

# Introducing Form 7 of the Cognitive Abilities Test

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## For a summary of this presentation see:

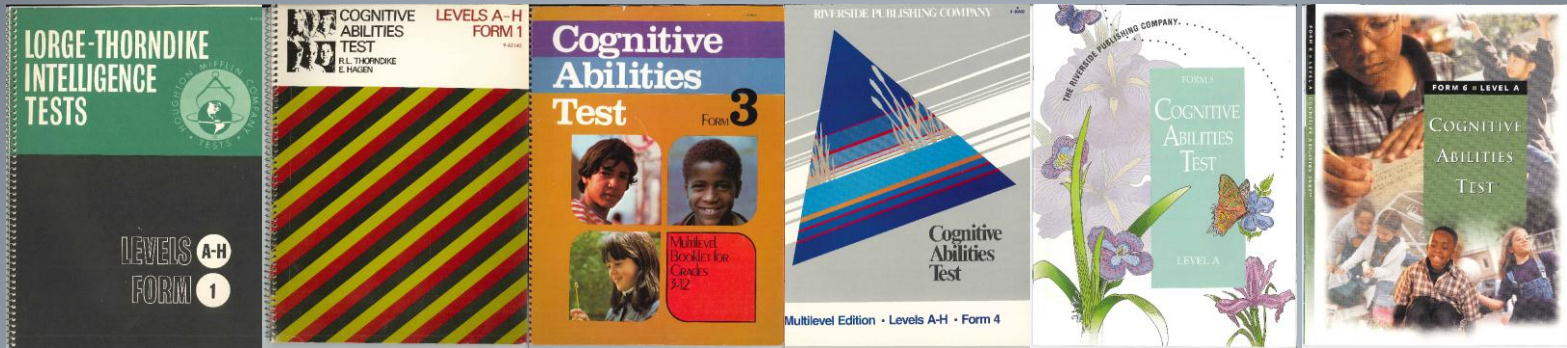
- *Cognitively Speaking*, Vol 7 (August 2011). Introducing CogAT Form 7
- Lohman, D. F., & Gambrell, J. (in press). Use of nonverbal measures in gifted identification. *Journal of Psychoeducational Assessment*.

Both papers and other materials at:

<http://faculty.education.uiowa.edu/dlohman>

# Major Features

- Fairness, especially for ELL students
- Ability test scores that can be trusted
  - Warnings when this is not the case
  - Confidence intervals that capture person misfit
- More than figural/spatial reasoning for ALL students
- True Spanish edition at primary grades
- On-line version of the test (2012)
- Short Screening Form
- Informative practice materials with teacher guides
- Test reporting tools that follow best practices in talent identification
- Specific guidance for using scores to help all children learn
- Co-normed with Iowa Assessments to help identify under-achievement



**The most significant revision of CogAT since the test was first published in 1968**

# By the Numbers

9 years

6 large-scale pilot studies

Over 20,000 drawings

4192+ items

4 Form 7 Tryout Forms

2 doctoral dissertations

10+ research publications

# Some of the contributors – At Iowa



Joni Lakin  
(Auburn U.)



James Gambrell



Katrina Korb  
(U. of Jos, Nigeria)



Ah Young Shin



# ***Major Changes***

# Test levels designated by Age

## Form 6

- K
- 1
- 2
- A
- B
- C
- D
- E
- F
- G
- H

## Form 7

- 5/6
- 7
- 8
- 9
- 10
- 11
- 12
- 13/14
- 15/16
- 17/18



# Primary Levels (5/6 – 8) Completely Revised to be ELL-Friendly

- All required subtests use only pictures
- Optional English/Spanish Sentence Completion subtest



# Bilingual, English/Spanish Primary Level Tests

- Directions for all tests in Spanish and/or English
- Prompts for the optional Sentence Completion test (levels 5 – 8) in Spanish and/or English
- Not a just a translated test
  - *Items for all tests in the Verbal Battery separately created within ELL and non-ELL groups,*
  - *Tests assembled from item that worked well in all groups.*

*“The ELL teacher said the Spanish directions were the best he has seen for a test!”*

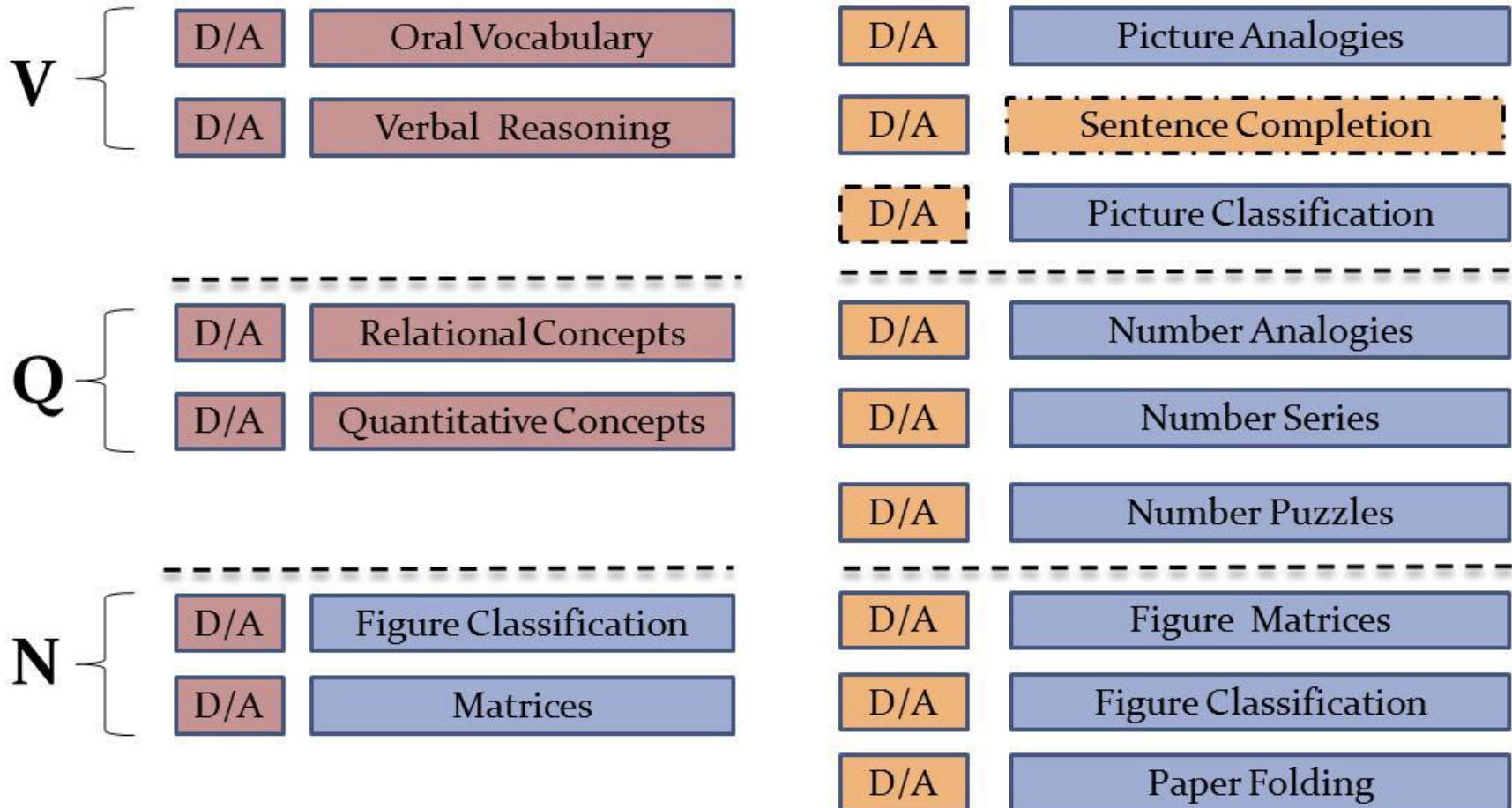
# Primary level tests (5-8) now correspond with upper level tests (9-18)



