Planning, Attention, Simultaneous and Successive (PASS): A Neurocognitive Approach to Defining and Measuring Intelligence

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Topical Outline

- Traditional IQ
- PASS neurocognitive perspective on thinking
- Using PASS to uncover learning strengths and weaknesses
- Illustrative Cases with validity
- Conclusions

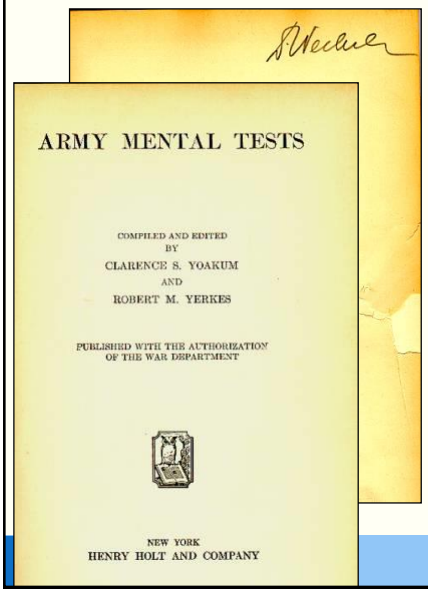
Traditional IQ and Achievement Tests

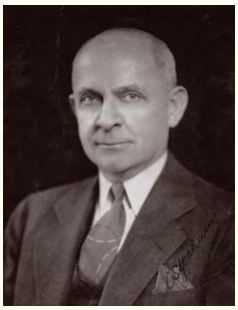
- 1975 Charles Campagne Elementary, Bethpage, NY
- Typical psychoeducational assessment
  - Draw A Person
  - Bender-Gestalt
  - WISC
  - Peabody Individual Achievement Test
  - Sentence Completion Test
  - Developmental history
  - other measures as needed

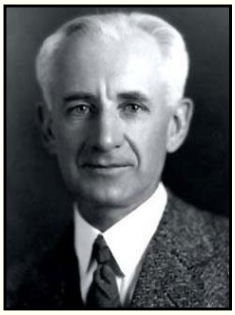
Traditional IQ and Achievement Tests

- I noticed that parts of the WISC I was administering was VERY similar to parts of the achievement test I was giving
- HOW DOES THAT MAKE SENSE?
- WHY DO WE HAVE THIS PROBLEM?

From Alpha/Beta to Wechsler IQ







- Yoakum & Yerkes (1920) summarized the methods used by the military to

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From Alpha/Beta to Wechsler IQ

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

Verbal & Quantitative

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

Nonverbal

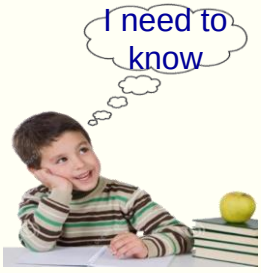
PASS: A new way to think about and measure intelligence 6

Thinking vs Knowing

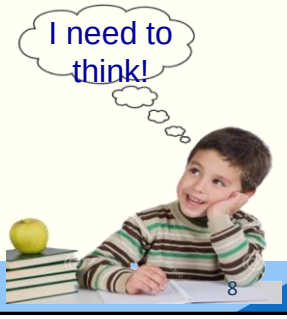
- Scales on IQ tests that are confounded by knowledge
  - WISC-V
    - Verbal Comprehension: Vocabulary, Similarities, Information & Comprehension
    - Fluid Reasoning: Figure Weights, Picture Concepts, Arithmetic
  - WJ-IV
    - Comprehension Knowledge: Vocabulary & General Information
    - Fluid Reasoning: Number Series & Concept Formation
    - Auditory Processing: Phonological Processing
  - K-ABC
    - Knowledge / GC: Riddles, Expressive Vocabulary, Verbal Knowledge

Measure Thinking not Knowing

- What does the student have to ***know*** to complete a task?
  - ***This is dependent on educational opportunity (e.g., Vocabulary, Arithmetic, phonological skills, etc.)***



- How does the student have to ***think*** to complete a task?
  - ***This is dependent on the brain's neurocognitive processes***



Measure Thinking not Knowing

- What do we mean – Thinking
- Thinking has many names
  - Metacognition, executive function, mindfulness, cognitive processing, IQ, intelligence, attention, reasoning, problem solving, memory etc.
- Psychologists have used these terms when defining thinking -- especially intelligence
- We use a neurocognitive approach to define thinking so we can teach students to THINK SMART.

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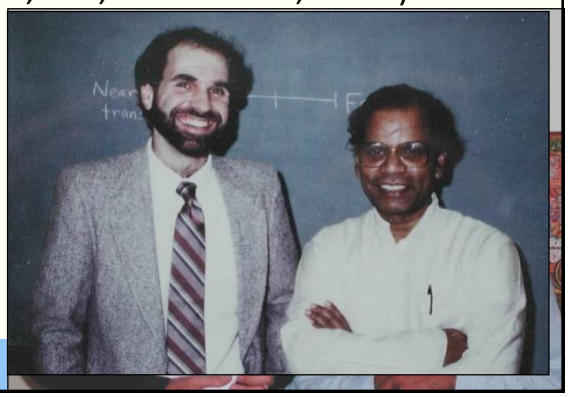
Intelligence in the 21st Century Conceptualized as brain function

Our Amazing Brains !

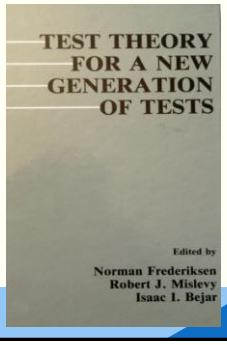
IQ as Neurocognitive Abilities 1986

- Das and Naglieri proposed a neurocognitive theory of intelligence called PASS and a way to measure it (**C**ognitive **A**ssessment **S**ystem (Naglieri & Das, 1997) and the **CAS2** (Naglieri, Das, & Goldstein, 2014.)
  - The CAS was the first intelligence *test* to be built on a specific *theory* of intelligence.



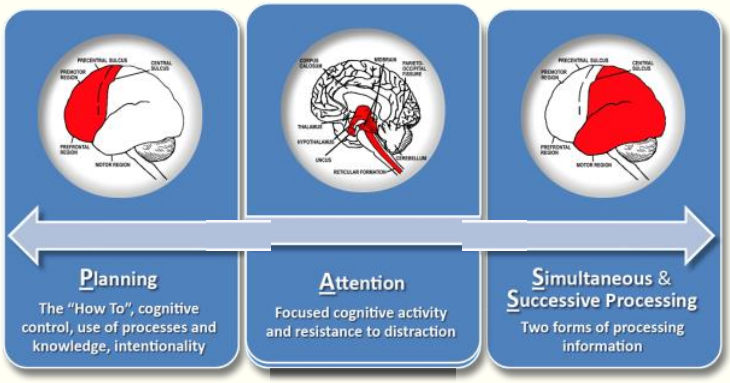
Defining Neurocognitive Abilities

- How did we identify 'basic psychological processes'?
  - We used research from cognitive and neuropsychology to construct a model to test
  - We did not assign new labels to traditional IQ subtests
- We recognized the limitations of developing a theory from factor analysis – "*a research program dominated by factor analyses of test intercorrelations is incapable of producing an explanatory theory of human intelligence*" (Lohman & Ippel, 1993, p. 41)



PASS Neurocognitive Theory

Three Functional Units described by A. R. Luria (1972)



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PASS Neurocognitive Theory

- **P**lanning = THINKING ABOUT HOW YOU DO WHAT YOU DECIDE TO DO
- **A**ttention = BEING ALERT AND RESISTING DISTRACTIONS
- **S**imultaneous = GETTING THE BIG PICTURE
- **S**uccessive = FOLLOWING A SEQUENCE

PASS = 'basic psychological processes'

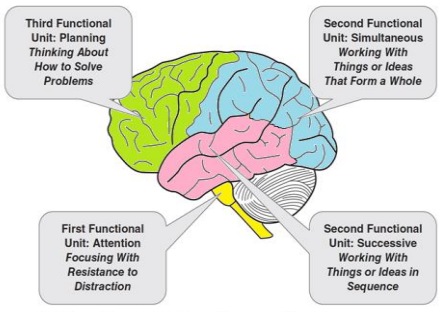

Figure 1.2 Three Functional Units and Associated Brain Structures

From: *Essentials of CAS2 Assessment*. Naglieri & Otero, 2017

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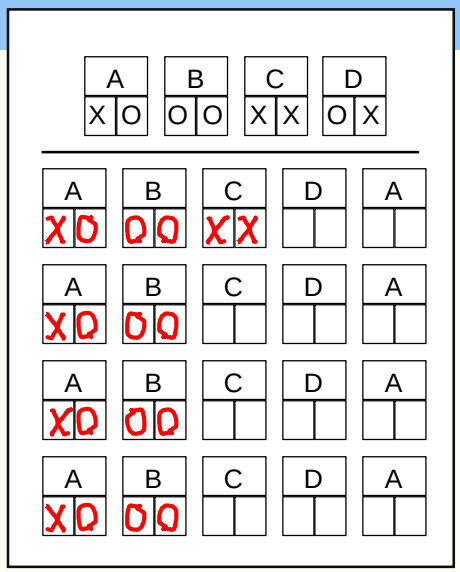
Planned Codes 1

- Child fills in the codes in the empty boxes
- Children are encouraged to think of a good way to complete the page



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CAS2 Expressive Attention

- The child says the color not the word
- Score is time and number correct

RED	BLUE	GREEN	YELLOW
YELLOW	GREEN	RED	BLUE
RED	YELLOW	YELLOW	GREEN
BLUE	GREEN	RED	BLUE
GREEN	YELLOW	RED	YELLOW

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Word Recall

- Man Cow Key
- Book Shoe Girl Dog Car
- Girl Book Dog Car Wall Cow Key Shoe

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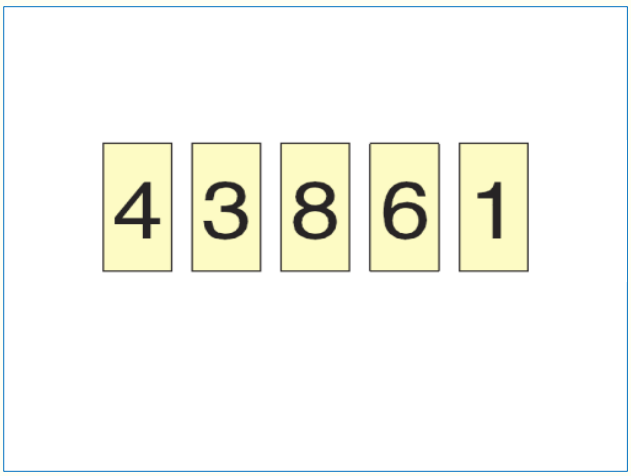
Visual Digit Span



