SLD and Other Learning Difficulties: Linking Results of XBA Assessment to Educational Interventions

Dawn P. Flanagan, Ph.D.
St. John’s University, New York

Yale Child Study Center, School of Medicine
Today’s Agenda

Morning Session:
• Overview of the Field of Ability Assessment
  – Progress in Theories of Intelligence
  – Progress in Test Development
  – Progress in Test Interpretation
• Relations between CHC Abilities and Academic Skills
• Refinements to CHC Theory
  – When evidenced-based interventions don’t work
  – Assessment for intervention
Today’s Agenda

Afternoon Session:

• Importance of Individual Differences and Differential Diagnosis
  – Intellectual Disability
  – General Learning Difficulty
  – Specific Learning Disability

• Third Method Approaches to SLD Identification
  – Operational Definition of SLD
  – Pattern of Strengths and Weaknesses

• Linking Assessment Results to Intervention
  – Excerpts of case study

• Conclusions
Progress in Intelligence theory, test development, and test interpretation
Continuum of Progress in Psychometric Theories of Intelligence

Theories
- General Ability ($g$)
  - Spearman

Two-Factor Models
- Original Gf-Gc Simultaneous-Successive

"Limited" Multiple Factor Models
- Thurstone’s Primary Mental Abilities Planning, Attention, Simultaneous, and Successive (PASS)

"Expanded" Multiple Factor Models
- Cattell-Horn Gf-Gc Theory
- Carroll Three-Stratum Theory
- Cattell-Horn-Carroll (CHC)
Continuum of Progress in Tests of Intelligence and Cognitive Abilities

Cognitive Tests
- Stanford-Binet LM
- W-B
- WISC
- WAIS
- WPPSI
- K-ABC
- KAIT
- WJ
- WISC-R
- WAIS-R
- WPPSI-R
- SB-IV
- WJ-R
- WJ III
- WISC-III/WISC-IV
- WAIS-III/WAIS-IV
- WPPSI-III
- CAS
- DAS
- DAS-II
- KABC-II

Cross-Battery Assessment (XBA) applied to limited batteries and used in hypothesis-testing approaches

VIQ-PIQ-FSIQ

CHC

WJ III
Continuum of Progress in Methods of Interpretation

| Clincial Profile Analysis (Second Wave) | Psychometric Profile Analysis (Third Wave) | Application of Theory to Interpretation (Fourth Wave) | Application of Refinements to Theory and CHC-based Research to Psychological Test Interpretation (Fifth Wave) |

<table>
<thead>
<tr>
<th>TABLE 2.4. Wechsler’s Case Example for “Adolescent Psychopaths”</th>
<th>Standard score</th>
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</thead>
<tbody>
<tr>
<td>Comprehension</td>
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<td>Arithmetic</td>
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<td>Information</td>
<td>10</td>
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<tr>
<td>Digits</td>
<td>6</td>
</tr>
<tr>
<td>Similarities</td>
<td>5</td>
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<td>Picture Arrangement</td>
<td>12</td>
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<tr>
<td>Picture Completion</td>
<td>10</td>
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<td>Block Design</td>
<td>15</td>
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<td>Object Assembly</td>
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<td>Digit Symbol</td>
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<tr>
<td>Verbal IQ (VIQ)</td>
<td>90</td>
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<tr>
<td>Performance IQ (PIQ)</td>
<td>123</td>
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</table>

**Continuum of Progress in Methods of Interpretation**

**Clinical Profile Analysis** (Second Wave)  
**Psychometric Profile Analysis** (Third Wave)  
**Application of Theory to Interpretation** (Fourth Wave)  
**Application of Refinements to Theory and CHC-based Research to Psychological Test Interpretation** (Fifth Wave)

**Factor Analysis** – Cohen’s Three-factor solution of the WISC

**Kaufman’s Psychometric Approach**

![Cohens WAIS-III factor structure](image.png)
Continuum of Progress in Methods of Interpretation

**Clinical Profile Analysis (Second Wave)**
- 1983

**Psychometric Profile Analysis (Third Wave)**
- 1989-1994

**Application of Theory to Interpretation (Fourth Wave)**
- Brought Gf-Gc and Three-stratum Theories to School Psychology
- 1997

**Application of Refinements to Theory and CHC-based Research to Psychological Test Interpretation (Fifth Wave)**
- Gf-Gc/CHC applied to Wechsler Scales
- 2000
McGrew (2005) and Schneider and McGrew’s (2012) Refinements to CHC Theory
Integration of CHC and neuropsychological theory for
cognitive test interpretation

• Dan Miller
• Scott Decker
• Brad Hale
• Cyndi Riccio
• George McCloskey
• Denise Maricle
SCHOOL NEUROPSYCHOLOGY CONSULTATION IN NEURODEVELOPMENTAL DISORDERS

SCOTT L. DECKER
Georgia State University

Additionally, the Cattell-Horn-Carroll (CHC) theory of intelligence and its operationalization in a Cross-Battery Assessment procedure may also improve school psychology assessment practice and facilitate the integration of neuropsychological methodology in school-based assessments. The CHC model benefits from more than a half-century of validity research on psychometric, developmental, heritability, academic outcome, and neurocognitive evidence (Flanagan & Harrison, 2005; Flanagan & Ortiz, 2005; McGrew, Keith, Flanagan, & Vanderwood, 1997). The CHC model is a multitiered model of intelligence, with tiers typically referred to as strata I, II, and III (Carroll, 1997). The broad abilities of stratum II are functionally similar to constructs measured in neuropsychology, although labels used to describe the measurements may differ (Dean et al., 2003). For example, neuropsychologists are familiar with constructs like executive functions, with such tests as the Wisconsin Card Sorting Test, Halstead’s Category Test, and the Trail Making Test, whereas school psychologists use equivalent concepts, like fluid intelligence. Psychometrically, these constructs are highly related but may differ in theoretical specifications (Decker, Hill, & Dean, 2007). The CHC and Cross-Battery Assessment approaches shift assessment practice from IQ composites to neurodevelopmental functions. This transition can be facilitated by training in contemporary psychometric models (Flanagan, Ortiz, & Alfonso, 2007). Furthermore, integrating Cross-Battery Assessment approaches within a global hypothesis-testing approach (Hale & Fiorello, 2004) may provide the best “alternative” method that meets federal requirements for a comprehensive evaluation.
AN INTEGRATIVE FRAMEWORK BASED ON PSYCHOMETRIC, NEUROPSYCHOLOGICAL, AND LURIAN PERSPECTIVES (Flanagan, Ortiz, Alfonso & Dynda, 2010)

Figure 6.3 An Integrative Framework Based on psychometric, neuropsychological, and Lurian perspectives (Flanagan et al., 2010).
<table>
<thead>
<tr>
<th>Subtest</th>
<th>Lurian Block</th>
<th>Neuropsychological Domains</th>
<th>CHC Broad and Narrow Abilities</th>
</tr>
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<tbody>
<tr>
<td>Arithmetic</td>
<td>✓</td>
<td>✓</td>
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<td>Block Design</td>
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<td>Cancellation</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Coding</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Comprehension</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Digit Span</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Information</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Letter-Number Sequencing</td>
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<td>✓</td>
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<tr>
<td>Matrix Reasoning</td>
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<tr>
<td>Picture Completion</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>Picture Concepts</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Similarities</td>
<td>✓</td>
<td>✓</td>
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<td>Symbol Search</td>
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<tr>
<td>Vocabulary</td>
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</tr>
<tr>
<td>Word Reasoning</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Refinements and Extensions to the CHC-Achievement Relations Research

CATTELL–HORN–CARROLL COGNITIVE-ACHIEVEMENT RELATIONS: WHAT WE HAVE LEARNED FROM THE PAST 20 YEARS OF RESEARCH

KEVIN S. McGREW AND BARBARA J. WENDLING

Woodcock-Muñoz Foundation

Contemporary Cattell–Horn–Carroll (CHC) theory of cognitive abilities has evolved over the past 20 years and serves as the theoretical foundation for a number of current cognitive ability assessments. CHC theory provides a means by which we can better understand the relationships between cognitive abilities and academic achievement, an important component of learning disabilities identification and instructional planning. A research synthesis of the extant CHC cognitive-achievement (COG-ACH) research literature is reported. Systematic and operationally defined research synthesis procedures were employed to address limitations present in the only prior attempted synthesis.
Continuum of Progress in Methods of Interpretation

- Clinical Profile Analysis (Second Wave)
- Psychometric Profile Analysis (Third Wave)
- Application of Theory to Interpretation (Fourth Wave)
- Application of Refinements to Theory and CHC-based Research to Psychological Test Interpretation (Fifth Wave)

Refinements and Extensions to the Cross-Battery Approach

Significantly improved evidence base
Significantly improved and expanded software programs

Essentials of Cross-Battery Assessment
Third Edition
Dawn P. Flanagan, Samuel O. Ortiz, Vincent C. Alfonso
Alan S. Kaufman & Nadeen L. Kaufman, Series Editors
Includes CD-ROM

• Integrates Cognitive, Achievement and Neuropsychological Tests
The Cattell-Horn-Carroll (CHC) Model of Cognitive Abilities that Guided Intelligence Test Construction from 2000-2010

Nine Broad and Approximately 35 Narrow Abilities are Represented on Cognitive and Achievement Batteries
Relations between cognitive constructs and academic skills
<table>
<thead>
<tr>
<th>CHC Ability</th>
<th>Reading Achievement</th>
<th>Math Achievement</th>
<th>Writing Achievement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gf</strong></td>
<td>Inductive (I) and general sequential reasoning abilities play a moderate role in reading comprehension.</td>
<td>Inductive (I) and general sequential reasoning abilities are consistently very important at all ages.</td>
<td>Inductive (I) and general sequential reasoning abilities is related to basic writing skills primarily during the elementary school years (e.g., 6 to 13) and consistently related to written expression at all ages.</td>
</tr>
<tr>
<td><strong>Gc</strong></td>
<td>Language development (LD), lexical knowledge (VL), and listening ability (LS) are important at all ages. These abilities become increasingly more important with age.</td>
<td>Language development (LD), lexical knowledge (VL), and listening abilities (LS) are important at all ages. These abilities become increasingly more important with age.</td>
<td>Language development (LD), lexical knowledge (VL), and general information (K0) are important primarily after age 7. These abilities become increasingly more important with age.</td>
</tr>
<tr>
<td><strong>Gsm</strong></td>
<td>Memory span (MS) is important especially when evaluated within the context of working memory.</td>
<td>Memory span (MS) is important especially when evaluated within the context of working memory.</td>
<td>Memory span (MS) is important to writing, especially spelling skills whereas working memory has shown relations with advanced writing skills (e.g., written expression).</td>
</tr>
<tr>
<td><strong>Ga</strong></td>
<td>Orthographic Processing. May be important primarily for higher level or advanced mathematics (e.g., geometry, calculus).</td>
<td>Phonetic coding (PC) or “phonological awareness/processing” is very important during the elementary school years.</td>
<td>Phonetic coding (PC) or “phonological awareness/processing” is very important during the elementary school years for both basic writing skills and written expression (primarily before age 11).</td>
</tr>
<tr>
<td><strong>Glr</strong></td>
<td>Naming facility (NA) or “rapid automatic naming” is very important during the elementary school years. Associative memory (MA) may be somewhat important at select ages (e.g., age 6).</td>
<td>Naming Facility (NA); Associative Memory (MA)</td>
<td>Naming facility (NA) or “rapid automatic naming” has demonstrated relations with written expression, primarily the fluency aspect of writing.</td>
</tr>
<tr>
<td><strong>Gs</strong></td>
<td>Perceptual speed (P) abilities are important during all school years, particularly the elementary school years.</td>
<td>Perceptual speed (P) abilities are important during all school years, particularly the elementary school years.</td>
<td>Perceptual speed (P) abilities are important during all school years for basic writing and related to all ages for written expression.</td>
</tr>
</tbody>
</table>
Relations between CHC Abilities and Processes and Reading Achievement

**Gf** – Induction (I) and general sequential reasoning (RG) play a moderate role in reading comprehension
Relations between CHC Abilities and Processes and Reading Achievement

- Gc – Language development (LD), lexical knowledge (VL), general information (KO) and listening ability (LS) are important at all ages. *These abilities become increasingly important with age*
Relations between CHC Abilities and Processes and Reading Achievement

• **Gsm** – Memory span (MS) is important, especially when evaluated within the context of *working memory*
Relations between CHC Abilities and Processes and Reading Achievement

- $Gv$ – Orthographic processing
Orthography (Wagner & Barker, 1994)

• The system of marks that make up the English language, including upper and lower case letters, numbers, and punctuation marks
Assessing Visual Processing Related to Reading

- Visual processing must be assessed using **orthography** (letters, words and numbers) rather than abstract designs or familiar pictures.
Assessing Orthographic Processing Related to Reading

Examples of assessments of orthographic processing directly related to reading:

- Test of Silent Word Reading Fluency (TOSWRF)
- Test of Irregular Word Reading Efficiency (TIWRE)
- Test of Orthographic Competence (TOC)
- Process Assessment of the Learner (PAL-II)
Relations between CHC Abilities and Processes and Reading Achievement

- **Ga** – Phonetic Coding (PC) or phonological awareness; phonological processing – very important during the elementary school years.
Examples of assessments of phonological processing directly related to reading:

- PAL-II Rhyming, Syllables, Phonemes, Rimes
- KTEA-II Phonological Awareness Subtest
- NEPSY-II Phonological Processing Subtest
- WJ III Sound Awareness, Sound Blending, and Incomplete Words Subtests
- DAS-II Phonological Processing Subtest
- CTOPP Blending and Segmenting Subtests
**Relations between CHC Abilities and Processes and Reading Achievement**

*Glr* – Naming facility (NA) or “rapid automatic naming” is very important during the elementary school years. Associative memory (MA) may be important at early elementary school ages.
• **Gs** – Perceptual speed (P) abilities are important during all school years, particularly the elementary school years.