- Nine subtests at all levels (5/6 through 17/18)
- Improves the consistency in the abilities measured across grades
- No increase in administration time



# Primary Battery

## CogAT6

## CogAT7

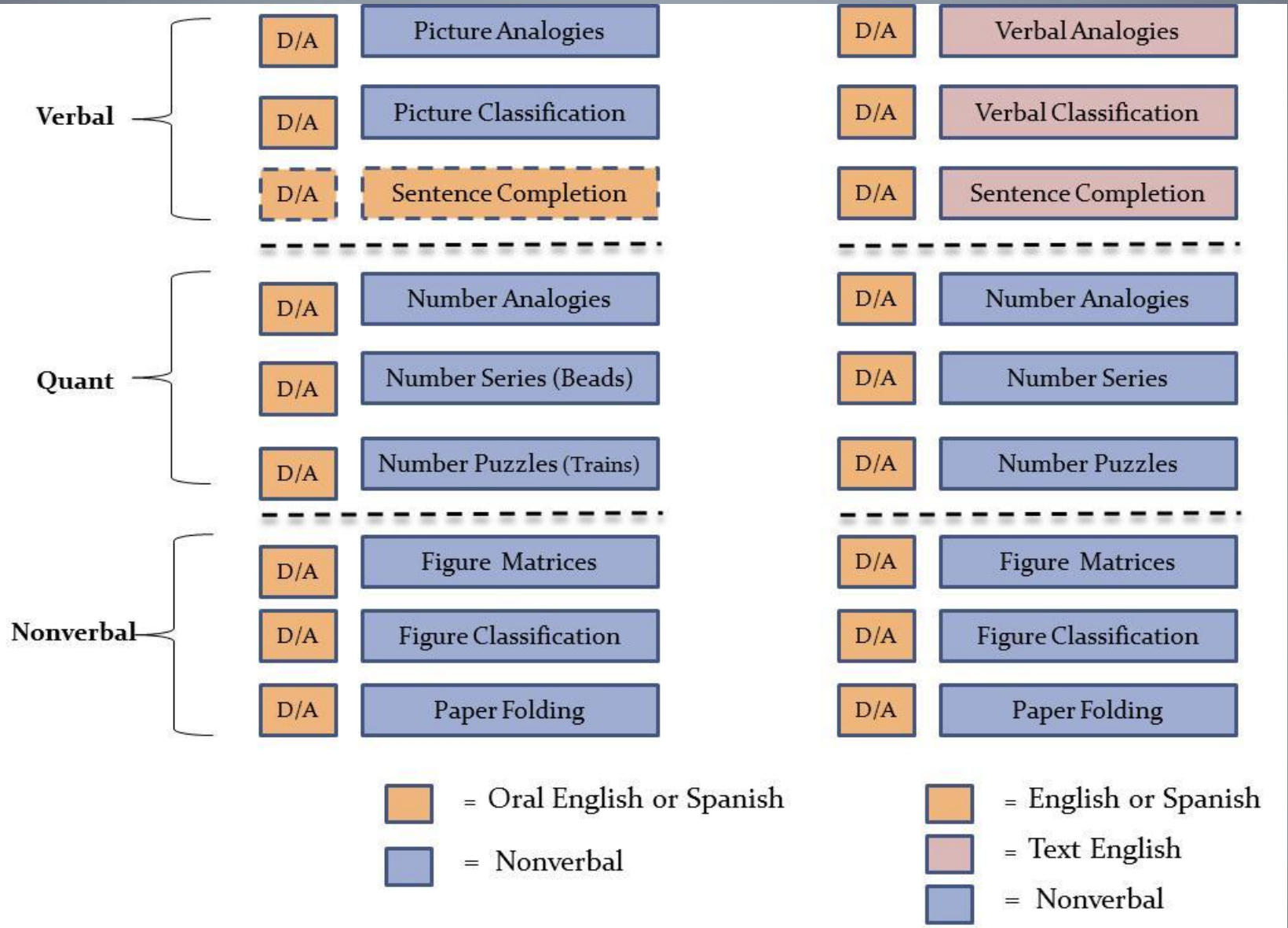


 = Oral English  
 = Nonverbal

 = Oral English or Spanish  
 = Nonverbal

# CogAT 7 (5/6 - 8)

# CogAT 7 (9 - 17/18)



# **Examples of New Primary-level tests**

# Picture Analogies

The image displays a visual analogy puzzle. It consists of a 2x2 grid of boxes. The top-left box contains a small orange kitten. An arrow points from this box to the top-right box, which contains a larger orange cat. The bottom-left box contains a small black and white puppy. An arrow points from this box to the bottom-right box, which contains a question mark. To the right of the grid are three options: a black and white cow, a black and white dog, and a small orange kitten. Each option has a pink circle below it, indicating a radio button for selection.

kitten → cat :: puppy → ?

A cow

B dog

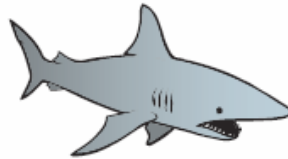
C kitten



# Sentence Completion

*Which one swims in the ocean?*

*¿Cuál animal nada en el océano?*



A \_\_\_\_\_ swims in the ocean.

A cat

B shark

C bird



# Picture Classification









turkey   duck   goose

**A** sparrow   **B** chicken   **C** butterfly

# Number Analogies

P2

	→	
	→	?

S1

1	→	2
3	→	4
5	→	?

A 6      B 5      C 4      D 3


S2

[2 → 5]	[4 → 9]	[3 → ?]		
J 4	K 5	L 6	M 7	N 8

# Number Puzzles

PI

○ ○ ○



$$\boxed{?} = \color{orange}{\blacklozenge} + 1$$

$$\color{orange}{\blacklozenge} = 4$$

J 3

K 4

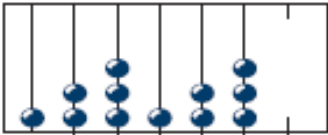

L 5


M 6

N 7

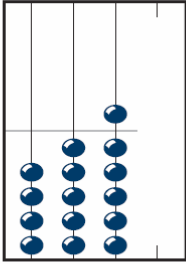
# Number Series

**P1**

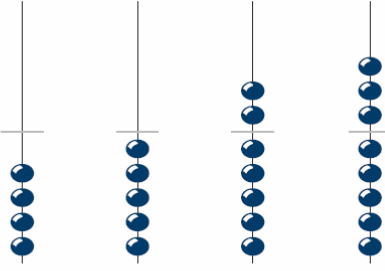





**S1**



4 5 6 ?