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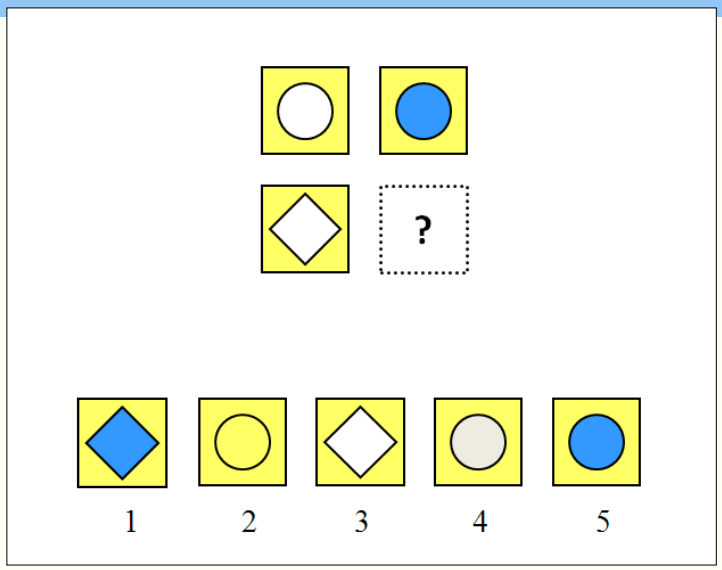
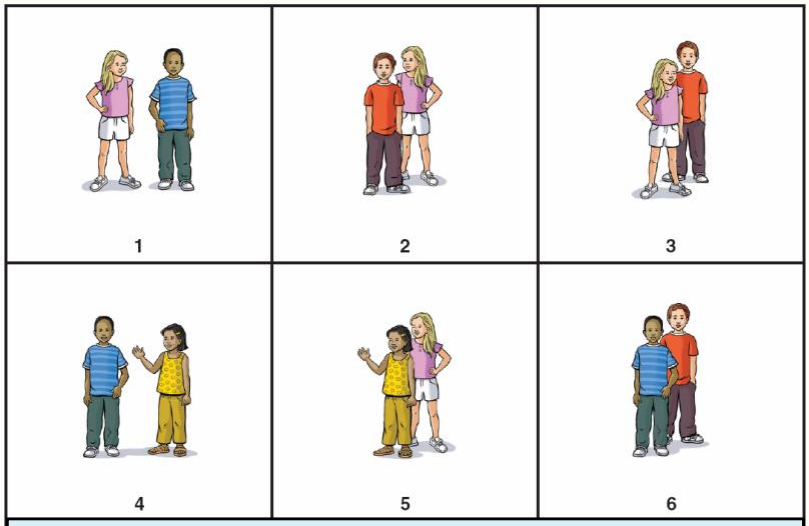
Simultaneous Matrices



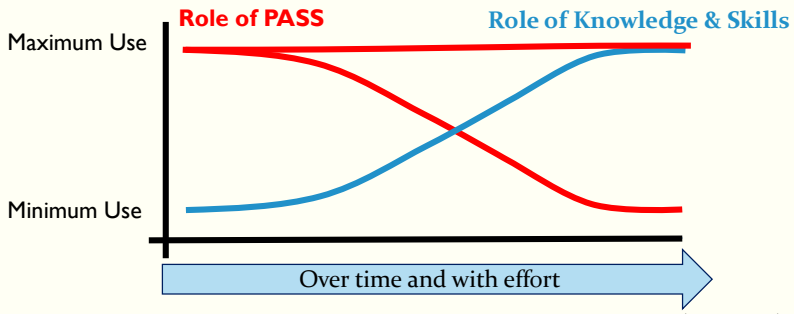
Verbal-Spatial Relations



Which picture shows a boy behind a girl?

PASS Learning Curves

- Learning depends upon many factors especially PASS
- At first, PASS plays a major role in learning
- When a task is well learned it requires less thinking (PASS) and **becomes a skill**
- **Helping students to use the COMBINATION of PASS and Skills is our goal**



Note: A **skill** is the ability to do something well with minimal effort (thinking)

PASS is A Theory of Cognition and Learning

28 Cognitive Assessment System: Redefining Intelligence From a Neuropsychological Perspective

Jack A. Naglieri and Tulio M. Otero

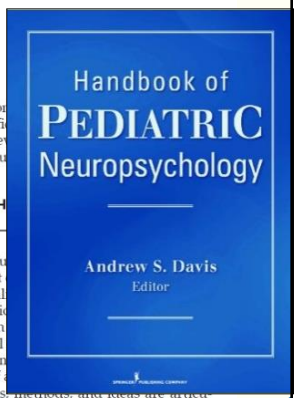
INTRODUCTION

Pediatric neuropsychology has become an important field for understanding and treating developmental, psychiatric, psychosocial, and learning disorders. By addressing both brain functions and environmental factors intrinsic in complex behaviors, such as thinking, reasoning, planning, and the variety of executive capacities, clinicians are able to offer needed services to children with a variety of learning, psychiatric, and developmental disorders. Brain–behavior relationships are investigated by neuropsychologists by interpreting several aspects of an individual's cognitive, language, emotional, social, and motor behavior. Standardized instruments are used by neuropsychologists to collect information and derive inferences about brain–behavior relationships. Technology, such as magnetic resonance imaging (MRI), functional MRI (FMRI), positron emission tomography, computerized tomography, and diffusion tensor imaging, has reduced the need for neuropsychological tests to localize and access brain damage. Neuropsychological tests, however,

Such tools should not o
cesses necessary for effi
also provide for the de
tions and address the qu

**FROM NEUROPSYCH
TO ASSESSMENT**

Luria's theoretical accou
perhaps one of the most
2008). Luria conceptual
of brain–behavior relati
orders that the clinician
the brain, the functional
syndromes and impairm
and clinical methods of
theoretical formulations,
lated in works such as *Higher cortical functions in man* (1966, 1980) and *The Working Brain* (1973). Luria viewed the brain as a functional mosaic, the parts of which interact in dif-



PASS Comprehensive System

(Naglieri, Das, & Goldstein, 2014)

CAS2 Rating Scale (4 subtests)	CAS2 Brief (4 subtests)	CAS2 Core (8 subtests)	CAS2 Extended (12 subtests)
Total Score Planning Simultaneous Attention Successive	Total Score Planning Simultaneous Attention Successive	Full Scale Planning Simultaneous Attention Successive	Full Scale Planning Simultaneous Attention Successive Supplemental Scales Executive Function Working Memory Verbal / Nonverbal Visual / Auditory

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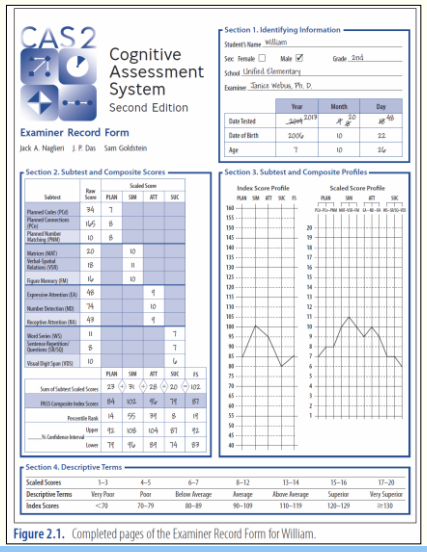
CAS2 & CAS2-Espanol (Ages 5-18 yrs.) Psychologists

CAS2 – Psychologist Level

- 8 (40 minutes) or 12 (60 minutes) subtest versions
- PASS and Full Scales provided (100 & 15) subtests (10 and 3)


CAS2 Cognitive Assessment System Second Edition

Examiner Record Form

Jack A. Naglieri J. P. Das Sam Goldstein

Section 1. Identifying Information

Student's Name William

Sex: Female ☐ Male ☑ Grade 2nd

School Unified Elementary

Examiner Janice Webus, Ph. D.

	Year	Month	Day
Date Tested	2019	10	20
Date of Birth	2006	10	22
Age	7	10	28

Section 2. Subtest and Composite Scores

Subtest	Raw Score	Scaled Score PLAN	SIM	ATT	SIM
Planned Codes (PCd)	94	7			
Planned Connections (PCn)	145	8			
Planned Number Matching (PNM)	10	8			
Matrices (MAT)	20		10		
Verbal-Spatial Relations (VSR)	18		11		
Figure Memory (FM)	42		10		
Expressive Attention (EA)	98			9	
Number Detection (ND)	74			10	
Receptive Attention (RA)	49			9	
Word Series (WS)	11				7
Sentence Repetition/Questions (SR/Q)	8				7
Visual Digit Span (VDS)	10				6

	PLAN	SIM	ATT	SIM	FS
Sum of Subtest Scaled Scores	29	31	28	20	102
PASS Composite Index Scores	84	103	96	71	87
Percentile Rank	14	58	39	3	19
95% Confidence Interval Upper	93	106	104	87	92
95% Confidence Interval Lower	77	96	86	74	83

Section 3. Subtest and Composite Profiles

Index Score Profile

Scaled Score Profile

Section 4. Descriptive Terms

Scaled Scores	1–3	4–5	6–7	8–12	13–14	15–16	17–20
Descriptive Terms	Very Poor	Poor	Below Average	Average	Above Average	Superior	Very Superior
Index Scores	<70	70–79	80–89	90–109	110–119	120–129	≥130

Figure 2.1. Completed pages of the Examiner Record Form for William.

