

OAGC Annual Conference  
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## How Intelligence Tests have Influenced Diversity in Gifted Programs

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## Disclosures

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## The Goals for Today

- Recognition of Drs. Ford, Brulles, and Lansdowne contributions to this session
- The American Psychological Association released an apology for the role psychology and APA itself has played in promoting racism
  - I will review this apology which many have rightfully criticized – see: *“Time Will Tell: Three Black Scholars Ponder APA’s Apology for Silence and Complicity in Perpetuating Racism”* (Pope-Davis, Moore, Ford, 2021)
- How many students of color are currently excluded
- What is it about IQ tests that has led to under-representation
- What research can guide our decision-making
- We CAN and we MUST follow the science

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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... and the ways measurement of intelligence has been systemically used to create the ideology of White supremacy”

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## American Psychological Association Apology

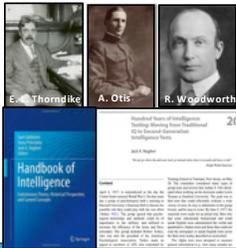
- Throughout the 1900s prominent psychologists involved in IQ test development supported eugenics and called for sterilization for unfit and inferior races
- In 1916 Lewis Terman created the *Stanford-Binet* and advocated an educational system which separated white children from Blacks, Mexicans and Native Americans
- 1933 Raymond Cattell (CHC & WJ) spoke out against race mixing and he lobbied to overturn the 1954 *Brown v. Board Education*

## IQ Tests Role in Promoting Racism

- Lewis Terman – promoter of eugenics (Greek for good birth) and author of the *Stanford-Binet* (1916) wrote that his test would reveal “significant racial differences in general intelligence...which cannot be wiped out by any culture”
- identification of low-intelligence children and adults who would be involuntarily institutionalized and sterilized would improve society. (p. 68, *Brookwood*, 2021)

IQ	American	British	French	German	Italian	Japanese	Chinese	Portuguese
Total cases	100	100	100	100	100	100	100	100
Mean	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
S.D.	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Coef. of var.	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15

### Origins of Traditional IQ Tests



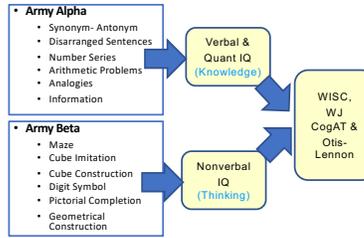
➤ A group of psychologists met at Harvard in April of 1917 to construct an ability test to help the US military evaluate recruits (WWI)

➤ By July 1917 their research showed that the Army Alpha (Verbal & Quantitative) and Beta (Nonverbal) tests could "aid in segregating and eliminating the mentally incompetent, classify men according to their mental ability; and assist in selecting competent men for responsible positions" (p. 19, Yerkes, 1921).

➤ This was the foundation of the **Wechsler Scales – Verbal, Performance (Nonverbal) and Quantitative subtests as well as the Otis-Lennon and CogAT**

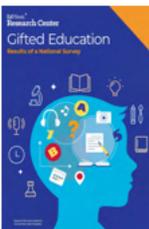
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### Alpha & Beta → Wechsler



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### National Survey of Gifted Education



These tests have verbal and quantitative questions and lengthy verbal directions



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### Numbers of Students Missed

Total Enrollments by Race and Ethnicity as of 2020.					English Language Learner (ELL) students enrolled in public elementary and secondary schools as of 2020 by race and ethnicity			
	N in Public Education K-12 in 2020	N Potentially gifted (8% of K-12)	N Students in gifted programs	Difference Between Potential and Identified	N of ELL in Public Schools	N Potentially gifted ELL	N ELL in gifted programs	N Missed ELL
White	23,834,458	1,906,757	1,937,350	30,593	294,763	23,581	8,541	15,033 (64%)
Black	7,754,506	620,360	330,774	-289,586	176,883	14,712	5,881	5,831 (40%)
Hispanic	14,337,467	1,146,997	600,498	-546,499	3,772,433	303,811	109,446	25,404 (8%)
Asian	5,117,901	409,432	14,833	-394,599	111,700	40,536	14,833	25,697 (64%)
Pacific Islander	26,902	2,152	951	-1,201	26,902	2,152	951	1,201 (56%)
Native American/Alaska Native	484,766	38,781	27,712	-11,069	1,400	111	111	1,289 (89%)
Two or More Races	1,641,817	131,345	105,371	-25,974	31,292	2,481	951	1,530 (61%)
<b>Total Non-Whites</b>	<b>24,218,556</b>	<b>1,937,484</b>	<b>1,064,355</b>	<b>-873,129</b>	<b>4,604,368</b>	<b>388,333</b>	<b>146,771</b>	<b>241,562</b>