4 5 7 8

**A B C D**

2	4	6	2	4	?
A 2	B 4	C 5	D 6		

# Figure Matrices

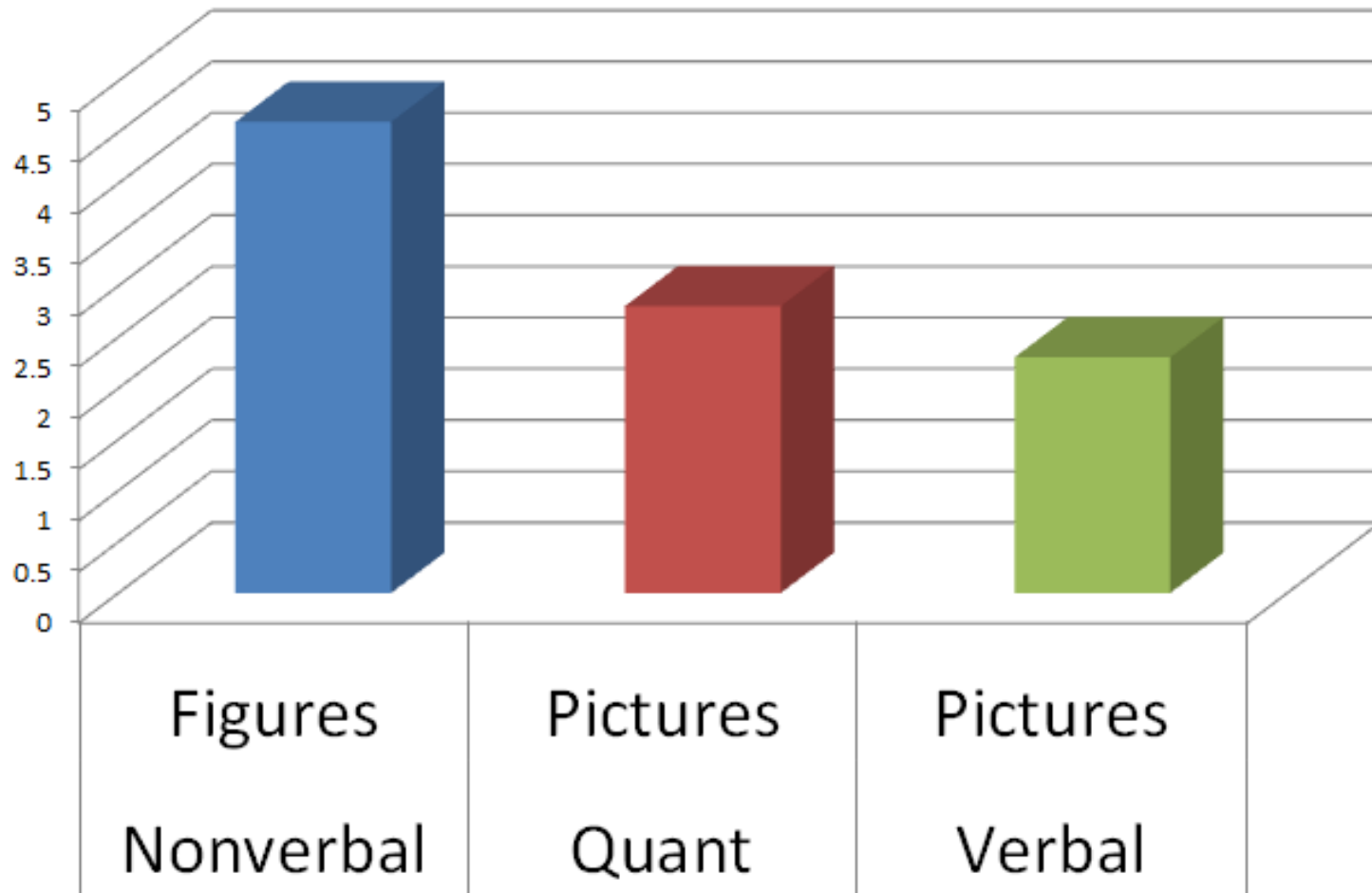
S2

J K L M N

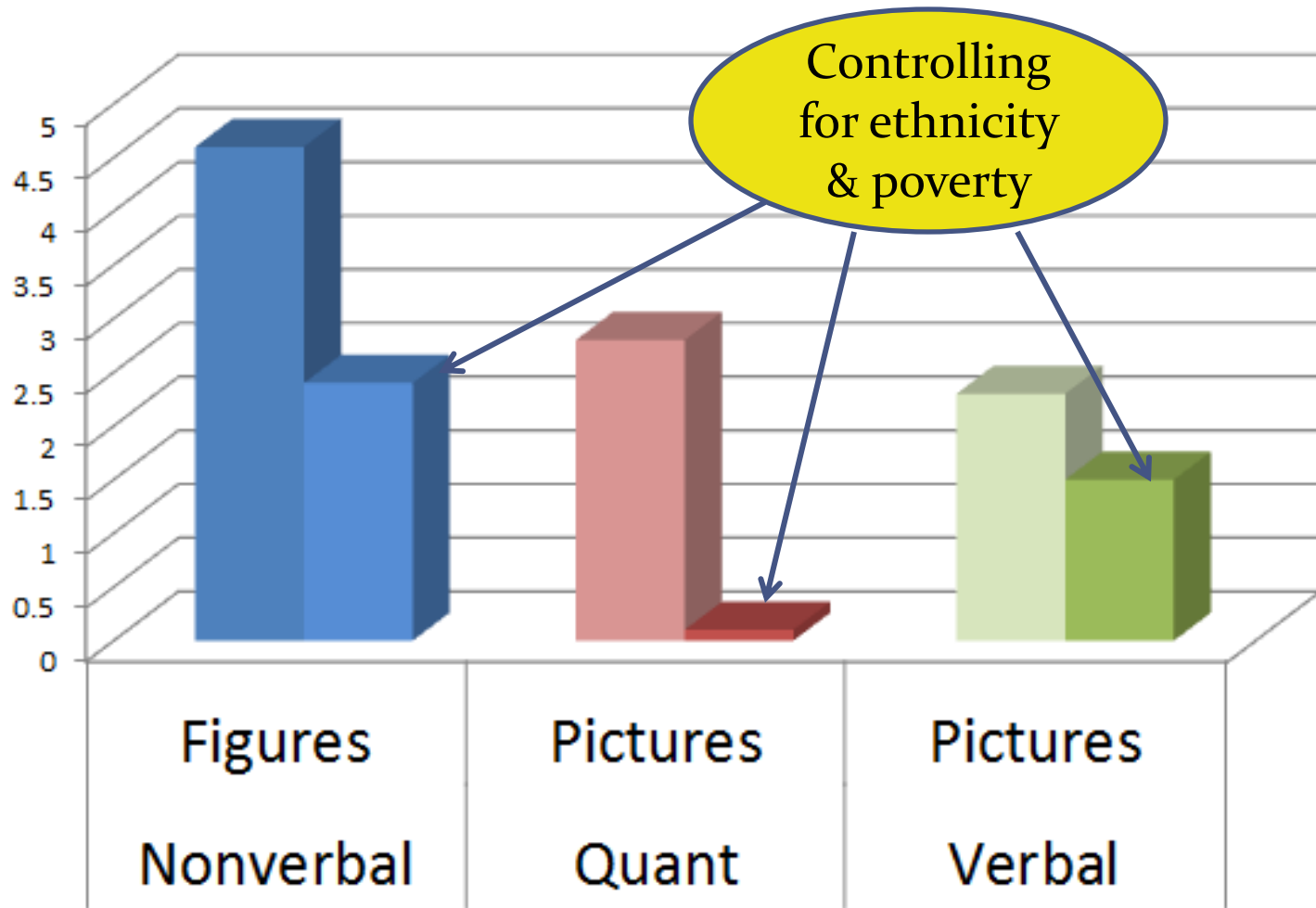
J K L M N

# **Fairness to ELL students**

## SAS difference between non-ELL and ELL students CogAT Form 7 Levels 5 - 8



## Effects of ELL status controlling for ethnicity and poverty





# New Verbal and Quantitative *Primary-Level* Tests

- A better, more comprehensive measure academic talent for all children than nonverbal battery alone
- Smaller differences between ELL and non-ELL children than on the nonverbal battery!
- More equitable gifted identification