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Supplemental Scales

- We have these scores so you can relate findings on CAS2 to other tests
- Executive Function
- Working Memory
- Verbal
- Nonverbal
- Visual - Auditory comparison

Supplemental Composite Scores

Subtest	Scaled Score EF w/o WM	EF w/ WM	WM	VC	NvC
Planned Codes					7
Planned Connections	8	8			
Matrices					10
Verbal-Spatial Relations		11	11	11	
Figure Memory					10
Expressive Attention	9	9			
Receptive Attention				9	
Sentence Repetition/Questions		7	7	7	

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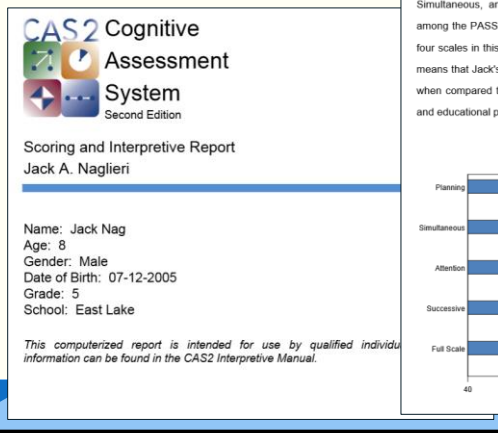
CAS2 Online Score & Report

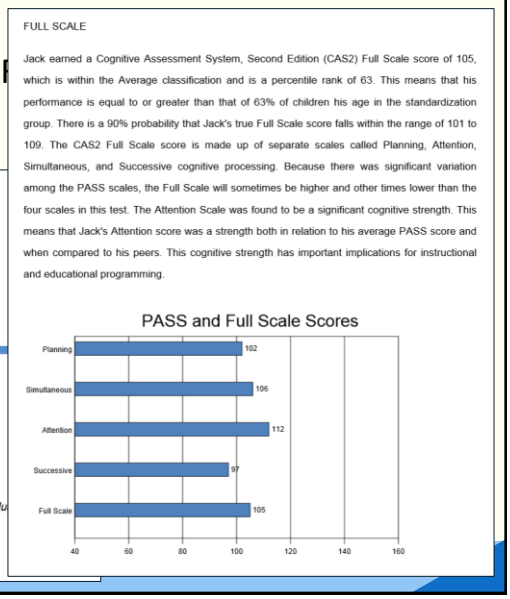
- Narrative report can be obtained in Word or PDF


CAS2 Cognitive Assessment System
Second Edition

Scoring and Interpretive Report
Jack A. Naglieri

Name: Jack Nag
Age: 8
Gender: Male
Date of Birth: 07-12-2005
Grade: 5
School: East Lake

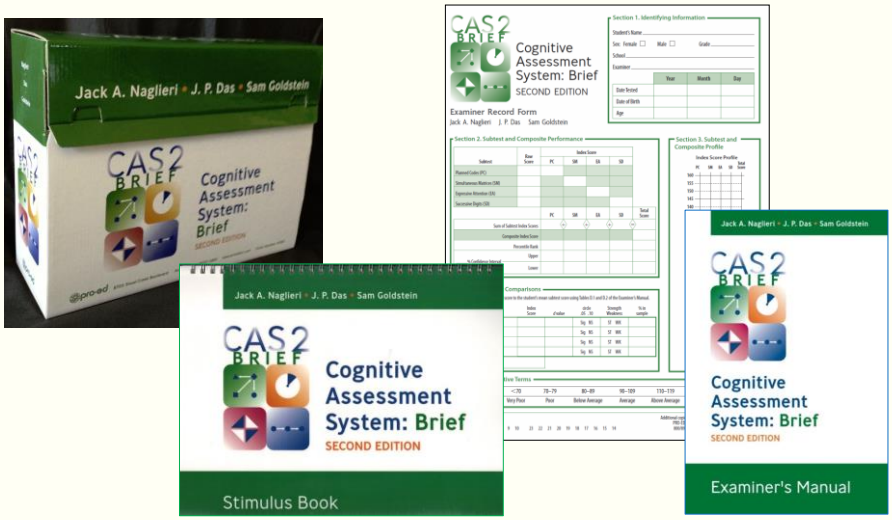
This computerized report is intended for use by qualified individu
information can be found in the CAS2 Interpretive Manual.


FULL SCALE

Jack earned a Cognitive Assessment System, Second Edition (CAS2) Full Scale score of 105, which is within the Average classification and is a percentile rank of 63. This means that his performance is equal to or greater than that of 63% of children his age in the standardization group. There is a 90% probability that Jack's true Full Scale score falls within the range of 101 to 109. The CAS2 Full Scale score is made up of separate scales called Planning, Attention, Simultaneous, and Successive cognitive processing. Because there was significant variation among the PASS scales, the Full Scale will sometimes be higher and other times lower than the four scales in this test. The Attention Scale was found to be a significant cognitive strength. This means that Jack's Attention score was a strength both in relation to his average PASS score and when compared to his peers. This cognitive strength has important implications for instructional and educational programming.

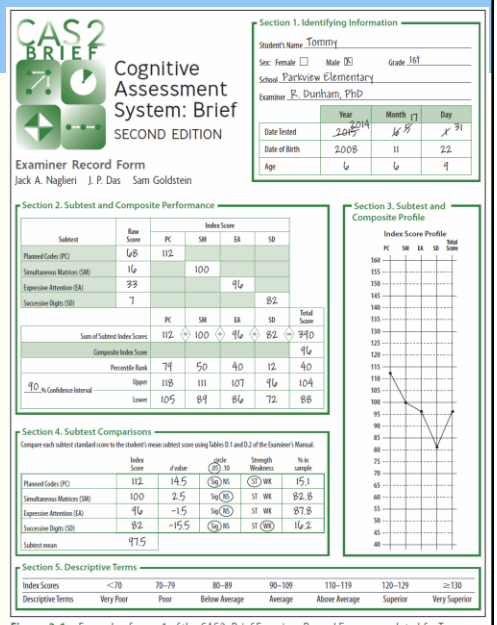
PASS and Full Scale Scores

CAS2: Brief (Ages 4-18 years) for Teachers



CAS2: Brief

- Give in 20 minutes
- **Good for reevaluations**
- Yields PASS and Total standard scores (Mn 100, SD 15)
- All items are different from CAS2
  - Planned Codes
  - Simultaneous Matrices
  - Expressive Attention
- New Subtest
  - Successive Digits (forward only)


CAS2 BRIEF
Cognitive Assessment System: Brief
SECOND EDITION
Examiner Record Form
Jack A. Naglieri J. P. Das Sam Goldstein

Section 1. Identifying Information
Student's Name Tommy
Sex: Female ☐ Male ☒ Grade 1st
School Parkview Elementary
Examiner R. Dunham, PhD

	Year	Month	Day
Date Tested	2014	5	31
Date of Birth	2008	11	22
Age	6	6	9

Section 2. Subtest and Composite Performance

Subtest	Raw Score	PC	SM	EA	SD
Planned Codes (PC)	68	112			
Simultaneous Matrices (SM)	16		100		
Expressive Attention (EA)	33			96	
Successive Digits (SD)	7				82

	PC	SM	EA	SD	Total Score
Sum of Subtest Index Scores	112	100	96	82	390
Composite Index Score					96
Percentile Rank	79	50	40	12	40
90% Confidence Interval Upper	118	111	107	96	104
90% Confidence Interval Lower	105	89	86	72	88

Section 3. Subtest and Composite Profile
Index Score Profile

Section 4. Subtest Comparisons
Compare each subtest standard score to the student's mean subtest score using Tables D.1 and D.2 of the Examiner's Manual.

	Index Score	d value	Circle .05 or .10	Strength or Weakness	% in sample
Planned Codes (PC)	112	14.5	Sig NS	ST WK	15.1
Simultaneous Matrices (SM)	100	2.5	Sig NS	ST WK	82.8
Expressive Attention (EA)	96	−1.5	Sig NS	ST WK	87.8
Successive Digits (SD)	82	−15.5	Sig NS	ST WK	14.2
Subtest mean	97.5				

Section 5. Descriptive Terms

Index Scores	<70	70–79	80–89	90–109	110–119	120–129	≥130
Descriptive Terms	Very Poor	Poor	Below Average	Average	Above Average	Superior	Very Superior

Figure 3.1. Example of page 1 of the CAS2: Brief Examiner Record Form, completed for Tommy.

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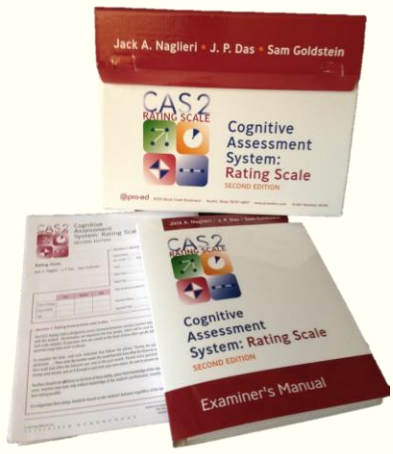
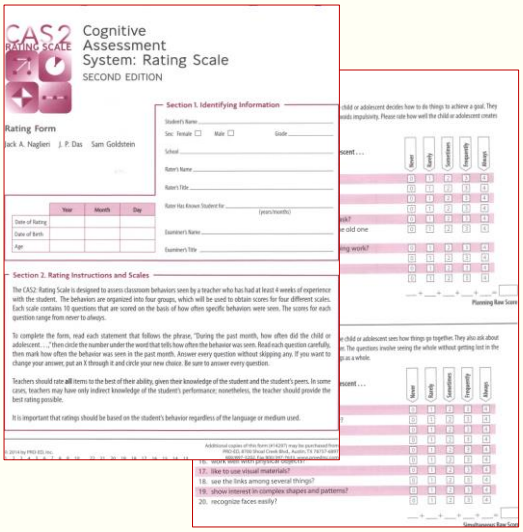
CAS2 Rating Scales (Ages 4-18 yrs.)