![Diagram of Automatic Word Recognition: Automatic and Accurate]
Building on the work of Flanagan and Colleagues (2006)

- McGrew and Wendling (2010)
  - Need to move from general to specific
    - **Reading** -> basic reading skills; reading comprehension
    - **Math** -> basic math skills; math application
  - Need to systematically take into account developmental level
    - Ages 6-8 years
    - Ages 9-13 years
    - Ages 14-19 years
  - Need to control for specification error
    - Seems necessary primarily if interested in percentage of variance accounted for in academic outcome
    - May pose more of a limitation (e.g., Flanagan et al. had over 100 studies in their review; McGrew and Wendling had less than 20)
## Rapid Reference 10.5. Important Findings on Relations Between CHC Abilities and Reading Achievement

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Gf</td>
<td>Inductive (I) and general sequential (RG) reasoning abilities play a moderate role in reading comprehension.</td>
<td>Quantitative Reasoning (RQ) tentative/speculative at ages 6-8 and 14-19 years for Basic Reading Skills (BRS). 2</td>
<td>The lack of a relationship between Gf abilities and reading in the McGrew and Wendling summary may be related to the nature of the dependent measures. For example, RC was represented by the WJ Passage Comprehension and Reading Vocabulary tests, both of which draw minimally on reasoning (e.g., they do not require an individual to draw inferences or make predictions).</td>
</tr>
<tr>
<td></td>
<td>Language development (LD), lexical knowledge (VL), and listening abilities (LS) are important. These abilities become increasingly more important with age.</td>
<td>Broad Gf is tentative/speculative at ages 14-19 years for Reading Comprehension (RC).</td>
<td></td>
</tr>
<tr>
<td>Gc</td>
<td>LS is moderately consistent at ages 6-8 years for BRS.</td>
<td>General Fund of Information (K0) is consistent at ages 6-8 and moderately consistent at ages 9-19 years for BRS.</td>
<td>The findings across the Flanagan et al., and McGrew and Wendling summaries are quite similar given that Broad Gc in the McGrew and Wendling summary is defined primarily by the narrow abilities of LD and VL. However, Flanagan et al. did not find a consistent relationship between the narrow ability of KO and reading, as KO was not well represented in the studies they reviewed.</td>
</tr>
<tr>
<td></td>
<td>LS is highly consistent at ages 6-19 years for RC.</td>
<td>K0 is highly consistent at ages 6-19 years for RC.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Broad Gc is moderately consistent at ages 6-13 and highly consistent at ages 14-19 years for BRS.</td>
<td>Broad Gc is highly consistent at ages 6-19 years for RC.</td>
<td></td>
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<tr>
<td>Gsm</td>
<td>Memory span (MS) is important especially when evaluated within the context of working memory.</td>
<td>Working Memory (MW) moderately consistent at ages 6-19 years for BRS and highly consistent for RC at ages 6-19 years.</td>
<td>Both the Flanagan et al. and McGrew and Wendling summaries highlight the importance of Gsm for reading.</td>
</tr>
<tr>
<td></td>
<td>MS is tentative/speculative at ages 6-8 and moderately consistent at ages 9-19 years for BRS.</td>
<td>MS is consistent at ages 6-13 and moderately consistent at ages 14-19 years for RC.</td>
<td></td>
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<td>Quantitative Reasoning (RQ) is tentative/speculative at ages 6-8 and 14-19 years for Basic Reading Skills (BRS). ²</td>
<td>The lack of a relationship between Gf abilities and reading in the McGrew and Wendling … RC was represented by the WJ Passage Comprehension and Reading Vocabulary tests, both of which draw minimally on reasoning (e.g., they do not require an individual to draw inferences or make predictions).</td>
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<table>
<thead>
<tr>
<th>CHC Ability</th>
<th>Source</th>
<th>Findings</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gc</td>
<td>Flanagan, Mascolo, Alfonso, &amp; Ortiz (2006) General Reading Review (116 independent studies)</td>
<td>Language Development (LD), Lexical Knowledge (VL), and Listening Abilities (LS) are important. These abilities become increasingly important with age.</td>
<td>LS is moderately consistent at ages 6-8 years for BRS. LS is highly consistent at ages 6-19 years for RC. General Fund of Information (K0) is consistent at ages 6-8 and moderately consistent at ages 9-19 years for BRS.</td>
</tr>
</tbody>
</table>

Broad Gc is highly consistent at ages 6-19 years for RC.
<table>
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<tr>
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<td>Gsm</td>
<td>Memory Span (MS) is important especially when evaluated within the context of working memory.</td>
<td>Working Memory (MW) is moderately consistent at ages 6-19 years for BRS and highly consistent for RC at ages 6-19 years.</td>
<td>Both the Flanagan et al. and McGrew and Wendling summaries highlight the importance of Gsm for reading.</td>
</tr>
<tr>
<td></td>
<td>MS is tentative/speculative at ages 6-8 and moderately consistent at ages 9-19 years for BRS.</td>
<td>MS is consistent at ages 6-13 and moderately consistent at ages 14-19 years for RC.</td>
<td></td>
</tr>
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</table>

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td><strong>Gv</strong></td>
<td>Orthographic processing <strong>Broad Gv is not consistently related to BRS or RC.</strong></td>
<td></td>
<td>One possible explanation for the lack of a Gv relationship with BRS in the McGrew and Wendling summary is that the types of tasks used to measure visual processing in the studies they reviewed (e.g., spatial relations) do not measure the visual aspects of reading (e.g., orthographic processing). Orthographic processing or awareness (the ability to rapidly map graphemes to phonemes) may be more related to the perceptual speed tasks found on cognitive tests (e.g., Symbol Search on the Wechsler Scales).</td>
</tr>
</tbody>
</table>

## Relations between cognitive constructs and academic skills

<table>
<thead>
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<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ga</td>
<td>Flanagan, Mascolo, Alfonso, &amp; Ortiz (2006) General Reading Review (116 independent studies)</td>
<td>Phonetic Coding (PC) or phonological awareness/processing are very important during the elementary school years.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>McGrew &amp; Wendling (2010) Basic Reading Skills and Reading Comprehension Findings¹ (19 CHC/WJ studies)</td>
<td>PC is moderately consistent at ages 6-13 and consistent at ages 14-19 years for BRS. PC is consistent at ages 6-8 and 14-19 years; tentative/speculative at ages 9-13 years for RC. Speech Sound Discrimination and Resistance to Auditory Stimulus Distortion (US/UR) are consistent at ages 9-19 years for BRS. Broad Ga is not consistently related to BRS. Broad Ga is moderately related at ages 6-8 years for RC.</td>
<td>Interestingly, and in contrast to Flanagan et al.’s summary, McGrew and Wendling’s summary does not show a strong relation between PC/phonological processing and reading at any age level. Given the wealth of research on the relations between PC/phonological processing and reading coupled with the neuroimaging research showing normalization of brain function in response to effective interventions for PC/phonological processing deficits, a reasonable assumption is that PC/phonological processing plays an important role in reading development during the early elementary school years. The relationship between PC/phonological processing and reading may be more prominent in students with reading difficulties, a population not included in the McGrew and Wendling samples.</td>
</tr>
</tbody>
</table>
### Basic Reading Skills – ages 6 to 8 – WISC-IV

Slide Adapted from Kevin S. McGrew

<table>
<thead>
<tr>
<th>Broad Domain Markers</th>
<th>Narrow Domain Markers</th>
<th>Relevant WISC-IV tests</th>
<th>XBA Supplemental Tests from WJ III</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gsm</strong> Short-Term Memory</td>
<td>Work Mem (MW)</td>
<td>Digit Span (MS/MW) Letter-Number Seq. (MW)</td>
<td></td>
</tr>
<tr>
<td><strong>Gs</strong> Processing Speed</td>
<td>Perc. Speed (P)</td>
<td>Coding (P/R9) Symbol Search (P) Cancellation (P)</td>
<td></td>
</tr>
<tr>
<td><strong>Ga</strong> Auditory Processing</td>
<td>Phonetic Coding (PC)</td>
<td></td>
<td>Snd. Aware (PC/MW) Snd. Blending (PC)</td>
</tr>
</tbody>
</table>

(NA)
The CHC Cross-Battery Assessment (XBA) Approach

• Guidelines for Test Selection and Organization
• Guidelines for Hypothesis Testing
• Guidelines for Test Interpretation
• Automated Program to Facilitate Interpretation and Reporting of Test Performance
What is Cross-Battery Assessment?

• An approach that neuropsychologists, and astute clinicians in other assessment-related fields, have always followed

• *Flanagan and colleagues transformed the practice of crossing batteries into a method that is both psychometrically and theoretically defensible*
  – A systematic method of ensuring adequate construct representation across a wide range of cognitive abilities and processes
  – A systematic method of interpreting test data from more than one battery
The Need for Cross-Battery Assessment

A WISC-III detective strives to use ingenuity, clinical sense, a thorough grounding in psychological theory and research, and a willingness to administer supplementary cognitive tests to reveal the dynamics of a child’s scaled-score profile

(Kaufman, 1994)
CHC Abilities and Processes Related to Basic Reading Skills and Reading Comprehension in Children Ages 6-8 Years

(*Cross-Battery Assessment* or other Flexible Battery Approaches May be Necessary to Measure All Important Abilities and Processes)

Important Broad CHC Cognitive Constructs

- **Gc**
  - LD
  - Verbal Know.

- **Ga**
  - PC
  - Non. Wrd Dcd
  - Phon. Aware.

- **Gs**
  - US
  - Timed Wrd Rec
  - Timed NWD
  - Word Order

- **Gsm**
  - MS/MW
  - Atlantis

- **Glr**
  - MA
  - Rebus
  - RAN

Important Narrow CHC Cognitive Constructs

- **KABC-II**
  - Riddles
  - WJ III Gs Cluster
  - Fluency
  - Word Order
  - WJ III WM Cluster
  - CTOPP

- **KTEA-II**
  - Verbal Know.
  - Non. Wrd Dcd
  - Phon. Aware.
  - Timed Wrd Rec
  - Timed NWD
  - Atlantis
  - RAN

<table>
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<tr>
<th>Co-normed</th>
<th>= Strongest and most consistent significant relation</th>
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<tr>
<td><strong>KABC-II</strong></td>
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<tr>
<td><strong>KTEA-II</strong></td>
<td></td>
</tr>
</tbody>
</table>

Supplemental

= Consistent significant relation
The results presented in this report were compiled from tests that do not share a common norm group; however, test results have been interpreted following the cross-battery approach and integrated with data from other sources including educational records, parent/teacher interviews, behavioral observations, work samples, and other test findings to ensure ecological validity. Standardization was followed for all test administrations. No single test or procedure was used as the sole criterion for classification, eligibility or educational planning. Unless otherwise noted, the results of this evaluation are considered a reliable and valid estimate of [Student’s Name] demonstrated skills and abilities at this time.

Adapted from D. Miller (2010)
New Features in XBA3

• Expands coverage of CHC theory to include abilities represented in the expanded model (e.g., Gh-tactile abilities, Gk-kinesthetic abilities; Flanagan et al., 2010; Schneider & McGrew, 2012).
New Features in XBA3

• Includes current intelligence batteries (i.e., WJ III, WPPSI-III, WPPSI-IV, WISC-IV, SB5, KABC-II, DAS-II, and WAIS-IV)
• Includes academic achievement batteries and tests (e.g., WJ III, KTEA-II, WIAT-III, KeyMath, WRMT-3)
• Includes neuropsychological instruments (e.g., D-KEFS, NEPSY-II)
• Includes special purpose tests (e.g., speech-language tests, memory tests, phonological processing tests).
• Over 700 tests and subtests were classified according to CHC theory only or both CHC theory and neuropsychological domains (e.g., sensory-motor, visual-spatial, speed and efficiency, executive).
New Features in XBA3

• Includes inter-rater reliability statistics for the majority of new tests that were classified according to CHC theory.

• Classifies all achievement tests according to IDEA area of specific learning disability (e.g., reading decoding tests were classified as tests of *Basic Reading Skill*; math reasoning tests were classified as tests of *Math Problem Solving*).
New Features in XBA3

- Compares all cognitive and achievement tests with regard to the nature of their stimuli and task demands.

<table>
<thead>
<tr>
<th>Battery with Reading Comp Subtest</th>
<th>Cloze Format</th>
<th>Open-Ended Questions</th>
<th>Literal Questions</th>
<th>Inferential Questions</th>
<th>Examinee can Refer back to Text</th>
<th>Multiple Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAB-3</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KTEA-II</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>WJ III</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>GORT-4</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WIAT-III</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>PIAT-R/NU</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
New Features in XBA3

• Calculates all cross-battery composites in a psychometrically defensible way, using median estimates of subtest reliability and subtest intercorrelations. These estimates were derived from a comprehensive review of test manuals as well as other data sources.

• **CHC Tab calculates** composites based on a consideration of subtest reliability and subtest intercorrelations – no more averaging
New Features in XBA3

- Summarizes current research on the relations between cognitive abilities and processes and academic skills and places even greater emphasis on forming narrow CHC ability clusters given their importance in predicting academic performance.

<table>
<thead>
<tr>
<th>Gs-P</th>
<th>Perceptual Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reading Decoding</td>
</tr>
<tr>
<td></td>
<td>Math Fluency</td>
</tr>
<tr>
<td></td>
<td>Spelling</td>
</tr>
</tbody>
</table>
New Features in XBA3

• The DMIA was revised extensively. Some revisions included:
  – More test tabs for achievement tests and combinations of cognitive and achievement tests
  – CHC tab calculates clusters based on subtest reliabilities and intercorrelations
  – CHC tab drop-down menus include cognitive, achievement and neuropsychological tests
  – Includes interpretive statements
  – Easier to navigate from tab to tab
  – Produces statements regarding whether or not follow up is considered necessary in any given domain and provides a rationale
New Features in XBA3

- The *SLD Assistant* was revised extensively and renamed, *The Pattern of Strengths and Weaknesses Analyzer (PSW-A)*.

- Includes a comprehensive approach to identification of specific learning disabilities (SLD) following Flanagan and colleagues (2002, 2006, 2007, 2011, 2012) operational definition of SLD. Their definition was renamed, the *Comprehensive Pattern of Strengths and Weaknesses SLD Model (C-PSW-SLD)*.

- Includes examples of how the cross-battery approach and the C-PSW-SLD model are used within the context of various state and district criteria for SLD identification.

- Includes guidelines for and examples of linking findings of cognitive weaknesses or deficits to intervention (including educational strategies, accommodations, compensatory strategies, and curricular modifications).
New Features in XBA3

- The Culture-Language and Interpretive Matrix (C-LIM) was revised. It includes current cognitive and intelligence batteries, special purpose tests, and selected neuropsychological instruments.
New Features in XBA3

• The C-LIM now provides additional features for evaluating individuals based on varying levels of language proficiency, acculturative knowledge, and/or giftedness.

• The C-LIM also allows for an examination of cognitive performance by the influences of language or culture independently.

  – May have greater utility for speech language pathologists
How has chc theory evolved in recent years?
Rate of CHC Publications

Current and Expanded Cattell-Horn-Carroll (CHC) Model of Cognitive Abilities
(adapted from Schneider & McGrew, 2012)

- **Acquired Knowledge**
  - **Gf**
  - **Gc**
  - **Gkn**
  - **Gq**
  - **Grw**
  - **Gsm**

- **Memory and Efficiency**
  - **Glr³**
  - **Gv**
  - **Ga**
  - **Go**

- **Sensory**
  - **Gh**

- **Motor**
  - **Gp**
  - **Gk**

- **Speed and Efficiency**
  - **Gs**
  - **Gt**
  - **Gps**
Nine of the 10 CHC factors were refined by Schneider and McGrew (2012; Gq remained the same)

First, with regard to Gf, Piagetian Reasoning (RP) and Reasoning Speed (RE) were deemphasized, primarily because there is little evidence that they are distinct factors.
Second, four narrow Gc abilities (Foreign Language Proficiency [KL], Geography Achievement [A5], General Science Information [K1], and Knowledge of Culture [K2]) were moved to a different CHC broad ability, called *Domain-Specific Knowledge (Gkn)*.
Revisions and Refinements to CHC Theory

• Another refinement to Gc involved dropping the narrow ability of Oral Production and Fluency (OP) because it is difficult to distinguish it from the narrow ability of Communication Ability (CM).
Difficult to Distinguish Between OP and CM

<table>
<thead>
<tr>
<th>Oral Production and Fluency (OP)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tests of Achievement</strong></td>
</tr>
<tr>
<td>CELF-4</td>
</tr>
<tr>
<td><strong>Formulated Sentences</strong></td>
</tr>
<tr>
<td>TELD-3(^b)</td>
</tr>
<tr>
<td><strong>Expressive Language (LD)</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Communication Ability (CM)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tests of Achievement</strong></td>
</tr>
<tr>
<td>KTEA-II</td>
</tr>
<tr>
<td><strong>Oral Expression (MY)</strong></td>
</tr>
<tr>
<td>OWLS(^b)</td>
</tr>
<tr>
<td><strong>Oral Expression (OP, LD)</strong></td>
</tr>
<tr>
<td>WIAT-II</td>
</tr>
<tr>
<td><strong>Oral Expression</strong></td>
</tr>
</tbody>
</table>
Revisions and Refinements to CHC Theory

• Third, in the area of Grw
  – Verbal (Printed) Language Comprehension (V) was dropped because it appears to represent a number of different abilities (e.g., reading decoding, reading comprehension, reading speed) and, therefore, is not a distinct ability.
  – Cloze Ability (CZ) was dropped because it is not meaningfully distinct from reading comprehension (RC). Rather, CZ appears to be an alternative method of measuring reading comprehension.
  – Writing Speed (WS) was added to Grw, as this ability appears to cut across more than one broad ability (see Schneider & McGrew, 2012).
Revisions and Refinements to CHC Theory

- Fourth, several refinements were made to Glr and Gsm.
  - Learning Abilities (L1) was dropped from both Glr and Gsm. Carroll conceived of L1 as a superordinate category consisting of different kinds of long-term learning abilities.
  - Schneider and McGrew refer to L1 as “Glr-Learning Efficiency,” which includes the narrow abilities of Free Recall Memory, Associative Memory, and Meaningful Memory.
  - The remaining Glr narrow abilities are referred to as “Retrieval Fluency” abilities.
Revisions and Refinements to CHC Theory

• In the area of Gsm, the name Working Memory (MW) was changed to Working Memory Capacity, as Schneider and McGrew believe this term is more descriptive of the types of tasks that are used most frequently to measure MW (e.g., Wechsler Letter-Number Sequencing Test).