Percent of Schools that Identify: 58.5%  
 Percent of Schools that do not identify: 41.5%  
 Additional non-white gifted students = 41.5% of 873,129 = 362,305  
**Total non-white gifted students missed: N = 1,235,434**

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## The Problem with Traditional IQ Tests

The measurement of intelligence is CONFOUNDED by knowledge

### Traditional IQ and Achievement Tests

- When I started working as a school psychologist in 1975...I noticed that parts of the intelligence tests we used were VERY similar to parts of the achievement tests
- In fact the Achievement Test had a General Information and Arithmetic subtests JUST LIKE THE WISC!
- THAT DID NOT MAKE SENSE



1975 Charles Champagne Elementary, Bethpage, NY

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### How and Why...

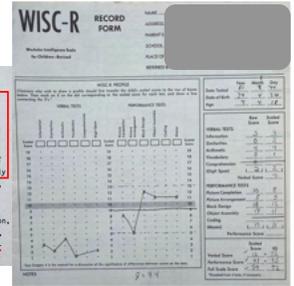
- First job as assistant professor at Northern Arizona University - 1979



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1981

**Test Results and Interpretations:**  
 On the WISC-R, Amada earned a Performance IQ of 96.7 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 Amada 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: Amada performed well on tasks that required little or no English language comprehension or expression, and poorly on all tasks which did require these linguistic skills. In fact, even if a task was visual and non-verbal, but required English language comprehension of instructions, she performed more poorly.



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

Naglieri, J. A., & Yazile, C. (1983). Comparison of the WISC-R and PPVT-R with Navajo children. *Journal of Clinical Psychology, 39*, 598-600.

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### The US Army Alpha Test (Verbal)

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

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

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### 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</li> <li>• Vocabulary, Similarities, Information &amp; Comprehension</li> <li>• Fluid Reasoning</li> <li>• Figure Weights, Arithmetic</li> </ul>	<ul style="list-style-type: none"> <li>• Comprehension</li> <li>• 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, Expressive Vocabulary, 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>

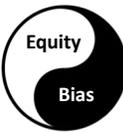
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### Test Bias vs Test Equity

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



- ... if a person has had limited opportunities to learn the content in a test of intelligence, **that test may be considered unfair** (because it penalizes students for not knowing the answers) **even if the norming data do not demonstrate test bias.**



- Evidence of EQUITY is examined by test content and mean score differences

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### Test Content and Race Differences

- When English is required in a vocabulary test of general ability this disadvantages students with limited educational opportunity.
- Matarazzo (1972) wrote about the Wechsler Scales
  - "...Vocabulary is necessarily influenced by ... education and cultural opportunities (p. 218)"
  - when referring to the Arithmetic subtest, "...its merits are lessened by the fact that it is influenced by education (p. 203)."



Even though the role of education was known, psychologists still attributed IQ test differences to the **people** instead of the **test**.

### Race and Ethnic Differences for Traditional and Second-Generation Ability Tests

Race and Ethnic Standard Score	By Race	By Ethnicity
<b>Differences Across Intelligence Tests</b>		
Tests that require knowledge	Mn = 11.5	Mn = 9.2
Otis-Lennon School Ability Test (district wide)	13.6	
Stanford-Binet IV (normative sample)	12.6	
WISC-V (normative sample)	11.6	
WI-III (normative sample)	10.9	10.7
CogAT7 (Nonverbal scale)	11.8	7.6
WISC-V (statistical controls normative sample)	8.7	
<b>Tests that require minimal knowledge</b>		
K-ABC (normative sample)	7.0	
K-ABC (matched samples)	6.1	
CAS-2 (normative sample)	6.3	4.5
CAS (statistical controls normative sample)	4.8	4.8
CAS-2 (statistical controls normative sample)	4.3	1.8
CAS-2 Brief (normative samples)	2.0	2.8

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).