- The CAS2: Rating measures behaviors associated with PASS constructs
- Normed on a nationally representative sample of 1,383 students rated by teachers



CAS2 Rating Scales – By & for Teachers

- The CAS2: Rating form contains 40 items
- 10 items for each PASS scale
- PASS and Total scales are set to have a mean of 100 and standard deviation of 15



Case of PAUL

Case of Paul by Steve Feifer

- **Case of Paul** -A 9 year old in 4th grade
  - Problems in reading and math
  - Can't remember the sequence of steps when doing math and math facts
  - Good memory for details
  - Can't sound out words
  - Poor spelling
  - Poor reading comprehension

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Paul – age 9 years

WISCV	COMPOSITE SCORE	RANGE	PERCENTILE RANK
Verbal Comprehension	89	Below Average	23%
Visual Spatial	84	Below Average	14%
Fluid Reasoning	82	Below Average	12%
Working Memory	72	Very Low	3%
Processing Speed	76	Very Low	6%
FULL SCALE SCORE	81	Below Average	10%
WIAT III Reading	87	Below Average	19%
WIAT III Math	90	Average	25%
WIAT III Writing	94	Average	34%

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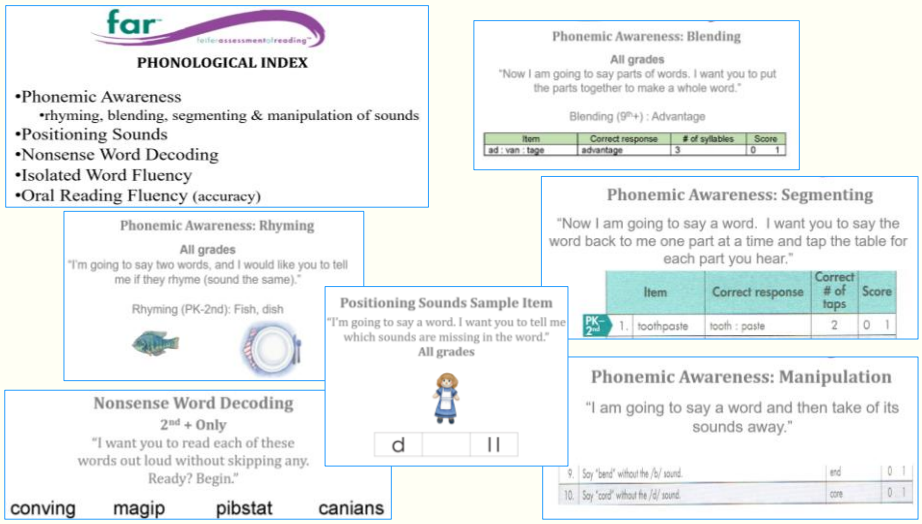
FAR Phonological Index Subtests



Paul – age 9 years

FAR index	Standard score (95% CI)	Percentile	Qualitative descriptor
Phonological Index	75	5%	Moderately Below Average
Fluency Index	92	30%	Average
Mixed Index	81	10%	Below Average
Comprehension Index	97	42%	Average
FAR Total Index	**84**	**14%**	**Below Average**

KEY INTERPRETATION	Score	Percentile	Descriptor
Nonsense Word Decoding – requires the student to decode a series of nonsense words presented in order of increasing difficulty .	71	3%	Moderately Below Average
Irregular Word Reading Fluency – the student reads a list of phonologically irregular words arranged in order of increasing difficulty in 60 seconds.	95	37%	Average

Paul – age 9 years

CAS-2	STANDARD SCORE	Classification
Planning	**92**	**Average**
Simultaneous	**92**	**Average**
Attention	**110**	**Average**
Successive	**75**	**Very Low**
Full Scale is not reported		

Differences Between PASS Scale Standard Scores and the Student's Average PASS Score Required for Significance for the CAS2 12-Subtest EXTENDED battery AGES 8-18 Years.

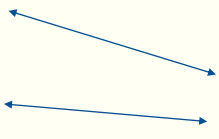
Ages 8-18 YEARS

Cognitive Assessment System - 2		Difference from PASS Mean of:	Significantly Different (at $p < .05$) from	Strength or Weakness	
PASS Scales	Standard Score	92.3			
Planning	92	-0.3	no		
Simultaneous	92	-0.3	no		
Attention	110	17.8	yes	Strength	
Successive	75	-17.3	yes		Weakness

WISC-V and CAS2

- **Why are the WISC-V and CAS2 scores so different?**
- **Because the two test measure VERY different things**
- **The only similarity is:**

Verbal Comprehension	
Visual Spatial	**Planning**
Fluid Reasoning	**Attention**
Working Memory	**Simultaneous**
Processing Speed	**Successive**



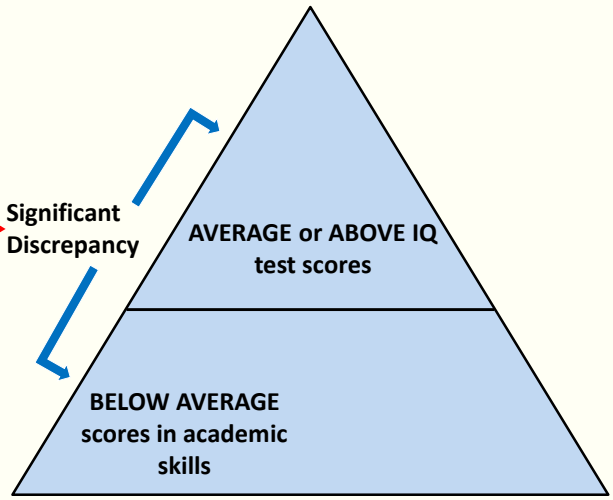
- But note, Working Memory on WISC-V includes Digit span Backwards which is Successive and Planning (Schofield & Ashman)

Does he have SLD?

His IQ on WISCV and achievement scores are similar, so no, he is a slow learner?

Traditional Discrepancy Approach

- **Discrepancy** between high IQ and low achievement test scores

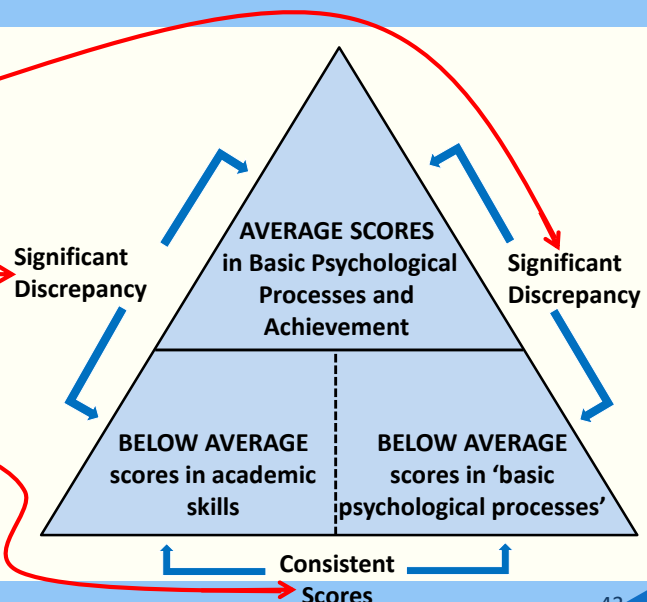


SLD Eligibility: We can do better

- Identify Specific Learning Disabilities (SLD) using the **Discrepancy/Consistency Method** (*Essentials of CAS2 Assessment* by Naglieri & Otero, 2017)
  - based on theoretically defined measures of neurocognitive processes rather than traditional IQ achievement discrepancy
  - The Pattern of Strengths and Weaknesses (PSW) will based on basic psychological processing scores combined with academic test scores

Discrepancy Consistency Method (DCM)

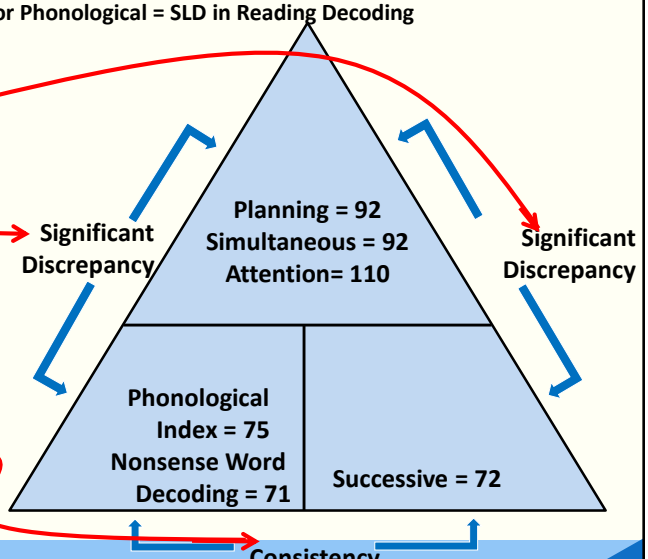
- **Discrepancy** between high and low processing scores
- **Discrepancy** between high processing and low achievement
- **Consistency** between low processing and low achievement



Discrepancy Consistency Method - Paul

Poor Successive + Poor Phonological = SLD in Reading Decoding

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



Kathleen's Intervention Plan for Paul

- Be Intentional and Transparent
  - Explain his PASS scores to him
- Build on His Strengths
  - Help him use his Planning, Attention, Simultaneous and Strengths to support his learning challenges with Successive Processing
- Develop Effective Skill Sets to remediate his weaker skills
- Offer and encourage the use of metacognitive strategies that can improve his Successive Processing skills.
- Encourage a Growth Mindset and Self Efficacy

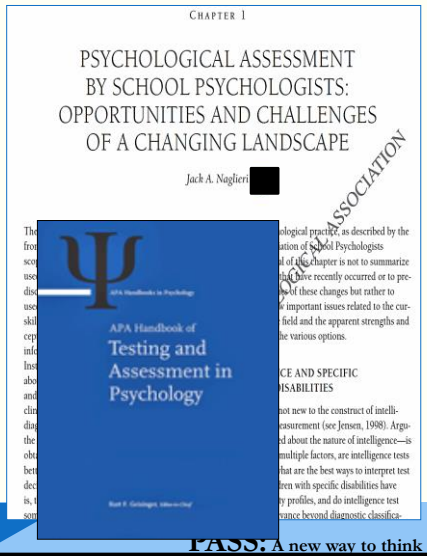
Making Successive Processing Sticky

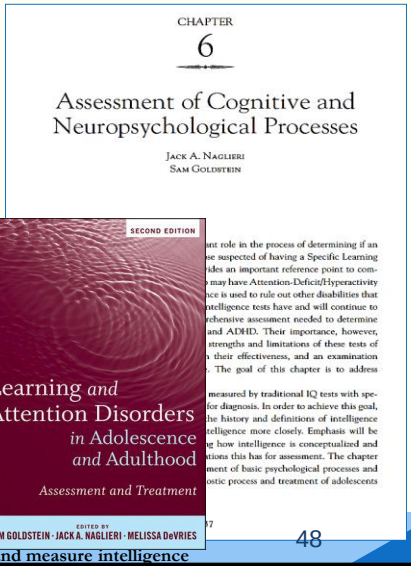
- **Work with Paul to find ways of remembering sequences…**
  - **Spelling**
    - Segmenting Words
    - Clapping, Tapping, Moving Visualizing, etc. Which one works best…
  - **Sentence Structure**
    - Silly Sentences
  - **Paragraphs and Essays**
    - Graphic organizers

IS there an SLD Profile on PASS for those with a phonological weakness?