# **Gifted Identification**

# Percent Scoring in the Top 5% on Each CogAT7 Primary Test Belonging to Various Subgroup

Test Format	ELL	FRL	Asian	Hispan	Black
Sample Percent	6	23	4	21	15
Picture Verbal	5	14	7	20	8
Picture Quant	4	9	11	11	5
Figural NV	2	11	8	12	7

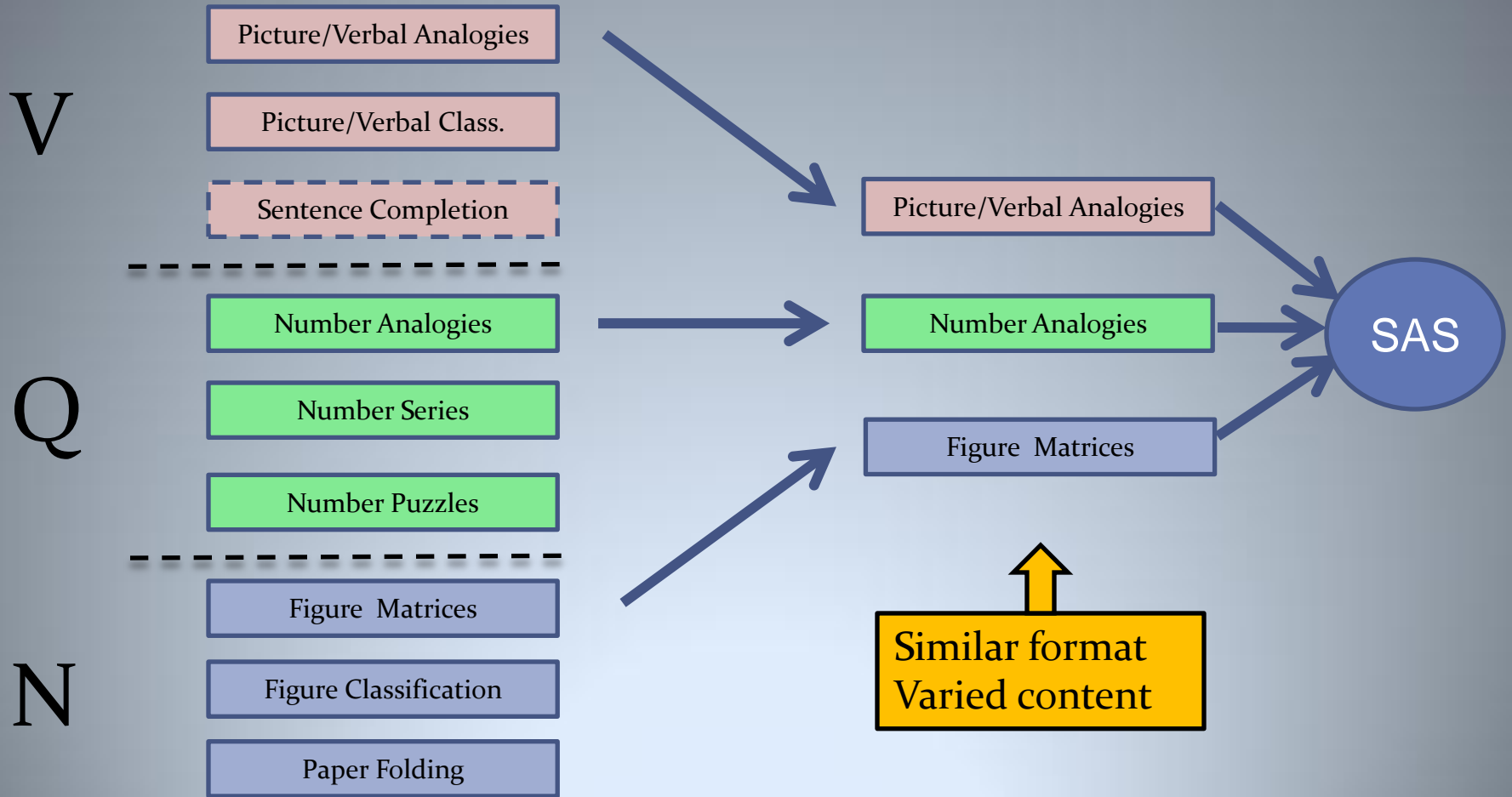
# Facts about Nonverbal Tests

- NV tests reduce differences between ELL and nonELL
- Comprehensive NV tests better measure ability than Figural/Spatial NV tests
- Language loading is not the same as cultural loading
  - Greater cultural loading for figural/spatial tasks
- There are culture-reduced tests, but no culture-free tests
- Form 7 tests substantially reduce but do not eliminate group differences

# Screening Form

# Complete Test

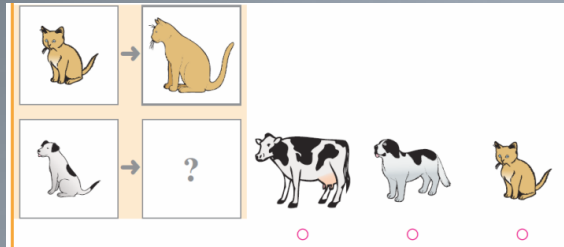
# Screening Form



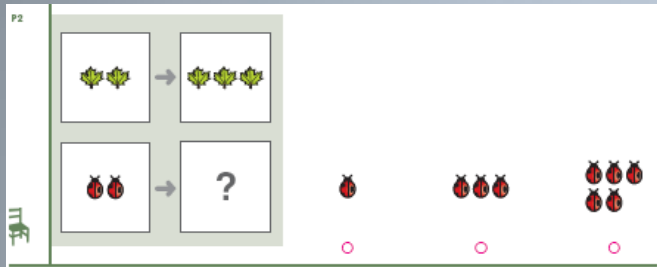
# Primary Levels (K-2)

# Upper Levels (3+)

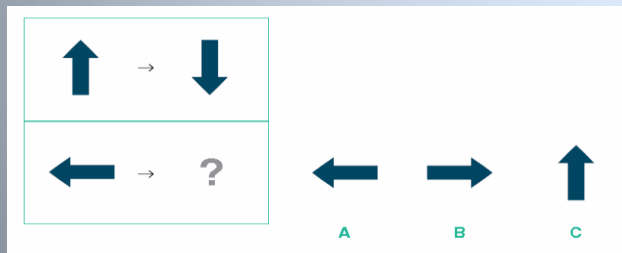
## Picture Analogies



## Number Analogies



## Figure Matrices



## Verbal Analogies

right → left : over →

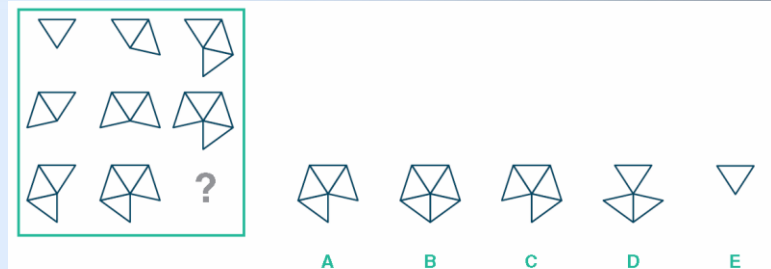
A finished    B out    C above    D around    E under

## Number Analogies

[1 → 2]    [2 → 4]    [3 → ?]

