Introducing the Naglieri General Ability Tests: Verbal, Nonverbal and Quantitative

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Thanks to MHS for Sponsoring this Presentation

A note about Multi-Health Systems MHS

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Measuring General Ability Equitably Using the Naglieri General Ability Tests: Verbal, Nonverbal and Quantitative … could not have been possible without the participation of:

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Beyond Assessments

It's a movement!

Clarification of Terms

Gifted ✣ Very Smart

Talented ✣ Very Accomplished

G&T: One definition

Francois Gagné ~

"Giftedness designates the possession and use of untrained and spontaneously expressed natural abilities *(called aptitudes or gifts),* in at least one ability domain *(e.g. intellectual, creative, socio-affective, perceptual/motor, and 'others')…"*

"By contrast, 'talent' designates the superior mastery of systematically developed abilities *(or skills)* and knowledge in at least one field of human activity."

The BIG picture

- Equitable Identification of gifted students is a critical issue
- Intelligence tests have played an important role in gifted identification and led to exclusion of students of color
- Understanding WHY we measure intelligence the way we do helps us understand what makes a test equitable
- It is important to differentiate test BIAS from test EQUITY
- Test EQUITY is about the CONTENT of the test questions
- The most equitable tests measure how well a student can THINK in a way that is not influenced by what they KNOW

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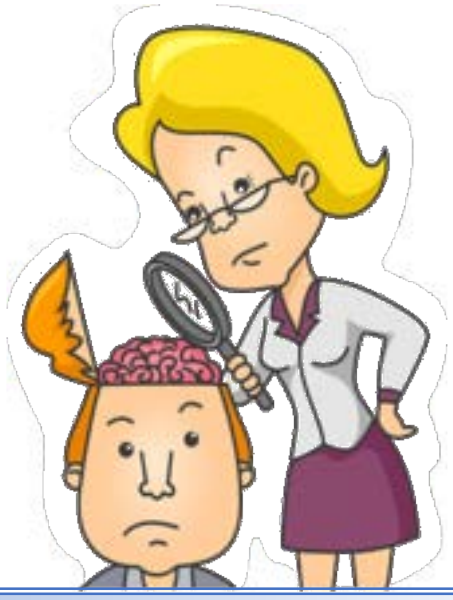
Two Questions:

1. Why do we measure ability the way we do?

2. Do the tests measure thinking or knowing?

The early history of IQ tests provides the answers



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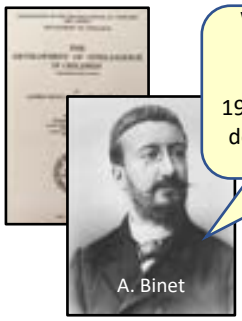
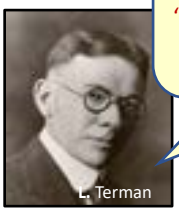
Stanford-Binet → Army Mental Tests → Today

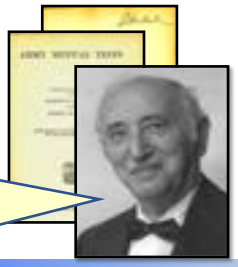


When working on the 1911 scale, Binet removed items from 1908 scale because 'they depended too much on school learning'



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

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



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

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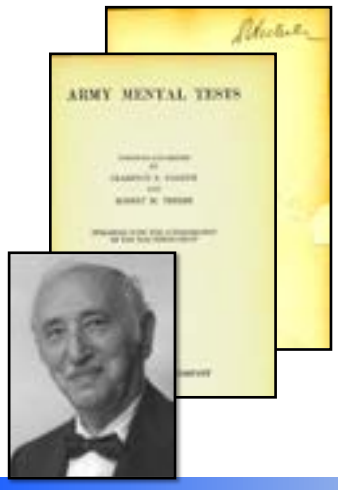
Alpha & Beta → Wechsler



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

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

Verbal & Quantitative IQ (Knowledge)

Nonverbal IQ (Thinking)