Which Tests have Useful Profiles ?

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





PASS: A new way to think about and measure intelligence

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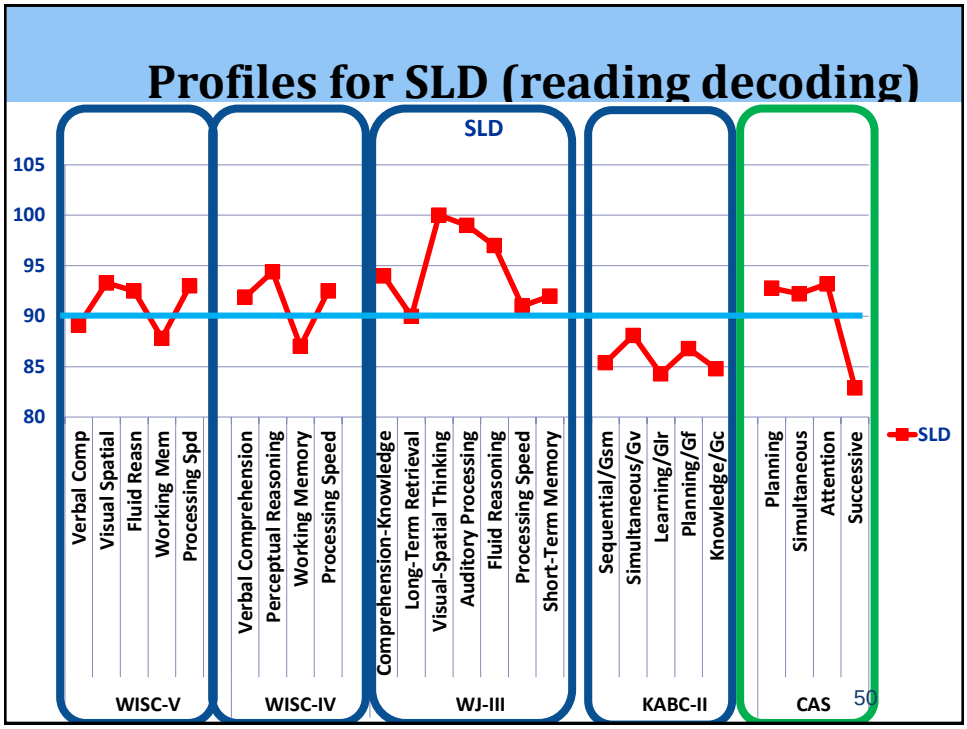
Naglieri & Goldstein (2011)

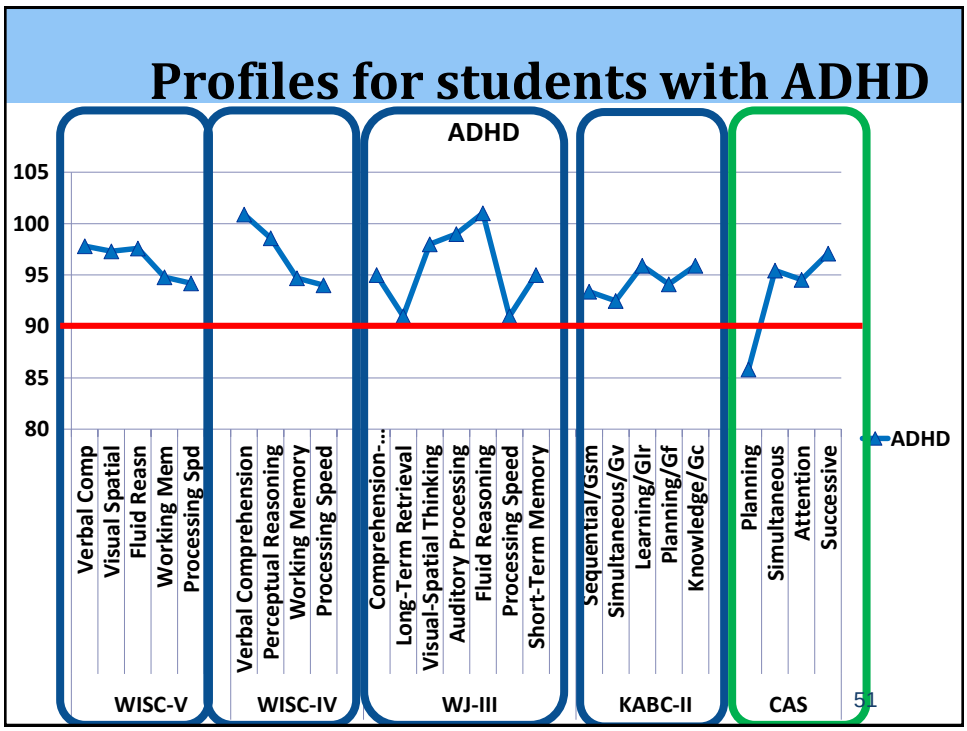
GROUP PROFILES BY ABILITY TEST

Because ability tests play such an important role in the diagnostic process, it is crucial to understand the sensitivity each test may have to any unique characteristics of those with an SLD or attention deficit. Clinicians need to know if an adolescent or adult has a specific deficit in ability that is related to a specific academic learning problem. There has been considerable research on, for example, Wechsler subtest profile analysis, and most researchers conclude that no profile has diagnostic utility for individuals with SLD or ADHD (Kavale & Forness, 1995). The failure of subtest profiles has led some to argue (e.g., Naglieri, 1999) that scale, rather than subtest, variability should

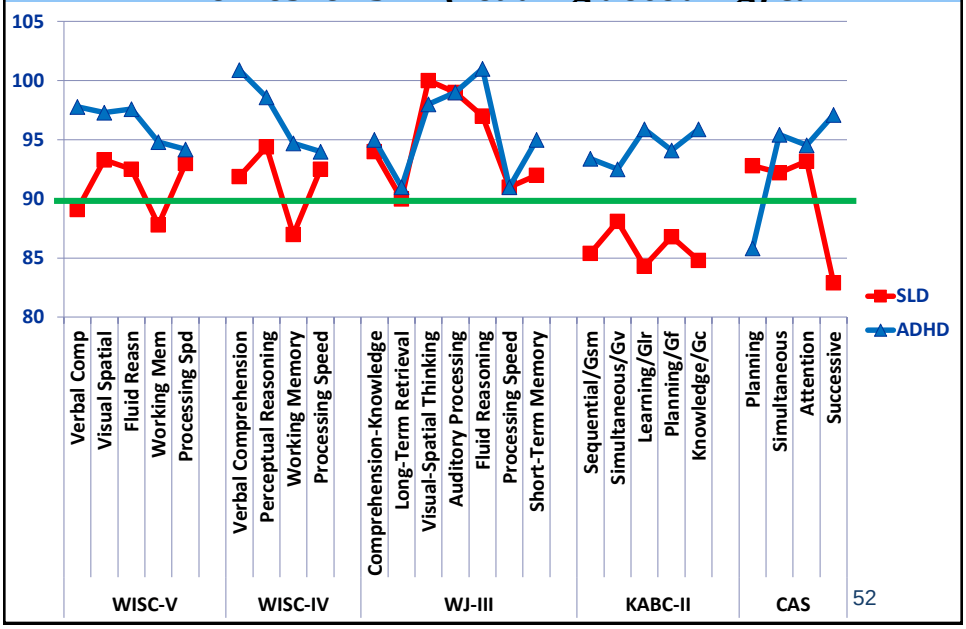
1. We need to know if intelligence tests yield distinctive profiles

2. Subtest profile analysis is UNSUPPORTED so use scale profiles instead


Profiles for SLD (reading decoding)
SLD
105
100
95
90
85
80
Verbal Comp
Visual Spatial
Fluid Reasn
Working Mem
Processing Spd
Verbal Comprehension
Perceptual Reasoning
Working Memory
Processing Speed
Comprehension-Knowledge
Long-Term Retrieval
Visual-Spatial Thinking
Auditory Processing
Fluid Reasoning
Processing Speed
Short-Term Memory
Sequential/Gsm
Simultaneous/Gv
Learning/Glr
Planning/Gf
Knowledge/Gc
Planning
Simultaneous
Attention
Successive
SLD
WISC-V
WISC-IV
WJ-III
KABC-II
CAS
50


Profiles for students with ADHD
ADHD
105
100
95
90
85
80
Verbal Comp
Visual Spatial
Fluid Reasn
Working Mem
Processing Spd
Verbal Comprehension
Perceptual Reasoning
Working Memory
Processing Speed
Comprehension-...
Long-Term Retrieval
Visual-Spatial Thinking
Auditory Processing
Fluid Reasoning
Processing Speed
Short-Term Memory
Sequential/Gsm
Simultaneous/Gv
Learning/Glr
Planning/Gf
Knowledge/Gc
Planning
Simultaneous
Attention
Successive
ADHD
WISC-V
WISC-IV
WJ-III
KABC-II
CAS
51

Profiles for SLD (reading decoding) & ADHD



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PASS Profiles and Educational Placement

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

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

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

Jack A. Naglieri
George Mason University

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

SLD Profiles on CAS (Huang, Bardos, D'Amato, 2010)

Journal of Psychoeducational Assessment
28(1) 19–30
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DOI: 10.1177/0734282909333057
http://jpa.sagepub.com
SAGE

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

Leesa V. Huang[1], Achilles N. Bardos[2], and Rik Carl D'Amato[3]

Abstract

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

54

Johnson, Bardos & Tayebi, 2003

- "this study suggests that the CAS…yields information that contributes to the differential diagnosis of students suspected of having a learning disability in writing"

