Using the Discrepancy Consistency Method for SLD Identification: Application of the CAS2 with FAR and FAM

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Copies of this and other presentations are available on my website as are articles, 10-minute solutions and PASS score analyzers
Disclosures

- We will be speaking about publications we have authored...
Think Partners ➔ Deeper Learning

- Find a small group of 2-3 people
  - First introduce yourself
  - Tell something interesting about yourself
  - Why this session?
  - Your thoughts...

Topical Outline

- Introduction
  - Definition of SLD
  - Measure “basic psychological process” with CAS2
  - Measure reading and math with the FAR and FAM
  - Using the Discrepancy Consistency Method
    - Reading Disabilities
      - Case study Paul (Successive processing disorder)
      - Case of Nelson (Simultaneous processing disorder)
    - Math Disabilities
      - Case study Kenny (Planning and Simultaneous)
      - Case study Jackson- (Planning and Attention)
  - CAS2 Case Study Workbook
- Conclusions
BIG Picture & Today’s Goals

- What do we want from our tests of cognition?
  - A general picture: Average, Gifted, Intellectual Disability
  - A more detailed description of student strengths and weaknesses that helps with diagnostic decision making.
  - A way to relate neurocognitive functioning to academic skills
  - Intervention options based on cognition and skills
  - A fair and equitable way to assess ability for students who are ELL, or from diverse populations
- Today you will learn how to achieve these goals, but first a look at the two fundamental problems with our ability tests – content and theory

Introduction

- Interest in intelligence and instruction
- Experience
**Traditional IQ and Achievement Tests**

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

When I started working as a school psychologist in 1975...I noticed that parts of the WISC were VERY similar to parts of the achievement test I was giving.

- In fact the Peabody Individual Achievement Test (1970) had a General Information and Arithmetic subtests JUST LIKE THE WISC!

HOW DOES THAT MAKE SENSE?

WHY DO WE HAVE THIS PROBLEM?
Yoakum & Yerkes (1920) summarized the methods used by the military to

**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

Nonverbal
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

The First IQ TEST: Alpha (Verbal)

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

From: Psychological Examining the United States Army (Yerkes, 1921, p. 213)
1927 Army Testing (Yoakum & Yerkes)

Methods and Results

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.

Spearman’s g

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

- The obvious connection between educational opportunity and scores on tests of vocabulary and arithmetic in the Wechsler Scales, was noted by Matarazzo (1972)
  - “a man’s vocabulary is necessarily influence by his education and cultural opportunities (p. 218)”
  - Referring to the Arithmetic subtest, “its merits are lessened by the fact that it is influenced by education (p. 203)”. 
- The recognition of the role played by education in tests of intelligence is clearly demonstrated as is the problem it presents.

Intelligence Tests and Prediction

- DO you need Verbal and Quantitative tests to predict achievement?
- This is a testable question
- But remember that traditional IQ tests have achievement in them, artificially inflating the correlation to academic tests
- PASS tests do not include achievement
Correlations: We can do better

We can do better

• Average correlations between IQ Scales with total achievement scores from *Essentials of CAS2 Assessment* Naglieri & Otero (2017)

<table>
<thead>
<tr>
<th>Correlations Between Ability and Achievement Test Scores</th>
<th>Average Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>WISC-V Verbal Comprehension</td>
<td>.74</td>
</tr>
<tr>
<td>WIAT-III Visual Spatial</td>
<td>.46</td>
</tr>
<tr>
<td>N = 201 Fluid Reasoning</td>
<td>.40</td>
</tr>
<tr>
<td>Working Memory</td>
<td>.63</td>
</tr>
<tr>
<td>Processing Speed</td>
<td>.34</td>
</tr>
<tr>
<td>WJ-IV COG Comprehension Knowledge</td>
<td>.50</td>
</tr>
<tr>
<td>WJ-IV ACH Auditory Processing</td>
<td>.52</td>
</tr>
<tr>
<td>N = 825 Short Term Working Memory</td>
<td>.55</td>
</tr>
<tr>
<td>Cognitive Processing Speed</td>
<td>.55</td>
</tr>
<tr>
<td>Long-Term Retrieval</td>
<td>.43</td>
</tr>
<tr>
<td>Visual Processing</td>
<td>.45</td>
</tr>
<tr>
<td>KABC-II Sequential/Gvm</td>
<td>.43</td>
</tr>
<tr>
<td>WJ-III ACH Simultaneous/Gv</td>
<td>.41</td>
</tr>
<tr>
<td>N = 167 Learning/Gr</td>
<td>.50</td>
</tr>
<tr>
<td>Planning/Gf</td>
<td>.59</td>
</tr>
<tr>
<td>Knowledge/Gc</td>
<td>.70</td>
</tr>
<tr>
<td>CAS Planning</td>
<td>.57</td>
</tr>
<tr>
<td>WJ-III ACH Attention</td>
<td>.67</td>
</tr>
<tr>
<td>N=1,600 Successive</td>
<td>.50</td>
</tr>
</tbody>
</table>

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

IT DOESN’T HAVE TO BE SO...

**COMPLICATED**
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Paul 4th grade

Presenting Concerns: Reading & Solving longer math equations

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

Questions: #1 Does Paul qualify for SPED?  
#2 Can you write an IEP based upon this data?
Specific learning disabilities are endogenous in nature and are characterized by neurologically based deficits in cognitive processes that interfere with the acquisition of academic skills.

Specific learning disabilities are heterogeneous—there are various types of learning disabilities, and there is no single defining academic or cognitive deficit or characteristic common to all types of specific learning disabilities.

Relying upon an ability–achievement discrepancy as the sole means of identifying children with specific learning disabilities is at odds with scientific research and with best practice (Gresham & Vellutino, 2010).

California Dyslexia Law

The California “Dyslexia Bill” has two main focuses:
1. AB 1369 text requires an additional section be added to CA Eligibility Criteria for Specific Learning Disability (SLD). This addition, Section 56334, reads: “The State Board of Education shall include “phonological processing” in the description of basic psychological processes in Section 3030 of Title 5 of the California Code of Regulations.”
2. The bill calls for the Superintendent of Public Instruction to develop program guidelines for dyslexia to be used to assist teachers and parents to plan, provide, evaluate, and improve educational services to students with dyslexia. These guidelines are to be available to the public in time for implementation in the 2017-18 school year. The Superintendent’s guidelines will not change current law nor require the use of any specific curriculum in instruction of students. Instead, they will give guidance for staff in understanding implementation of instructional programs. Further information on the guidelines will be covered later in this document.

As mentioned above, AB1369 requires the addition of “phonological processing” to the “basic psychological processes” in the Eligibility Criteria for Specific Learning Disability (SLD). The bill does not establish a new eligibility category, it simply adds phonological processes to the existing processing areas defined in the current SLD eligibility criteria (CCR Section 56320 § 3030).

Basic Psychological Processes Prior to AB1369  | Basic Psychological Processes After AB1369
---|---
1. Attention  | 1. Attention
2. Visual processing  | 2. Visual processing
3. Auditory processing  | 3. Auditory processing
4. Sensory-motor skills  | 4. Sensory-motor skills
5. Cognitive abilities including:  | 5. Phonological processing
   a. Association  |   a. Association
   b. Conceptualization  |   b. Conceptualization
   c. Expression  |   c. Expression

Note: As of Oct. 1, 2016, the addition of phonological processing has not been officially included into the existing California SLD Eligibility Criteria (CCR “Title 5”). Existing SLD Eligibility Criteria defines SLD as “a disorder in one or more of the basic psychological processes...including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia.”
Defining Dyslexia

➢ “Dyslexia is characterized by difficulties with accurate and / or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.”

- International Dyslexia Association

Problems with the “Phonological Deficit” Model of Reading

1. Assumes dyslexia is a homogenous condition.
2. Does not account for the developmental trajectory of phonological awareness being more significant with younger than older readers (Araujo et al., 2010; Frijters et al., 2011).
3. The model fails to account why numerous phonological skills are preserved for disabled readers (Shany & Share, 2011).
4. The model suggests that phonological training is the only course of intervention.
5. Inconsistent with IDA definition and neuroscience.
Is CHC the same as Neuropsychology?

- **CHC** aims to comprehensively define and quantify every aspect of cognitive processing. Its ultimate goal is to broaden our definition and perspective of “IQ”.
- **CHC** validates its claims through statistical rigor and factor analytic modeling (16 Broad and 70 Narrow abilities).

- **Neuropsychology** is the study of the brain and nervous system.
  - Validates claims through brain imaging and not necessarily through factor analysis.
  - Greater emphasis on frontal lobe functioning (EF) and affective components.
  - Both approaches are attempting to integrate themselves in order to agree on which processes are related solely to the academic skill in question.