<table>
<thead>
<tr>
<th>Item</th>
<th>Correct response</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNS-Forward</td>
<td>9 - A - 6 - J - 3 - P</td>
</tr>
<tr>
<td>LNS-Reordered</td>
<td>E - 1 - R - 8 - M - 7</td>
</tr>
</tbody>
</table>
Schneider and McGrew’s Conceptualization of Gsm and Glr in Contemporary CHC Theory

Figure 4.6. Conceptual map of memory-related abilities in CHC theory.
Fifth, one refinement was made to $G_v$.

The name Spatial Relations (SR) was changed to “Speeded Rotation” (also “SR”) to more accurately describe this ability.

- Speeded Rotation is the *ability to solve problems quickly using mental rotation of simple images* (Schneider & McGrew, 2012, p. 129).

- This ability is similar to visualization because it involves rotating mental images but it is distinct because it has more to do with the speed at which mental rotation tasks can be completed (Lohman, 1996).

- Speeded Rotation tasks typically involve fairly simple images. *It is likely that the majority of tests that were classified as Spatial Relations in the past should have been classified as measures of Vz only (rather than SR, Vz).*
# Appendix B in Essentials of XBA-2

## Visual Processing (SV)

<table>
<thead>
<tr>
<th>Spatial Relations (SR)</th>
<th>Visualization (V2)</th>
<th>Visual Memory (MV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to rapidly perceive and manipulate visual patterns or to maintain orientation with respect to objects in space.</td>
<td>Ability to mentally manipulate objects or visual patterns and to “see” how they would appear under altered conditions.</td>
<td>Ability to form and store a mental representation or image of a visual stimulus and then recognize or recall it later.</td>
</tr>
<tr>
<td><strong>KABC-II</strong> 5-18</td>
<td><strong>BLOCK COUNTING (Vz)</strong> †</td>
<td><strong>RIAS</strong> 3-94</td>
</tr>
<tr>
<td><strong>KABC-II</strong> 3-6</td>
<td><strong>CONCEPTUAL THINKING (Vz)</strong> †</td>
<td><strong>UNIT</strong> 5-17</td>
</tr>
<tr>
<td><strong>KABC-II</strong> 5-6</td>
<td><strong>PATTERN REASONING (Vz)</strong> †</td>
<td><strong>OBJECT MEMORY (MV)</strong></td>
</tr>
<tr>
<td><strong>KABC-II</strong> 5-6</td>
<td><strong>STORY COMPLETION (Vz)</strong> †</td>
<td><strong>UNIT</strong> 5-17</td>
</tr>
<tr>
<td><strong>SB5</strong> 2-85</td>
<td><strong>VERBAL VISUAL-SPATIAL PROCESSING (Vz)</strong> †</td>
<td><strong>UNIT</strong> 5-17</td>
</tr>
<tr>
<td><strong>WAIS-III</strong> 16-89</td>
<td><strong>PICTURE ARRANGE (Vz)</strong> †</td>
<td><strong>SYMBOLIC MEMORY (MV)</strong></td>
</tr>
<tr>
<td><strong>WJ III</strong> 6-90+</td>
<td><strong>BLOCK ROTATION (Vz, SR)</strong></td>
<td><strong>WJ III</strong> 6-90+</td>
</tr>
<tr>
<td><strong>Leiter-R</strong> 2-18+</td>
<td><strong>FORM COMPLETION (Vz, SR)</strong></td>
<td><strong>PICTURE RECOGNITION (MV)</strong></td>
</tr>
<tr>
<td><strong>Leiter-R</strong> 2-10</td>
<td><strong>MATCHING (Vz)</strong></td>
<td><strong>WRAML2</strong> 5-85+</td>
</tr>
<tr>
<td><strong>Leiter-R</strong> 11-18+</td>
<td><strong>PAPER FOLDING (Vz)</strong></td>
<td><strong>WRAML2</strong> 5-85+</td>
</tr>
<tr>
<td><strong>NEPSY</strong> 3-12</td>
<td><strong>BLOCK CONSTRUCTION (Vz)</strong></td>
<td><strong>WRAML2</strong> 5-85+</td>
</tr>
<tr>
<td><strong>KABC-II</strong> 3-18</td>
<td><strong>TRIANGLES (SR, Vz)</strong></td>
<td><strong>KABC-II</strong> 3-5</td>
</tr>
<tr>
<td><strong>SB5</strong> 2-85</td>
<td><strong>NONVERBAL VISUAL-SPATIAL PROCESSING (SR, CS)</strong></td>
<td><strong>CMS</strong> 5-16</td>
</tr>
<tr>
<td><strong>WJ III DS</strong> 6-90+</td>
<td><strong>SPATIAL RELATIONS (SR, Vz)</strong></td>
<td><strong>DOT LOCATIONS (MV)</strong></td>
</tr>
<tr>
<td><strong>WRIT</strong> 4-85</td>
<td><strong>DIAMONDS (SR, Vz)</strong></td>
<td><strong>CMS</strong> 5-16</td>
</tr>
<tr>
<td><strong>Leiter-R</strong> 11-18+</td>
<td><strong>FIGURE ROTATION (SR, Vz)</strong></td>
<td><strong>DOT LOCATIONS 2 (MV)</strong></td>
</tr>
<tr>
<td><strong>UNIT</strong> 5-17</td>
<td><strong>CUBE DESIGN (SR, Vz)</strong></td>
<td><strong>CMS</strong> 5-16</td>
</tr>
</tbody>
</table>

## Closure Speed (CS)

<table>
<thead>
<tr>
<th>Ability to quickly combine disconnected, vague, or partially obscured visual stimuli or patterns into a meaningful whole, without knowing in advance what the pattern is.</th>
<th>Spatial Scanning (SS)</th>
<th>Flexibility of Closure (CF)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KABC-II</strong> 3-18</td>
<td><strong>GESTALT CLOSURE (CS)</strong></td>
<td><strong>CAS</strong> 5-17</td>
</tr>
<tr>
<td><strong>WJ III DS</strong> 6-90+</td>
<td><strong>VISUAL CLOSURE (CS)</strong></td>
<td><strong>WECH</strong> 4-89</td>
</tr>
<tr>
<td><strong>WAIS-III</strong> 19-89</td>
<td><strong>OBJECT ASSEMBLY (CS, SR)</strong></td>
<td><strong>WJ III DS</strong> 6-90+</td>
</tr>
<tr>
<td><strong>WPPSI-III</strong> 2-7</td>
<td><strong>OBJECT ASSEMBLY (CS, SR)</strong></td>
<td><strong>Leiter-R</strong> 2-18+</td>
</tr>
<tr>
<td><strong>KABC-II</strong> 5-18</td>
<td><strong>ROVER (SS)</strong> †</td>
<td><strong>FIGURE MEMORY (CF, MV)</strong></td>
</tr>
<tr>
<td><strong>WJ III</strong> 6-90+</td>
<td><strong>PLANNING (SS)</strong> †</td>
<td><strong>FIGURE COMPLET (CF)</strong> †</td>
</tr>
<tr>
<td><strong>UNIT</strong> 5-17</td>
<td><strong>Mazes (SS)</strong></td>
<td><strong>WJ III DS</strong> 6-90+</td>
</tr>
<tr>
<td><strong>NEPSY</strong> 5-12</td>
<td><strong>ROUTEFINDING (SS)</strong></td>
<td><strong>Leiter-R</strong> 2-18+</td>
</tr>
</tbody>
</table>

## Spatial Scanning (SS)

| Ability to accurately and quickly survey a spatial field or pattern and identify a path through the visual field or pattern. | | |
|-------------------------------------------------| | |
| **KABC-II** 5-18 | **GESTALT CLOSURE (CS)** | **CAS** 5-17 |
| **WJ III DS** 6-90+ | **VISUAL CLOSURE (CS)** | **WECH** 4-89 |
| **WAIS-III** 19-89 | **OBJECT ASSEMBLY (CS, SR)** | **WJ III DS** 6-90+ |
| **WPPSI-III** 2-7 | **OBJECT ASSEMBLY (CS, SR)** | **Leiter-R** 2-18+ |
| **KABC-II** 5-18 | **ROVER (SS)** † | **FIGURE MEMORY (CF, MV)** |
| **WJ III** 6-90+ | **PLANNING (SS)** † | **FIGURE COMPLET (CF)** † |
| **UNIT** 5-17 | **Mazes (SS)** | **WJ III DS** 6-90+ |
| **NEPSY** 5-12 | **ROUTEFINDING (SS)** | **Leiter-R** 2-18+ |

## Flexibility of Closure (CF)

| Ability to identify a visual figure or pattern embedded in a complex visual array, when knowing in advance what the pattern is. | | |
|-------------------------------------------------| | |
| **KABC-II** 5-18 | **GESTALT CLOSURE (CS)** | **CAS** 5-17 |
| **WJ III DS** 6-90+ | **VISUAL CLOSURE (CS)** | **WECH** 4-89 |
| **WAIS-III** 19-89 | **OBJECT ASSEMBLY (CS, SR)** | **WJ III DS** 6-90+ |
| **WPPSI-III** 2-7 | **OBJECT ASSEMBLY (CS, SR)** | **Leiter-R** 2-18+ |
| **KABC-II** 5-18 | **ROVER (SS)** † | **FIGURE MEMORY (CF, MV)** |
| **WJ III** 6-90+ | **PLANNING (SS)** † | **FIGURE COMPLET (CF)** † |
| **UNIT** 5-17 | **Mazes (SS)** | **WJ III DS** 6-90+ |
| **NEPSY** 5-12 | **ROUTEFINDING (SS)** | **Leiter-R** 2-18+ |

What's Missing (CF, Oc-KO)
Revisions and Refinements to CHC Theory

• Sixth, in the area of Ga, Temporal Tracking (UK) was dropped because these tasks are thought to measure Attentional Control within working memory.

• Six additional narrow Ga were dropped because they are considered to represent sensory acuity factors, which fall outside the scope of CHC theory (Schneider & McGrew)
  – General Sound Discrimination [U3], Sound-Intensity/Duration Discrimination [U6], Sound-Frequency Discrimination [U5], and Hearing and Speech Threshold [UA, UT, UU]
Questions About Auditory Attention

• Auditory Attention on WJ III (current classification is US/U3, UR)

• **Now** - Resistance to auditory stimulus distortion (UR): *The ability to hear words correctly even under conditions of distortion or loud background noise.* It is not yet clear to what degree this ability depends on sensory acuity. As people age, they tend to complain that they have greater difficulty understanding speech in noisy public places or on a telephone with background noise. Speaking louder usually helps them understand better.
Revisions and Refinements to CHC Theory

• Seventh, in the area of **Gs**, Reading Speed (RS) and Writing Speed (WS) were added (also listed under Grw)
  – Reading and writing speed demand quick, accurate performance and, therefore, are measures of Gs.

• The narrow Gs ability of Semantic Processing Speed (R4) was moved to Gt and Inspection Time (IT) was added to Gt.
Revisions and Refinements to CHC Theory

- **Six broad abilities were added** to CHC theory (McGrew, 2005; Schneider & McGrew, 2012)
  - General (Domain-Specific) Knowledge (Gkn)
  - Olfactory Abilities (Go)
  - Tactile Abilities (Gh)
  - Psychomotor Abilities (Gp)
  - Kinesthetic Abilities (Gk)
  - Psychomotor Speed (Gps)

- Common cognitive and intelligence batteries do not measure these abilities directly (e.g., they don’t contribute much to prediction of achievement)
Revisions and Refinements to CHC Theory

• Many of these broad abilities appear to be assessed by neuropsychological instruments
  – Intention is to understand the sensory and motor manifestations of typical and atypical fine and gross motor development, traumatic brain injury, and other neurologically-based disorders.

