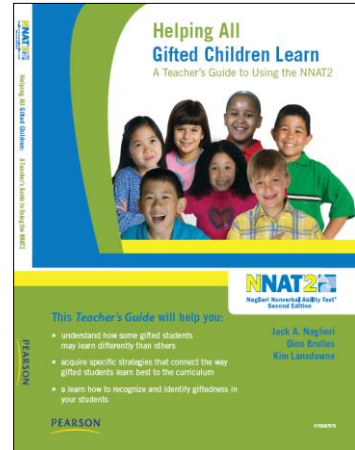
of nonverbal assessment many paces forward. In addition, the emphasis in the *WNV Manual* that the Full Scale measures *general ability nonverbally*—and *not* nonverbal ability—is an important distinction that further ties the WNV to Dr. Wechsler. Although his intelligence tests in the 1930s and 1940s departed from the one-score *Stanford-Binet* by offering separate Verbal and Performance IQs as well as a profile of scaled scores, Dr. Wechsler remained a firm believer in Spearman's *g* theory throughout his lifetime. He believed that his Verbal and Performance Scales represented different ways to access *g*, but he never believed in nonverbal intelligence as being separate from *g*. Rather, he saw the Performance Scale as the most sensible way to measure the general intelligence of people with hearing impairments, language disorders, or limited proficiency in English. And that is precisely what the WNV is intended to do.

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



## General ability (Naglieri, Brulles & Lansdowne, 2009)

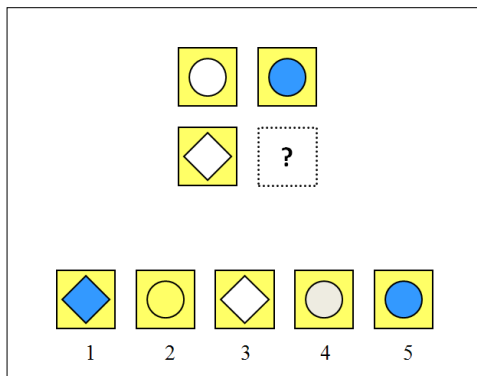
- General ability (i.e. 'g') is what allows us to solve many kinds of problems
- The problems may involve
  - reasoning, memory, sequencing, verbal and math skills, patterning, connecting ideas across content areas, insights, making connections, drawing inferences, analyzing simple and complex ideas.
- Verbal or Nonverbal describes the content of the test NOT a type of intelligence



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## These questions require General Ability!



Which word is different:  
girl dog chair fish ?

3 is to 6 as 5 is to \_\_\_\_\_?

$C^7$  is to F as  $E^7$  is to \_\_\_\_\_?

Despite the differences in content, each of these questions requires understanding the relationships among parts.

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How do  
*different tasks*  
use the *same*  
ability?



## General Ability

- Even though the tasks were different in content (shapes, words, numbers) they all rely on **general ability (*g*)** as described by Spearman, Wechsler and many others
- The reason is that they all require understanding relationships among things or ideas

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

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

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

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

## Support for 'g'

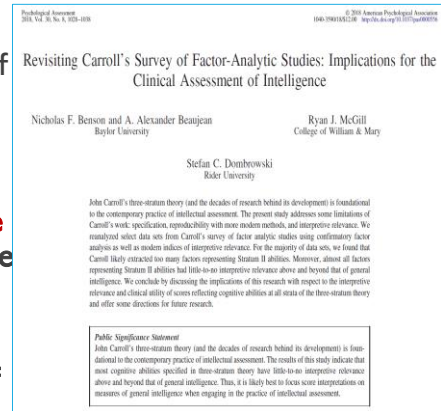
- The small portions of variance uniquely captured by [subtests]... render the group factors [scales] of questionable and support the value of general ability
- Present CFA results confirm the EFA results (Canivez, Watkins, & Dombrowski, 2015; Dombrowski, Canivez, Watkins, & Beaujean (2015); and Canivez,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

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# Support for 'g': Research on CHC

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



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# Research Supports General Ability

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

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

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

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

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

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

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

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

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

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## Test Directions ALSO Matter