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

— Mae Jemison —

### Change Demands Courage to Think Differently

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

## How Intelligence can be Measured More Efficiently

Use test questions that measure THINKING in a way that is not dependent upon KNOWING

### Naglieri's Nonverbal Tests: 1985 to Present

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

Validity Results:

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

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### Naglieri's Nonverbal Tests : 1985 to Present

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

Initial Research Findings:

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

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### Naglieri's Nonverbal Tests : 1985 to Present

- Fourth Version of the Naglieri Nonverbal Tests**
  - NNAT—Individual (2003) for one-on-one testing and two forms

The NNAT individual Validity:

- Similar scores by race, ethnicity and ELL status and students with hearing impairment
- Strong correlation with the Ravens Progressive Matrices (.78), TONI-3 (.63), WISC-IV Matrix Reasoning (r = .62)

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## Naglieri's Nonverbal Tests : 1985 to Present

### • Fifth Version of the Naglieri Nonverbal Tests

MAT Short and Expanded Forms 1985  
Naglieri Nonverbal Ability Test 1997  
NNAT - Individual, 2003

**The NNAT2 Validity:**

- Strong correlation with OLSAT8 ( $r = .67$ ,  $N = 592$ )
- Strong correlation with Reading & Math (SAT10) ( $r = .65$ ,  $N = 2,552$ )
- Small differences between race/ethnicity and ELL and matched samples)
- Strong correlation with the Wechsler Nonverbal Scale ( $r = .74$ ) for gifted students.

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## Naglieri's Nonverbal Tests : 1985 to Present

### • Sixth Version of the Naglieri Nonverbal Tests

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

The NNAT3 (2016) was created to provide new items and updated norm group

**The NNAT3 Validity:**

- No difference between online & paper
- The NAI scores correlated with the OLSAT 8 suggesting that the two tests measure general ability.

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## Can a Nonverbal Test Identify Gifted Students?

- The research on the NNAT is very strong and suggests:
- NNAT is a nonverbal test of intelligence that WILL identify those **gifted** students who may not YET be **talented**
- NNAT is strongly correlated with academic skills
  - BUT...
- Can measures of general ability using VERBAL and QUANTITATIVE test questions be constructed that do not demand academic knowledge ?

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## Naglieri General Ability Tests

- We explicitly made tests for equitable identification of students from diverse cultural, linguistic, or socioeconomic backgrounds
- We used the traditional Verbal, Nonverbal and Quantitative formats to **measure general ability** 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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## Solution: Measure Thinking not Knowledge

• What does the student have to know to complete a task?

- This is dependent upon educational opportunity

I know this!

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

- This is dependent on the brain

I need to see relationships

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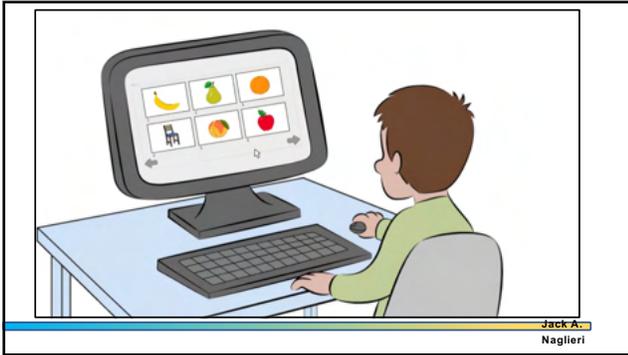
## Naglieri General Ability Test – Verbal (Naglieri & Brulles)

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.

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

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

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

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

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

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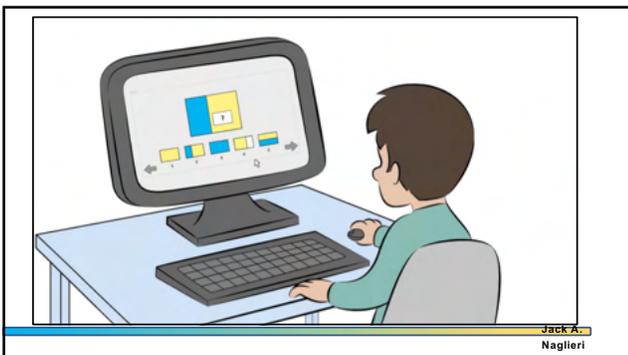
### Naglieri General Ability Test - Nonverbal

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

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

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

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### A Pilot Study of the Effects of Race, Ethnicity, Gender and Parental Education on the Naglieri General Ability Tests: Verbal, Nonverbal, and Quantitative

Dr. Jack A. Naglieri  
University of Virginia

Dr. Kimberly Lansdowne  
University of Virginia

Dr. Dina Drufen  
University of Virginia

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### Three Research Studies (2022)