WISC, WJ CogAT & Otis-Lennon

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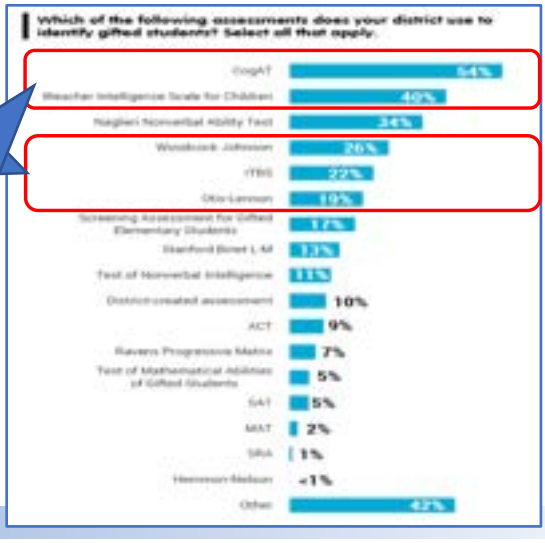
Wechsler's View of General ability

- 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)"

National Survey of Gifted Education

These tests have verbal and quantitative questions and lengthy verbal directions



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Including *Knowledge* in "Ability" Tests & Equity

Stanford-Binet-5	WISC-V	WJ-IV	KABC-II	OLSAT	CogAT
• Verbal • Knowledge • Quantitative Reasoning • Vocabulary • Verbal Analogies	• Verbal Comprehension Vocabulary, Similarities, Information • Fluid Reasoning Figure Weights, Arithmetic	• Comprehension Knowledge: Vocabulary & General Information • Fluid Reasoning: Number Series & Concept Formation • Auditory Processing: Phonological Processing	• Knowledge / GC • Riddles, • Expressive Vocabulary, • Verbal Knowledge	• Verbal • Following directions • Verbal Reasoning • Quantitative • Verbal Arithmetic Reasoning	• Verbal Scale • Analogies • Sentence Completion • Verbal Classification • Quantitative • 44 pages of oral instructions

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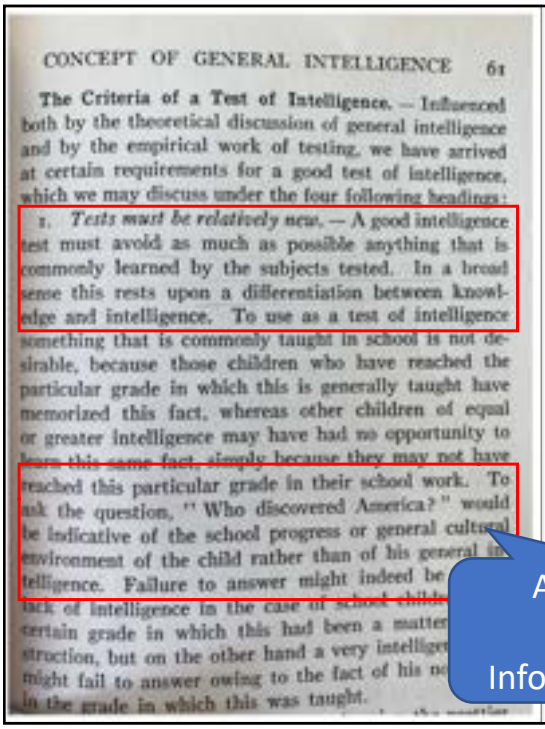

CONCEPT OF GENERAL INTELLIGENCE 61

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

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

Pintner
(Intelligence Testing, 1923)

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

A question on Wechsler's Information subtest

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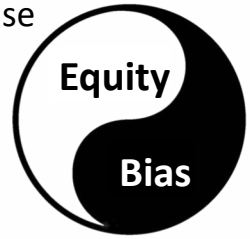
Test Content, Test Bias and Test Equity

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

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



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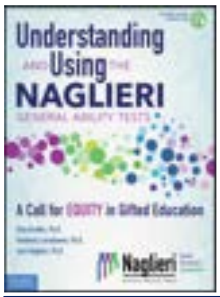
Race and Ethnic Average Score Differences by Ability Test



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

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

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

	By Race	By Ethnicity
Tests that require knowledge	**Mn = 9.5**	**Mn = 5.2**
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 scale)	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
WISC-V (statistical controls normative sample)	8.7	
Tests that require minimal knowledge	**Mn = 4.3**	**Mn = 2.9**
K-ABC (normative sample)	7.0	
K-ABC (matched samples)	6.1	
KABC-II (adjusted for gender & SES)	6.7	5.4
CAS-2 (normative sample)	6.3	4.5
CAS (statistical 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
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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Numbers of Gifted Students Missed = 1,235,434

Total Enrollments by Race and Ethnicity as of 2020.