Journal of Psychoeducational Assessment
2003, *21*, 180-195

DISCRIMINANT VALIDITY OF THE COGNITIVE ASSESSMENT SYSTEM FOR STUDENTS WITH WRITTEN EXPRESSION DISABILITIES

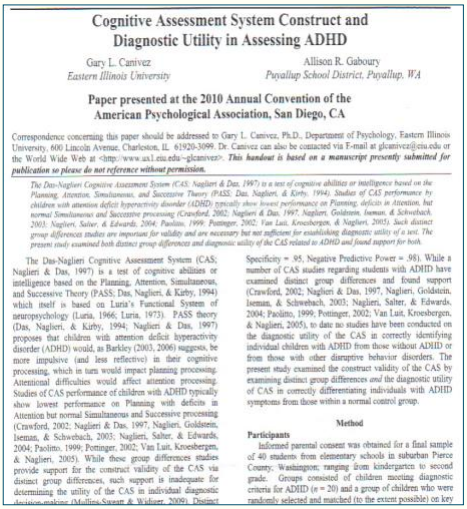
Judy A. Johnson
University of Houston - Victoria
Achilles N. Bardos
University of Northern Colorado
Kandi A. Tayebi
Sam Houston State University

This study explored the PASS cognitive processing theory in junior high students (aged 11-15 years) with and without written expression disabilities. Ninety-six students with (n = 48) and without (n = 48) written expression disabilities were administered the Das-Naglieri: Cognitive Assessment System (DN:CAS; 1997) and the writing subtests of the Wechsler Individual Achievement Test (WIAT; 1992). Discriminant analyses were utilized to identify the DN:CAS subtests and composites that contributed to group differentiation. The Planning composite was found to be the most significant contributor among the four composite scores. Subsequent efficiency of classification analyses provided strong support for the validity of the obtained discriminant functions in that the four DN:CAS composite scale scores correctly identified 83% of the students as members of their respective groups.

55

Canivez & Gaboury (2010)

- "the present study demonstrated the potential of the CAS to correctly identify students who demonstrated behaviors consistent with ADHD diagnosis." glcanivez@eiu.edu



Cognitive Assessment System Construct and Diagnostic Utility in Assessing ADHD

Gary L. Canivez
Eastern Illinois University

Allison R. Gaboury
Puyallup School District, Puyallup, WA

Paper presented at the 2010 Annual Convention of the American Psychological Association, San Diego, CA

Correspondence concerning this paper should be addressed to Gary L. Canivez, Ph.D., Department of Psychology, Eastern Illinois University, 600 Lincoln Avenue, Charleston, IL 61920-3099. Dr. Canivez can also be contacted via E-mail at glcanivez@eiu.edu or the World Wide Web at <http://www.ux1.eiu.edu/~glcanivez>. ***This handout is based on a manuscript presently submitted for publication so please do not reference without permission.***

The Das-Naglieri Cognitive Assessment System (CAS; Naglieri & Das, 1997) is a test of cognitive abilities or intelligence based on the Planning, Attention, Simultaneous, and Successive Theory (PASS; Das, Naglieri, & Kirby, 1994). Studies of CAS performance by children with attention deficit hyperactivity disorder (ADHD) typically show lowest performance on Planning, deficits in Attention, but normal Simultaneous and Successive processing (Crawford, 2002; Naglieri & Das, 1997; Naglieri, Goldstein, Iseman, & Schwebach, 2003; Naglieri, Salter, & Edwards, 2004; Paolitto, 1999; Pottinger, 2002; Van Luit, Kroesbergen, & Naglieri, 2005). Such distinct group differences studies are important for validity and are necessary but not sufficient for establishing diagnostic utility of a test. The present study examined both distinct group differences and diagnostic utility of the CAS related to ADHD and found support for both.

The Das-Naglieri Cognitive Assessment System (CAS; Naglieri & Das, 1997) is a test of cognitive abilities or intelligence based on the Planning, Attention, Simultaneous, and Successive Theory (PASS; Das, Naglieri, & Kirby, 1994) which itself is based on Luria's Functional System of neuropsychology (Luria, 1966; Luria, 1973). PASS theory (Das, Naglieri, & Kirby, 1994; Naglieri & Das, 1997) proposes that children with attention deficit hyperactivity disorder (ADHD) would, as Barkley (2003, 2006) suggests, be more impulsive (and less reflective) in their cognitive processing, which in turn would impact planning processing. Attentional difficulties would affect attentive processing. Studies of CAS performance of children with ADHD typically show lowest performance on Planning with deficits in Attention but normal Simultaneous and Successive processing (Crawford, 2002; Naglieri & Das, 1997; Naglieri, Goldstein, Iseman, & Schwebach, 2003; Naglieri, Salter, & Edwards, 2004; Paolitto, 1999; Pottinger, 2002; Van Luit, Kroesbergen, & Naglieri, 2005). While these group differences studies provide support for the construct validity of the CAS via distinct group differences, such support is inadequate for determining the utility of the CAS in individual diagnostic decision-making (Mullins-Sweatt & Widiger, 2009). Distinct Specificity = .95, Negative Predictive Power = .98). While a number of CAS studies regarding students with ADHD have examined distinct group differences and found support (Crawford, 2002; Naglieri & Das, 1997, Naglieri, Goldstein, Iseman, & Schwebach, 2003; Naglieri, Salter, & Edwards, 2004; Paolitto, 1999; Pottinger, 2002; Van Luit, Kroesbergen, & Naglieri, 2005), to date no studies have been conducted on the diagnostic utility of the CAS in correctly identifying individual children with ADHD from those without ADHD or from those with other disruptive behavior disorders. The present study examined the construct validity of the CAS by examining distinct group differences *and* the diagnostic utility of CAS in correctly differentiating individuals with ADHD symptoms from those within a normal control group.

Method

Participants

Informed parental consent was obtained for a final sample of 40 students from elementary schools in suburban Pierce County, Washington; ranging from kindergarten to second grade. Groups consisted of children meeting diagnostic criteria for ADHD (*n* = 20) and a group of children who were randomly selected and matched (to the extent possible) on key

Georgiou & Das (2013)

Article

HAMMILL INSTITUTE ON DISABILITIES

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XX(X) 1–11

DOI: 10.1177/0022219413513924
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SAGE

University Students With Poor Reading Comprehension: The Hidden Cognitive Processing Deficit

George K. Georgiou, PhD[1] and J. P. Das, PhD[1]

Abstract

The present study aimed to examine the nature of the working memory and general cognitive ability deficits experienced by university students with a specific reading comprehension deficit. A total of 32 university students with poor reading comprehension but average word-reading skills and 60 age-matched controls with no comprehension difficulties participated in the study. The participants were assessed on three verbal working memory tasks that varied in terms of their processing demands and on the *Das–Naglieri Cognitive Assessment System*, which was used to operationalize intelligence. The results indicated first that the differences between poor and skilled comprehenders on working memory were amplified as the processing demands of the tasks increased. In addition, although poor comprehenders as a group had average intelligence, they experienced significant difficulties in simultaneous and successive processing. Considering that working memory and general cognitive ability are highly correlated processes, these findings suggest that the observed differences between poor and skilled comprehenders are likely a result of a deficient information processing system.

Case of Alejandro

Note: this is not a picture of Alejandro

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CASE STUDY: ALEJANDRO (C.A. 7-0 GRADE 1)

REASON FOR REFERRAL

- Academic:
  - Could not identify letters/sounds
  - October 2013: Could only count to 39
  - All ACCESS scores of 1
- Behavior:
  - Difficulty following directions
  - Attention concerns
  - Refusal/defiance

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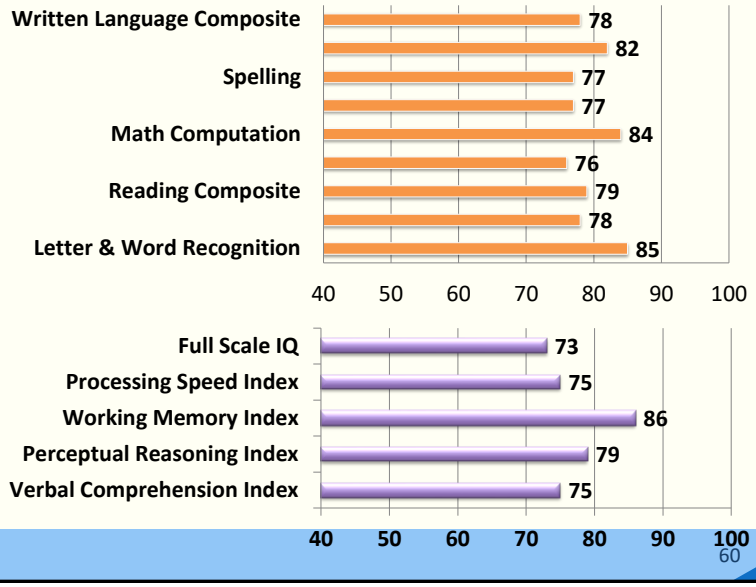
WISC-IV ASSESSMENT



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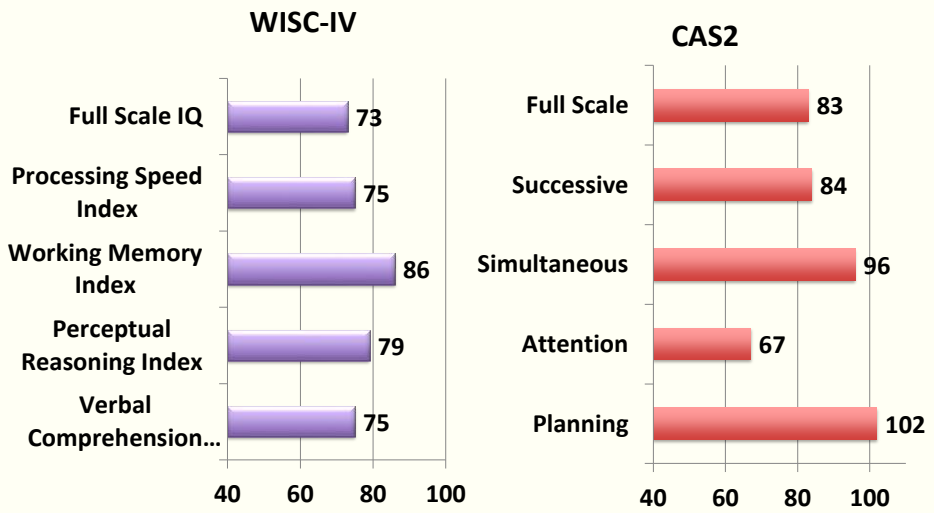
Assessing Brain Function is Different



PASS: A new way to think about and measure intelligence

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Alejandro and PASS (by Dr. Otero)

- Alejandro is not a slow learner.
- He has good scores in basic psychological processes:
  - Simultaneous = 96 and Planning = 102
- He has a "disorder in one or more of the basic psychological processes"
  - Attention = 67 and Successive = 84
- And he has academic failure which equals an SLD determination.