• With rare exception, there do not appear to be any commercially published and commonly used intelligence or neuropsychological batteries that measure Go, Gt, or Gps.
The CHC Model Has Been Expanded But Not the Tests
<table>
<thead>
<tr>
<th></th>
<th>Gf</th>
<th>Gc</th>
<th>Gv</th>
<th>Gsm</th>
<th>Glr</th>
<th>Ga</th>
<th>Gs</th>
</tr>
</thead>
<tbody>
<tr>
<td>WISC-IV</td>
<td>Matrix Reasoning (I) Picture Concepts (RL, Grw-MW, Gq-A3)</td>
<td>Vocabulary (VL, K0) Information (K0) Similarities (VL, Gl, Gf) Comprehension (K0) Word Reasoning (VL, Gf)</td>
<td>Block Design (Vz) Picture Completion (CF, Gc-K0)</td>
<td>Digit Span (MS, MW) Letter-Number Sequencing (MW)</td>
<td>Not measured</td>
<td>Not measured</td>
<td>Use WIAT-III</td>
</tr>
<tr>
<td>WAIS-IV</td>
<td>Matrix Reasoning (I) Arithmetic (RL, Grw-MW, Gq-A3) Figure Weights (RQ)</td>
<td>Vocabulary (VL, K0) Information (K0) Similarities (VL, Gl, Gf) Comprehension (K0)</td>
<td>Block Design (Vz) Picture Completion (CF, Gc-K0) Visual Puzzles (Vz)</td>
<td>Not measured</td>
<td>Not measured</td>
<td>Use WIAT-III</td>
<td>Not measured</td>
</tr>
<tr>
<td>WPPSI-III</td>
<td>Pattern Reasoning (I) Story Completion (RO, Gc-K0)</td>
<td>Expressive Vocabulary (VL, K0) Verbal Knowledge (VL, K0) Riddles (VL, Gf)</td>
<td>Face Recognition (MV)</td>
<td></td>
<td>Not measured</td>
<td>Not measured</td>
<td>Use WIAT-III</td>
</tr>
<tr>
<td>KABC-II</td>
<td>Concept Formation (I) Analysis Synthesis (RG)</td>
<td>Verbal Comprehension (VL, Gl) General Information (K0)</td>
<td>Spatial Relations (Vz) Picture Recognition (MV) Planning (SS, Gl), Gf)</td>
<td>Number Recall (MS) Word Order (MS), MW Hand Movements (MS, Gs-MV)</td>
<td></td>
<td></td>
<td>Use KTEA-II</td>
</tr>
<tr>
<td>WJ III</td>
<td>Nonverbal Fluid Reasoning (I) Oral Language Reasoning (I, RO, Gc-K0) Nonverbal Quantitative Reasoning (RL, Gq-A3)</td>
<td>Nonverbal Knowledge (K0, LS, Gf-RG) Verbal Knowledge (VL, K0)</td>
<td>Nonverbal Visual-Spatial Processing (Vz) Verbal Visual-Spatial Processing (Vz, Gr-VL, K0)</td>
<td></td>
<td>Not measured</td>
<td></td>
<td>Not measured</td>
</tr>
<tr>
<td>DAS-II</td>
<td>Matrix Reasoning (I) Picture Concepts (Vz, Gl, Gf) Naming Vocabulary (VL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Speed of Information Processing (P)</td>
</tr>
</tbody>
</table>

1Pattern Reasoning appears to be a measure of Gv-Vz only at ages 5-6 years.
2Go-K0 appears to be the primary ability measured by Story Completion at ages 5-6 years. At older ages (i.e., ages 7+), the primary ability measured by Story Completion appears to be Gf-RG.
Next Generation of Cognitive Tests

• Better measurement of Narrow CHC Abilities

• Bridge CHC and neuropsychological theories
  – KABC-II

• Greater attention paid to Executive Functioning
  – “Essentials of Executive Functioning” by George McCloskey coming soon

• More computerized assessment
Next Generation of Cognitive Tests

• BETTER DIAGNOSTIC TOOLS
  – Drill down and understand disorders more precisely (e.g., subtypes)
  – Make better connections between disorder and treatment/intervention
Subtypes of Reading Disability

- **Dysphonetic Dyslexia** – difficulty sounding out words in a phonological manner

- **Surface Dyslexia** – difficulty with the rapid and automatic recognition of words in print

- **Mixed Dyslexia** – multiple reading deficits characterized by impaired phonological and orthographic processing skills. It is probably the most severe form of dyslexia.

- **Comprehension Deficits** – the mechanical side of reading is fine but difficulty persists deriving meaning from print

  - *(Ga-Phonetic Coding; Gsm-Memory Span, Working Memory)*

  - *(Glr-Naming Facility; Gv-Orthographic Processing; Gs-Perceptual Speed; Gc-Vocabulary Knowledge)*

  - *(Multiple CHC abilities or processes involved; attention and executive functioning)*

  - *(Gf-Induction, General Sequential Reasoning; Gc-Language Development; attention and executive functioning)*

---

Predicting the 4 Subtypes of Reading Disability

**Criterion DVs**
- Dysphonetic Dyslexia
- Surface Dyslexia
- Mixed Dyslexia
- Comprehension Deficits

<table>
<thead>
<tr>
<th>Gf</th>
<th>Gc</th>
<th>Gv</th>
<th>Ga</th>
<th>Gsm</th>
<th>Glr</th>
<th>Gs</th>
<th>etc</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PC</th>
<th>NA</th>
<th>OrthP</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>VM</th>
<th>PC</th>
<th>NA</th>
<th>OrthP</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>I,RG</th>
<th>LD,MY</th>
<th>VM</th>
<th>MW</th>
<th>EF, AC</th>
</tr>
</thead>
</table>

= most likely a strong predictor
= most likely a moderate predictor
= most likely non-significant

**Note:** four subtypes from Feifer (2011); identification of IVs from Flanagan
Correspondence Between Diagnosis and Treatment

As syndromes/disorders become more discretely defined, there may be a greater correspondence between diagnoses and treatment.

Kratochwill and McGivern's (1996; p. 351)
<table>
<thead>
<tr>
<th>Subtype</th>
<th>Brain relationship</th>
<th>Description of Disorder²</th>
<th>Norm-based Measures for Identification</th>
<th>CHC and Neuropsychological Process involvedδ</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysphonetic Dyslexia</td>
<td>Supramarginal gyrus, located at the juncture of the temporal and parietal lobes¹</td>
<td>Difficulty sounding out words in a phonological manner; inability to use phonological route to bridge letters and sounds; over-reliance on visual or orthographic cues; tend to guess on words based on initial letters observed; typically memorize whole words</td>
<td>Letter-Word Identification; Word Attack; Reading Decoding</td>
<td>Ga – PC: A, PC:S Gsm</td>
<td>Intervention should include an explicit phonological approach</td>
</tr>
<tr>
<td>Surface Dyslexia</td>
<td>Left fusiform gyrus³</td>
<td>Difficulty with the rapid and automatic recognition of words in print; can sound out words, but cannot recognize words in print automatically and effortlessly; letter-by-letter and sound-by-sound readers; over-reliance on phonological properties and underappreciation of orthographic or spatial properties of the word; reading is slow and laborious</td>
<td>Test of Silent Word Reading Fluency (TOSWRF); Test of Orthographic Competence (TOC)</td>
<td>Gv – VM Orthographic Processing Glr – NA Gc – VL</td>
<td>Intervention should focus on automaticity and fluency goals (not necessarily an explicit phonological approach)</td>
</tr>
</tbody>
</table>
## Measures and Processes involved suggested by Flanagan

<table>
<thead>
<tr>
<th>Subtype</th>
<th>Brain relationship</th>
<th>Description of Disorder</th>
<th>Norm-based Measures for Identification</th>
<th>CHC and Neuropsychological Process involved</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed Dyslexia</td>
<td>Show weaker modulatory effects from the left fusiform gyrus to the left inferior parietal lobes, suggesting deficits integrating both the phonological representation and orthographical representation of words</td>
<td>Multiple reading deficits characterized by impaired phonological and orthographic processing skills. Most likely the most severe form of dyslexia; characterized by a combination of poor phonological processing skills, slower rapid and automatic word recognition skills, inconsistent language comprehension skills; bizarre error patterns in reading; <em>double-deficit.</em></td>
<td>Combination of tests for two previous subtypes</td>
<td>Ga – PC: A, PC:S, Gv – VM, Orthographic Processing, Gf – NA, Gsm, Gc – VL</td>
<td>Intervention should incorporate a <em>balanced literacy</em> approach</td>
</tr>
<tr>
<td>Comprehension</td>
<td>The brain’s <em>executive attention network</em> – modulated primarily by the anterior cingulate gyrus in the frontal lobes</td>
<td>The mechanical side of reading is fine, but difficulty deriving meaning from print</td>
<td>D-KEFS, BRIEF, NEPSY-II, Tests of MW, Language skills assessment</td>
<td>Executive Functioning Gf – I, RG, Gsm – MW, Gc – VL, KO, MY, Attention</td>
<td></td>
</tr>
</tbody>
</table>
When Progress Monitoring Data are not enough:
Application of chc theory and research in the schools
What is the School Psychologist’s Goal When Working With Students With Significant Learning Difficulties and Skill Deficiencies?

• Identify targets for remediation and determine what the student needs to improve academically
Letter Naming Fluency – one minute probe; KS score likely spurious due to unreliability of the measure (or some other factor); he knows his letters (see KTEA-II Letter-Word Identification) and has demonstrated that he can name them quickly.
<table>
<thead>
<tr>
<th>Item</th>
<th>Score</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

- KTEA-II Letter & Word Recognition
- Recognizes all letters
- Demonstrated in K that he can say the letters quickly
- KS LNF score is not indicative of true performance
Progress Monitoring Results

Letter Sound Fluency – OK

Phoneme Segmentation Fluency – OK (segment 3 to 4 phoneme words into individual phonemes in one minute)

Nonsense Word Fluency – perhaps a different evaluator (at KS and 1F). KS performance is unlikely because Johnny cannot read (see Nonsense Word Decoding on KTEA-II)
<table>
<thead>
<tr>
<th>Item</th>
<th>Score</th>
<th>Response</th>
<th>Scored</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>1</td>
<td>ip</td>
<td>✓</td>
<td>ip</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>mab</td>
<td></td>
<td>māb</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>fap</td>
<td></td>
<td>fāp</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>zib</td>
<td></td>
<td>zīb</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>fask</td>
<td></td>
<td>fās k</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>blex</td>
<td>✓</td>
<td>błęks</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>hapt</td>
<td></td>
<td>hält</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>rel</td>
<td>✓</td>
<td>rel</td>
</tr>
</tbody>
</table>

- **KTEA-II Nonsense Word Decoding** performance is consistent with 1F NWF.
- Both performances call into question the KS NWF performance.
Reading - CBM

- Assessed Johnny’s accuracy and speed of reading grade level text
- **Was accuracy impacted by his articulation difficulties?** He substitutes “d” for “g”, “w” for “l” (wov instead of love), “bw for bl”, “fw for fl”, “gw for gl” (gwass instead of glass), “pw for kl”, “pw for pi”, “sw for sl”, “f for th”, and “d for th”.

---

![Box plot comparing Johnny's reading accuracy over the spring and late fall term, with details on his articulation errors.]
Johnny's R-CBM is consistent with his performance on the KTEA-II Letter & Word Recognition Test.
Ehri’s Phases of Word Reading

• **Pre-Alphabetic** (e.g., when a child says “that says stop!” when they see a red octagonal traffic sign, but cannot read the word “stop” in isolation)

• **Partial-Alphabetic**
  - Understand that there is a relationship between letters and sounds
  - Rely on beginning and ending sounds so they continue to make errors in reading words (e.g., reading “bank” as “book” or “bake” or “belt”)

<table>
<thead>
<tr>
<th></th>
<th>19</th>
<th>20</th>
<th>21</th>
<th>22</th>
<th>23</th>
<th>24</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

\[\text{on} \quad \text{it} \quad \text{be} \quad \text{was} \quad \text{apple} \quad \text{that} \]
Ehri’s Phases of Word Reading

- **Fully Alphabetic Phase** – students are able to sound out words successfully
  - They know the sound-symbol connections and move from guessing a word from the first or last letter to complete word decoding **sound by sound**. (e.g., /b/ /a/ /n/ /k/)
  - When they see the same word more than a few times, then that word becomes automatically recognized.
  - As more and more words become “sight” words, students move into the **consolidated alphabetic phase** (e.g., /b/ /ank/)

- There is an assumption that Johnny is **AT the fully alphabetic phase**. He is not. Therefore, **developing this phase of reading should be the immediate goal for reading intervention**.
Evaluation of Gc – VL (Looking for an Exact Word)

- DAS-II Naming Vocabulary = 79
- CELF-4 Expressive Vocabulary = 75
Evaluation of Gc – VL (Looking for a Definition of a Word)

- DAS-II Word Definitions = 90

<table>
<thead>
<tr>
<th>Item</th>
<th>Response</th>
<th>0-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Scissors</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Bed</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Tiny</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Travel</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Crash, you crash into somebody when not looking</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Disappear</td>
<td>0</td>
</tr>
<tr>
<td>7</td>
<td>Prize</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>Discover</td>
<td>0</td>
</tr>
<tr>
<td>9</td>
<td>Collect</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>Hide</td>
<td></td>
</tr>
</tbody>
</table>

Broader parameters; Can give enough information to show understanding.
TOLD: P-3 Oral Vocabulary = 70  (Scoring more stringent in this tests as compared to DAS-II Word Definitions)

2. apple  
   * can put caramel on it*  
   
   *One point = a fruit; or Two of the following:* red, yellow, or green; grows on a tree; has a core, skin, stem; get juice from it; crunchy when you bite it; round; food; something you eat  
   *No point = give it to a teacher; gets rotten, a pie*

5. cow  
   *One point = a bovine, a heifer, a beef, female moose, buffalo, elephant, etc.; or Two of the following:* gives milk, a calf, has horns, has udders, part of a herd, where it lives (e.g., a ranch, farm, barn), goes "moo," killed for meat, an animal, the "wife of a bull," something it eats (e.g., hay, grass)  
   *Note: If the child confuses the stimulus word with a response word.*

7. ocean  
   *can dive where it's really deep, can take you back*  
   *One point = a large body of salt water, a sea; or Two of the following:* has waves, you surf on it, salty, swim in it, lots of water, names a specific sea (e.g., Atlantic, Pacific), has sand on the bottom, ships/boats go on it, has land all around it, gives various forms of sea life (e.g., flounder, perch, crabs, oysters)  
   *No point = you can go to the ocean, alligators live in it, has water*

8. face  
   *like you can get mad at somebody*  
   *One point = the front part of the head, to confront; or Two of the following:* cheeks, beard, you wash it, part of the body, has eyes, has nose, has mouth, has forehead, has lips, has chin, has lashes, has eyebrows, it can smile, it can frown, it's pretty, something on your head  
   *No point = people love them, has ears, points to face, you smell with it, talk with it, see with it*
<table>
<thead>
<tr>
<th>DAS-II Word Definitions</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOLD-P:3 Oral Vocabulary</td>
<td>70</td>
</tr>
</tbody>
</table>

- Same task; same quality of responses; very different scores

Johnny’s vocabulary knowledge appears to be more consistent with the DAS-II estimate
Evaluation of Gc with Reasoning Component: CELF-4 Word Classes Receptive (55) and Expressive (60)

<table>
<thead>
<tr>
<th>Demo</th>
<th>Trial 1</th>
<th>Trial 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>puppy</td>
<td>a) horn</td>
<td>a) cat</td>
</tr>
<tr>
<td>b) frog</td>
<td>b) drum</td>
<td>b) whiskers</td>
</tr>
<tr>
<td>c) dog</td>
<td>c) sign</td>
<td>c) nest</td>
</tr>
<tr>
<td>puppy is a young/baby dog</td>
<td>musical instruments, play them, make sound/music, used in a band</td>
<td>cats have whiskers, whiskers are part of a cat</td>
</tr>
</tbody>
</table>

1. a) egg  b) apple  c) banana
   they are fruit

2. a) candle  b) apple  c) flashlight
   give/make light, use them to see in the dark

3. a) slide  b) swing  c) flag
   things/equipment on a playground/park, play on them, together on a play set

4. a) pen  b) bottle  c) rattle
   babies use these

5. a) butterfly  b) caterpillar  c) kitten
   caterpillar turns into a butterfly

6. a) pink  b) circle  c) square

<table>
<thead>
<tr>
<th>Receptive Score</th>
<th>Expressive Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 0</td>
<td>1 0</td>
</tr>
<tr>
<td>1 0</td>
<td>1 0</td>
</tr>
<tr>
<td>1 0</td>
<td>1 0</td>
</tr>
<tr>
<td>1 0</td>
<td>1 0</td>
</tr>
</tbody>
</table>

Very Deficient in Ability to Reason with Words
Evaluation of Gc with Reasoning Component: TOLD-P:3
Relational Vocabulary (65)

3. a glass and a cup
   One point: to drink from them, hold liquid/beverages, drinking utensils
   Query: things to hold

4. a book and a newspaper
   One point: you read them, reading materials/matter, publications, readable
   Query: contain information, letters/words, news/information

5. an oven and a grill
   One point: used to cook food, you cook on them
   Query: heat

6. a penny and a dime
   One point: coins, change, currency, money, you spend them, mediums of exchange, have heads and tails
   Query: made of metal