- *California Achievement Test & Iowa Test of Basic Skills* instructions include many basic concepts that students may not have mastered at the ages for which the tests were intended (Cummings & Nelson, 1980)
- Students' ability to recall directions presented orally was related to their working memory capacity. (Randall, Engle, Carullo, & Collins, 2015)
- CogAT *nonverbal* scale demands comprehension of *verbal* directions
  - The instructions for 5 and 6-year-olds contain approximately 400 words and many verbal concepts and complex verbal statements like: **The small circle goes with the large circle in the same way that the small square goes with the large square.**
- The inclusion of verbal concepts and strain on working memory are an obstacle for any student with limited verbal skills

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What are  
you  
thinking?

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

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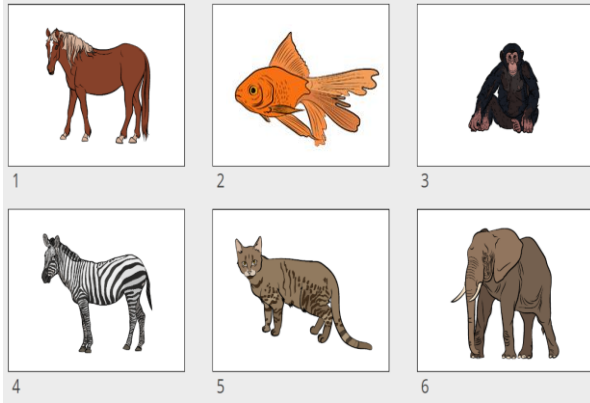
## *Naglieri General Ability Tests*

- Kim, Dina and I **explicitly constructed tests for equitable identification** of students from diverse cultural, linguistic, or socioeconomic backgrounds, or those who have had limited educational experiences.
- We used the traditional Verbal, Nonverbal and Quantitative formats to measure general ability and identify gifted students. To ensure equity we used:
  - Verbal and Quantitative test questions that do not require academic knowledge,
  - Verbal and Quantitative test questions that can be solved using any language,
  - Animated instructions that remove the need for verbal comprehension of directions,
  - A multiple-choice response which removes the need for verbal expression.

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# Naglieri Ability Test - Verbal



- Online and paper version
- Classroom and individual administration
- Animated instructional video
- Minimal verbal directions by administrator
- Interactive practice questions
- 3 different test forms:
  - Kindergarten – Grade 2,
  - Grade 3-6, Grade 7-12