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- The IDEA definition of SLD is
  - “…a disorder in 1 or more of the basic psychological processes ... [that results] in the imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations.”
- Neither the IQ/achievement discrepancy model nor RTI evaluates basic psychology processes
- “Establishing a disorder in the basic psychology processes is *essential* for determining SLD”
- But first we have to define “basic psychology processes”
We will merge PASS theory as measured by the CAS2 with the Feifer Assessment of Reading and Feifer Assessment of Math

Determining if a student has a specific learning disability is founded on the assumption that a ‘disorder in basic psychological processes’ is related to a specific academic weakness

Because the CAS2 and the FAR/FAM are based on the same neurocognitive theory of functioning, then an ideal pairing is achieved

THAT is what you get from CAS2 with FAR and FAM

基于一个理论的教育，由我们对大脑的知识驱动。

在统计学上具有可靠性和有效性。

在文化上公平，对具有不同背景的学生敏感。

绝不要机械性。与学生的背景，课程接触，对先前干预的反应，以及整体的社会情感发展相结合，来确定特定的学习障碍。

INFORM, INFORM, INFORM 干预决策！！！
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Intelligence as Neurocognitive Abilities

- In Das and Naglieri’s first meeting (February 11, 1984) they proposed that cognitive ability was better reinvented as PASS processes so we built the Cognitive Assessment System (Naglieri & Das, 1997).
- The CAS was the first test of its kind to be built on a specific theory of brain function not Army Alpha and Beta.

Defining Neurocognitive Abilities

- How did we identify ‘basic psychological processes’?
  - 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)
  - We used research from cognitive and neuropsychology to construct a way to measure basic psychological processes.
Why PASS and CAS2?

- CAS2 is based on a THEORY of brain function
  - Luria’s concept of the three functional units -> PASS
- We measure basic neurocognitive processes
  - Not Vocabulary, Arithmetic, or other knowledge based subtests
- The test is easily administered and scored (online available)
- PASS theory drives interpretation (not subtests)
- PASS theory has considerable validity:
  - Profiles for different types of SLD for PSW
  - Fair and equitable assessment by race, ethnicity, and language
  - PASS scores and intervention
- We measure thinking (PASS) not knowing (achievement)

Cognition or Knowledge?

- What does the student have to know to complete a task?
  - This is dependent on instruction
- How does the student have to think to complete a task?
  - This is dependent on the brain – PASS
- We must assess ability and achievement separately
What do we mean by thinking?

- Thinking means brain function
- That means we conceptualize thinking as basic psychological processes related to different brain areas
- What functions do different parts of the brain provide?
- We looked to A. R. Luria for the answers

PASS Comprehensive System
(Naglieri, Das, & Goldstein, 2014)

For eligibility determination

**CAS2 Rating Scale**
(4 subtests)
- Total Score
- Planning
- Simultaneous
- Attention
- Successive

**CAS2 Brief**
(4 subtests)
- Total Score
- Planning
- Simultaneous
- Attention
- Successive

**CAS2 Core**
(8 subtests)
- Full Scale
- Planning
- Simultaneous
- Attention
- Successive

**CAS2 Extended**
(12 subtests)
- Full Scale
- Planning
- Simultaneous
- Attention
- Successive
- Supplemental Scales
  - Executive Function
  - Working Memory
  - Verbal / Nonverbal
  - Visual / Auditory
PASS Neurocognitive Theory

- **Planning** = THINKING ABOUT HOW YOU DO WHAT YOU DECIDE TO DO
- **Attention** = BEING ALERT AND RESISTING DISTRACTIONS
- **Simultaneous** = GETTING THE BIG PICTURE
- **Successive** = FOLLOWING A SEQUENCE

**PASS** = ‘basic psychological processes’

PASS Theory: Planning

- **Planning** is a term used to describe a neurocognitive function similar to metacognition and executive function
  - Planning is needed for setting goals, making decisions, predicting the outcome of one’s own and others actions, impulse control, strategy use and retrieval of knowledge
  - **Planning** helps students make decisions about how to solve any kind of a problem from academics to social situations and life in general
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

PASS Theory: Attention

**Attention** is a basic psychological process we use to selectively attend to some stimuli and ignores others
- Listening, as opposed to hearing
- Focused cognitive activity
- Selective attention
- Resistance to distraction

Attention provides focus despite distractions in the class and maintenance of effort over time despite continued noises.
CAS2 Expressive Attention

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

<table>
<thead>
<tr>
<th>RED</th>
<th>BLUE</th>
<th>GREEN</th>
<th>YELLOW</th>
</tr>
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<td>RED</td>
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</tr>
<tr>
<td>GREEN</td>
<td>YELLOW</td>
<td>RED</td>
<td>YELLOW</td>
</tr>
</tbody>
</table>

PASS Theory: Simultaneous

- **Simultaneous** processing is used to recognize patterns
  - Stimuli are seen as a whole
  - Each piece must be related to the other
  - Understanding grammar
  - Whole language
  - Seeing word as a whole
  - Verbal concepts
  - Geometry, math word problems
  - Getting the BIG picture
  - Noticing nuance

[Diagram of brain showing Simultaneous processing]
Simultaneous Subtests

Successive processing is used when information is in a specific serial order:
- Remembering the sequence of events in a story
- Sequence of words, sentences, paragraphs
- Comprehension of written instructions
- Understanding the syntax of sentences
- Decoding words and phonological tasks
- Letter-sound correspondence

Successive helps students sequence movements, recall of things in order and the association of the sounds with letters.

PASS Theory: Successive
Successive Subtests Across Modalities

- **Word Recall**
  - Book Shoe Girl Dog
  - Car Man Cow Key

- **Visual Digit Span**

  4 3 8 6 1

- **Heteromodal** association cortex merges information from **primary** and **unimodal** association cortices

PASS, CAS2 and Race Ethnic Differences
Race Differences

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

<table>
<thead>
<tr>
<th>Test</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional IQ Tests</td>
<td></td>
</tr>
<tr>
<td>SB-IV (matched samples)</td>
<td>12.6</td>
</tr>
<tr>
<td>WISC-IV (normative sample)</td>
<td>11.5</td>
</tr>
<tr>
<td>WJ-III (normative sample)</td>
<td>10.9</td>
</tr>
<tr>
<td>WISC-IV (matched samples)</td>
<td>10.0</td>
</tr>
<tr>
<td>WISC-V (normative sample)</td>
<td>11.6</td>
</tr>
<tr>
<td>WISC-V (Sex PEL adjusted)</td>
<td>8.7</td>
</tr>
<tr>
<td>Nontraditional Tests</td>
<td></td>
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<tr>
<td>K-ABC (normative sample)</td>
<td>7.0</td>
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<tr>
<td>K-ABC (matched samples)</td>
<td>6.1</td>
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<tr>
<td>KABC-II (matched samples)</td>
<td>5.0</td>
</tr>
<tr>
<td>CAS2 (normative sample)</td>
<td>6.3</td>
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<tr>
<td>CAS (demographic controls of normative sample)</td>
<td>4.8</td>
</tr>
<tr>
<td>CAS2 (demographic controls of normative sample)</td>
<td>4.3</td>
</tr>
</tbody>
</table>

Note: The data for these results are reported for the Stanford-Binet IV from Warener (2000); Woodcock-Johnson III from Edwards and Oakland (2006); Kaufman Assessment Battery for Children from Naglieri (1986); Kaufman Assessment Battery for Children II from Lichtenberger, 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).

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

Naglieri, Rojahn, Matto (2007)
Conclusions:
Strengths and weaknesses in PASS scores across these two studies were identical 93% of the time.

Naglieri & Rojahn (2001)

- Significantly lower VIQ (62) than PIQ (67) for African-Americans but not whites (V=65, P=63)
- African-Americans were more likely to be incorrectly labeled ID because of lower Verbal IQ scores
...we recommend using the CAS2...