7. red and yellow
   Query: red you can like, yellow you can like

8. a rose and a daisy
   One point: flowers
   Query: smell sweet, have petals
Evaluation of Gc – LS, LD, MY

- Listening Ability – Ability to Comprehend Oral Communication
- Language Development – General development or the understanding of words, sentences and paragraphs (not requiring reading) in spoken native language.
- Grammatical Sensitivity – Knowledge or awareness of the grammatical features of the native language

-- CELF-4
  - Concepts & Following Directions (LD) = 70 (point to the ball first and the car second)
  - Sentence Structure (LD, LS) = 55 (point to picture that best depicts sentence stated by examiner)
  - Word Structure (MY, LS) = 75

-- TOLD-P:3
  - Grammatic Understanding (LD, LS) = 55 (same task as Sentence Structure)
  - Grammatic Completion (MY, LS) = 60 (same task as Word Structure)
Evaluation of Gc – OP, CM

- Ability to communicate meaningful information (CELF-4, Formulating Sentences = 60)

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>gave</td>
<td>Gave are eating</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>never</td>
<td>Never touch a dog when they're not your parents</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>finally</td>
<td>Finally I brought my paper in</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>running</td>
<td>Running in a lap</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>9.</td>
<td>longest</td>
<td>Longest dog</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>10.</td>
<td>best</td>
<td>Best friend</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>11.</td>
<td>third</td>
<td>Third best friend</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>12.</td>
<td>quickly</td>
<td>Quickly going outside</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>13.</td>
<td>if</td>
<td>If that's my bus</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>14.</td>
<td>and</td>
<td>And this is my cat</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>15.</td>
<td>before</td>
<td>Before the lady comes and gets some food</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>16.</td>
<td>because</td>
<td>Because you can't pass this road</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>17.</td>
<td>instead</td>
<td>Instead I want this book</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>18.</td>
<td>unless</td>
<td>Unless we have to go to baseball class</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
Overall Evaluation of Gc

• **Gc-LS, LD** – Deficient (receptive; corroborated by other receptive language tests)

• **Gc-OP, CM** – Deficient (expressive; corroborated by other expressive language tests)

• **Gc-MY** – Deficient (grammatical features of the language; as evidenced on two subtests)
  – Qualitatively different aspects of Gc are deficient; suggestive of a more pervasive language impairment

• **Gc-VL** – Within Normal Limits – with broad parameters for task; relative strength
Gc Information from Johnny’s Report

- Should take into account Gc performance on CELF-4 and TOLD-P:3 when evaluating this construct.

<table>
<thead>
<tr>
<th>Broad Ability/Subtest</th>
<th>Standard Score</th>
<th>%ile Rank</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crystallized Intelligence</td>
<td>86*</td>
<td>18</td>
<td>Low Average/Within Normal Limits</td>
</tr>
<tr>
<td>DAS-II Verbal Comprehension</td>
<td>88</td>
<td>21</td>
<td>Low Average</td>
</tr>
<tr>
<td>DAS-II Naming Vocabulary</td>
<td>79</td>
<td>8</td>
<td>Below Average</td>
</tr>
<tr>
<td>DAS-II Word Definitions</td>
<td>90</td>
<td>25</td>
<td>Average</td>
</tr>
</tbody>
</table>

- Gc may appear ok from DAS-II VC and WD subtests.
- But there are about 10 Gc tests from the Language batteries on which Johnny scored well below average.
Gc and Reading Achievement

Johnny demonstrates a Below Average Gc – Reading Consistency

Both areas are in need of **intensive** remedial interventions

<table>
<thead>
<tr>
<th>Subtest/Composite</th>
<th>Standard Score</th>
<th>%ile Rank</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading Composite</td>
<td>76</td>
<td>5</td>
<td>Significantly Below Average</td>
</tr>
<tr>
<td>Decoding Composite</td>
<td>78</td>
<td>7</td>
<td>Below Average</td>
</tr>
<tr>
<td>Letter &amp; Word Recognition</td>
<td>82</td>
<td>12</td>
<td>Below Average</td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td>75</td>
<td>5</td>
<td>Significantly Below Average</td>
</tr>
<tr>
<td>Nonsense Word Decoding</td>
<td>85</td>
<td>16</td>
<td>Low Average</td>
</tr>
</tbody>
</table>
Evaluation of Gc also Suggested a Word Retrieval Problem – Let’s Look at Glr (Naming Facility or NA)

- **DAS-II Rapid Naming** (no score reported – Johnny unable to learn how to complete the task)

<table>
<thead>
<tr>
<th>Item 1</th>
<th>brown</th>
<th>red</th>
<th>yellow</th>
<th>blue</th>
<th>green</th>
<th>red</th>
<th>orange</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>orange</td>
<td>green</td>
<td>brown</td>
<td>yellow</td>
<td>orange</td>
<td>blue</td>
<td>red</td>
</tr>
<tr>
<td></td>
<td>blue</td>
<td>yellow</td>
<td>red</td>
<td>green</td>
<td>blue</td>
<td>yellow</td>
<td>brown</td>
</tr>
<tr>
<td></td>
<td>blue</td>
<td>yellow</td>
<td>brown</td>
<td>blue</td>
<td>red</td>
<td>orange</td>
<td>brown</td>
</tr>
</tbody>
</table>

Completion Time (seconds) 42 / 120
Number Correct 33 / 35

*Use the table on the top of the next page to determine the Converted Raw Score.*
Let’s Look at Glr (NA)

- WJ III Rapid Picture Naming (SS= 71)

- “weak awareness of how he is doing”

- “has trouble staying with rows; tends to skip or move between rows”
Glr – Free Recall Memory (M6)

- DAS-II Recall of Objects Immediate (SS= 78)
- It is likely that some of these words are not in Johnny’s lexicon (Gc)
- Without hearing the words more than once, verbal encoding was not possible
- Use of strategies, such as semantic clustering (retrieval of all animals first, followed by vehicles, etc.), requires good Gc (and Gf)
- Johnny did not appear to use any strategy, although by the third trial, the three words he recalled began with “b” and he added a “b” word that was not on the list
- General difficulty with word retrieval adversely impacted his performance on this task
Rapid Naming Tests

- Progress monitoring probes (e.g., Letter Naming Fluency; Letter Sound Fluency) – Within average range for grade
- DAS-II Rapid Naming – Difficulty performing task; no score
- WJ III Rapid Picture Naming – Well below average
- Retrieval is aided when material is very familiar (over learned)
- Johnny will need explicit instruction on how to make associations, will require multiple types of associations for a given word, and will need much repetition to ensure adequate encoding – Note that Associative Memory was not assessed
Relation between NA and Reading

• The relationship between $Gl_r$-NA and basic reading skills is well documented

• A measure of MA would have helped

• Johnny needs frequent progress monitoring to ensure that the interventions he is receiving (designed to improve his fluency) are effective
How is Johnny’s Gsm?

- DAS-II Recall of Digits Forward (MS) – 87
- DAS-II Recall of Digits Backward (MW) – 93
  - Average is 90
- CELF-4 Number Repetition (Forward – 11; Backwards – 8)
  - Average is 100
- Numbers 1-9 are over learned and predictable
  - Under these circumstances, verbal auditory memory is average
How is Johnny’s Gsm?

- DAS-II Recall of Sequential Order (MW) – 70

- **Sequence**: Toes, Shoulders, Knees; **Response**: Shoulders, Knees, Toes

  – Significantly below average
DAS-II Recall of Sequential Order (70)

- What do you notice about Johnny’s responses?
- You know more about his MS than his MW

<table>
<thead>
<tr>
<th>Item</th>
<th>Stimulus</th>
<th>Correct Response Order</th>
<th>Response</th>
<th>Score 0-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mouth, nose</td>
<td>Nose, mouth</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Hand, hair</td>
<td>Hair, hand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Foot, hand</td>
<td>Hand, foot</td>
<td>✓</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Chin, nose</td>
<td>Nose, chin</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>Eyes, shoulder</td>
<td>Eyes, shoulder</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Mouth, hair</td>
<td>Hair, mouth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Hand, foot, mouth</td>
<td>Mouth, hand, foot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Shoulder, nose, knee</td>
<td>Nose, shoulder, knee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Foot, eyes, hair</td>
<td>Hair, eyes, foot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Elbow, chin, hand</td>
<td>Chin, elbow, hand</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Understanding “Highest” and “Lowest”

If the child has demonstrated understanding of the concepts “highest” and “lowest,” proceed to Sample D.

If the child does not understand these concepts, do not administer this subtest.
How is Johnny’s Gsm?

• TOLD-P:3 Sentence Imitation – 75

<table>
<thead>
<tr>
<th>Item</th>
<th>Score</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>3</td>
<td>The boy fell and hurt himself.</td>
</tr>
<tr>
<td>5.</td>
<td>2</td>
<td>Because he was tired, he had to leave the party.</td>
</tr>
<tr>
<td>6.</td>
<td>1</td>
<td>Have the people been helped by the king?</td>
</tr>
<tr>
<td>7.</td>
<td>0</td>
<td>Weren’t the boys chased by the policeman?</td>
</tr>
<tr>
<td>8.</td>
<td>3</td>
<td>Those women aren’t baking cakes.</td>
</tr>
<tr>
<td>9.</td>
<td>2</td>
<td>She didn’t believe he liked her.</td>
</tr>
<tr>
<td>10.</td>
<td>1</td>
<td>Here is a picture that you should see.</td>
</tr>
</tbody>
</table>

• CELF-4 Recalling Sentences – 85

• Performance aided by good Gc and visualization (facilitator/inhibitor)
<table>
<thead>
<tr>
<th>Nature of Stimuli</th>
<th>Sequencing Demands</th>
<th>Modality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meaningful</td>
<td>Immediate Recall</td>
<td>Auditory aided by Gc and visualization</td>
</tr>
<tr>
<td></td>
<td>and Reverse Sequence and recall</td>
<td></td>
</tr>
<tr>
<td>Recall of Digits F &amp; B 87, 90, 93, 105</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sentence Repetition 75, 85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recall of Sequential Order 70</td>
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<td></td>
</tr>
</tbody>
</table>

*WISC-IV Letter-Number Sequencing
Evaluation of Ga-PC

- CTOPP Blending Words – 90
- CTOPP Sound Matching – 85

Tasks involve immediate memory

1. Which word starts with the same sound as pan? pig, hat, or cone? pig
2. Which word starts with the same sound as duck? run, kick, or dice? dice
3. Which word starts with the same sound as fan? fire, can, or sack? fire

4. Which word starts with the same sound as man? cat, fin, or mouse? mouse
5. Which word starts with the same sound as love? dive, light, or tub? light
6. Which word starts with the same sound as nap? tape, net, or man? net
7. Which word starts with the same sound as bag? bone, dad, or pig? bone
8. Which word starts with the same sound as rain? tape, line, or rope? rope
9. Which word starts with the same sound as house? mice, ham, or couch? ham

- Seems to have switched to end sound
  - There’s a pattern to his errors
  - Consistent with what he knows (beginning and end sounds in words)
Evaluation of Ga-PC

CTOPP Elision – 75 (requires MW; too cognitively demanding)

PRACTICE ITEMS:

a. Say toothbrush. Now say toothbrush without saying tooth. brush
   If correct say, “That’s right. Let’s try the next one.”
   If incorrect say, “That’s not quite right. Toothbrush without saying tooth is brush.”

b. Say airplane. Now say airplane without saying plane. air
   nut
c. Say doughnut. Now say doughnut without saying dough. doon

TEST ITEMS: Continue to give correct/incorrect feedback as before. Say, “Let’s try some more.”

1. Say popcorn. Now say popcorn without saying corn. pop
   ball
2. Say baseball. Now say baseball without saying base. spy
3. Say spider. Now say spider without saying der. base
   spider

Correct Response

PRACTICE ITEMS: Say, “Okay, now let’s try some where we take away smaller parts of the words.” Continue to give correct/incorrect feedback. Use the phoneme, not the letter name (e.g., /k/ is the sound of k).

4. Say cup. Now say cup without saying /k/. up
   me
5. Say farm. Now say farm without saying /f/. old
   at

TEST ITEMS: Continue to give correct/incorrect feedback as before.

4. Say bold. Now say bold without saying /b/. bold
   at

Score (1/0)

REMAINING TEST ITEMS: Provide no feedback on remaining items.
Evaluation of Ga-PC

- CTOPP Performance plus progress monitoring data plus sound matching (described as strength by K teacher)

<table>
<thead>
<tr>
<th>Auditory Processing</th>
<th>88*</th>
<th>21</th>
<th>Low Average/Within Normal Limits</th>
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</thead>
<tbody>
<tr>
<td>CTOPP Elision (Outlier)</td>
<td>75</td>
<td>5</td>
<td>Significantly Below Average</td>
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<tr>
<td>CTOPP Blending Words</td>
<td>90</td>
<td>25</td>
<td>Average</td>
</tr>
<tr>
<td>CTOPP Sound Matching</td>
<td>85</td>
<td>16</td>
<td>Average</td>
</tr>
</tbody>
</table>

- Continued phonological processing interventions are necessary and must significantly reduce working memory demands
Summary of Classroom Observation

• Johnny was observed in his first grade classroom by the Speech Language Pathologist
• During the observation, students were working in their journals independently and participating in Calendar Math, weather review, and a movement/music activity.
• Johny had a hard time getting started on his writing assignment independently. When his teacher prompted him, he said he didn’t know what to write about.
Johnny “didn’t know what to write about”

- Fan, dog, he, book
- Can Johnny work in his journal independently?
- Johnny doesn’t have the skills to write in a journal
The observer also prompted him by encouraging him to draw pictures about their upcoming field trip to a dairy farm and she gave him several examples of what he might draw. When she asked him what he was going to draw, he stated that he was going to draw a “monster truck” and “hot lava.” Johnny wrote several letters on his paper and began copying another student’s name from the wall.
Johnny wants to Write But he Doesn’t Have the Skills

• He is at this level

1. PONY
2. GAME
3. BA-
4. STA-

• “I Miss Home”
Johnny wants to Write But he Doesn’t Have the Skills

• Recommendation in report:
  – “Johnny should work on improving his reading accuracy and reading speed”
Increase Oral Language Skills

• Speech Language Therapy
Teach Phonological Awareness – Move from Partial Alphabetic Phase to Fully Alphabetic Phase
How to use Elkonin Boxes

1. Pronounce a target word slowly, stretching it out by sound.
2. Ask the child to repeat the word.
3. Draw "boxes" or squares on a piece of paper, chalkboard, or dry erase board with one box for each syllable or phoneme.
4. Have the child count the number of phonemes in the word, not necessarily the number of letters. For example, wish has three phonemes and will use three boxes. /w/, /i/, /sh/
5. Direct the child to slide one colored circle, unifix cube, or corresponding letter in each cell of the Elkonin box drawing as he/she repeats the word.

The example below shows an Elkonin Box for the word "sheep," which consists of three phonemes (sounds): /sh/ /ee/ /p/
Build Elkonin Boxes

If you wish to make your own sheets, here is a blank template that has been sized for cutting and pasting the cards found on this site. You will have to cut and paste the word boxes below into the template.