J 2    K 4    L 6    M 8    N 12

## Figure matrices



# Upper Levels (3+)

## Verbal Analogies

right → left : over →

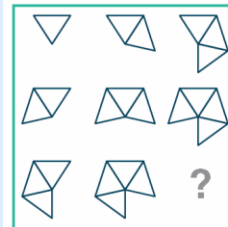
A finished      B out      C above      D around      E under

## Number Analogies

[1 → 2]      [2 → 4]      [3 → ?]

J 2      K 4      L 6      M 8      N 12

## Figure matrices



Option to omit or not score for ELL students



# Effectiveness for Screening

- When followed by Complete CogAT, Iowa's, or a good individually-administered ability test
  - 2 – 3 times more effective than commonly used screening tests

What is the follow-up or placement test?

What is the cut score on the placement test?

Cutscore to use on the *CogAT* Screening Form

Complete *CogAT*, with separate scores for Verbal and Quantitative-Nonverbal

Top 3%

Top 10%

Top 10%

Top 20%

Iowa Assessments (ELA and Mathematics) or individually-administered ability test (Verbal and Nonverbal scores)

Top 3%

Top 20% Math  
Top 25% Reading

Top 10%

Top 30% Math  
Top 40% Reading

# Reduced Level to Level Overlap

CogAT Forms 1 – 5

80% items common across adjacent levels

CogAT Form 7

50% item common across adjacent levels

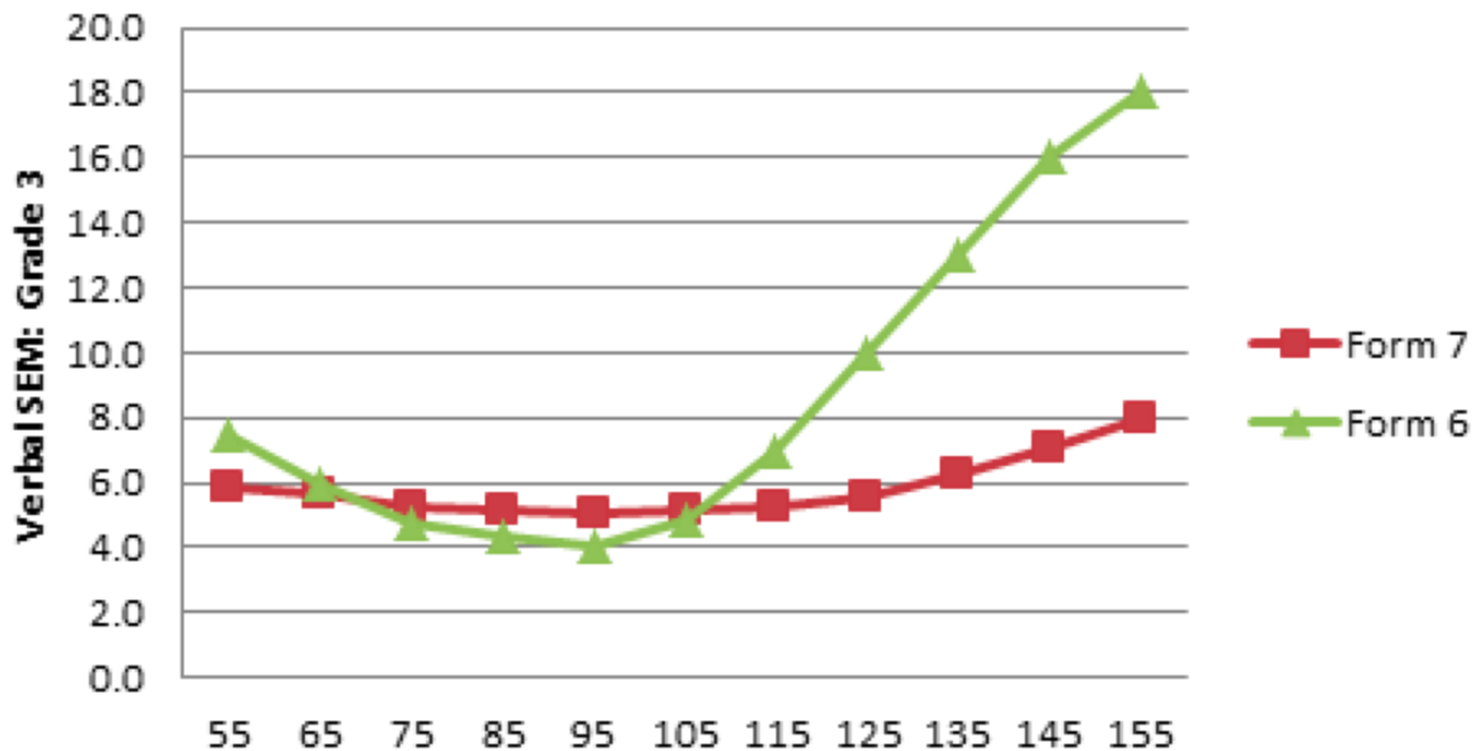
Completely new test every other level

# Better measurement for the most able learners

- Higher ceilings on all tests
- SAS scores extend up to 160

# Reduced SEM's for high scorers

## SEM by SAS : Form 6 versus Form 7



# Enhanced Data Management and Score Reporting

- Examples of data management capabilities
  - Combine with achievement test scores, other data
  - Breaking down test scores by opportunity to learn
  - Hot-linked ability profile interpretation/suggestions
- New Talent-identification reports
  - Lohman-Renzulli Matrix
    - Integrate CogAT, Iowa Assessments, Teacher Ratings
- Lohman, D. F. (in press). Nontraditional uses of traditional measures. In C. M. Callahan & H. Hertberg-Davis (Eds.) *Fundamentals of gifted education*. (on my webpage)

# Lohman-Renzulli Matrix

		Teacher Rating on Learning Ability, Motivation, or Creativity	
		Low teacher ratings	High teacher ratings
CogAT Verbal <u>OR</u> Quantitative-Nonverbal	( >95 <sup>th</sup> PR )	II	I
	( 80 <sup>th</sup> – 95 <sup>th</sup> PR )	IV	III

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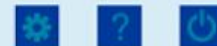


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# Reports

Assessment

[Cancel Filter\(s\)](#) [Show Filter\(s\)](#)

[Search by Last Name](#)