Think Partners ➔ Deeper Learning

- Topic: PASS and CAS2
  - What are your thoughts about PASS?
  - Questions about CAS2?
  - Modalities matter?
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Limitations of Traditional Achievement Tests: WHY vs WHERE

**WIAT III Reading Comprehension:** Each passage read silently; story stays in front of student while answering free recall questions. *Examiner assumes an EF deficit.*

**GORT V:** Each passage is read out loud, and then the story is taken away. Questions are multiple choice. *Examiner assumes a Working Memory deficit.*

**WJ IV Passage Comprehension:** A closed procedure where the student reads a short passage and identifies a missing key word that makes sense in the context of the passage. *More a measure of semantic and syntactic knowledge than true comprehension.*

**KTEA III:** Can read silently or out loud. Student reads each question and story remains in view when answering. *Examiner is unsure of what strategy is implemented to derive a response.*
FAR: Semantic Concepts

Synonyms Presentation

error
earn blunder correct
chance grasp

Antonyms Presentation

divide
reject deride split
combine hinder

FAR: Word Recall

[Diagrams showing word recall exercises for different grade levels]
**FAR: Silent Reading Fluency**

**2 passages and 8 questions**

**Grades 11+ Story 1**

The legacy of James Madison goes well beyond that created by being the fourth president of the United States. In fact, perhaps no other individual in history has had a more profound role in shaping the basic tenets of our society. A noted political philosopher, Madison was the principal author of the Constitution and introduced the Bill of Rights, convinced by many to play an essential part in maintaining a balance of power between the individual and the federal government. Some Bill of Rights clauses include the right to free speech, the right to a free press, the right to bear arms, and the right to free assembly. Furthermore, it was Madison who argued for a three-branch federal system, which ultimately became the basis for our government today. His great adversary, Alexander Hamilton, proposed a republic dominated by a strong central government and national bank. Madison combated this notion by forging an alliance with Thomas Jefferson to create the Democratic-Republican Party. Madison eventually retired to Virginia and served as a college chancellor to the University of Virginia until his death. Today, James Madison University, also in Virginia, remains a living institution in his honor.

**Grades 11 + Story 1 Questions**

1. What number president was Madison?
2. Who was Madison’s chief political adversary?
3. Who did Madison form an alliance with to create the Democratic-Republican party?
4. What college did Madison eventually preside over?
5. What Bill of Rights clauses does the passage mention?
6. Beyond being one of our presidents, what are Madison’s other legacies to the American people?
7. What does the word “free” imply in this passage?
8. Why do you think Madison opposed a republic dominated by a strong central government?

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**Planning and FAR**

<table>
<thead>
<tr>
<th>FAR Subtests</th>
<th>Involvement of Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semantic Concepts</strong> – a multiple choice test requiring the student to select the correct antonym or synonym of a target word.</td>
<td>Poor planning results in impulsive responding of choices when words presented in multiple choice format.</td>
</tr>
<tr>
<td><strong>Word Recall</strong> – requires the student to repeat back a list of words over a series of two trials. The second trial requires the student to recall a word from a selected list.</td>
<td>Lack of a strategy leads to poor word recall.</td>
</tr>
<tr>
<td><strong>Silent Reading Fluency</strong> – requires the student to silently read a passage, and then answer a series of literal and inferential questions about the story. Reading rate is also recorded as well.</td>
<td>Poor planning leads to inconsistent recall of passages.</td>
</tr>
</tbody>
</table>
Traditional Math Achievement Tests

- Wechsler Individual Achievement Test - 3rd Edition
- Woodcock Johnson IV Achievement Test
- Kaufman Test of Educational Achievement (KTEA-III)
- Test of Early Mathematics Ability – 3rd Edition (TEMA-3)
- Comprehensive Mathematical Abilities Test (CMAT)
- Test of Mathematical Abilities -3rd Edition (TOMA-3)
- WRAT-5
- Academic Achievement Battery (AAB)

Diagnostic Achievement Tests

- KEYMATH-3 (2007)
- PAL-II (2007)

Planning and FAM

<table>
<thead>
<tr>
<th>FAM Subtests</th>
<th>Involvement of Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sequences</strong> – the student attempts to identify the missing picture or missing number from a visual pattern or sequence.</td>
<td>Measures <strong>deductive reasoning</strong> to determine an underlying pattern.</td>
</tr>
<tr>
<td><strong>Equation Building</strong> – the student selects an equation that best represents how to solve a mathematical word problem.</td>
<td><strong>Generalization</strong> of number sense toward application of mathematical problems in a real-world context.</td>
</tr>
<tr>
<td><strong>Perceptual Estimation</strong> – the student identifies which of two pictures has more items without counting them. Older students are required to estimate the approximate number of items in a picture based upon a picture cue.</td>
<td><strong>Plan</strong> a response based upon cues from picture cue.</td>
</tr>
<tr>
<td><strong>Addition Knowledge</strong> – a timed task requiring the student to identify the missing addends to addition problems presented in an array in 60 seconds.</td>
<td><strong>Cognitive flexibility</strong> of addition concepts</td>
</tr>
<tr>
<td><strong>Subtraction Knowledge</strong> – a timed task requiring the student to identify the missing minuends to subtraction problems presented in an array in 60 seconds.</td>
<td><strong>Cognitive flexibility</strong> of subtraction concepts</td>
</tr>
<tr>
<td><strong>Multiplication Knowledge</strong> – a timed task requiring the student to identify the missing factors to multiplication problems presented in an array in 60 seconds.</td>
<td><strong>Cognitive flexibility</strong> of multiplication concepts</td>
</tr>
<tr>
<td><strong>Division Knowledge</strong> – a timed task requiring the student to identify the missing dividends or divisors to division problems presented in an array in 60 seconds.</td>
<td><strong>Cognitive flexibility</strong> of division concepts</td>
</tr>
</tbody>
</table>
Correspondence of PASS, FAR, & FAM

<table>
<thead>
<tr>
<th>Feiler Assessment of Reading</th>
<th>Feiler Assessment of Mathematics</th>
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</thead>
<tbody>
<tr>
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<td><strong>Feiler Assessment of Mathematics</strong></td>
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<td>Planning</td>
<td>Attention</td>
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<td>Phonological Index</td>
<td>X</td>
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<tr>
<td>Phonemic Awareness</td>
<td>X</td>
</tr>
<tr>
<td>Nonsense Word Decoding</td>
<td>X</td>
</tr>
<tr>
<td>Isolated Word Reading Fluency</td>
<td>X</td>
</tr>
<tr>
<td>Oral Reading Fluency</td>
<td>X</td>
</tr>
<tr>
<td>Positioning Sounds</td>
<td>X</td>
</tr>
<tr>
<td>Fluency Index</td>
<td>X</td>
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<tr>
<td>Rapid Automatic Naming</td>
<td>X</td>
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<tr>
<td>Verbal Fluency</td>
<td>X</td>
</tr>
<tr>
<td>Visual Perception</td>
<td>X</td>
</tr>
<tr>
<td>Irregular Word Reading Fluency</td>
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<td>Orthographical Processing</td>
<td>X</td>
</tr>
<tr>
<td>Comprehension Index</td>
<td>X</td>
</tr>
<tr>
<td>Semantic Concepts</td>
<td>X</td>
</tr>
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<td>Word Recall</td>
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</tr>
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<td>Print Knowledge</td>
<td>X</td>
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<td>Morphological Processing</td>
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<tr>
<td>Silent Reading Fluency: Comprehension</td>
<td>X</td>
</tr>
</tbody>
</table>

Topical Outline

- Introduction
- Definition of SLD
- Measure “basic psychological process” with CAS2
- Measure reading and math with the FAR and FAM

Using the Discrepancy Consistency Method

- Reading Disabilities
  - Case study Paul (Successive processing disorder)
  - Case of Nelson (Simultaneous processing disorder)
- Math Disabilities
  - Case study Kenny (Planning and Simultaneous)
  - Case study Jackson- (Planning and Attention)
- CAS2 Case Study Workbook

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

REASON FOR REFERRAL

- From Naglieri & Otero, 2017 Essentials of CAS2 Assessment
- Academic problems:
  - 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

WISC-IV ASSESSMENT

<table>
<thead>
<tr>
<th>Scale</th>
<th>Verbal Comprehension Index</th>
<th>Full Scale IQ</th>
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<tbody>
<tr>
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<td>82</td>
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<td>Written Expression</td>
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<td>78</td>
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<tr>
<td>Spelling</td>
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<tr>
<td>Math Composite</td>
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<tr>
<td>Math Computation</td>
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<td>77</td>
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<td>Math Concepts &amp; Applications</td>
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<td>79</td>
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<td>78</td>
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<tr>
<td>Reading Comprehension</td>
<td>85</td>
<td>77</td>
</tr>
<tr>
<td>Letter &amp; Word Recognition</td>
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<td>77</td>
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Note: All pictures are not actual students assessed.
Alejandro’s Results

<table>
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<th>60</th>
<th>70</th>
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<tr>
<td>Written Expression</td>
<td>82</td>
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<td>77</td>
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<tr>
<td>Math Composite</td>
<td>77</td>
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<td>Math Computation</td>
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<td></td>
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<tr>
<td>Math Concepts &amp; Applications</td>
<td>76</td>
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<tr>
<td>Reading Composite</td>
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<tr>
<td>Letter &amp; Word Recognition</td>
<td>85</td>
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<td></td>
</tr>
</tbody>
</table>

CAS2

- Full Scale: 83
- Successive: 84
- Simultaneous: 96
- Attention: 67
- Planning: 102

67

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 despite appropriate instruction and no other issues, but there is evidence of a specific learning disability (Attention and Successive) with similarly low academic scores.
- This fits the Discrepancy Consistency Method

68
Discrepancy Consistency Method (DCM)

- The Discrepancy Consistency Method (DCM) was first introduced in 1999 (most recently in 2017).