Blank Elkonin Template

<table>
<thead>
<tr>
<th>ant</th>
<th>dog</th>
<th>kick</th>
<th>pot</th>
</tr>
</thead>
<tbody>
<tr>
<td>bat</td>
<td>duck</td>
<td>lamp</td>
<td>rain</td>
</tr>
<tr>
<td>bath</td>
<td>feet</td>
<td>leaf</td>
<td>ring</td>
</tr>
<tr>
<td>beach</td>
<td>fish</td>
<td>log</td>
<td>rock</td>
</tr>
<tr>
<td>bed</td>
<td>fist</td>
<td>map</td>
<td>run</td>
</tr>
<tr>
<td>bee</td>
<td>foot</td>
<td>mask</td>
<td>saw</td>
</tr>
<tr>
<td>boat</td>
<td>frog</td>
<td>moon</td>
<td>sheep</td>
</tr>
<tr>
<td>book</td>
<td>goat</td>
<td>nest</td>
<td>ship</td>
</tr>
<tr>
<td>boot</td>
<td>hand</td>
<td>net</td>
<td>sun</td>
</tr>
<tr>
<td>bus</td>
<td>hat</td>
<td>nut</td>
<td>teeth</td>
</tr>
<tr>
<td>can</td>
<td>hut</td>
<td>pea</td>
<td>three</td>
</tr>
<tr>
<td>cat</td>
<td>jeep</td>
<td>peach</td>
<td>tooth</td>
</tr>
<tr>
<td>cup</td>
<td>jet</td>
<td>pen</td>
<td>town</td>
</tr>
<tr>
<td>dish</td>
<td>jump</td>
<td>pig</td>
<td>tree</td>
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<tr>
<td>Strategy</td>
<td>Before reading</td>
<td>During reading</td>
<td>After reading</td>
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<tr>
<td>--------------------------</td>
<td>----------------</td>
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<td>Blending/Segmenting Games</td>
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<td>○</td>
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<td>Elkonin Boxes</td>
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<td>Onset/Rime Games</td>
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<td>Rhyming Games</td>
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<tr>
<td>Syllable Games</td>
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<td>Alphabet Matching</td>
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<td>Matching Books to Phonics Features</td>
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<td>Choral Reading</td>
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<td>Reader’s Theater</td>
<td>○</td>
<td>●</td>
<td>○</td>
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<td>Shared Reading</td>
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<td>Tape Assisted Reading</td>
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<td>Timed Repeated Readings</td>
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<td>List-Group-Label</td>
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<td>Possible Sentences</td>
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<td>Semantic Feature Analysis</td>
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<td>Word Maps</td>
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<td>Word Hunts</td>
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</table>
Increase Vocabulary

VOCABULARY WORD MAP

Definition in Your Own Words

VOCABULARY WORD

Synonyms

Use It Meaningfully in a Sentence

Draw a Picture of It
Effectively Teach High Frequency Vocabulary

• Provide many opportunities for practice
# Build Sight Words

Go to: [http://www.mrsperkins.com/dolch.htm](http://www.mrsperkins.com/dolch.htm)

## Print Flash Cards

<table>
<thead>
<tr>
<th>Pre-primer</th>
<th>Primer</th>
<th>First</th>
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<td>after</td>
</tr>
<tr>
<td>and</td>
<td>am</td>
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<td>one</td>
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<td>old</td>
</tr>
<tr>
<td></td>
<td>out</td>
<td>once</td>
</tr>
</tbody>
</table>
Encourage Reading at Home:
Family Literacy Bags on ReadingRockets.org

What goes into each literacy bag?

- Parent information sheet with an introductory note that you can personalize, instructions about how to use the packet, and tips for sharing fiction and nonfiction books with children
- Two books: one fiction and one nonfiction, selected by Reading Rockets for high quality and wide availability in school libraries
- Creativity Activity: a hands-on craft project
- Imagination Activity: encourages imaginative play, writing, or drawing
- Get Real Activity: focuses on real-world experiences for parent and child
- Bookmark: lists the featured titles and alternative titles

Themed literacy bags

- **Animals**: Theme: Animals, Age: Kindergarten
- **Environment**: Theme: Environment, Age: First grade
- **Food**: Theme: Food, Age: Kindergarten
Dear _______________________

Exploring new ideas and enjoying books with you sends a powerful message to your child: Reading and learning are fun, and happen everywhere – not just at school. This Reading Rockets Activity Packet about _________________ was created to help you and your child enjoy reading and learning together.

Start your learning adventure by reading some books with your child about this popular topic. Then explore the topic with three activities. Enclosed you’ll find what you need:

- two books to share with your child
- three related activities
- bookmark with a list of other books to extend the fun, if you wish
- short survey to tell me if you enjoyed using the packet

The simple steps on the back explain how to use the packet.

The bookmark, this parent information sheet, and the activities are yours to keep.

When you’ve finished with the materials, please return the books and the completed survey to school in your child’s backpack. Please return the Reading Rockets Activity Packet by ________________.

I hope you’ll enjoy reading and learning together!
Select High Interest Topics

- Individuals working with Johnny should help him select high-interest books to promote his motivation to read and increase his daily exposure. To capitalize on his interest in trucks, Kristen L. Nelson’s *Monster Trucks* (2002) book or John Scieszka’s *Trucktown Series* might be enjoyable as might books that focus on Johnny’s sports interests such as karate, soccer, and baseball.
Capitalize on Johnny’s Strength in Gv-Visualization
Allows him to feel successful; builds vocabulary and sight words
When Reading

• Use guided oral repeated reading strategies
• Choral Reading – reading aloud in unison with a whole class or group. Helps build student’s fluency, self-confidence, and motivation.
Monitor Progress to Determine Fully Alphabetic Phase

• Work in conjunction with interventionist to identify progress monitoring tools
Accommodations/Compensation

• May need extra time to respond. Build in “wait time” for a response due to retrieval difficulties
• Use short instructions
• When segmenting and blending words, be sure to have visuals to lessen memory demands
Accommodations/Compensation

• Small group and one on one support (intensive tier 3)
Adapt Writing Assignments

• Have Johnny tell you what he wants to write about

• Provide structure based on instructional level. For example,
  – Johnny wants to write about monster trucks.
  – __onster ___rucks are bi___. I have a re__
  – Monste__ Truc__.
  – Task: Fill in missing letters. Re-write first sentence.

• This will keep Johnny busy during journal time with a journal activity that is at his instructional level.
Outcome

• Activities will build confidence
• Foster independence
• More on-task behaviors
Next Steps

• Once fully alphabetic phase is reached, time for
  – Talking Word Factory by LeapFrog
Is Progress Monitoring Data And Norm-referenced Standardized Academic Achievement Data Enough for All Students?
RTI at Tiers I and II

- Students (Grade 1)
  - Amy
  - Belinda
  - Carl

- Tier I Screening
  - At-risk in Reading
    - Decoding
    - Fluency
    - Comprehension

- Tier II Treatment Protocol
  - Reading Recovery

Mascolo and Flanagan (2011)
What Works Clearinghouse

Results. 1 Interventions found using these filters:

- Outcome Domains: Alphabetics, Early reading/writing, Reading fluency, Reading achievement
- Grade: 1
- Population: General Education
- Effectiveness: Positive Effects
- Extent of Evidence: Medium to Large
- Delivery Method: Small Group
- Program Type: Supplement
What Works Clearinghouse

Table: Reading achievement

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Topic</th>
<th>Improvement Index</th>
<th>Effectiveness Rating</th>
<th>Extent Of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading Recovery®</td>
<td>Literacy (Beginning Reading)</td>
<td>34</td>
<td>++</td>
<td>Medium to Large</td>
</tr>
</tbody>
</table>

How much evidence and How broadly findings may be applied to different settings.
Reading Recovery Results

• Amy, Belinda, and Carl are making some gains in Reading Recovery

• No appreciable change in reading performance

• Tier II “nonresponders”

• WHAT DO SCHOOLS DO?
  – move to Tier III?
  – conduct a “diagnostic assessment”?

Mascolo and Flanagan (2011)
Individual Differences Are Important

One Size Does Not Fit All
Different Cognitive Ability Profiles Suggest Different Interventions
Amy’s cognitive testing shows a significant deficit in phonetic coding – she doesn’t know how to translate symbols into sounds

*Ga* deficit impacts her fluency – labored reading

Lack of decoding and fluency impacts comprehension

**Intervention should focus on Phonemic Awareness (phoneme-grapheme correspondence) – Remediate Ga**

Mascolo and Flanagan (2011)
INTRODUCTION: AUDITORY DISCRIMINATION IN DEPTH (ADD) / LINDAMOOD PHONEMIC SEQUENCING (LiPS)
April 23, 2007

Overview

The Auditory Discrimination in Depth (ADD) Program® (currently called the Lindamood Phonemic Sequencing (LiPS) Program®) is designed to teach students skills to successfully decode words and to identify individual sounds and blends in words. Initial activities engage students in discovering the lip, tongue, and mouth actions needed to produce specific sounds. After students are able to produce, label, and organize the sounds with their mouths, subsequent activities in sequencing, reading, and spelling use the oral aspects of sounds to identify and order them within words. The program also offers direct instruction in letter patterns, sight words, and context clues in reading. The Auditory Discrimination in Depth Program® is individualized to meet students’ needs and is often used with students who have learning disabilities or difficulties. The version of the program tested here involved computer-supported activities.

Research

One study of Auditory Discrimination in Depth® met the What Works Clearinghouse (WWC) evidence standards. The study included 150 first grade students in five elementary schools. ¹

The WWC considers the extent of evidence for Auditory Discrimination in Depth® to be small for alphabets and comprehension. No studies of Auditory Discrimination in Depth® that met WWC standards with or without reservations addressed outcomes in the domains of fluency and general reading achievement.
Another Program for Ga-Phonetic Coding Deficit

Wilson Reading®
Another Program for Ga-Phonetic Coding Deficit

Road to the Code

Benita A. Blachman
Eileen Wynne Ball
Rochella Black
Darlene M. Tangel

A Phonological Awareness Program for Young Children

Becked by more than 10 years of study in kindergarten and first-grade classrooms.
Programs/Techniques for Ga-Phonetic Coding Deficits

• When selecting a program or a technique to intervene with a student with a Ga-Phonetic Coding deficit, consider one that
  – *Teaches students to manipulate sounds by using letters (i.e., phoneme-grapheme correspondence)*
  – Uses individual or small group format
  – Focuses on reading and spelling development (again, the phoneme-grapheme connection)
  – Explicitly teaches student how to blend sounds
<table>
<thead>
<tr>
<th>Essential Component</th>
<th>Definition</th>
<th>High Priority Skill</th>
<th>Examples</th>
<th>Instructional research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phonemic Awareness</td>
<td>Awareness that spoken words are made up of individual sounds. Blending 2 and 3 sounds to make spoken words. Segmenting spoken words into individual sounds</td>
<td>Teacher places three pictures on the board. She says three sounds out loud that represent the name of one of the pictures. Student listens and says the word. Students move three chips into the sound boxes as they say single sounds of the word /h/ /ou/ /s/ (house).</td>
<td>Make sure students know meanings of words that are used in sound blending and sound segmenting activities.</td>
<td></td>
</tr>
<tr>
<td>Phonics</td>
<td>Understanding that words are made up of letters, sounds are connected to letters, and can use these letter and letter combinations to read and spell unfamiliar words. Blends sounds in printed words together and reads words as a whole accurately.</td>
<td>Teacher tells students – dge and –ge both stand for /j/ at the ends of words. Students sort 20 –ge and –dge words to determine when –dge spelling is used. Students read the words when done. The teacher points to the written word matador and asks the student how many syllables or parts are in the word.</td>
<td>Keep the end in mind. Have students apply phonics skills daily in reading and writing activities.</td>
<td></td>
</tr>
</tbody>
</table>
### Reading Skills
#### Error Analysis Sheet

<table>
<thead>
<tr>
<th>Actual Word</th>
<th>Student’s Response</th>
<th>Error Category (sight words)</th>
<th>Error Category (misses beginning sounds)</th>
<th>Error Category (misses ending sounds)</th>
<th>Error Category (short vowels)</th>
<th>Error Category (long vowels)</th>
<th>Error Category (silent “e” rule)</th>
<th>Error Category (vowel teams)</th>
<th>Error Category (consonant blends)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>pan</td>
<td>pen</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bird</td>
<td>birb</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cold</td>
<td>col</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>pot</td>
<td>put</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tape</td>
<td>tap</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Different Cognitive Profiles Suggest Different Interventions

- **Gc deficit** – speech-language impairment?
- Comprehension is poor b/c of low Gc
- Poor vocabulary – needs to re-read to gain meaning, which impacts fluency
- *Intervention should focus on vocabulary development – Build Gc-VL, KO – and building fluency*
- Accommodation of extended time may be warranted due to a Gs deficit

Mascolo and Flanagan (2011)
What is Text Talk?

*Text Talk* is an oral language instruction program intended for all students in grades K-3. It is designed to supplement a school’s core reading program with 20 minutes of daily whole or small group instruction delivered by the teacher. The goal of the program is to develop the student’s ability to construct meaning of sophisticated vocabulary words within the context of read-alouds and explicit vocabulary instruction. These vocabulary words and ideas are contextualized with explicit descriptions of how the words are used in the story and through interactive discussions.

The *Text Talk* instructional approach was developed by Drs. Isabel L. Beck and Margaret G. McKeown based on findings from their many years of research. These findings are depicted in their book, *Bringing Words to Life* which describes the rationale and methods for teaching children rich, robust vocabulary words. These words are not ordinarily found in their speaking vocabulary but would most likely be in their conceptual lexicon and appear in a variety of texts. Described as Tier 2 words in their book, Beck and McKeown underscore the importance of providing students repeated opportunities to hear and use these new vocabulary words in different contexts. The instructional strategies discussed in *Bringing Words to Life* are applied in the *Text Talk* program.
Lesson 1

Comprehension
Story Structure

Ruby the Copycat by Peggy Rathmann

Vocabulary
coinidence
loyal
murmured
recited
bitter
sensitive
<table>
<thead>
<tr>
<th>Sessions</th>
<th>Focus</th>
<th>Instruction</th>
<th>Standards &amp; Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Read Aloud</strong></td>
<td>Develop Language &amp; Comprehension</td>
<td>Read aloud <em>Ruby the Copycat</em>. Use the Text Talk Notes to scaffold and monitor comprehension.</td>
<td>- Responds to open-ended questions about the story with substantive sentences</td>
</tr>
<tr>
<td><strong>Vocabulary</strong></td>
<td>Introduce Vocabulary</td>
<td>Contextualize and explain vocabulary words and provide examples. Ask children to think about examples and to provide their own.</td>
<td>- Describes the story characters</td>
</tr>
<tr>
<td></td>
<td>coincidence p. 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>loyal p. 17</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>bitter</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>murmured p. 19</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>recited p. 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sensitive</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Return to the Story</strong></td>
<td>Develop Vocabulary</td>
<td>Review and assess vocabulary words. Use them to enhance story comprehension and in shared writing. Discuss character traits in <em>Ruby the Copycat</em>.</td>
<td>- Applies vocabulary words in multiple contexts</td>
</tr>
<tr>
<td></td>
<td>Integrate Vocabulary</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Review</td>
<td></td>
<td>- Uses new vocabulary words to show understanding of story characters</td>
</tr>
<tr>
<td></td>
<td>Assess</td>
<td></td>
<td>- Demonstrates use of new and previously taught vocabulary in writing and daily conversation</td>
</tr>
<tr>
<td></td>
<td>Maintain</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
“What a coincidence!” said Miss Hart.