Test Date

First Prev Next Last Goto Page **1** of 8

Prebuilt Report

Grade/Level

Graph Type

Score Type

Content Scope

Filters

My Saved Reports

My Saved Groups

## Student Roster (Talent Identification)

Multimeasure

Grade: 4 Level: 10

Disaggregation: All Students  
Score Type: More than One

Norms: Fall 2011

Building: Lincoln Elem  
District: Rolling Falls ISD

State: IL








Admin Type: More than One

Total No. Tested = 102, Total No. Included = 8

STUDENT NAME I.D. Number 1 I.D. Number 2 A B C D E F G H I J K L M N O P Z	Birth Date Age Program	(Gender)	Program	CogAT Verbal	CogAT Composite (QN)
<a href="#">Barnes, Tyvon</a>	09/01 10-00	(M)	NPR LPR	93 99	88 94
<a href="#">Bryant, Jason</a>	06/01 10-03	(F)	NPR LPR	91 97	83 89
<a href="#">Ford, Jennifer</a>	07/01 10-02	(F)	NPR LPR	91 97	85 91
<a href="#">Goethal, Quentin</a>	07/01 10-02	(M)	NPR LPR	90 96	91 97
<a href="#">Gonzalez, Emilia</a>	03/01 10-06	(F)	NPR LPR	89 95	87 93
<a href="#">Houston, Leslie</a>	05/01 10-04	(F)	NPR LPR	87 93	92 98
<a href="#">McFadden, Roz</a>	03/01 10-06	(F)	NPR LPR	85 91	90 96
<a href="#">Moss, Brandon</a>	06/01 10-03	(M)	NPR LPR	82 88	91 97

STUDENT NAME I.D. Number 1 I.D. Number 2 A B C D E F G H I J K L M N O P Z	Birth Date Age Program	(Gender)		CogAT	CogAT
				Verbal	Composite (QN)
<a href="#">Barnes, Tyvon</a>	09/01 10-00	(M)	NPR	93	88
			LPR	99	94
<a href="#">Bryant, Jason</a>	06/01 10-03	(F)	NPR	91	83
			LPR	97	89
<a href="#">Ford, Jennifer</a>	07/01 10-02	(F)	NPR	91	85
			LPR	97	91
<a href="#">Goethal, Quentin</a>	07/01 10-02	(M)	NPR	90	91
			LPR	96	97

STUDENT NAME I.D. Number 1 I.D. Number 2 A B C D E F G H I J K L M N O P Z	Birth Date Age Program	(Gender)	CognAT Verbal	CognAT Composite (QN)	SRBCSS	SRBCSS	SRBCSS	
					Learning Ability	Creativity	Motivation	
<a href="#">Barnes, Tyvon</a>	09/01 10-00	(M)	NPR LPR	93 99	88 94	Above Avg.	Below Avg.	Above Avg.
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<a href="#">Gonzalez, Emilia</a>	03/01 10-06	(F)	NPR LPR	89 95	87 93	Above Avg.	Above Avg.	Below Avg.

	CogAT Verbal 	CogAT Composite (QN) 	The Iowa Tests Reading 	The Iowa Tests Math Total 	SRBCSS Learning Ability 	SRBCSS Creativity 	SRBCSS Motivation 
R	93	88	91	83	Above Avg.	Below Avg.	Above Avg.
R	99	94	97	89			
R	91	83	82	90	Above Avg.	Above Avg.	Above Avg.
R	97	89	88	96			
R	91	85	92	86	Below Avg.	Above Avg.	Above Avg.
R	97	91	98	92			
R	90	91	92	84	Above Avg.	Below Avg.	Above Avg.
R	96	97	98	90			
R	89	87	90	85	Above Avg.	Above Avg.	Below Avg.
R	95	93	96	91			
R	87	92	93	82	Below Avg.	Above Avg.	Above Avg.
R	93	98	99	88			

# Lohman-Renzulli Matrix

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Grade/Level

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### Group Summary Report (Talent Identification)

Multimeasure

Grade: 4 Level: 10

Disaggregation: All Students

Score Type: More than One

Norms: Fall 2011

Building: Lincoln Elem  
District: Rolling Falls ISD

State: IL

Admin Type: More than One

Total No. Tested = 102, Total No. Included = 37

#### Category I

[8 students](#)

Students in category I exhibit superior reasoning abilities on CogAT and superior achievement in Reading or Mathematics. Their combined score on an equally weighted talent identification scale is greater than or equal to 8 points for either The Iowa Tests Reading Total plus the CogAT Verbal Total or The Iowa Tests Math Total plus the CogAT Quantitative/Nonverbal Composite. Students in Category I are also rated as highly capable or motivated, or creative by their teachers. [Learn more about these students.](#)

#### Category II

[6 students](#)

Students in category II exhibit superior reasoning abilities on CogAT and superior achievement in Reading or Mathematics. Their combined score on an equally weighted talent identification scale is greater than or equal to 8 points for either The Iowa Tests Reading Total plus the CogAT Verbal Total or The Iowa Tests Math Total plus the CogAT Quantitative/Nonverbal Composite. Unlike Students in Category I, students in category II are not rated quite as highly capable or motivated, or creative by their teachers. [Learn more about these students.](#)

#### Category III

[12 students](#)

Students in category III exhibit somewhat lower but still strong reasoning abilities on CogAT and somewhat lower but still strong achievement in Reading or Mathematics. Their combined score on an equally weighted talent identification scale is between 2-7 points for either The Iowa Tests Reading Total plus the CogAT Verbal Total or The Iowa Tests Math Total plus the CogAT Quantitative/Nonverbal Composite. Like students in Category I, students in category III are rated as highly capable or motivated, or creative by their teachers. [Learn more about these students.](#)

#### Category IV

[11 students](#)

Students in category IV exhibit somewhat lower but still strong reasoning abilities on CogAT and somewhat lower but still strong achievement in Reading or Mathematics. Their combined score on an equally weighted talent identification scale is between 2-7 points for either The Iowa Tests Reading Total plus the CogAT Verbal Total or The Iowa Tests Math Total plus the CogAT Quantitative/Nonverbal Composite. Like students in Category II, students in category IV are not rated quite as highly capable or motivated, or creative by their teachers. [Learn more about these students.](#)