Discrepancy Consistency Method

The essence of the Discrepancy Consistency Method is two discrepancies and one consistency.

Discrepancy 1:
Significant variability among the PASS scores indicating a weakness in one or more of the basic psychological processes

Discrepancy 2:
Significant difference between high PASS scores and low achievement test scores

Consistency:
No significant difference between low PASS scores and low achievement

DON'T FORGET 3.5

The Discrepancy Consistency Method is two discrepancies and one consistency.

Pattern of Strengths and Weaknesses Using the Discrepancy/Consistency Method for SLD Determination

Three methods for detecting a pattern of strengths and weaknesses (PSW) that can be used as part of the process of identifying a student with a specific learning disability (SLD) have been suggested by Naglieri in 1999, Hale and Fiorello in 2004, and by Flanagan, Ortiz, and Alfonso in 2007. These authors share the same goal: to present a procedure to detect a PSW in scores that can be used to identify an SLD (sometimes referred to as a third option; Zirkel & Thorias, 2010). Despite differences in the composition of the scores used and the definitions of what constitutes a basic psychological process, these methods all rely on finding a combination of differences as well as similarities in scores across academic and cognitive tests. Our approach to operationalizing a PSW is called the Discrepancy/Consistency Method (DCM) for the identification of SLD. Determining SLD is essentially based on the combination of PASS and achievement test scores. The method involves a systematic examination of variability of PASS and academic achievement test scores which by

Discrepancy Consistency Method

- The Discrepancy Consistency Method is used to determine if there is evidence of “a disorder in 1 or more of the basic psychological processes ... which manifests itself in the imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations.”

- The disorder in 1 or more basic psychological processes is found when a student shows a pattern of strengths and weaknesses in basic psychological processes, and...

- The imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations is found when a student shows a pattern of strengths and weaknesses in achievement

- The result is two discrepancies and a consistency
Discrepancy Consistency Method for SLD

- **Discrepancy #1** between high and low processing scores
- **Discrepancy #2** between high processing and low achievement
- **Consistency** between low processing and low achievement

---

Discrepancy Consistency Method for SLD

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

**Math Composite=77**
**Reading Composite=79**
**Written Language =78**

**Planning (102) & Simultaneous (96)**

**Attention (67) & Successive (84)**

**Consistent Scores**
How to Determine a Disorder

- Two sets of PASS scores were studied
  - Significant variation in relation to student’s average has instructional relevance
  - Significant variation in relation to student’s average AND a standard score less than 90 (< 25th %tile) supports designation as SLD

CAS2 Achievement PSW Analyzers

- A free excel worksheet that analyzes the relationships between the CAS2 with various achievement tests is available from www.jacknaglieri.com
CAS2 Analyzer Options

- FREE CAS2 Analyzers are available for the WIAT-3, WJ-4, and KTEA-3 on www.jacknaglieri.com
- But WHY do I suggest the combination of PASS scores from CAS2 with the FAR and FAM?
  - FAR and FAM are elegantly inter-related to the CAS2 because PASS processes underlie reading and math skills
    - For example, when you determine if a student is using a strategy when doing reading comprehension on the FAR you can tie that to the CAS2 Planning score
    - Or when a student struggles with decoding words you can connect that to the CAS2 Successive processing score
  - The connection between low scores on the FAR and/or FAM with PASS is so important because it explains WHY student struggles AND what to do about it

CAS2, FAR & FAM PSW Analyzer

- Instructions tab Page 1

HOW TO USE THIS WORKBOOK:
1. Click on tab for the CAS2 Extended (12-subtests) or Core (8-subtests) with the FAR or FAM.
2. Enter the PASS scores in the column labeled "Standard Scores" in BOX #1.
3. Enter the FAR and/or FAM standard scores in BOX #2.

Note: Once the PASS and FAR or FAM scores are entered the discrepancies and consistencies between neurocognitive and achievement scores will be noted. Follow the Flow-Chart (see Figure 3.2 included here which is from Essentials of CAS2 Assessment) for more guidance.
CAS2, FAR & FAM PSW Analyzer

- CAS2 Extended and FAR analysis on Page 2
- Enter PASS and FAR standard scores in the yellow boxes

FREE – on www.jacknaglieri.com
CAS2, FAR & FAM PSW Analyzer

- Discrepancy #1: Successive processing is a weakness
- Discrepancy #2: between good PASS and poor FAR scores
- Consistency between Successive and FAR achievement scores

Note: This is a traditional Ability Achievement Discrepancy

Significant Discrepancy #2

Consistency

The Consistency tells you WHY the student fails

PASS: A new way to think about and measure intelligence
PASS and DCM for Eligibility and Intervention

From a practitioner perspective:

➢ DCM provides clarity for SLD eligibility
➢ PASS shines light on strengths that would go unnoticed via knowledge-based cognitive assessment
➢ Better understanding for using strengths to mitigate weaknesses
➢ Simple explanations for parents, teachers AND students
➢ Process approach to developing strategies and interventions for learning challenged students

CAS2 Illustrative Case Studies

• A free CAS2 Case Workbook with illustrative examples of how to identify different PASS processing disorders and academic weakness, with interventions, is available
Rules are Made to be Broken – Case of Lilly

- Lilly was retained last year now in 2nd grade.
  - Second language learner, Spanish spoken at home.
  - Based on oral language dominance is stronger in English.
  - Lilly can speak Spanish, however she prefers English.
  - All instruction in the monolingual English program.
  - Showing adequate progress based on TELPAS scores regarding language proficiency.
  - Teachers referred for an evaluation due to lack of progress in all areas, especially in Math.

- No significant ipsative results; BUT Planning = 82, Attention = 85 and these are consistent with Early Reading Skills (85), Spelling (85), and Math Problem Solving (84)
- Successive (94) and Simultaneous (91) significantly discrepant from Math Fluency (65 & 76), Pseudoword Decoding (77) and Numerical operations (74)
Think Partners ➔ Deeper Learning

- Topic: Your Thoughts about these cases
  - Which case was most helpful?
  - Does the Discrepancy Consistency Method make sense?

Topical Outline

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    - Case study Jackson- (Planning and Attention)
- CAS2 Case Study Workbook
- Conclusions
Multiple Cueing Systems of Reading

- Recognizes that both phonological and orthographic and semantic cues can facilitate word recognition.

Word Reading

Phonics
- Phonemic Awareness
- Decoding

Orthography
- Orthographic Perception
- Orthographic Memory
- Alphabetic Knowledge

Semantic
- Vocabulary
- Executive Functioning

A Universal Reading Brain


- Proficient reading entails the convergence of phonological and orthographic processing systems onto a common network of neural structures dominated by the left perisylvian regions of the brain.

- Dyslexics in transparent orthographic systems, such as Spanish, German, Italian, Greek have difficulty in acquiring reading speed as a hallmark deficit of dyslexia (Ziegler et al., 2003; Davies et al., 2007; Constantinidou & Stainthorp, 2009; Wimmer et al., 2010).
FAR SUBTYPES OF READING DISORDERS

(1) **Dysphonetic Dyslexia** – difficulty sounding out words in a phonological manner.

(2) **Surface Dyslexia** – difficulty with the rapid and automatic recognition of words in print.

(3) **Mixed Dyslexia** – multiple reading deficits characterized by impaired phonological and orthographic processing skills. Most severe form of dyslexia.

(4) **Comprehension Deficits** – mechanical side of reading is fine but difficulty persists deriving meaning from print.
FAR SUBTEST STRUCTURE

<table>
<thead>
<tr>
<th>Index</th>
<th>Subtest</th>
<th>Grade range</th>
<th>Approximate administration time in minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Phonological Index (PI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Phonemic Awareness (PA)</td>
<td>PK to college</td>
<td>5 to 10</td>
</tr>
<tr>
<td></td>
<td>Nonsense Word Decoding (NWD)</td>
<td>Grade 2 to college</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Isolated Word Reading Fluency (ISOR)</td>
<td>K to college</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Oral Reading Fluency (ORF)</td>
<td>K to college</td>
<td>2 to 3</td>
</tr>
<tr>
<td></td>
<td>Positioning Sounds (PS)</td>
<td>PK to college</td>
<td>3 to 4</td>
</tr>
<tr>
<td></td>
<td>Fluency Index (FI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rapid Automatic Naming (RAN)</td>
<td>PK to college</td>
<td>2</td>
</tr>
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<td>Verbal Fluency (VF)</td>
<td>PK to college</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Visual Perception (VP)</td>
<td>PK to college</td>
<td>1</td>
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<td>Orthographical Processing (OP)</td>
<td>K to college</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Irregular Word Reading Fluency (IRR)</td>
<td>Grade 2 to college</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Comprehension Index (CI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Semantic Concepts (SC)</td>
<td>PK to college</td>
<td>5 to 8</td>
</tr>
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<td></td>
<td>Word Recall (WR)</td>
<td>PK to college</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Print Knowledge (PK)</td>
<td>PK to Grade 1</td>
<td>4</td>
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<tr>
<td></td>
<td>Morphological Processing (MP)</td>
<td>Grade 2 to college</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Silent Reading Fluency (SRF)</td>
<td>Grade 2 to college</td>
<td>8</td>
</tr>
</tbody>
</table>

Dyslexia in California

10-MINUTE SOLUTIONS

Short published papers that describe applications of PASS theory to identify disabilities such as SLD and Dyslexia.