	N in Public Education K-12 in 2020	N Potentially Gifted (8%; 92 %tile)	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 American/ Alaska Native	484,766	38,781	27,712	-11,069
Two or More Races	1,641,817	131,345	105,371	-25,974
Total Non-Whites	24,218,556	1,937,484	1,064,355	-873,129

873,129 +

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

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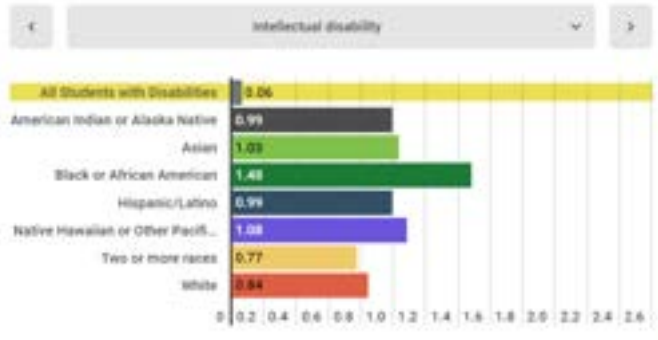
OSEP Office of Special Education Programs
Office of Special Education and Rehabilitative Services

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

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

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



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

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

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

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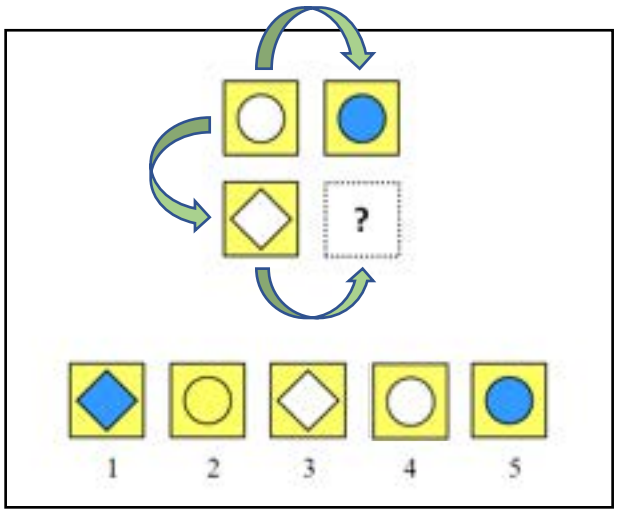
Tests that Measure Thinking or Knowing?



Girl is woman as boy is to ____?

3 is to 6 as 4 is to ____?

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

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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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Psychologists who studied race and ethnic differences attributed IQ test results to the people instead of the tests

YOUR QUESTIONS PLEASE

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The Naglieri General Ability Tests: Verbal, Nonverbal and Quantitative

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Learn More
NaglieriGiftedTests.com