# Online Test

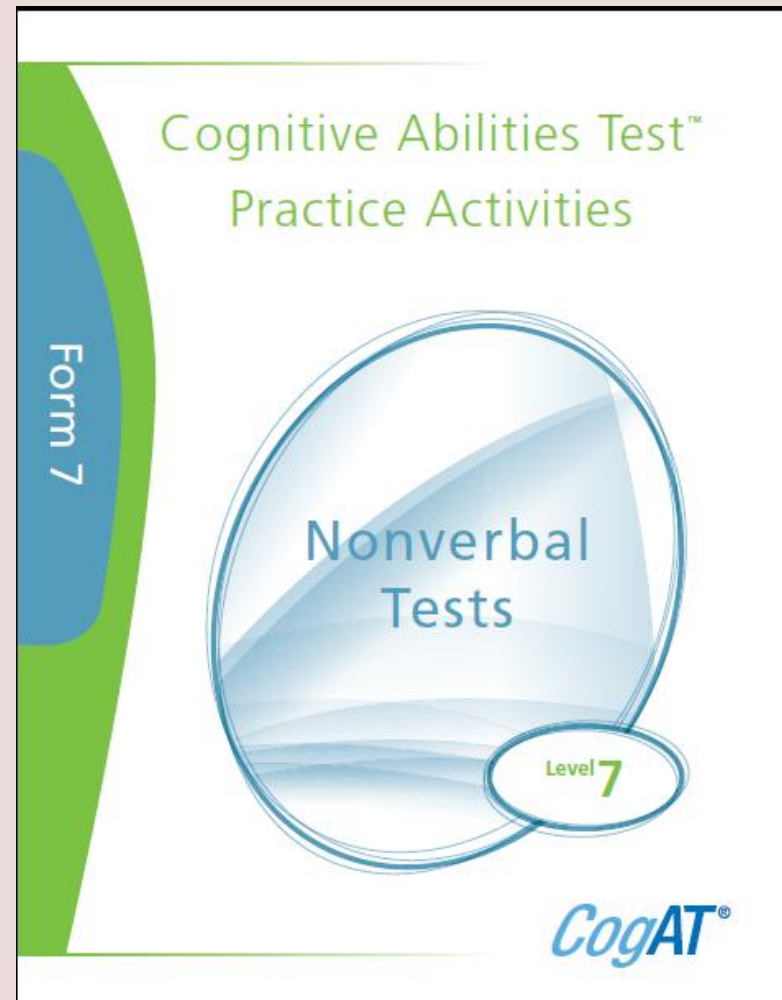
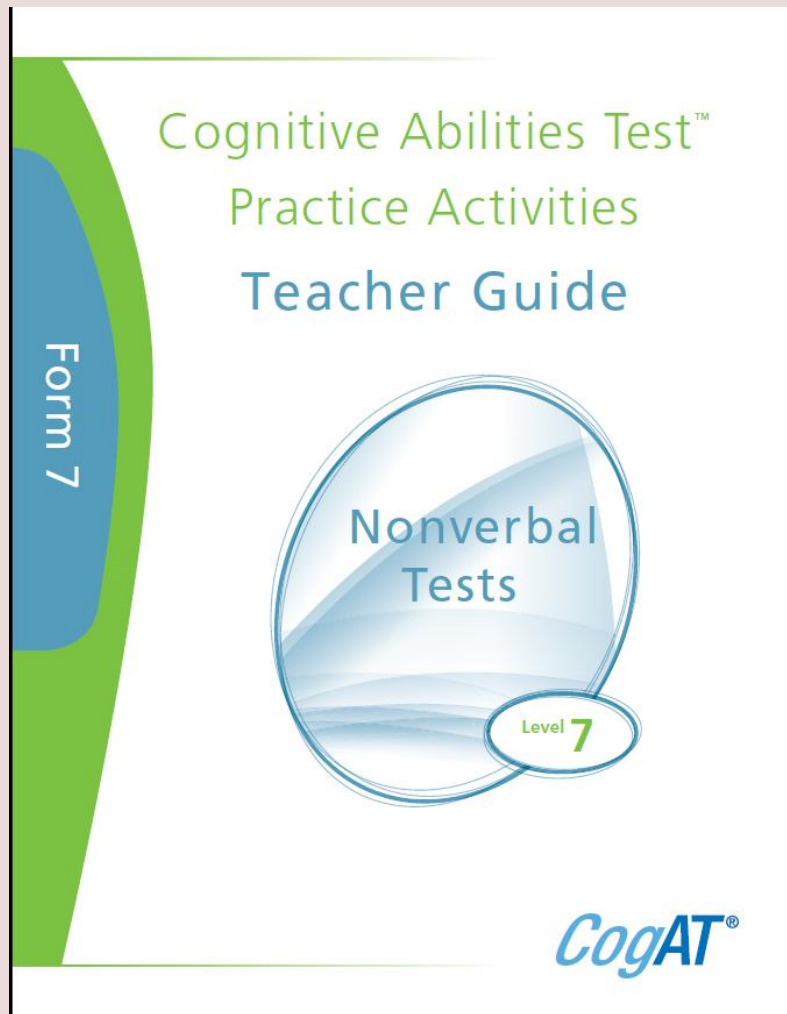
- Beta version Fall 2011
- Equate Spring 2012
- Available Fall 2012



# Free Practice Activities

- Scores are most valid when students clearly understand what they are supposed to do
- Unequal preparation – by accident or design
- Levels the playing field
- Activities can help teach important thinking skills
  
- Teacher guide and student practice booklet
- By battery (V, Q, N)
- Levels 5/6, 7, 8, 9, 10, 11, 12

# Example: Nonverbal Tests, Level 7



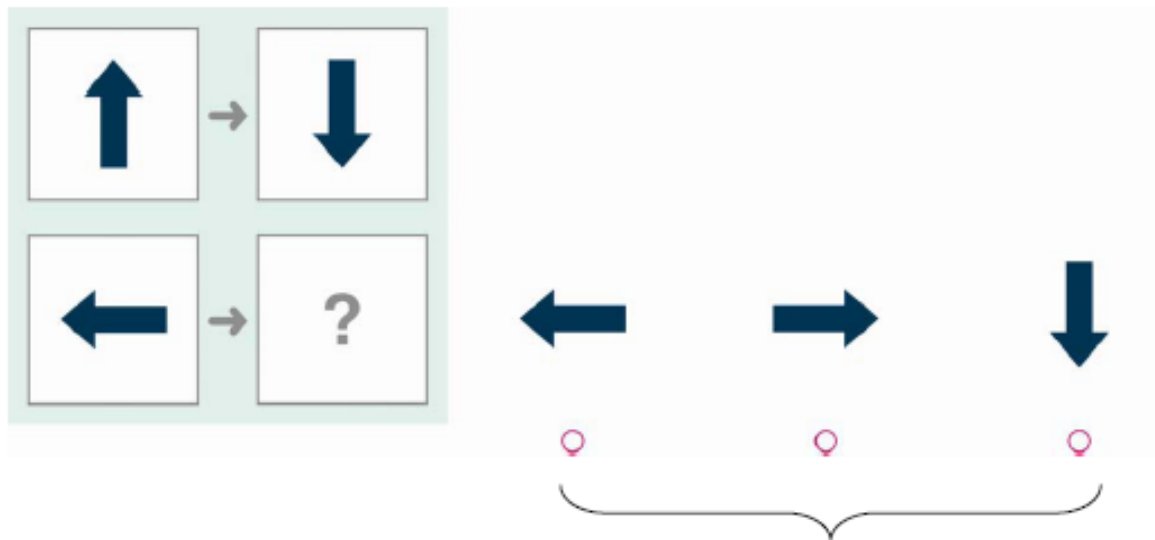
## Test 7: Figure Matrices, Levels 5/6–7

### Part 1: Overview of Figure Matrices

An analogy draws parallels between objects or ideas, for example, “up is to down as left is to right.” Analogies can be about simple things “A tadpole is like a fish” or complex concepts “Friendships are like glass. Once broken, they are hard to fix.” Successful learners habitually reason by analogy. Good analogies allow them to use what they already know to understand or remember new ideas. Reasoning by analogy requires attending carefully to how two things are similar and then applying these relationships to something new.

The Figure Matrices test is like the Picture Analogies and Number Analogies tests except the questions use figures or shapes rather than pictures of objects or activities.

In this test, students are asked to solve problems that look like this:



When practicing the Figure Matrices questions, encourage students to use these strategies.

- Carefully examine the first two figures. Then think of a rule (and say it silently) that describes the relationship between the figures. For example, flip the first figure to get the second one.
- Apply the rule to the third figure to determine the missing figure.
- Test the rule on each answer picture, eliminating answer pictures that do not fit the rule.
- Look for a more precise rule if more than one answer choice fits the rule.

Students at this level tend to make the following common mistakes.

- Students may choose an answer picture that looks like the figure in the bottom row. For example, in the sample question above, students might select the first answer choice.
- Students might infer the wrong relationship between the first two figures. Putting the rule into words will help them be more precise.
- Students may overlook or forget a critical feature of the figures in the top row. Using language to describe the rules will help them remember them.
- Students might select an answer choice before checking all the answer pictures.