SPECIFIC LEARNING DISABILITIES


DYSLEXIA


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    - Case of Nelson (Simultaneous processing disorder)
  - Math Disabilities
    - Case study Kenny (Planning and Simultaneous)
    - Case study Jackson (Planning and Attention)
- CAS2 Case Study Workbook
- Conclusions
Case of Paul: 4th grade referral

- **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

![Image of a child studying]

Paul – age 9 years

<table>
<thead>
<tr>
<th>WISCV</th>
<th>COMPOSITE SCORE</th>
<th>RANGE</th>
<th>PERCENTILE RANK</th>
</tr>
</thead>
<tbody>
<tr>
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<td>89</td>
<td>Below Average</td>
<td>23%</td>
</tr>
<tr>
<td>Visual Spatial</td>
<td>84</td>
<td>Below Average</td>
<td>14%</td>
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<tr>
<td>Fluid Reasoning</td>
<td>82</td>
<td>Below Average</td>
<td>12%</td>
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<td>Working Memory</td>
<td>72</td>
<td>Very Low</td>
<td>3%</td>
</tr>
<tr>
<td>Processing Speed</td>
<td>76</td>
<td>Very Low</td>
<td>6%</td>
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<tr>
<td>FULL SCALE SCORE</td>
<td>81</td>
<td>Below Average</td>
<td>10%</td>
</tr>
<tr>
<td>WIAT III Reading</td>
<td>87</td>
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<td>WIAT III Math</td>
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<tr>
<td>WIAT III Writing</td>
<td>94</td>
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<td>34%</td>
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Paul – age 9 years

<table>
<thead>
<tr>
<th>FAR index</th>
<th>Standard score (95% CI)</th>
<th>Percentile</th>
<th>Qualitative descriptor</th>
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<tbody>
<tr>
<td>Phonological Index</td>
<td>75</td>
<td>5%</td>
<td>Moderately Below Average</td>
</tr>
<tr>
<td>Fluency Index</td>
<td>92</td>
<td>30%</td>
<td>Average</td>
</tr>
<tr>
<td>Mixed Index</td>
<td>81</td>
<td>10%</td>
<td>Below Average</td>
</tr>
<tr>
<td>Comprehension Index</td>
<td>97</td>
<td>42%</td>
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<tr>
<td>FAR Total Index</td>
<td>84</td>
<td>14%</td>
<td>Below Average</td>
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KEY INTERPRETATION

<table>
<thead>
<tr>
<th>Nonsense Word Decoding – requires the student to decode a series of nonsense words presented in order of increasing difficulty.</th>
<th>Score</th>
<th>Percentile</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>3%</td>
<td>Moderately Below Average</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Irregular Word Reading Fluency – the student reads a list of phonologically irregular words arranged in order of increasing difficulty in 60 seconds.</th>
<th>Score</th>
<th>Percentile</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>37%</td>
<td>Average</td>
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Paul – age 9 years

<table>
<thead>
<tr>
<th>CAS-2</th>
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<tbody>
<tr>
<td>Planning</td>
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<td>Average</td>
</tr>
<tr>
<td>Simultaneous</td>
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<td>Average</td>
</tr>
<tr>
<td>Attention</td>
<td>110</td>
<td>Average</td>
</tr>
<tr>
<td>Successive</td>
<td>75</td>
<td>Very Low</td>
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<tr>
<td>Full Scale is not reported</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Cognitive Assessment System - 2 PASS Scales</th>
<th>Standard Score</th>
<th>Difference from PASS Mean of:</th>
<th>Significantly Different (at p &lt; .05) from</th>
<th>Strength or Weakness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>92</td>
<td>92.3</td>
<td>-0.3</td>
<td>no</td>
</tr>
<tr>
<td>Simultaneous</td>
<td>92</td>
<td></td>
<td>-0.3</td>
<td>no</td>
</tr>
<tr>
<td>Attention</td>
<td>110</td>
<td>17.8</td>
<td>yes</td>
<td>Strength</td>
</tr>
<tr>
<td>Successive</td>
<td>75</td>
<td>-17.3</td>
<td>yes</td>
<td>Weakness</td>
</tr>
</tbody>
</table>
Think Partners ➔ Deeper Learning

• Topic: Your Thoughts about Paul
  • discuss his pattern of strengths and weaknesses in ability and skills
  • What can you conclude?

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:

<table>
<thead>
<tr>
<th>WISC-V Subtests</th>
<th>CAS2 Subtests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal Comprehension</td>
<td>Planning</td>
</tr>
<tr>
<td>Visual Spatial</td>
<td>Attention</td>
</tr>
<tr>
<td>Fluid Reasoning</td>
<td>Simultaneous</td>
</tr>
<tr>
<td>Working Memory</td>
<td>Successive</td>
</tr>
<tr>
<td>Processing Speed</td>
<td></td>
</tr>
</tbody>
</table>

• But note, Working Memory on WISC-V includes Digit span Backwards which is Successive and Planning (Schofield & Ashman)
Significant Discrepancy
BELOW AVERAGE scores in academic skills
AVERAGE or ABOVE IQ test scores

• Discrepancy between high IQ and low achievement test scores

Traditional Discrepancy Approach

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

CAS2 FAR Analyzer Results for Paul

- Discrepancy Consistency Results show a PSW
Discrepancy Consistency Method - Paul

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

Poor Successive + Poor Phonological = SLD in Reading Decoding

Planning = 92
Simultaneous = 92
Attention = 110

Phonological Index = 75
Nonsense Word Decoding = 71
Successive = 72

Consistency = 110

Intervention Plan for Paul

- Explain his PASS scores to engage the student in the solutions and build confidence
- Build on His Strengths
  - Help him use his Planning, Attention, Simultaneous and Strengths to support challenges with Successive processing
  - Encourage the use of metacognitive strategies (P) that can him perform better when tasks demand Successive processing
- See Naglieri and Pickering’s book
Interventions related to PASS


**FAR INTERPRETIVE REPORT WRITER**

<table>
<thead>
<tr>
<th>Fundations</th>
<th>FAR INTERPRETIVE REPORT WRITER: Targeted Reading Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alphabetic Phonics</td>
<td>A multisensory phonological approach to reading that is an extension of the traditional Orton-Gillingham model. There are 11 fast-paced activities embedded within each lesson to develop automaticity with phonics skills.</td>
</tr>
<tr>
<td>Read Well</td>
<td>A top-down reading and language arts solution that emphasizes a mixture of instruction to the class as a whole, smaller groups, and individual student practice.</td>
</tr>
<tr>
<td>Lexia Primary Reading</td>
<td>A self-paced computer-based program that helps students develop reading skills. The program identifies when students would benefit from additional support, and automatically notifies the teacher with individualized feedback and recommendations.</td>
</tr>
<tr>
<td>Fast Forward Language to Reading</td>
<td>A scientifically-based 8-12 week reading intervention that boosts students’ reading levels by one or two grades. Focuses on phonemic awareness, phonics, fluency, comprehension, and vocabulary.</td>
</tr>
<tr>
<td>Voyager Time Warp Plus</td>
<td>A summer reading intervention that encompasses 80 hours worth of material. Phonemic awareness, phonics and word analysis, fluency, vocabulary, and comprehension are covered thoroughly through daily practice.</td>
</tr>
<tr>
<td>System 44</td>
<td>Teaches foundational reading skills to students Grades 3+. This computer-based platform encourages students to think critically and interact with the text as they learn phonics and comprehension.</td>
</tr>
<tr>
<td>Academy of Reading</td>
<td>An intervention program that helps students with phonemic awareness, phonics, fluency, vocabulary, and comprehension. This online program includes real-time reading assessments and progress monitoring.</td>
</tr>
<tr>
<td>Words Their Way</td>
<td>A developmental spelling, phonics, and vocabulary program with numerous activities geared toward developing orthographic knowledge. Sorting, constructing a word wall, and creating a word study notebook are essential components of the program.</td>
</tr>
</tbody>
</table>
Test Profile Studies – Validity matters

1. We need to know if intelligence tests yield distinctive profiles
2. Subtest profile analysis is UNSUPPORTED so use scale profiles instead

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
Profiles for SLD (reading decoding)

Profiles for students with ADHD
Profiles for SLD (reading decoding) & ADHD

![Profiles for SLD (reading decoding) & ADHD chart]

WE CAN DO BETTER

![Message: WE CAN DO BETTER]
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.