💡 A coincidence! Miss Hart is saying that two things happened at the same time by accident. • Clarify vocabulary

❓ What just happened that Miss Hart says is a coincidence? (Ruby said she was a flower girl in her sister’s wedding, just like Angela had been.) • Clarify story ideas
Different Cognitive Profiles Suggest Different Interventions

Other Interventions for Gc Deficit

<table>
<thead>
<tr>
<th>CHC Broad Cognitive Abilities/Neuropsychological Functions</th>
<th>Brief Definition(^1)</th>
<th>General Manifestations of Cognitive/Neuropsychological Weakness</th>
<th>Specific Manifestations of the Cognitive/Neuropsychological Weakness</th>
<th>Recommendations/Interventions</th>
</tr>
</thead>
</table>
| Crystallized Intelligence (Gc)                           | • Breadth and depth of knowledge and skills that are valued by one’s culture  
• Developed through formal education as well as general learning experiences  
• Stores of information and declarative and procedural knowledge  
• Reflects the degree to which a person has learned practically useful knowledge and mastered valued skills (Schnieder & McGrew, 2012)  
• Narrow Gc abilities include General Verbal Information, Language Development, Lexical Knowledge, Listening Ability, Information about Culture, Communication Ability, and Grammatical Sensitivity | **Difficulties with:**  
• Vocabulary acquisition  
• Knowledge acquisition  
• Comprehending language or understanding what others are saying  
• Fact-based/informational questions  
• Using prior knowledge to support learning  
• Finding the right words to use/say | **Reading Difficulties:**  
• Decoding (e.g., word student is attempting to decode is not in his/her vocabulary)  
• Comprehending (e.g., poor background knowledge about information contained in text)  
**Math Difficulties:**  
• Understanding math concepts and the “vocabulary of math”  
**Writing Difficulties:**  
• Grammar (syntax)  
• Bland writing with limited descriptors  
• Verbose writing with limited descriptors  
• Inappropriate word usage  
• Expressive language – “poverty of thought” | • Provide an environment rich in language and experiences  
• Frequent practice with and exposure to words  
• Read aloud to children  
• Vary reading purpose (leisure, information)  
• Work on vocabulary building  
• Teach morphology  
• Use text talks  
• Include supportive modalities (e.g., visuals, gestures) to increase understanding of language used  
• Embed instruction within a meaningful context (e.g., relating words to learner experiences, increasing listening ability through game-like format)  
• Use Vocabulary Cartoons (Burchers, 2000) |

---

1. Slight modifications were made to simplify the language for the table.
Gc Recommendations

• Provide an environment rich in language and experiences
• Frequent practice with and exposure to words
• Read aloud to children
• Vary reading purpose (leisure, information)
• SES strong predictor of reading problems

• Low SES children with PA problems have reading areas intact and use the same reading areas as controls

• More about underdeveloped connections (due to lack of experience, etc.)

• Low SES same reading systems but delayed and never really catch up (Noble & McCandliss, 2005)

“Use it or Lose it”

- Neurons that are weak or unused are pruned
- Neurons that are exercised get stronger and develop more connections

What Does It Look Like?

**Pathology**
- Low SES readers
- Bulk of students identified for RTI
- Impoverished backgrounds

**Wellness**
- Ready to read in Kindergarten
- Know the alphabetic principle
- Exposed to literacy
- Eager and quick to learn
- Consistent exposure

Information on this slide was presented by Elaine Fletcher-Janzen at the 3rd annual assessment conference, Fordham University. New York, NY (May, 2011).
“Use it or Lose it”

• When it’s not used
  – Poor reading (e.g., result of low SES environment)
  – “At-risk” status in early grades
  – Not ready to learn at start of school due to impoverished environment

• What do we do?
  – Provide experiences with learning that are:
    – Present, early, and sustained
    – Supported by multiple environments
    – RTI and home-school collaboration

Information on this slide was presented by Elaine Fletcher-Janzen at the 3rd annual assessment conference, Fordham University. New York, NY (May, 2011).
The Early Catastrophe: The 30 Million Word Gap by Age 3

We observed the 42 children grow more like their parents in stature and activity levels, in vocabulary resources, and in language and interaction styles. Despite the considerable range in vocabulary size among the children, 86 percent to 93 percent of the words recorded in each child’s vocabulary consisted of words also recorded in their parents’ vocabularies. By the age of 34-36 months, the children were also talking and using numbers of different words very similar to the averages of their parents (see the table below).

<table>
<thead>
<tr>
<th>Measures &amp; Scores</th>
<th>13 Professional</th>
<th>23 Working-class</th>
<th>6 Welfare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent</td>
<td>Child</td>
<td>Parent</td>
<td>Child</td>
</tr>
<tr>
<td>Protest score</td>
<td>41</td>
<td>31</td>
<td>14</td>
</tr>
<tr>
<td>Recorded vocabulary size</td>
<td>2,176</td>
<td>1,116</td>
<td>1,498</td>
</tr>
<tr>
<td>Average utterances per hour</td>
<td>487</td>
<td>310</td>
<td>301</td>
</tr>
<tr>
<td>Average different words per hour</td>
<td>382</td>
<td>297</td>
<td>251</td>
</tr>
</tbody>
</table>

The 30 Million Word Gap

• Given a 100-hour week (14 hour waking day)
  – Avg child in professional families: 215,000 words of language experience
  – Avg child in working class families: 125,000
  – Avg child in welfare families: 62,000

• Given a 5,200-hour year
  – Professional families: 11.2 million words
  – Working class families: 6.5 million words
  – Welfare families: 3.2 million words

• In 4 years of such experience, an average child in a professional family would have accumulated experience with almost 45 million words
  – Working class: 26 million
  – Welfare: 13 million

• *Children in professional families are exposed to over 30 million more words/language experience than children in welfare families*

The Importance of Early Experience

• We learned from the longitudinal data that the problem of skill differences among children at the time of school entry is bigger, more intractable, and more important than we had thought.

• So much is happening to children during their first 3 years at home, at a time when they are especially malleable and uniquely dependent on the family for virtually all their experience that by age 3, an intervention must address not just a lack of knowledge or skill, but an entire general approach to experience.

Betty Hart and Todd R. Risley
“Neurons that Fire Together Wire Together”

• means that synapses- *unions between neurons*—get solidified the more often the respective neurons “talk” to each other

Early and sustained exposure to the alphabetic principle

Information on this slide was presented by Elaine Fletcher-Janzen at the 3rd annual assessment conference, Fordham University. New York, NY (May, 2011).
What Does it Look Like?

• Wellness
  – Polymaths
  – Thinking outside the box
  – Curiosity
  – Natural generalization
  – Quick long-term storage and retrieval

• Pathology
  – Poor initial learning
  – Long time needed for initial learning
  – Poor retrieval
  – Poor comprehension
  – Little imagination
  – Dependent learners
  – Concrete learners

Information on this slide was presented by Elaine Fletcher-Janzen at the 3rd annual assessment conference, Fordham University. New York, NY (May, 2011).
What Do You Do?

- Enrich
- Relate
- Create
- Ratify
- Mnemonic devices
- Multidisciplinary curricula

Information on this slide was presented by Elaine Fletcher-Janzen at the 3rd annual assessment conference, Fordham University, New York, NY (May, 2011).
Recommendations for Gc Deficit

• Work on vocabulary building
• Teach morphology
• Activities to build listening skills
• Explicitly teach listening strategies
Programs/Techniques for Gc Deficits

• When selecting a program or a technique to intervene with a student with a Gc deficit, it may be helpful to consider one that
  – includes some sort of vocabulary building
  – includes supportive modalities to increase understanding of language used (e.g., visuals, gestures)
  – embeds instruction within a meaningful context (e.g., relating words to learner experiences, communicating word meanings with visuals, increasing listening ability through game-like format)
Using Instructional Materials (Gc) - helps with lexical knowledge deficit

http://www.harcourtschool.com/glossary/science/
Vocabulary with Sound
http://www.harcourtschool.com/glossary/science/

absorption
The stopping of light when it hits a wall or other opaque object

Has the added audio if child needs it
Limited Background Knowledge? Build it!

(Harcourt online activities)
Building Background (K0)

Grade 2

[ Being Me | Helping Hands | Our World | Imagine That! | Neighborhood News | Travel Time ]

Being Me

- The Mixed-Up Chameleon
- Get Up and Go!
- Days With Frog and Toad
What is a Chameleon?
A chameleon is a kind of lizard that can change color. A chameleon can turn brown, green, blue, yellow, red, black, or white. The colors help the chameleon let other chameleons know how it is feeling. If the chameleon is happy, it may turn green. If the chameleon is mad, it may turn yellow. A chameleon also changes color because of how hot or cold it is, or how light or dark it is.
Belinda also has a Gs Deficit – Suggest Need to Work on Building Fluency

• **Choral Repeated Reading**
  – Students listen to the text being read and follow along by reading aloud and looking at the text (using their fingers to keep pace)
  – 10 to 15 minutes
  – Text can be higher than students’ instructional level
  – Comprehension activities can be added
  – Feedback and assistance can be provided
Peer-Assisted Learning Strategies (PALS)

- Teachers train students
- Students partner with peers, alternating the role of tutor while reading aloud, listening, and providing feedback in various structural activities
WWC: Reading Fluency interventions

• Fluency Formula™
  – Grades 1-6
  – Emphasizes automatic recognition of words, decoding accuracy, and oral expression
  – 10-15 minutes daily; small groups
  – Uses workbooks, read-aloud anthologies, fluency activity cards and audio CDs
Accommodations for Gs Deficit

- Extra time on exams
- Shortened in-class/home assignments
- Take exams orally
- Provide guided notes/class notes/topical outlines
- Books on tape
- Well established and understood daily routines and instructional routines
  - Because slow processing has a lesser effect when tasks are routine, *instructional activities should become as routine or automatic as possible* (e.g., important for students with TBI)
- Organizational supports
- Nonverbal supports
- Peer support
  - Cooperative learning
- Use of technology
Different Cognitive Profiles Suggest Different Interventions

- **Gsm** deficit – memory span and working memory are deficient; visual memory ok
- Decoding is poor – he cannot hold the complete phonemic string in mind long enough to say the word
- Comprehension is poor because he needs to allocate all memory space decoding words and therefore cannot focus on meaning
- Fluency is impaired because he must re-read the text to gain meaning
- Intervention should focus on developing a sight word vocabulary
- Carl needs to be taught *compensatory strategies* to assist with poor Gsm (text previews; guided notes; one comprehension question at a time)

Mascolo and Flanagan (2011)
Build Sight Words

Go to: http://www.mrsperkins.com/dolch.htm

Print Flash Cards

Use folding-in technique (builds confidence)
Build Sight Words: Good Gv; Difficulty with Gsm
Carl needs strategies for Gsm deficits (memory span; working memory)

- **Give Directions in Multiple Formats:**
  - visual and verbal
  - encourage them to repeat directions and explain what they mean
  - give examples of what needs to be done

Glenda Thorne, Ph.D., “10 Strategies to Enhance Students’ Memory”; CLD.org
Carl needs strategies for Gsm deficits (memory span; working memory)

• **Teach Students to Over-learn Material**
  – several error-free repetitions are needed to solidify the information

• **Teach Students to Use Visual Images and Other Memory Strategies**

Glenda Thorne, Ph.D., “10 Strategies to Enhance Students’ Memory”; CLD.org
Visual Images Used to Aid Vocabulary Development

• Reading
  – *Vocabulary Cartoons II* (Burchers, 2000)
    • Target word and definition are included along with a cartoon that reinforces the words meaning in a visual format
  • Grades 3+
COLOSSAL
(kuh LOS ul) adj.
enormous, gigantic; huge in
size, extent or degree

Sounds like: FOSSIL

“A COLOSSAL FOSSIL,”
Sight Word Development Aides by Visual Images and Multiple Associations

VOCABULARY WORD MAP

Definition in Your Own Words

VOCABULARY WORD

Synonyms

Use It Meaningfully in a Sentence

Draw a Picture of It
Strategies for Gsm deficits (memory span; working memory)

- Give Teacher-Prepared Handouts Prior to Class Lectures:
  - brief outline
  - guided notes
  - partially completed graphic organizer that the student would complete during the lecture

Glenda Thorne, Ph.D., “10 Strategies to Enhance Students’ Memory”; CLD.org
Strategies for Gsm deficits (memory span; working memory)

• **Teach Students to Be Active Readers:**
  – students should underline, highlight, or jot key words down in the margins
  – To consolidate this information in long-term memory, they can make outlines or use graphic organizers

Glenda Thorne, Ph.D., “10 Strategies to Enhance Students’ Memory”; CLD.org
Strategies for Gsm deficits (memory span; working memory)

• Help Students Develop Cues When Storing Information:
  – HOMES can be used to represent the names of the Great Lakes – Huron, Ontario, Michigan, Erie and Superior

• Prime the Memory Prior to Teaching/Learning:
  – discuss the vocabulary and the overall topic before a reading comprehension task is given. This will allow them to focus on the salient information and engage in more effective depth of processing.

Glenda Thorne, Ph.D., “10 Strategies to Enhance Students’ Memory”; CLD.org
Strategies for Gsm deficits

• **Review Material Before Going to Sleep:**
  – information studied this way is better remembered
  – any other task that is performed after reviewing and prior to sleeping (such as getting a snack, brushing teeth, listening to music) interferes with consolidation of information in memory
Different Cognitive Ability Profiles Suggest Different Interventions

- All had same academic deficits (decoding, comprehension, fluency)
- All made slow gains with Reading Recovery
- All had different patterns of cognitive strengths and weaknesses
- Reading Recovery – allocating time to areas that do not need to be trained
- Not enough explicit instruction in main problem area because the intervention was not tailored

Mascolo and Flanagan (2010)
Individual Differences ARE Important

“A neuropsychological process that is important to reading skills development is working memory – it is a crucial process for early reading recognition and later reading comprehension. **One must assess it if one is to develop the most appropriate method of intervention** (Teeter et al., 1997).”

“Given the findings from the neuroimaging and neuropsychological fields of deficient performance on measures of **working memory, processing speed, auditory processing ability, and executive functions**, evaluation of these skills is necessary to determine the most appropriate program to fit the individual child’s need.”