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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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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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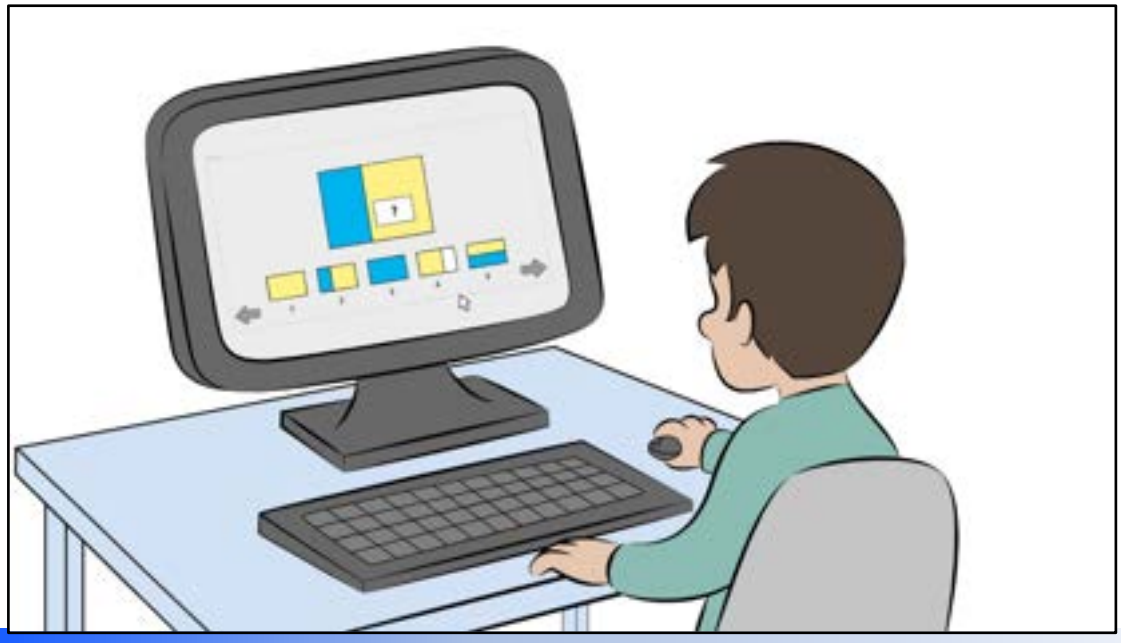

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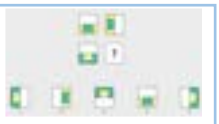
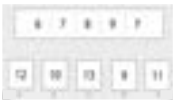
Research Evidence of Equity

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

NONVERBAL TEST 	VERBAL TEST 	QUANTITATIVE TEST 
• N= 3,630 Sample closely matches the US population on key demographics • **No GENDER differences** found between **males** and **females** for raw score across all forms • **No RACE/ETHNICITY differences** among **White, Black, & Hispanic** for raw score across all forms • **No PARENTIAL EDUCATIONAL differences** among five education levels (No high school diploma; High School graduate; Some college/Associate's degree; Bachelor's degree; Graduate/professional degree) for raw score across all forms	• N= 2,482 Sample closely matches the US population on key demographics • **No GENDER differences** found between **males** and **females** for raw score across all forms • **No RACE/ETHNICITY differences** among **White, Black, & Hispanic** for raw score across all forms • **No PARENTIAL EDUCATIONAL differences** among five education levels (No high school diploma; High School graduate; Some college/Associate's degree; Bachelor's degree; Graduate/professional degree) for raw score across all forms	• N= 2,841 Sample closely matches the US population on key demographics • **No GENDER differences** found between **males** and **females** for raw score across all forms • **No RACE/ETHNICITY differences** among **White, Black, & Hispanic** for raw score across all forms • **No PARENTIAL EDUCATIONAL differences** among five education levels (No high school diploma; High School graduate; Some college/Associate's degree; Bachelor's degree; Graduate/professional degree) for raw score across all forms

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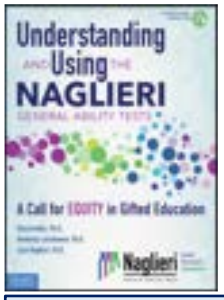
Race and Ethnic Differences by Ability Test



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

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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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Naglieri General Ability Tests: V, NV, Q

- Initially released using LOCAL NORMS, now NATIONAL NORMS
  - 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 both have value
- For example…