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 ipatiusve, 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 ipatiusve PASS scores, called Relative

SLD Profiles on CAS

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

Leona Y. Huang1, Achilles N. Bardos2, and Rik Carl D’Amato2

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 profile analysis to augment diagnosis and the instructional process. The Cognitive Assessment System was 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 ($N = 342$) 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.

12 profiles were found, most were unique from the general sample

the CAS correctly identified students who demonstrated behaviors consistent with ADHD diagnosis
SLD Profiles on CAS

**Topical Outline**

- Introduction
- Definition of SLD
- Measure “basic psychological process” with CAS2
- Measure reading and math with the FAR and FAM
- Using the Discrepancy Consistency Method
  - Reading Disabilities
    - Case study Paul (Successive processing disorder)
    - Case of Nelson (Simultaneous processing disorder)
  - Math Disabilities
    - Case study Kenny (Planning and Simultaneous)
    - Case study Jackson (Planning and Attention)
- CAS2 Case Study Workbook
- Conclusions

Despite average intelligence college students with poor reading comprehension were low on Simultaneous and Successive processing scores from the CAS.
The case of Nelson
We will determine if he has a PASS weakness?
What interventions are appropriate?

Case of Nelson (Naglieri & Feifer, 2017, Intervention Chapter 5)

Nelson (9 year-old 4th grader) for 3 years
- difficulty with spelling and written language math facts, and inconsistent with reading comprehending skills.
- difficulty keeping pace with his peers and often failed to complete his work in a timely manner.
- The Child Development Team (CDT) recommended a comprehensive psychological evaluation.
### Table 5.2 Nelson’s CAS2 Scoring

<table>
<thead>
<tr>
<th>PASS Scales</th>
<th>Scaled Score</th>
<th>Percentile</th>
<th>Ability Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS2 Planning</td>
<td>94</td>
<td>34</td>
<td>Average</td>
</tr>
<tr>
<td>CAS2 Attention</td>
<td>98</td>
<td>45</td>
<td>Average</td>
</tr>
<tr>
<td>CAS2 Simultaneous Processing</td>
<td>74</td>
<td>4</td>
<td>Very low</td>
</tr>
<tr>
<td>CAS2 Successive Processing</td>
<td>90</td>
<td>25</td>
<td>Average</td>
</tr>
<tr>
<td>CAS2 Total Composite Score</td>
<td>89</td>
<td>23</td>
<td>Below average</td>
</tr>
</tbody>
</table>
### Case of Nelson (Naglieri & Feifer, 2017)

#### Table 5.6 Nelson's Scores on the Feifer Assessment of Reading (FAR)

<table>
<thead>
<tr>
<th>FAR Index</th>
<th>Standard Score (95% CI)</th>
<th>Percentile</th>
<th>Qualitative Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phonological Index</td>
<td>90 (±5)</td>
<td>25</td>
<td>Average</td>
</tr>
<tr>
<td>Fluency Index</td>
<td>73 (±7)</td>
<td>3</td>
<td>Moderately below average</td>
</tr>
<tr>
<td>Mixed Index</td>
<td>81 (±5)</td>
<td>10</td>
<td>Below average</td>
</tr>
<tr>
<td>Comprehension Index</td>
<td>97 (±8)</td>
<td>42</td>
<td>Average</td>
</tr>
<tr>
<td>FAR Total Index</td>
<td>84 (±5)</td>
<td>14</td>
<td>Below average</td>
</tr>
</tbody>
</table>

#### Table 5.3 Nelson's Scores on the KTEA-III Reading Subtests

<table>
<thead>
<tr>
<th>Reading Subtest</th>
<th>Age Norms</th>
<th>Percentile</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading Comprehension: The student reads a word and points to its corresponding picture or reads a simple instruction and responds by performing the action.</td>
<td>83 ± 10</td>
<td>13</td>
<td>Below average</td>
</tr>
<tr>
<td>Silent Reading Fluency: The student is required to read as many statements as possible in 2 minutes and must respond either &quot;yes&quot; or &quot;no&quot; as to whether each statement is valid.</td>
<td>80 ± 11</td>
<td>9</td>
<td>Below average</td>
</tr>
<tr>
<td>KTEA-III Reading Composite Score</td>
<td>81 ± 6</td>
<td>10</td>
<td>Below average</td>
</tr>
</tbody>
</table>

### Case of Nelson (Naglieri & Feifer, 2017)

#### Table 5.4 Nelson's Scores on the KTEA-III Math Subtests

<table>
<thead>
<tr>
<th>Math</th>
<th>Age Norms</th>
<th>Percentile</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math Computation: The student solves math equations in the response booklet including addition and subtraction.</td>
<td>87 ± 10</td>
<td>19</td>
<td>Below average</td>
</tr>
<tr>
<td>Math Fluency: This is a timed task requiring the student to solve as many single-digit addition, subtraction, multiplication, and division problems in a minute.</td>
<td>89 ± 11</td>
<td>23</td>
<td>Below average</td>
</tr>
<tr>
<td>KTEA-III Math Composite Score</td>
<td>90 ± 6</td>
<td>25</td>
<td>Average</td>
</tr>
<tr>
<td>Spelling: The student is required to spell words of increasing difficulty dictated by the examiner.</td>
<td>86 ± 5</td>
<td>18</td>
<td>Below average</td>
</tr>
<tr>
<td>Writing Fluency: The student has 5 minutes to write as many sentences as possible describing various pictures.</td>
<td>88 ± 14</td>
<td>21</td>
<td>Below average</td>
</tr>
<tr>
<td>KTEA-III Written Language</td>
<td>87 ± 6</td>
<td>19</td>
<td>Below average</td>
</tr>
</tbody>
</table>
Case of Nelson (Naglieri & Feifer, 2017)

- Nelson’s history of reading problems and interventions to address this, slower reading speed, difficulty reading phonetically irregular words, and poor Simultaneous

Topical Outline

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    - Case of Nelson (Simultaneous processing disorder)
  - Math Disabilities
    - Case study Kenny (Planning and Simultaneous)
    - Case study Jackson- (Planning and Attention)
  - CAS2 Case Study Workbook
- Conclusions
What is a Math Disability?

* **Dyscalculia** – children with specific math-related deficits, including:
  a) Learning and retrieving mathematical facts
     (Language Retrieval)
  b) Executing math calculation procedures
     (Working Memory)
  c) Basic number sense and concept development
     (Executive Functioning)

**Math Learning Disability (MLD)** - a generic term referring to children whose math performance in the classroom is substantially below age- and grade-level expectations. Often used when there is unexpected underachievement.

* Up to 20% of school age children have MLD or persistent difficulty with math (Luculano et al., 2015)

Dyscalculia Subtypes

- **Procedural** – a deficit in the ability to count, order, or sequence numbers or mathematical procedures. Often, there are limitations with symbolic working memory and pattern recognition. (PASS: Successive)

- **Verbal** – an inability to use language-based procedures to assist in arithmetic skills. Difficulties with rapid number identification skills, and retrieving stored mathematical facts. (PASS: Attention)

- **Semantic** – a core deficit in both visual-spatial and conceptual components of mathematics. Deficits include poor estimation skills, difficulty aligning numbers in columns, poor magnitude representations, and difficulty selecting a particular mathematical strategy to solve real world problems. (Planning & Simultaneous)
A neurodevelopmental assessment of mathematics
Prem-K to College (Ages 4-21)
Normative sample included 1,061 students
19 subtests in complete battery
Diagnoses 3 subtypes of math disorders
Includes the FAM-S dyscalculia screening battery
Total Fam index score and 3 math index scores:
a) Procedural subtype
b) Verbal subtype
c) Semantic subtype