Authors: Jack Naglieri & Dina Brulles

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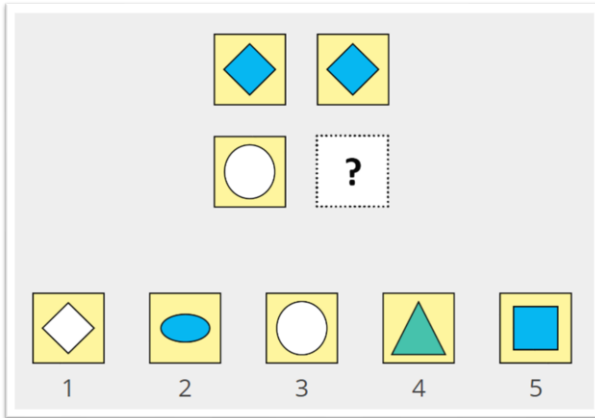
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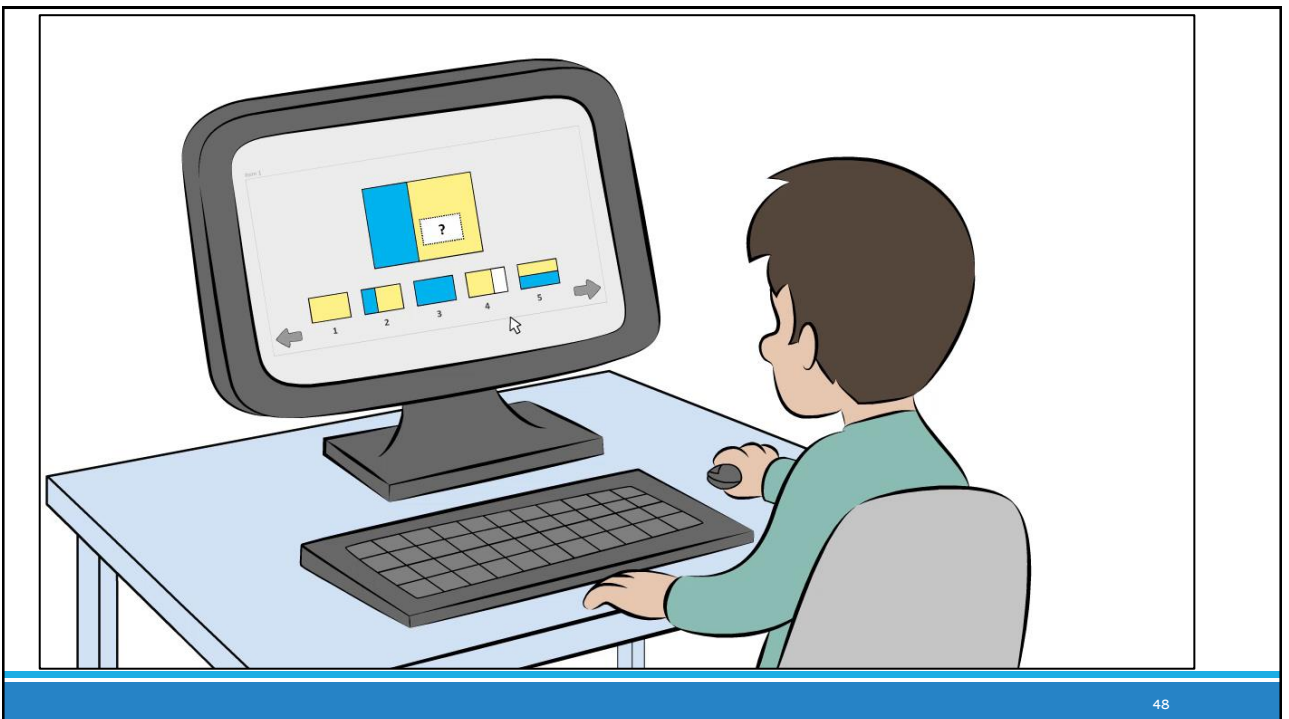
## Naglieri Ability Test - Non-verbal



- Online and paper versions
- Group or individual administration
- Several NEW types of items have been developed
- Animated instructional video
- Interactive practice questions
- Minimal verbal directions
- Pre-K, Kindergarten, Grade 1, Grade 2, Grade 3/4, Grade 5/6, Grade 7-9, Grade 10-12

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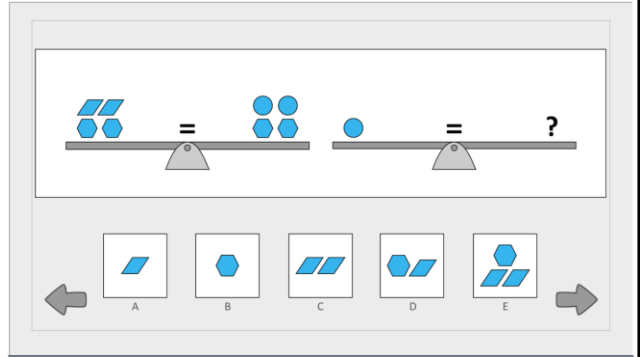
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# Naglieri Ability Test - Quantitative

- These items demand analysis of sequences of numbers or relationships among a group of numbers. For example, 1 is to 2 (a difference of 1) as 3 is to ... 4. Alternatively, the items can be solved by simply recognizing that the when analyzed vertically, 1 becomes 3, so 2 should become 4.
  - These items test a person's ability to understand relationships and patterns involving numbers, just as understanding relationships among shapes in the NAT-Nonverbal or verbal categories in the NAT-Verbal.
- Classroom and individual administration
  - Animated instructional video
  - Minimal verbal directions by administrator