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

<p><b>VERBAL SAMPLE</b></p> <ul style="list-style-type: none"> <li>2,482 That closely matches the US population on key demographics</li> </ul> <p><b>GENDER</b></p> <ul style="list-style-type: none"> <li>No differences between males and females for raw score across all forms</li> </ul> <p><b>RACE/ETHNICITY</b></p> <ul style="list-style-type: none"> <li>No differences among White, Black, &amp; Hispanic for raw score across all forms</li> </ul> <p><b>PARENTAL EDUCATION LEVEL</b></p> <ul style="list-style-type: none"> <li>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</li> </ul>	<p><b>NONVERBAL SAMPLE</b></p> <ul style="list-style-type: none"> <li>3,630 That closely matches the US population on key demographics</li> </ul> <p><b>GENDER</b></p> <ul style="list-style-type: none"> <li>No differences between males and females for raw score across all forms</li> </ul> <p><b>RACE/ETHNICITY</b></p> <ul style="list-style-type: none"> <li>No differences among White, Black, &amp; Hispanic for raw score across all forms</li> </ul> <p><b>PARENTAL EDUCATION LEVEL</b></p> <ul style="list-style-type: none"> <li>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</li> </ul>	<p><b>QUANTITATIVE SAMPLE</b></p> <ul style="list-style-type: none"> <li>2,841 That closely matches the US population on key demographics</li> </ul> <p><b>GENDER</b></p> <ul style="list-style-type: none"> <li>No differences between males and females for raw score across all forms</li> </ul> <p><b>RACE/ETHNICITY</b></p> <ul style="list-style-type: none"> <li>No differences among White, Black, &amp; Hispanic for raw score across all forms</li> </ul> <p><b>PARENTAL EDUCATION LEVEL</b></p> <ul style="list-style-type: none"> <li>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</li> </ul>
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### Race and Ethnic Differences for Traditional and Second-Generation Ability Tests

Race and Ethnic Standard Score Differences Across Intelligence Tests	By Race	By Ethnicity
<b>Tests that require knowledge</b>	<b>Mn = 11.5</b>	<b>Mn = 9.2</b>
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CogAT7 (Nonverbal scale)	11.8	7.6
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<b>Tests that require minimal knowledge</b>	<b>Mn = 4.1</b>	<b>Mn = 2.6</b>
K-ABC (normative sample)	7.0	
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CAS-2 (normative sample)	6.3	4.5
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CAS-2 (statistical controls normative sample)	4.3	1.8
CAS-2 Brief (normative samples)	2.0	2.8
NNAT (matched samples)	4.2	2.8
Naglieri General Ability Test-Verbal	2.2	1.6
Naglieri General Ability Test-Nonverbal	1.0	1.1
Naglieri General Ability Test-Quantitative	3.2	1.3

Note: 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).

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### CAUTION!

Using **one fair test** does **NOT** ensure an equitable assessment process.

To find **ALL** gifted students the **entire assessment process must be equitable.**

The U-46 case reminds us that **HOW** tests scores are used in the assessment process as important as **WHICH** tests are used.



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### How Scores are Combined

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

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

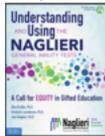
Assessment process and weighted matrix favored achievement and CogAT

On July 11, 2013, Judge Robert Gottman issued a decision holding that District U-46 intentionally discriminated against Hispanic students specific to their gifted programming (placement), and found problems with policies and instruments for screening and identification, (1) use of both verbal and math scores at arbitrary designated levels for screening and for identification, (4) use of weighted matrix, as well as content and criteria in weighted matrices that favored achievement and traditional resources, (e) too little reliance on a nonverbal test (Naglieri Nonverbal Ability Test) for admission to

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### Equitable Process of Identification

- Begins with choosing **EQUITABLE** tests
- Tests can **ONLY** solve the problem if they are used correctly
- Universal testing of **ALL** students, not just those nominated by teachers or parents
- Use **LOCAL** norms as well as national norms
  - Norms by school can help achieve equity
- Adjust the curriculum to **MATCH** the students' needs
- See Brulles, Lansdowne and Naglieri (2022) for details



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### Your Thoughts and Questions...



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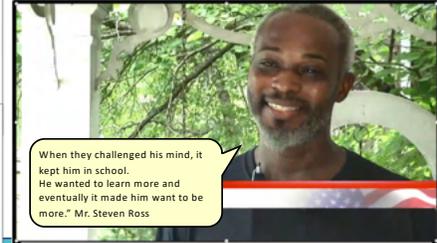
### Wall Street Journal - December 2003

- In kindergarten, he scored **141** on the *Naglieri Nonverbal Ability Test*
- He was the only African-American at his school to qualify for gifted services
- But Devion was **NOT** getting good grades in school and was not considered GT
- He was bored and resistant to do silly work
- He appeared in the *Wall Street Journal* article, and was invited to his magnet school
- He started there January 5<sup>th</sup>, 2004
- **WHAT HAPPENED SINCE THEN?**



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### Devion Graduated High School and...



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Change Demands Courage to Think Differently

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

FOR MORE INFORMATION PLEASE GO TO MY WEB PAGES