Qualification Level: S or B

---

Structure of the FAM

<table>
<thead>
<tr>
<th>Index</th>
<th>Subtest</th>
<th>Grade range</th>
<th>Approximate administration time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedural Index (PI)</td>
<td>Forward Number Count (FNC)</td>
<td>PK to college</td>
<td>5 minutes</td>
</tr>
<tr>
<td></td>
<td>Backward Number Count (BNC)</td>
<td>K to college</td>
<td>5 minutes</td>
</tr>
<tr>
<td></td>
<td>Numeric Capacity (NCA)</td>
<td>PK to college</td>
<td>3 minutes</td>
</tr>
<tr>
<td></td>
<td>Sequences (SEQ)</td>
<td>PK to college</td>
<td>5 minutes</td>
</tr>
<tr>
<td></td>
<td>Object Counting (OC)</td>
<td>PK to Grade 2</td>
<td>5 minutes</td>
</tr>
<tr>
<td>Verbal Index (VI)</td>
<td>Rapid Number Naming (RNN)</td>
<td>PK to college</td>
<td>1 minute</td>
</tr>
<tr>
<td></td>
<td>Addition Fluency (AF)</td>
<td>K to college</td>
<td>1 minute</td>
</tr>
<tr>
<td></td>
<td>Subtraction Fluency (SF)</td>
<td>K to college</td>
<td>1 minute</td>
</tr>
<tr>
<td></td>
<td>Multiplication Fluency (MF)</td>
<td>Grade 3 to college</td>
<td>1 minute</td>
</tr>
<tr>
<td></td>
<td>Division Fluency (DF)</td>
<td>Grade 3 to college</td>
<td>1 minute</td>
</tr>
<tr>
<td></td>
<td>Linguistic Math Concepts (LMC)</td>
<td>PK to college</td>
<td>6 minutes</td>
</tr>
<tr>
<td>Semantic Index (SI)</td>
<td>Spatial Memory (SM)</td>
<td>PK to college</td>
<td>5 minutes</td>
</tr>
<tr>
<td></td>
<td>Equation Building (EB)</td>
<td>Grade 3 to college</td>
<td>4 to 6 minutes</td>
</tr>
<tr>
<td></td>
<td>Perceptual Estimation (PE)</td>
<td>PK to college</td>
<td>5 minutes</td>
</tr>
<tr>
<td></td>
<td>Number Comparison (NCO)</td>
<td>PK to college</td>
<td>2 minutes</td>
</tr>
<tr>
<td></td>
<td>Addition Knowledge (AK)</td>
<td>K to college</td>
<td>2 minutes</td>
</tr>
<tr>
<td></td>
<td>Subtraction Knowledge (SK)</td>
<td>K to college</td>
<td>2 minutes</td>
</tr>
<tr>
<td></td>
<td>Multiplication Knowledge (MK)</td>
<td>Grade 3 to college</td>
<td>2 minutes</td>
</tr>
<tr>
<td></td>
<td>Division Knowledge (DK)</td>
<td>Grade 3 to college</td>
<td>2 minutes</td>
</tr>
</tbody>
</table>
Topical Outline

- Introduction
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  - Math Disabilities
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    - Case study Jackson (Planning and Attention)
    - CAS2 Case Study Workbook
- Conclusions

Kenny – 8 years old

- 3rd grade and struggles retaining basic math facts.
- Often fails most tests and quizzes.
- Limited conceptual understanding of math.
- Tends to count on his fingers when working.
- Reading and writing skills commensurate with age and grade level.

*No behavior or attention concerns.*
### Kenny 8 years-old

#### CAS-2

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Composite Score</th>
<th>Range</th>
<th>Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning: the ability to apply a strategy, and self-monitor and self-correct performance while working toward a solution.</td>
<td>79</td>
<td>Poor</td>
<td>8%</td>
</tr>
<tr>
<td>Attention: the ability to selectively focus on a stimulus while inhibiting responses from competing stimuli.</td>
<td>103</td>
<td>Average</td>
<td>58%</td>
</tr>
<tr>
<td>Simultaneous Processing: is the ability to reason and problem solve by integrating separate elements into a conceptual whole, and often requires strong visual-spatial problem solving skills.</td>
<td>74</td>
<td>Poor</td>
<td>5%</td>
</tr>
<tr>
<td>Successive Processing: is the ability to put information into a serial order or particular sequence.</td>
<td>94</td>
<td>Average</td>
<td>34%</td>
</tr>
<tr>
<td><strong>CAS-2 Composite Score</strong></td>
<td><strong>88</strong></td>
<td>Below Average</td>
<td><strong>21%</strong></td>
</tr>
</tbody>
</table>

### Kenny 8 Years-old

#### KTEA III Math Subtests

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Standard Score</th>
<th>Percentile</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math Concepts &amp; Applications – the student responds orally to applied math problems involving number concepts, time, and measurement.</td>
<td>80</td>
<td>9%</td>
<td>Below Average</td>
</tr>
<tr>
<td>Math Computation – an untimed test requiring student to solve math equations including addition, subtraction, multiplication and division.</td>
<td>88</td>
<td>21%</td>
<td>Below Average</td>
</tr>
<tr>
<td>Math Fluency – the student solves as many basic problems as possible in one minute</td>
<td>85</td>
<td>16%</td>
<td>Below Average</td>
</tr>
<tr>
<td><strong>KTEA III Math Composite</strong></td>
<td><strong>82</strong></td>
<td>12%</td>
<td>Below Average</td>
</tr>
</tbody>
</table>
Kenny 8 Years-old

<table>
<thead>
<tr>
<th>FAM Index</th>
<th>Standard Score</th>
<th>Percentile</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedural Index</td>
<td>90</td>
<td>25%</td>
<td>Average</td>
</tr>
<tr>
<td>Verbal Index</td>
<td>83</td>
<td>13%</td>
<td>Below Average</td>
</tr>
<tr>
<td>Semantic Index</td>
<td>75</td>
<td>5%</td>
<td>Moderately Below Average</td>
</tr>
<tr>
<td>FAM TOTAL INDEX</td>
<td>79</td>
<td>8%</td>
<td>Moderately Below Average</td>
</tr>
</tbody>
</table>

Think Partners ➔ Deeper Learning

**Topic: Your Thoughts about Kenny**

- discuss his pattern of strengths and weaknesses in ability and skills
- Is there a PASS weakness and similarly low achievement score?
CAS2 & FAM Analyzer Results for Kenny

Discrepancy Consistency Method shows a PSW

Discrepancy Consistency for Kenny

- Discrepancy between high and low processing scores
- Discrepancy between high processing and low achievement
- Consistency between low processing and low achievement
CAS-2 Simultaneous and Math

➢ Simultaneous Processing – the ability to integrate separate elements into a conceptual whole, and often requires visual-spatial problem solving skills.

➢ Simultaneous & Math – underscores the ability to subitize, estimate, align columns of numbers, and develop a visual-spatial representation (nonsymbolic) of magnitudes and amounts. Essential in the core development of “number sense”.

How to Pair CAS2 & FAM

➢ CAS2 - determine if there is a cognitive processing weakness (i.e. Planning & Simultaneous) and whether that particular weakness directly impacts mathematics.

➢ FAM: The Semantic Index on the FAM is heavily dependent upon both Planning and Simultaneous processing.

Poor Planning (CAS-2)  +  Poor Semantic Index (FAM)  ➡
SLD in Mathematical Problem Solving (Semantic Dyscalculia)
FAM Report Writer: Semantic Dyscalculia

1. **Math Word Walls** – create classroom charts or individual desk laminates with math vocabulary terms, magnitude representations through pictures, and numeric equations and facts as a reference guide.

2. **Answers Provided** – administer math worksheets with the answers already provided to the equations. Half should be correct answers, and the other half are incorrect. Have the student identify all of the correct answers and verbally explain "why" the answer is correct, and draw a picture to demonstrate "why" the answer is not correct.

3. **Think in Pictures** – present word problems to students, and have them draw a picture or represent the equation using a picture, outline, or bar graph, not a numeric equation. This will develop greater conceptual understanding and heighten magnitude representational skills. The Singapore math curriculum is based upon a bar graph representation to assist students.

4. **Language Notebook** - Create a notebook with a vocabulary list of specific math terminology. Have Kenny define math terms and write their meanings by giving specific examples.

5. **Equation Dictation** – Have Kenny write or "set up" a math equation from a verbal sentence.

6. **Fact Family Charts** - Create a math fact family chart and place it in a clear sheet protector. The sheet protector works as a dry erase board, so students can write in the fact family with a dry erase marker as the instructor says the problem aloud.

---

**Helping Children Learn Resources**

- Kenny needs:
  - To understand his PASS strengths (Successive & Attention) and weaknesses (Planning & Simultaneous)
  - Planning Facilitation
    - Strategies for Learning Basic Math Facts
  - Touch Math for Calculation
A Cognitive Strategy Instruction to Improve Math Calculation for Children With ADHD and LD: A Randomized Controlled Study

Jackie S. Isemann and Jack A. Naglieri

Abstract
The authors examined the effectiveness of cognitive strategy instruction (Successive) given by special education teachers to students with ADHD. Experimental group were exposed to a brief cognitive strategy instruction development and application of effective planning for mathematical computation. Standardized tests of cognitive processes as students completed math worksheets throughout the experimental period. Johnson Tests of Achievement, Third Edition, Math Fluency and Wechsler Numerical Operations were administered pre- and postintervention, as a follow-up. Large pre/post effect sizes were found for students in the experimental group (0.85 and 0.26), Math Fluency (1.17 and 0.09), and NLU. At 1 year follow-up, the experimental group continued to outperform students with ADHD evidenced greater improvement in math works (which measured the skill of generalizing learned strategies to other situations) when provided the PASS-based cognitive strategy instruction.