Local Norming Example

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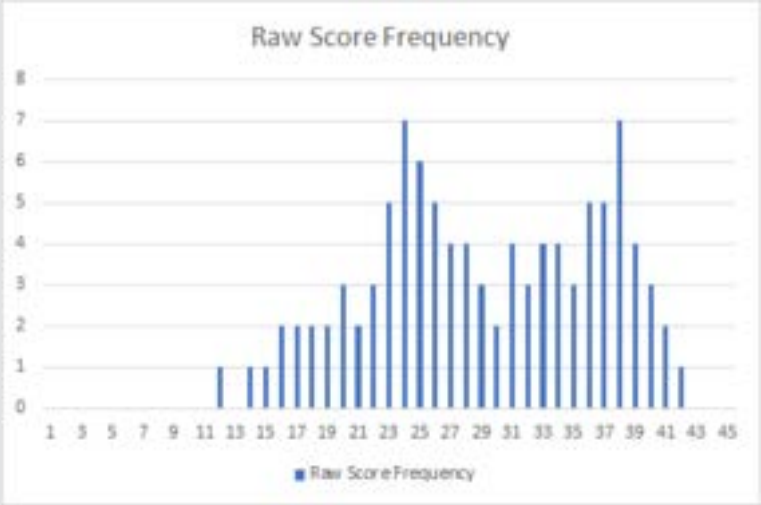
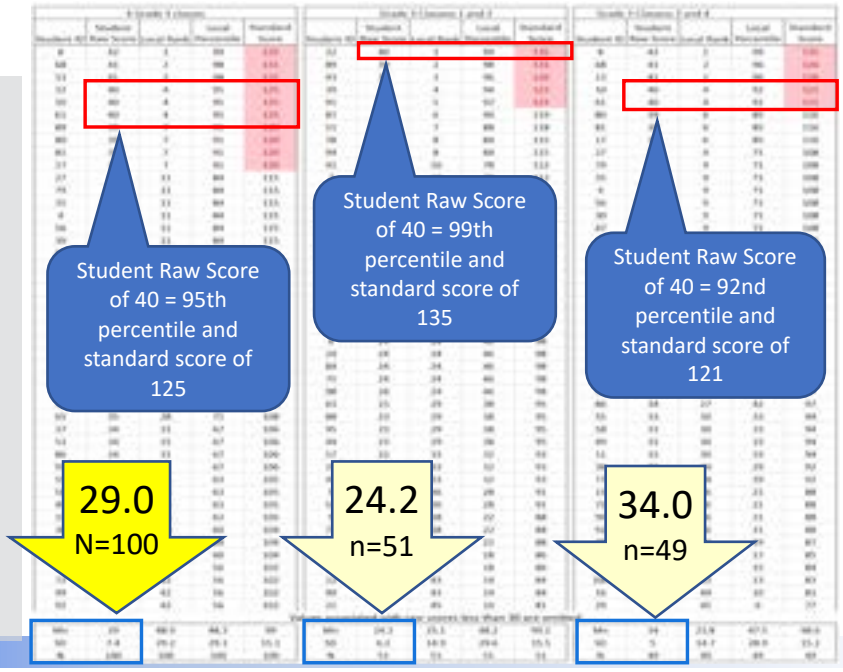
Raw scores for all student across four grade 3 classrooms

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.



Local Norming Example

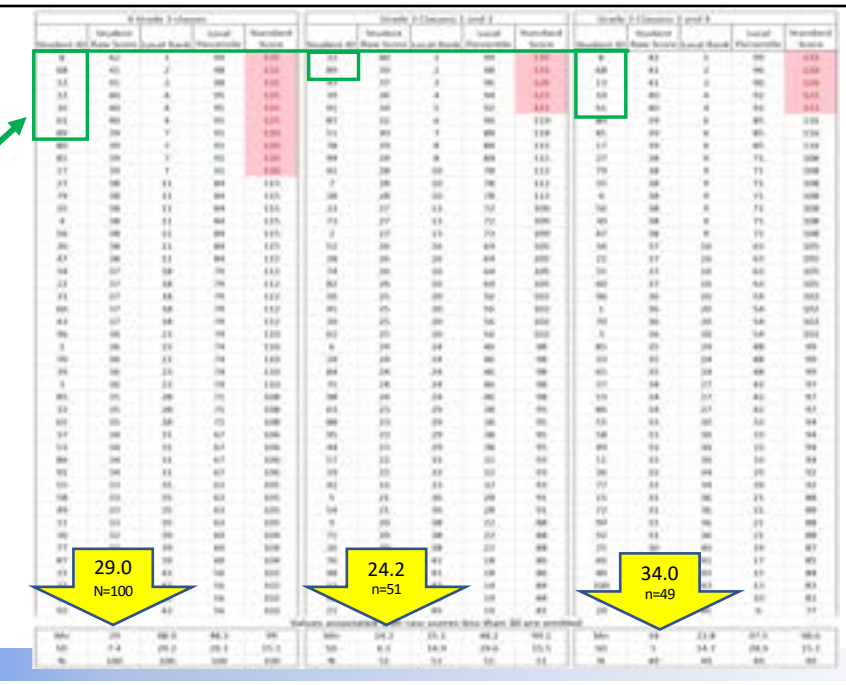
- The same raw score (number correct) yields different percentile ranks and standard scores because these scores are calculated on the mean and SD of the three separate groups.
- Each student is compared to a group that more precisely represents them.