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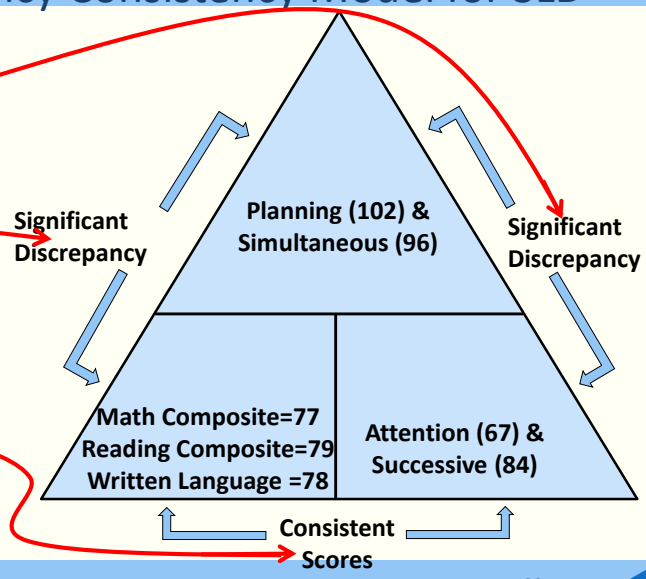
Discrepancy Consistency Model for SLD

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



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Naglieri, Rojahn, Matto (2007)

Hispanic White difference on CAS Full Scale of 4.8 standard score points (matched)

Available online at www.sciencedirect.com
ScienceDirect
ELSEVIER
Intelligence 35 (2007) 568–579
INTELLIGENCE

Hispanic and non-Hispanic children's performance on PASS cognitive processes and achievement☆

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[b] Virginia Commonwealth, United States

Received 16 May 2006; received in revised form 6 November 2006; accepted 6 November 2006
Available online 8 January 2007

Abstract

Hispanics have become the largest minority group in the United States. Hispanic children typically come from working class homes with parents who have limited English language skills and educational training. This presents challenges to psychologists who assess these children using traditional IQ tests because of the considerable verbal and academic (e.g., quantitative) content. Some researchers have suggested that intelligence conceptualized on the basis of psychological processes may have utility for assessment of children from culturally and linguistically diverse populations because verbal and quantitative skills are not included. This study examined Hispanic children's performance on the Cognitive Assessment System (CAS; [Naglieri, J.A., and Das, J.P. (1997). Cognitive Assessment System. Itasca, IL: Riverside.]) which is based on the Planning, Attention, Simultaneous, and Successive (PASS) theory of intelligence. The scores of Hispanic (N=244) and White (N=1956) children on the four PASS processes were obtained and the respective correlations between PASS and achievement compared. Three complementary sampling methodologies and data analysis strategies were chosen to compare the Ethnic groups. Sample size was maximized using nationally representative groups and demographic group differences were minimized using smaller matched samples. Small differences between Hispanic and non-Hispanic children were found when ability was measured with tests of basic PASS processes. In addition, the correlation between the PASS constructs and achievement were substantial for both Hispanic and non-Hispanic children and were not significantly different between the groups.
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PASS scores – English and Spanish

Bilingual Hispanic Children's Performance on the English and Spanish Versions of the Cognitive Assessment System

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Columbia College, Elgin Campus
Brianna DeLauder
George Mason University
Holly Matto
Virginia Commonwealth University

School Psychology Quarterly
2007, Vol. 22, No. 3, 432–448

This study compared the performance of re
on the Planning, Attention, Simultaneous, S
sured by English and Spanish versions of
(CAS; Naglieri & Das, 1997a). The results su
on both English and Spanish versions of the
CAS, the bilingual children earned their low
regardless of the language used during test
ences were noted between the means of the E
Simultaneous and Successive processing scale
were similar. Specific subtests within the Simultaneous and Successive scales

English & Spanish CAS

Means, *SDs*, *d*-ratios, Obtained and Correction Correlations Between the English a
Spanish Version of the CAS ($N = 55$).

	CAS English		CAS Spanish		*d*-ratio	Correlations	
	Mean	*SD*	Mean	*SD*	*d*	Obtained	Corrected
Planning	92.6	13.1	92.6	13.4	.00	.96	.97
Simultaneous	89.0	12.8	93.0	13.7	-.30	.90	.93
Attention	94.8	13.9	95.1	13.9	-.02	.98	.98
Successive	78.0	13.1	83.1	12.6	-.40	.82	.89
Full Scale	84.6	13.6	87.6	13.8	-.22	.96	.97

Otero, Gonzales, Naglieri (2012)

- SLD and PASS scores

APPLIED NEUROPSYCHOLOGY: CHILD, 0: 1–9, 2012

ISSN: 2162-2965 print/2162-2973 online
DOI: 10.1080/21622965.2012.670547

Psychology Press
Taylor & Francis Group

The Neurocognitive Assessment of Hispanic English-Language Learners With Reading Failure

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Lauren Gonzales
George Mason University, Fairfax, Virginia

Jack A. Naglieri
University of Virginia, Fairfax, Virginia

This study examined the performance of referred Hispanic English-language learners ($N = 40$) on the English and Spanish versions of the *Cognitive Assessment System* (CAS; Naglieri & Das, 1997). The CAS measures basic neuropsychological processes based on the Planning, Attention, Simultaneous, and Successive (PASS) theory (Naglieri & Das, 1997; Naglieri & Otero, 2011c). Full Scale (FS) scores as well as PASS processing scale scores were compared, and no significant differences were found in FS scores or in any of the PASS processes. The CAS FS scores on the English ($M = 86.4$, $SD = 8.73$) and Spanish ($M = 87.1$, $SD = 7.94$) versions correlated .94 (uncorrected) and .99 (corrected for range restriction). Students earned their lowest scores in Successive processing regardless of the language in which the test was administered. PASS cognitive profiles were similar on English and Spanish versions of the PASS scales. These findings suggest that students scored similarly on both versions of the CAS and that the CAS may be a useful measure of these four abilities for Hispanic children with underdeveloped English-language proficiency.

CAS in Italy

Psychological Assessment

1040-3590/12/$12.00 DOI: 10.1037/a0029828

Multigroup Confirmatory Factor Analysis of U.S. and Italian Children's Performance on the PASS Theory of Intelligence as Measured by the Cognitive Assessment System

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University of Virginia and Devereux Center for Resilient Children

Stefano Taddei
University of Florence

Kevin Williams
Multi-Health Services, Toronto, Ontario, Canada

ined Italian and U.S. children's performance on the English and Italian versions, e Cognitive Assessment System (CAS; Naglieri & Conway, 2009; Naglieri & Das, d on a neurocognitive theory of intelligence entitled PASS (Planning, Attention, l Successive; Naglieri & Das, 1997; Naglieri & Otero, 2011). CAS subtest, PASS ale scores for Italian (N = 809) and U.S. (N = 1,174) samples, matched by age and mined. Multigroup confirmatory factor analysis results supported the configural CAS factor structure between Italians and Americans for the 5- to 7-year-old error of approximation [RMSEA] = .038; 90% confidence interval [CI] = .033, .043; lex [CFI] = .96) and 8- to 18-year-old (RMSEA = .036; 90% CI = .028, .043; CFI = he Full Scale standard scores (using the U.S. norms) for the Italian (100.9) and U.S. ere nearly identical. The scores between the samples for the PASS scales were very the Attention Scale (d = 0.26), where the Italian sample's mean score was slightly mean differences were found for 9 of the 13 subtest scores, 3 showed small d-ratios talian sample), and 1 was large (in favor of the U.S. sample), but some differences in vere found. These findings suggest that the PASS theory, as measured by CAS, yields s and showed factorial invariance for these samples of Italian and American children, ural and linguistic characteristics.

US and Italian Samples– Mean Scores

Table 5

Means and SDs for Italian Children (N = *809) on the CAS Subtests and PASS and Full Scales Using U.S. Norms and Comparisons to U.S. Sample* (N = *1,174), Matched by Age*

Subtests and scales	Italian			U.S.					
	M	*SD*	*n*	*M*	*SD*	*n*	*F*	*p*	*d*-ratio
CAS composite scales									
Planning	97.7	13.4	809	100.5	15.4	1,174	18.1	<.01	−0.19
Simultaneous	103.0	13.9	809	101.1	14.1	1,174	9.3	<.01	0.14
Attention	104.2	13.7	809	100.6	14.4	1,174	32.2	<.01	0.26
Successive	99.0	12.5	809	100.5	14.5	1,174	5.1	.02	−0.11
Full Scale	100.9	12.9	809	100.5	14.8	1,174	2.3	.13	0.03

Note. CAS = Cognitive Assessment Syst… SS = Planning, Attention, Simultaneous, and Successive. U.S. sample *N*s vary due Designations for *d*-ratios are as follows… <.2), S = small (.2), M = medium (.5), and L = large (.8). For all *F* values the *df*s a for Speech Rate (1, 1219) and Se… 762).

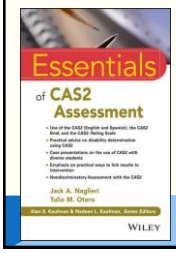
Italian mean = 100.9 &US mean = 100.5 using US NORMS

Race Differences

Table 1.6 Standard Score Mean Differences by Race on Traditional and Nontraditional Intelligence Tests

Test	Difference
Traditional IQ Tests	
SB-IV (matched samples)	12.6
WISC-IV (normative sample)	11.5
WJ-III (normative sample)	10.9
WISC-IV (matched samples)	10.0
Nontraditional Tests	
K-ABC (normative sample)	7.0
K-ABC (matched samples)	6.1
KABC-II (matched samples)	5.0
CAS2 (normative sample)	6.3
CAS (demographic controls of normative sample)	4.8
CAS2 (demographic controls of normative sample)	4.3

Note: The data for these results are reported for the Stanford-Binet IV from Wasserman (2000); Woodcock-Johnson III from Edwards and Oakland (2006); Kaufman Assessment Battery for Children from Naglieri (1986); Kaufman Assessment Battery for Children II from Lichenberger, Sotelo-Dynega, and Kaufman (2009); CAS from Naglieri, Rojahn, Matto, and Aquilino (2005); CAS2 from Naglieri, Das, and Goldstein (2014a); and Wechsler Intelligence Scale for Children IV (WISC-IV) from O'Donnell (2009).