Instructional Sessions

- Math lessons were organized into “instructional sessions” delivered over 13 consecutive days
- Each instructional session was 30-40 minutes
- Each instructional session was comprised of three segments as shown below
Planning (Metacognitive) Strategy Instruction

Teachers *facilitated* discussions to help students become more self-reflective about use of strategies.

Teachers asked questions like:
- What was your goal?
- Where did you start the worksheet?
- What strategies did you use?
- How did the strategy help you reach your goal?
- What will you do again next time?
- What other strategies will you use next time?

Student Plans

- “My goal was to do all of the easy problems on every page first, then do the others.”
- “I do the problems I know, then I check my work.”
- “I do them (the algebra) by figuring out what I can put in for X to make the problem work.”
- “I did all the problems in the brain-dead zone first.”

“I try not to fall asleep.”
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 WI-III ACH Math Fluency subscale 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 ($M = 3.21$, $SD = 18.21$, $d = 0.09$).

Summary of PASS Intervention Research in Essentials of CAS2

Effectiveness of a Cognitive Strategy Intervention in Improving Arithmetic Computation Based on the PASS Theory

Mathematics Instruction and PASS Cognitive Processes: An Intervention Study

A Cognitive Strategy Instruction to Improve Math Calculation for Children With ADHD and LD: A Randomized Controlled Study

Objective: The purpose of this study was to determine if a cognitive strategy intervention designed to facilitate planning given to students that demonstrated academic difficulties. The study was conducted in a classroom setting, and the intervention consisted of instruction on planning strategies. Students were randomly assigned to the intervention or control group. The results showed that the intervention group achieved significantly higher scores on the arithmetic computation task compared to the control group. The study concluded that the intervention was effective in improving arithmetic computation skills for students with ADHD and LD.
We can connect PASS to...

INSTRUCTION

Topical Outline

- Introduction
- Definition of SLD
- Measure “basic psychological process” with CAS2
- Measure reading and math with the FAR and FAM
- Using the Discrepancy Consistency Method
  - Reading Disabilities
    - Case study Paul (Successive processing disorder)
    - Case of Nelson (Simultaneous processing disorder)
  - Math Disabilities
    - Case study Kenny (Planning and Simultaneous)
  - Case study Jackson- (Planning and Attention)
- CAS2 Case Study Workbook
- Conclusions
Jackson: 13 yrs old

- 7th grader who makes careless mistakes in math.
- Needs excessive time to complete homework.
- Good conceptual understanding of math, though often misses important details.
- Tends to forget steps when problem solving.
- Declining grades in math.

* Seems to lack confidence in mathematics.

**CAS-2 COMPOSITE SCORE**

<table>
<thead>
<tr>
<th>Planning: the ability to apply a strategy, and self-monitor and self-correct performance while working toward a solution.</th>
<th>101</th>
<th>Average</th>
<th>53%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention: the ability to selectively focus on a stimulus while inhibiting responses from competing stimuli.</td>
<td>81</td>
<td>Below Average</td>
<td>10%</td>
</tr>
<tr>
<td>Simultaneous Processing: is the ability to reason and problem solve by integrating separate elements into a conceptual whole, and often requires strong visual-spatial problem solving skills.</td>
<td>104</td>
<td>Average</td>
<td>61%</td>
</tr>
<tr>
<td>Successive Processing: is the ability to put information into a serial order or particular sequence.</td>
<td>83</td>
<td>Below Average</td>
<td>13%</td>
</tr>
<tr>
<td>CAS-2 COMPOSITE SCORE</td>
<td>92</td>
<td>Average</td>
<td>30%</td>
</tr>
</tbody>
</table>
### Jackson 13 years-old

#### KTEA III Math Subtests

<table>
<thead>
<tr>
<th></th>
<th>Standard Score</th>
<th>Percentile</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Math Concepts &amp; Applications</strong> – the student responds orally to applied math problems involving number concepts, time, and measurement.</td>
<td>94</td>
<td>34%</td>
<td>Average</td>
</tr>
<tr>
<td><strong>Math Computation</strong> – an untimed test requiring student to solve math equations including addition, subtraction, multiplication and division.</td>
<td>82</td>
<td>12%</td>
<td>Below Average</td>
</tr>
<tr>
<td><strong>Math Fluency</strong> – the student solves as many basic problems as possible in one minute</td>
<td>90</td>
<td>25%</td>
<td>Average</td>
</tr>
<tr>
<td><strong>KTEA III Math Composite</strong></td>
<td>86</td>
<td>18%</td>
<td>Below Average</td>
</tr>
</tbody>
</table>

#### FAM Index

<table>
<thead>
<tr>
<th></th>
<th>Standard Score</th>
<th>Percentile</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Procedural Index</strong> – measures the ability to count, order, and/or sequence numbers.</td>
<td>74</td>
<td>4%</td>
<td>Moderately Below Average</td>
</tr>
<tr>
<td><strong>Verbal Index</strong> – measures the ability to automatically identify numbers, retrieve facts, and understand math terminology.</td>
<td>90</td>
<td>25%</td>
<td>Average</td>
</tr>
<tr>
<td><strong>Semantic Index</strong> – measures the ability to determine magnitude representations, estimation, pattern recognition, and quantitative reasoning.</td>
<td>94</td>
<td>34%</td>
<td>Average</td>
</tr>
<tr>
<td><strong>FAM TOTAL INDEX</strong></td>
<td>85</td>
<td>16%</td>
<td>Below Average</td>
</tr>
</tbody>
</table>
CAS2 & FAM Analyzer Results for Jackson

- Discrepancy Consistency Method shows a PSW

Discrepancy Consistency for Jackson

- Discrepancy between high and low processing scores
- Discrepancy between high processing and low achievement
- Consistency between low processing and low achievement
How to Pair CAS2 & FAM

➢ **CAS2** - determine if there is a cognitive processing weakness (i.e. Successive) and whether that particular weakness directly impacts mathematics.

➢ **FAM**: The Procedural Index on the FAM is heavily dependent upon *Successive* processing.

Poor Successive (CAS2) + Poor Procedural (FAM) ➞ SLD in Mathematical Problem Solving

(Procedural Dyscalculia)

FAM Report Writer: Procedural Dyscalculia

1. **FNWS/BNWS** – place emphasis on developing a Forward Number Word Sequence and Backward Number Word Sequence by skip counting out loud from various increments. Begin with whole numbers (i.e. “Count backwards by 6’s from the number 136” and then incorporate fractions and decimals “Count forwards from 3’s by 1/3rd”)  
2. **Hundreds Chart** - A hundreds chart will assist students in developing a greater sense of number patterns and relationships. Place a chip on the chart, and ask students to move the chip by various increments on the chart.
3. **Abacus Training** – Using a color-coded abacus helps to reinforce magnitude representation of numbers and develop more automatic counting skills. The beads should be color-coded and divided into two groups of five for each row.
4. **Sequence Sense** – practice developing an understanding of basic number patterns and how numerals sequentially relate to one another. For instance, present a number pattern such as 3 – 6 – 9 - ____ - 15. First, allow Jackson to use manipulatives and/or paper and pencil To solve, and eventually try solving without any manipulatives.
5. **Vertical number lines** – attach a number line that runs vertically beside Jackson’s desk. This will aid in developing a better feel for spatial relationships between numbers.
6. **Student directed algorithms** - Instead of memorizing a singular method for problem solving, students should be taught multiple methods and select their own, rather than be forced to abide by the teacher’s method.
FAM Report Writer: Websites and Apps

1. Khan Academy  https://www.khanacademy.org/
The Khan Academy is full of helpful videos explaining a variety of math topics, as well as other academic topics. There is an initial pre-test upon first logging in that determines appropriate starting levels.

Hooda Math is geared toward helping kids practice and learn through games and computer activities. Specific math topics include addition, subtraction, multiplication, addition, geometry, basic physics, fractions, integers, and algebra.

Estimation 180 is a website that presents a new estimation challenge every day of the school year.

The “JMT” in Patrick JMT stands for “Just Math Tutorials.” This website has clear math videos on a variety of math related topics.

A highly entertaining and interactive website offering games, activities, puzzles, and challenges for a variety of math topics for children.

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Think Partners Look at Case Workbook

- Open the Case Study Workbook and complete one of the examples

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- Conclusions
CAS2, FAR and FAM are based upon a neurocognitive theory of brain functioning.

Using these measures is a time-efficient way to measure basic psychological processes and their influence of academic skill acquisition and execution.

Detect a pattern of cognitive and academic strengths and weaknesses using the Discrepancy Consistency Method (DCM) to diagnose SLD.

DCM explains WHY a student is having math difficulty, by showing HOW a student thinks about reading or math.

Directly informs intervention decision making.

This approach puts the “I” back into IEP’s!!!