Authors: Jack Naglieri & Kim Lansdowne

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# Verbal, Nonverbal Quantitative Results

➤ **VERBAL SAMPLE**

- **2,482** That closely matches the US population on key demographics

➤ **GENDER**

- No difference 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 difference 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 difference 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

## Naglieri General Ability Tests Release



- The Verbal, Nonverbal and Quantitative tests will be released in summer of 2021 for application using local norms

The graphic features the Naglieri logo at the top, followed by the text 'Introducing a New Generation of Measures' and 'Putting Fairness, Equity, and Representation First in Gifted & Talented Education'. Below this is a photograph of a teacher sitting on the floor with a diverse group of children, all smiling and engaged in a discussion. At the bottom left is the MHS logo, and at the bottom right is a dark blue box with white text that reads 'COMING 2021/2022 SCHOOL YEAR!'.

## How to Equitably Identify Gifted

---

- Do **universal *ASSESSMENT*** with ability tests that do not require knowledge of English
- Use the Verbal, Nonverbal and Quantitative test scores to help ensure that every student had the opportunity to demonstrate their ability.
- These tests will help increase participation of under-served populations if they are used properly...
- Use local norms

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## Local Norming Procedure for V, NV, & Q

---

- Obtain scores for **ALL** students (not only referred students) in the grades for which the GT decisions is needed
- Decide how the information obtained for each student is to be evaluated (i.e., average, and or logic) and if it is to be weighted
- Rank order the students' raw scores on the V, NV & Q tests
  - Raw scores can be converted to percentile or standard scores as desired
- Determine a cut-score based on the number of students the GT program can accommodate
- Evaluate the outcome

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## Gifted Identification

- WE CAN devise Verbal and Quantitative tests that can be solved regardless of the language a student speaks with nonverbal directions and no verbal expression required...AND add a Nonverbal tests to provide an equitable approach to assessment.

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**Any Questions**

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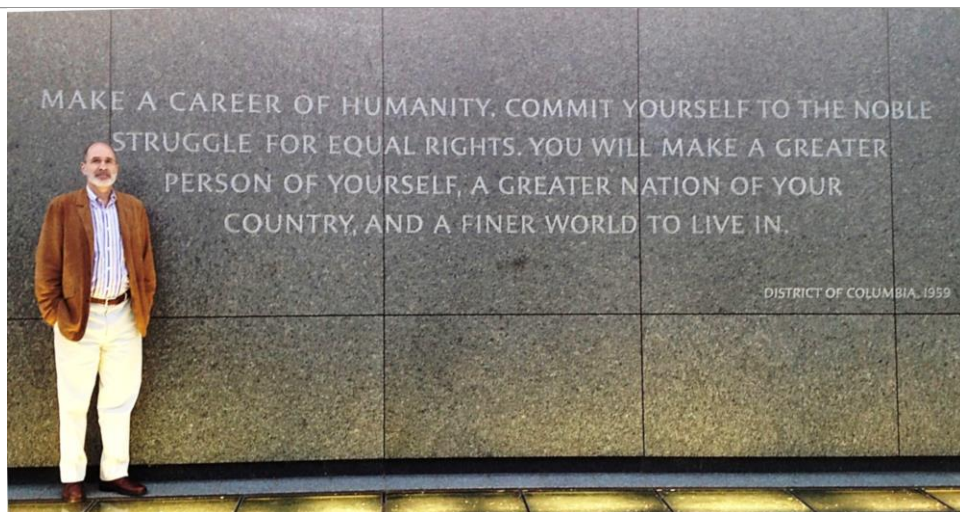
## Final Thoughts

- The evaluation of students for gifted based on group and individually administered ability tests should take into consideration the content of the tests' **directions, items and responses**
- The tests we have created improve the traditional approach to ability testing by reducing the inequities caused by the confounding impact language and knowledge have had on measures of ability used to identify gifted students
- We can find gifted students of color using the right tests, universal assessment, and local norms

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## *Equitable Identification of Gifted Students*



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