Effect of Verbal Knowledge on Ability

American Journal on Mental Retardation, 2001, Vol. 106, No. 4, 359–367

Intellectual Classification of Black and White Children in Special Education Programs Using the WISC-III and the Cognitive Assessment System

Jack A. Naglieri
George Mason University

Johannes Rojahn
The Ohio State University

PASS: A new way to think about and measure intelligence

Naglieri & Rojahn (2001)

- White children earned the same mean scores on WISC-III and CAS
- Black children earned lower VIQ than PIQ scores due to language / achievement tasks
- Black children earned higher scores on CAS than whites
- Fewer Black children would be identified as having intellectual disability using CAS than WISC-III

Intelligence Testing & Social Justice

- WHY did the US Army include the Beta (nonverbal) tests?

1927 Army Testing (Yoakum & Yerkes)

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.

Note there is no mention of measuring verbal and nonverbal intelligences – **it was a social justice issue.**

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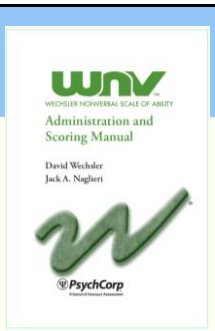
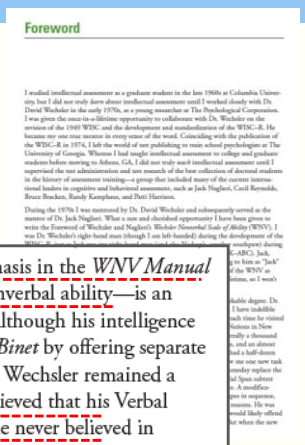
Spearman's *g*

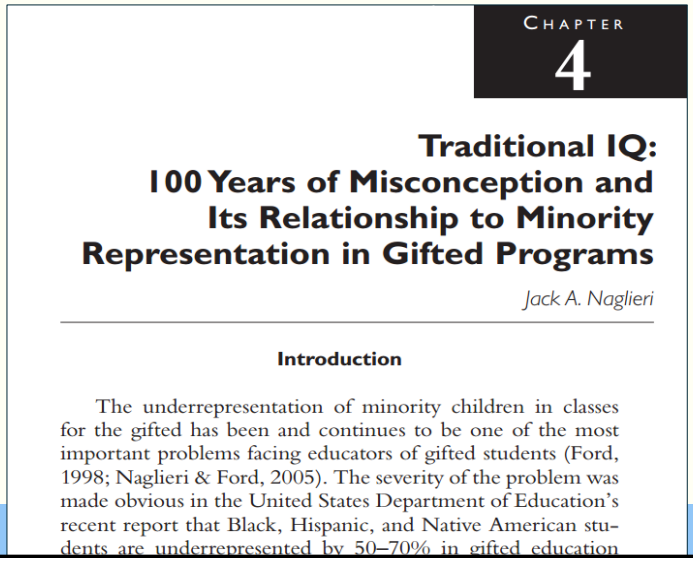



Foreword

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

Verbal intelligence or achievement?



CHAPTER
4

Traditional IQ: 100 Years of Misconception and Its Relationship to Minority Representation in Gifted Programs

Jack A. Naglieri

Introduction

The underrepresentation of minority children in classes for the gifted has been and continues to be one of the most important problems facing educators of gifted students (Ford, 1998; Naglieri & Ford, 2005). The severity of the problem was made obvious in the United States Department of Education's recent report that Black, Hispanic, and Native American students are underrepresented by 50–70% in gifted education

Social Justice

- Does the removal of Verbal and Quantitative tests make the CAS2 less valid?
- Profiles work
- PASS scores are very similar across race, ethnic, and cultural boundaries
- And correlation to achievement is …

SLD Eligibility: We can do better

- Average correlations between IQ Scales with total achievement scores from Naglieri & Otero (2017)

Note: All correlations are reported in the ability tests' manuals. Values per scale were averaged within each ability test using Fisher z transformations.

Correlations Between Ability and Achievement Test Scores			Average Correlation: All Scales	Average Correlation: Scales without achievement
WISC-V	Verbal Comprehension	.74		
WIAT-III	Visual Spatial	.46		
N = 201	Fluid Reasoning	.40		
	Working Memory	.63		
	Processing Speed	.34	.53	.47
WJ-IV COG	Comprehension Knowledge	.50		
WJ-IV ACH	Fluid Reasoning	.71		
N = 825	Auditory Processing	.52		
	Short Term Working Memory	.55		
	Cognitive Processing Speed	.55		
	Long-Term Retrieval	.43		
	Visual Processing	.45	.54	.50
KABC	Sequential/Gsm	.43		
WJ-III ACH	Simultaneous/Gv	.41		
N = 167	Learning/Glr	.50		
	Planning/Gf	.59		.48
	Knowledge/GC	.70	.53	
CAS	Planning	.57		
WJ-III ACH	Simultaneous	.67		
N=1,600	Attention	.50		
	Successive	.60	.59	

Note: WJ-IV Scales Comp-Know= Vocabulary and General Information; Fluid Reasoning = Number Series and Concept Formation; Auditory Processing = Phonological processing.

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Social Justice

- Does the removal of Verbal and Quantitative tests make the CAS2 less valid?
- Profiles work
- PASS scores are very similar across race, ethnic, and cultural boundaries
- And correlation to achievement is …
- And INTERVENTION …

PASS and Intervention…

One of many studies

Iseman & Naglieri (2010)

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

HAMMILL INSTITUTE ON DISABILITIES
Journal of Learning Disabilities
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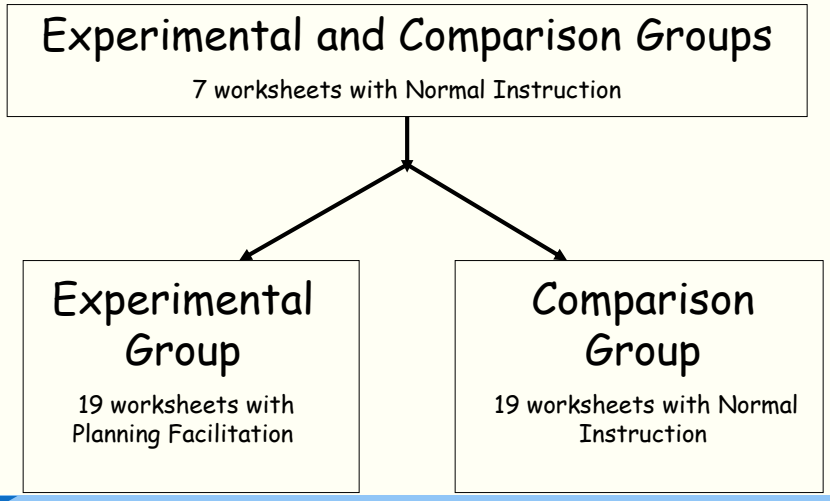
A Cognitive Strategy Instruction to Improve Math Calculation for Children With ADHD and LD: A Randomized Controlled Study

Jackie S. Iseman[1] and Jack A. Naglieri[1]

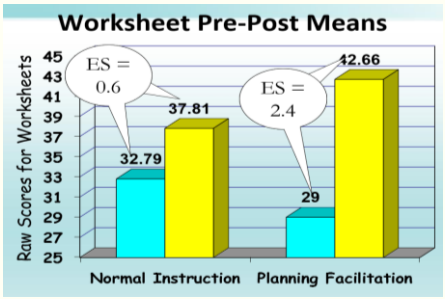
Abstract

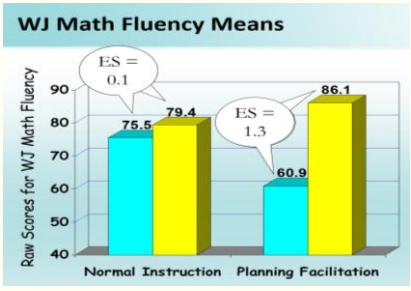
The authors examined the effectiveness of cognitive strategy instructio
Successive) given by special education teachers to students with ADH
experimental group were exposed to a brief cognitive strategy instruc
development and application of effective planning for mathematical co
standard math instruction. Standardized tests of cognitive processes
students completed math worksheets throughout the experimental
Johnson Tests of Achievement, Third Edition, Math Fluency and Wech
Numerical Operations) were administered pre- and postintervention,
follow-up. Large pre–post effect sizes were found for students in the ex
math worksheets (0.85 and 0.26), Math Fluency (1.17 and 0.09), and N
At 1 year follow-up, the experimental group continued to outperform the comparison group. These findings suggest that

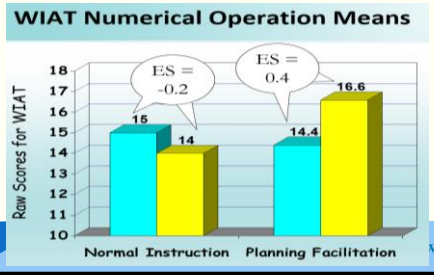
Design of the Study



Pre-Post Means and Effect Sizes for the Students with LD and ADHD







At 1-year follow-up, 27 of the students were retested on the WJ-III ACH Math Fluency subtest as part of the school's typical yearly evaluation of students. This group included 14 students from the comparison group and 13 students from the experimental group. The results indicated that the improvement of students in the experimental group ($M = 16.08$, $SD = 19$, $d = 0.85$) was significantly greater than the improvement of students in the comparison group ($M = 3.21$, $SD = 18.21$, $d = 0.09$).

Take Away Messages

- All traditional IQ tests are contaminated by knowledge which distort the IQ score
- We can do better with the PASS neurocognitive approach to defining and measuring intelligence because research shows
  - Profiles for special populations
  - Smaller differences across race, ethnic and culture
  - Clear relevance to intervention

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