Local Norming Example

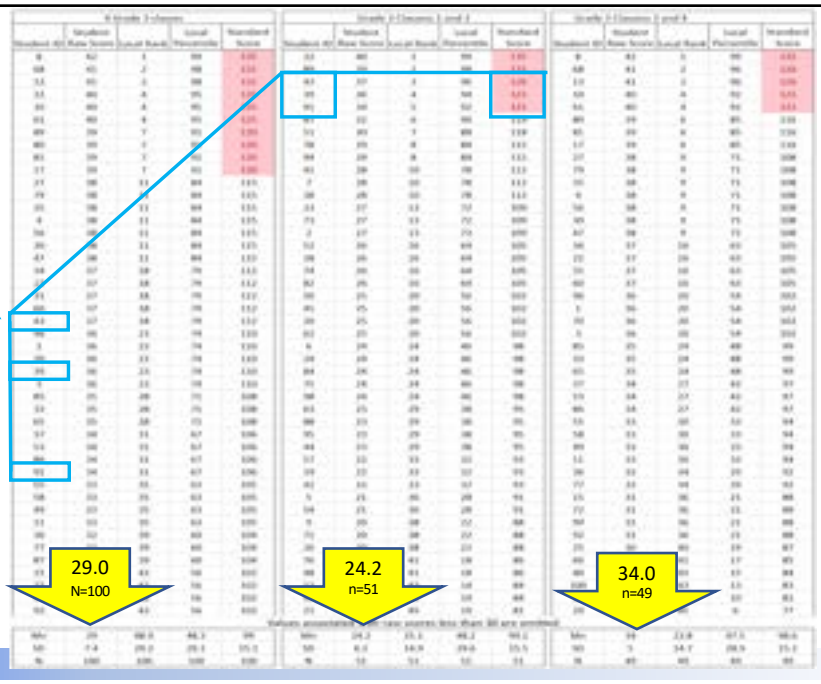
The **top seven students** in all four classes **are still identified**

ID# 8, 68, 13, 32, 10, 61, 89



Local Norming Example

Students with ID# 43, 39 & 91 **are now identified** because they are compared to **a group that more precisely reflects their background**



What is the Practical Impact?

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

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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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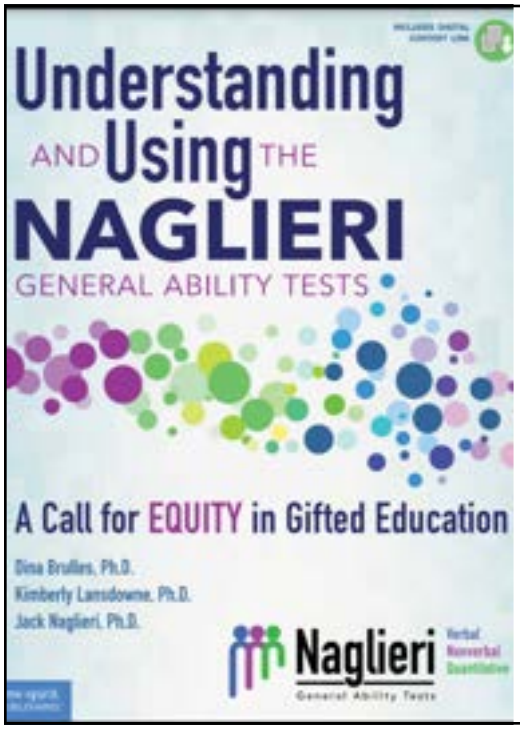

For Additional Information See:

- www.NaglieriGiftedTests.com
- Brulles, Lansdowne and Naglieri (2022) book covering 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

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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Questions

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Helpful Links

NaglieriGiftedTests.com

Naglieri

Download the handout for this presentation

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