## Part 2: Figure Matrices Practice Test Script

The following script covers many issues that will help students do their best on the test. Read aloud the text printed in *blue italics*: these are directions to the students. Directions for you are in parentheses and should NOT be read aloud. Feel free to modify the script to ensure that students understand what they are supposed to do and how to do it.

It may be helpful to make copies of the practice questions in order to display them one at a time on an overhead projector. If this is not possible, hold up a copy of the student practice booklet and point to different parts of each practice question as you discuss them with the class. Also, be sure to have a two-inch-by-four-inch place marker for each student (either a note card or a piece of cardboard).

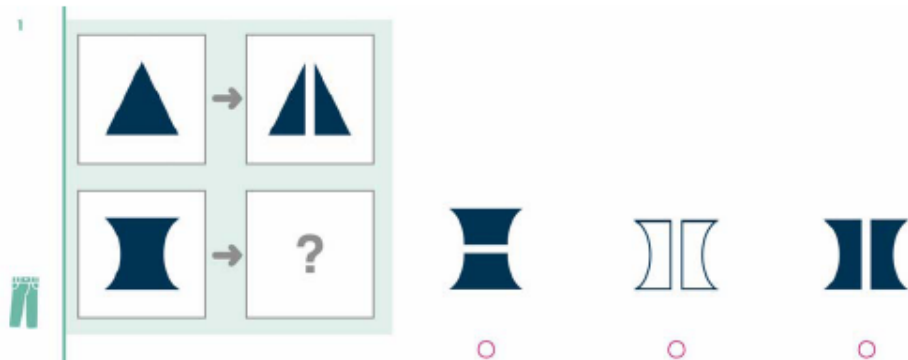
(Make sure each student has a practice booklet and place marker. Then SAY:)

*Open your practice booklet to page 1. You should be on the page with the birds across the top.*

(Check that all students have the correct page.)

P1

*Let's do the first practice question together. Put your marker under the pants.*




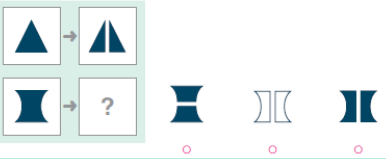
(Point to the big box that has pictures inside of it as you SAY:)


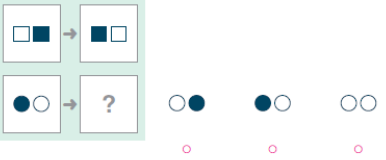
*The big box has three pictures. We must decide which answer picture goes in the box with the question mark.*

(Point to the top row of the big box as you SAY:)

*Look at the shapes in the top row. The first picture is a triangle, and the second picture is two triangles. The arrow (Point.) means that the first picture goes with the second picture in some way. How do the first and second pictures go together?*

Figure Matrices

1  

2  


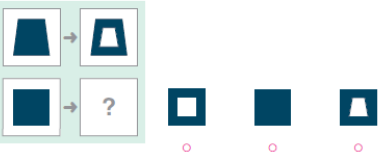
3  


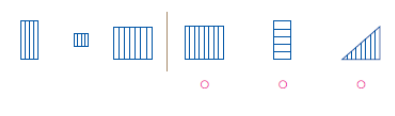
Figure Matrices



1  


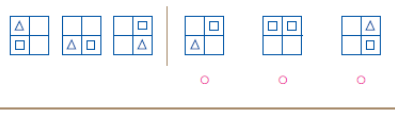
2  

3  

Figure Classification

1  

2  

3  






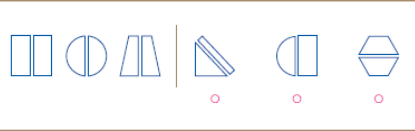

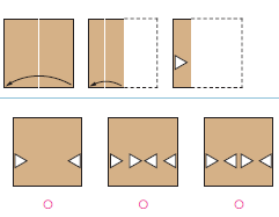
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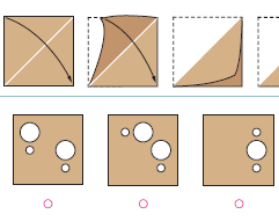
Figure Classification

5  


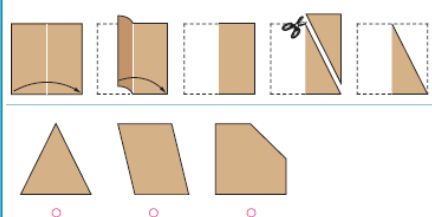
6  


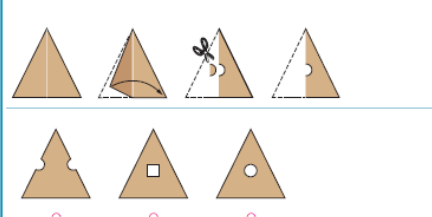
Paper Folding

5  


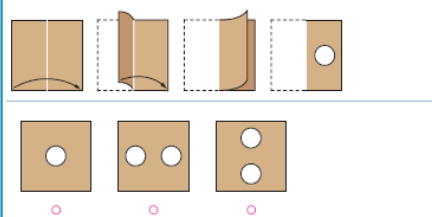
6  


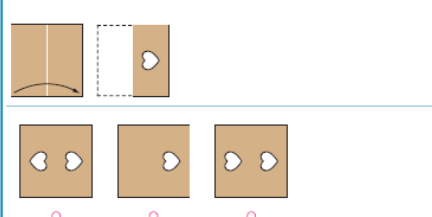
Paper Folding

1  

2  

Paper Folding

3  

4  



# Summary – Major Changes in Form 7

- ELL-friendly, bilingual English/Spanish primary battery
  - Comprehensive assessment for all students
  - Fair for ELL, low income, minority students
  - Smaller ELL/nonELL differences than conventional NV
  - Excellent measure of academic talent for all students
- Upper levels
  - Two “nonverbal” batteries: N and Q
  - Excellent measurement of verbal reasoning with minimal reading load



- ELL-friendly, comprehensive (VQN) Screening Form
- Free practice activities
- New talent-identification reports
- Repeated items only on adjacent levels
- New data management capabilities, with hot-linked Ability Profile interpretations/suggestions
- Online edition (2012)
- Psychological and psychometric excellence

Jameson,  
Lohman, Sierra,  
Avery, JJ, & Adel

Thank  
You



# Number of Items: Form 6 versus Form 7

	5/6	7	8	9	10-17/18
CogAT 6	120	132	144	190	190
CogAT 7	118	136	154	170	176
	-2	+4	+10	-20	-14

- Much shorter prompts at Primary levels
- Upper Levels (10+) changes
  - Verbal - 1 item
  - Quantitative - 8 items
  - Nonverbal - 5 items
- 10 minutes for every subtest at 10+

## Success in identifying gifted students (top 3%) on placement test

<b>Percent administered follow-up test</b>	<b>Typical Screening Test (out of 10)</b>	<b>CogAT Screening Test (out of 10)</b>
30%	8.0	9.6
20%	7.3	9.3
10%	5.4	7.9
3%	2.6	4.5

- Follow up with more comprehensive assessment such as CogAT 7 (or ITBS) for placement
  - Remaining 6 subtests or give full battery (repeating the 3 analogy/matrix tests)
  - Top 10 – 15 %
- Profiles especially important for gifted  
PLACEMENT

# Too many “gifted”

- Suppose mean SAS = 109 (rather than 100)
- Admission is based on an OR rule (CogAT V or Q or N > 97<sup>th</sup> NPR)
- The combination of the “OR” rule and higher average ability of the group increases the percentage of children labeled as “gifted” from the expected 3% to about 20% .