Semrud-Clikeman (2005)
Individual Difference ARE Important

• “The danger with not paying attention to individual differences is that we will repeat the current practice of simple assessments in curricular materials to evaluate a complex learning process and to plan for interventions with children and adolescents with markedly different needs and learning profiles.” (Semrud-Clikeman, 2005)

• “Nonresponders” provide sound evidence that one size DOES NOT fit all.
Individual Differences

Differential Diagnosis: Intellectual Disability, General Learning Difficulty (Slow Learner), and Specific Learning Disability
## Differential Diagnosis: Cognitive Ability and Adaptive Behavior

<table>
<thead>
<tr>
<th>Intellectual Disability (ID)</th>
<th>General Learning Difficulty (Slow Learner)</th>
<th>Specific Learning Disability (SLD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General ability ≤ 70-75</td>
<td>Little to moderate variation in cognitive ability and processing profile</td>
<td>Moderate to high (or statistically significant) variation in cognitive ability and processing profile</td>
</tr>
<tr>
<td>All or nearly all cognitive areas ≤ 75</td>
<td>May have normative deficits in one or more cognitive and academic areas (≤ 85)</td>
<td>Normative deficits (≤ 85) in specific cognitive abilities and processes; Normative deficits (≤ 85) in specific academic area(s); Empirical or ecologically valid relationship between cognitive and academic deficits</td>
</tr>
<tr>
<td>Deficits (≤ 75) in Adaptive Behavior; little variation in performance across adaptive behavior domains</td>
<td>May have relative strengths in one or more processes or abilities</td>
<td>Intact functioning (≥ 90 and ≤ 115) in many processes and abilities and possible normative cognitive or academic strengths (&gt; 115)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minimal to no deficits in Adaptive Behavior</td>
</tr>
</tbody>
</table>
## Differential Diagnosis: Etiology

<table>
<thead>
<tr>
<th>Intellectual Disability (ID)</th>
<th>General Learning Difficulty (Slow Learner)</th>
<th>Specific Learning Disability (SLD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normative cognitive deficits are explained by genetic conditions (e.g., PKU, chromosomal abnormalities, such as Down syndrome and fragile X syndrome); problems during pregnancy (e.g., use of alcohol or drugs; illnesses of the mother); problems at birth (prematurity, low birth weight); problems after birth (e.g., childhood diseases, head injuries; lead and mercury exposure); or poverty and cultural deprivation (e.g., malnutrition, inadequate medical care, environmental health hazards; under-stimulation). Note: in approximately 1/3 of individuals with ID, the cause is not known.</td>
<td>Underlying causes of generally low average cognitive and academic abilities are typically not known.</td>
<td>SLD has a neurobiological basis. The pattern of generally Average or better overall cognitive ability and Below Average performance in related cognitive and academic areas cannot be explained by exclusionary factors (e.g., poor instruction; social/emotional factors; psychological disturbance; cultural or language differences, environmental deprivation, etc.), although one or more of these factors may contribute to weak academic performance.</td>
</tr>
<tr>
<td>Intellectual Disability (ID)</td>
<td>General Learning Difficulty (Slow Learner)</td>
<td>Specific Learning Disability (SLD)</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Progress Monitoring (or other performance indicators) demonstrates very slow rate of response/learning; will not meet typical grade level benchmarks in any academic area</td>
<td>Progress Monitoring (or other performance indicators) demonstrates slow rate of response/learning; may meet typical grade level benchmarks in some, but not all, academic areas</td>
<td>Following a comprehensive evaluation and resultant provisions of tailored interventions, accommodations, compensatory strategies, and/or modifications, Progress Monitoring (or other performance indicators) demonstrates rate of response/learning similar to same grade peers; may approximate or meet typical grade level benchmarks</td>
</tr>
</tbody>
</table>

**Primary Foci:** Self-Help Skills; Functional Academics; Social Skills  
**Primary Foci:** Functional Academics; Vocational Training; Accommodations; Compensatory Strategies; Social Skills and Self-Esteem  
**Primary Foci:** Grade Level Performance; College Preparation; Accommodations; Compensatory Strategies; Self-Esteem; Self-Advocacy

Use data from strength-based assessment for intervention planning  
Use data from strength-based assessment for intervention planning  
Use data from strength-based assessment for intervention planning
Third Method Approaches

Multiple Methods/Multiple Data Sources
9. How many options for identifying specific learning disabilities (SLD) are offered in the federal regulations that accompany IDEA 2004?

<table>
<thead>
<tr>
<th>Option</th>
<th>Response Percent</th>
<th>Response Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.0%</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>58.5%</td>
<td>282</td>
</tr>
<tr>
<td>3</td>
<td>18.5%</td>
<td>89</td>
</tr>
<tr>
<td>4</td>
<td>2.5%</td>
<td>12</td>
</tr>
<tr>
<td>I don't know</td>
<td>9.3%</td>
<td>45</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>6.2%</td>
<td>30</td>
</tr>
</tbody>
</table>

**N = 498**

THEME: Multi-method, Multi-source Approach to SLD Identification

Contributors:
Berninger; Fiefer; Flanagan and Alfonso; Fletcher, Barth, and Steubing, Geary; Hale and Fiorello; Mather and Wendling; Naglieri; Ortiz; Wiig
<table>
<thead>
<tr>
<th>Level</th>
<th>Nature of SLD(^1)</th>
<th>Focus of Evaluation</th>
<th>Examples of Evaluation Methods and Data Sources</th>
<th>Criteria for SLD</th>
<th>SLD Classification and Eligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Difficulties in one or more areas of academic achievement, including (but not limited to) Basic Reading Skill, Reading Comprehension, Reading Fluency, Oral Expression, Listening Comprehension, Written Expression, Math Calculation, Math Problem Solving.</td>
<td>Academic Achievement: Performance in specific academic skills (e.g., Grw, Gg, Gc); may also include performance on measures of phonological and orthographic processing.</td>
<td>Response to quality instruction and intervention via progress monitoring, performance on norm-referenced, standardized achievement tests, evaluation of work samples, observations of academic performance, teacher/parent/child interview, history of academic performance, data from other members of Multidisciplinary Team (MDT) (e.g., speech-language pathologist, interventionist, reading specialist).</td>
<td>Performance in one or more academic areas is weak or deficient(^2) (despite attempts at delivering quality instruction) as evidenced by converging data sources.</td>
<td>Necessary</td>
</tr>
<tr>
<td>II</td>
<td>SLD does not include a learning problem that is the result of visual, hearing, or motor disabilities; of mental retardation; of social or emotional disturbance; or of environmental, educational, cultural, or economic disadvantage.</td>
<td>Exclusionary Factors: Identification of potential primary causes of academic skill weaknesses or deficits, including Intellectual Disability, cultural or linguistic difference, sensory impairment, insufficient instruction or opportunity to learn, organic or physical health factors, social/emotional or psychological disturbance.</td>
<td>Data from the methods and sources listed at Levels I and III. Behavior Rating Scales; medical records; prior evaluations; interviews with current or past counselors, psychiatrists, etc.</td>
<td>Performance is not primarily attributed to these exclusionary factors, although one or more of them may contribute to learning difficulties.</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>A disorder in one or more of the basic psychological/neuropsychological processes involved in understanding or in using language, spoken or written; such disorders are presumed to originate from central nervous system dysfunction.</td>
<td>Cognitive Abilities &amp; Processes: Performance in cognitive abilities (e.g., Gc, Gf, Gv, Ga, Glr, Gsm, Gs), neuropsychological processes (e.g., attention, executive functioning) and learning efficiency.</td>
<td>Performance on norm-referenced tests, evaluation of work samples, observations of cognitive performance, task analysis/testing limits, teacher/parent/child interview, history of academic performance, records review.</td>
<td>Performance in one or more cognitive abilities and/or neuropsychological processes (related to academic skill deficiency) is weak or deficient(^2) as evidenced by converging data sources.</td>
<td></td>
</tr>
</tbody>
</table>


\(^2\) Weak or deficient refers to performance that is significantly below average and is not due to lack of adequate instruction or other environmental factors.
<table>
<thead>
<tr>
<th>IV</th>
<th>Unexpected Underachievement – the specific learning disability is a discrete condition differentiated from generalized learning failure by average or better cognitive ability and a learning skill profile exhibiting significant variability indicating processing areas of strength and weakness.</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>Specific learning disability has an adverse impact on educational performance</td>
</tr>
<tr>
<td></td>
<td>Special Education Eligibility⁴</td>
</tr>
</tbody>
</table>

1. This column includes concepts inherent in the federal definition (IDEA, 2004) and in Kavale, Spaulling, and Beam’s (2009) definition of Specific Learning Disability.
2. Poor spelling with adequate ability to express ideas in writing is often typical of dyslexia and/or disgraphia. Even though IDEA 2004 includes only the broad category of written expression, poor spelling and handwriting are often symptomatic of a specific writing disability and should not be ignored (Mather & Wendling, in press).
3. Weak or deficient performance (also called, normative weakness) is defined typically by standard score performances that are low average (i.e., ≤ 89) or significantly below average (i.e., ≤ 84) and that have ecological validity (e.g., standardized test performance is consistent with performance observed in the child’s everyday classroom or educational environment).
4. The major specific learning disability may be accompanied by secondary learning difficulties that also may be considered when planning the more intensive, individualized special education instruction directed at the primary problem. For information on linking assessment data to intervention, see Rapid Reference 10.9.

Select a Classification System for Use with All Standardized, Norm-referenced Tests

<table>
<thead>
<tr>
<th>Standard Score</th>
<th>Percentile Range</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 70</td>
<td>&lt;2nd</td>
<td>Extremely Below Average/Intellectual Disability Range</td>
</tr>
<tr>
<td>70-79</td>
<td>2nd to 8th</td>
<td>Well Below Average/Normative Deficit</td>
</tr>
<tr>
<td>80-89</td>
<td>9th to 24th</td>
<td>Below Average/Relative to Normative Weakness</td>
</tr>
<tr>
<td>90-109</td>
<td>25th to 74th</td>
<td>Average</td>
</tr>
<tr>
<td>110-119</td>
<td>75th to 90th</td>
<td>Above Average/Relative to Normative Strength</td>
</tr>
<tr>
<td>120-129</td>
<td>91st to 97th</td>
<td>Well Above Average/Normative Strength</td>
</tr>
<tr>
<td>≥130</td>
<td>≥98th</td>
<td>Extremely Above Average/Intellectually Gifted Range</td>
</tr>
</tbody>
</table>

*Note: On standardized norm referenced tests, most people perform within the range of normal limits (i.e., standard scores of 85 to 115, inclusive). Performances that fall outside and below the range of normal limits are considered normative weaknesses; performances that fall outside and above normal limits are considered normative strengths.*
Level IV of Flanagan et al.’s Operational Definition: 
*Pattern of Strengths and Weaknesses Consistent with SLD*

**COGNITIVE STRENGTHS**

- Average or better overall ability
- Supported by strengths in academic skills

**ACADEMIC WEAKNESS/FAILURE**

- Actual academic area of weakness is significantly lower than expected based on overall cognitive ability
- Academic deficit(s) is unexpected because overall cognitive ability is at least average (and other factors were ruled out, such as inadequate instruction)

**COGNITIVE WEAKNESS/DEFICIT**

- Cognitive Ability or Processing Disorder

“the key deficit must be a vertical faculty rather than a horizontal faculty – a domain-specific process rather than a process that operates across a variety of domains” (Stanovich, 1993, p. 279)

Performance approximately 1SD below the mean or lower (cognitive and academic areas of weakness are related empirically and relationship is ecologically valid)

---

Level IV of Flanagan et al.’s Operational Definition of SLD: Pattern of Strengths and Weaknesses

Below Average Aptitude-Achievement Consistency (scores approximately 1SD below the mean or lower)

Differences between related cognitive areas of weakness or deficit and academic areas of weakness or deficit *are not* statistically significant

**Level IV of Flanagan et al.'s Operational Definition of SLD: Pattern of Strengths and Weaknesses**

Below Average Aptitude-Achievement Consistency  
(scores approximately 1SD below the mean or lower)

Difference between related cognitive areas of weakness or deficit and academic areas of weakness or deficit *are* statistically significant.

Student may be using compensatory strategies or benefiting from accommodations or curricular modifications.

Level IV of Flanagan et al.’s Operational Definition of SLD: Pattern of Strengths and Weaknesses

Below Average Aptitude-Achievement Consistency (scores approximately 1SD below the mean or lower)

Difference between related cognitive areas of weakness or deficit and academic areas of weakness or deficit are statistically significant

There may be one or more exclusionary (or other) factors inhibiting performance

Factors that may affect learning

1. Executive functioning (e.g., time management skills, organizational skills)
2. Ability to complete tasks within a specified time period (e.g., classwork, tests, homework)
3. Sensory-motor integration (e.g., visual-motor coordination)
4. Ability to attend and concentrate on academic tasks in school
5. Match between student’s learning needs and instructional environment
6. Relationships with same age and grade peers
7. Receptive to corrective feedback
8. Uses educational supports in school (e.g., before/after school programs)
9. Uses educational supports outside of school (e.g., tutoring, community programs)
10. Familial support (e.g., parent involvement, assistance from family members)
11. Self-esteem or self-concept
12. School climate (e.g., safety, peer group)
13. Motivation and level of effort
Level IV of Flanagan et al.’s Operational Definition of SLD

**Review: SLD Pattern**

- **COGNITIVE STRENGTHS**: Average or better overall ability
- **ACADEMIC WEAKNESS**
- **COGNITIVE WEAKNESS**: Consistent Level IV of Flanagan et al.’s Operational Definition of SLD
- Discrepant
- Consistent
Level IV of Flanagan et al.’s Operational Definition of SLD: Pattern of Strengths and Weaknesses

**Pattern not consistent with SLD construct**

Domain-specific aspect of SLD is not present.

Similar to traditional ability-achievement discrepancy

Level IV of Flanagan et al.’s Operational Definition of SLD: Pattern of Strengths and Weaknesses

*Pattern not consistent with SLD construct:*

Unexpected underachievement is not present.

Area of cognitive weakness or deficit is likely not particularly important for academic skill acquisition and development at this age/grade level

Alternatively, student compensates well for area of cognitive weakness or deficit (history is important in making SLD determination)

SS = 85
Level IV of Flanagan et al.’s Operational Definition of SLD: Pattern of Strengths and Weaknesses

**Pattern not consistent with SLD construct:**

Unexpected underachievement is not present.

Domain-specific cognitive weakness as a primary contributing factor to poor achievement not present

All performances are similar – expected achievement

Likely general learning difficulty (slow learner), especially in an average to high achieving school

---

Level IV of Flanagan et al.’s Operational Definition of SLD: Pattern of Strengths and Weaknesses

Scores appear to be in the “right” ranges – 90=Average; 80=Below Average/weakness/deficit

Variation is not statistically significant; variation is common in general population

Little to moderate variation in cognitive/academic ability profile

Level IV of Flanagan et al.’s Operational Definition of SLD: Pattern of Strengths and Weaknesses

All Scores/Areas Approximately 85 or Lower

*Remediate cognitive/academic deficits
*Teach compensatory strategies to assist in bypassing cognitive deficits
*Achieve overall cognitive ability-achievement consistency

Level IV of Flanagan et al.’s Operational Definition of SLD: Pattern of Strengths and Weaknesses

All Scores/Areas Suggest Deficiency (generally 70 or lower)

Pattern is Not Consistent with SLD

**Construct** – All scores suggestive of deficiency

**OVERALL COGNITIVE ABILITY**
Well Below Average

**SPECIFIC COGNITIVE ABILITY**
Cognitive Ability or Processing Disorder

**ACADEMIC ABILITY**
Academic Skills/Knowledge Deficits

Not Discrepant

SS = 65-75

Not Discrepant

SS = < 70

Consider Intellectual Disability – Assess adaptive behavior

Level IV of Flanagan et al.’s Operational Definition of SLD: Pattern of Strengths and Weaknesses

All Scores/Areas Suggest Deficiency (generally 70 or lower)

Pattern is Not Consistent with SLD Construct – All scores suggestive of deficiency

Consider Intellectual Disability – Assess adaptive behavior

Little to no variation in cognitive/academic ability profile

COGNITIVE STRENGTHS
Average or better overall ability

RELATIVE COGNITIVE WEAKNESS

Consistent

RELATIVE ACADEMIC WEAKNESS

More likely to see this pattern in older students (and adults) who were identified early and who either compensate for their weaknesses, overcame their weaknesses, or receive accommodations and modifications in the educational setting.

All Scores/Areas Approximately 90 or higher

LIKELY SUGGESTS NORMAL VARIATION

Normal Variation: To Err is Human

• *To Err is Human: “Abnormal” Neuropsychological Scores and Variability are Common in Healthy Adults*  
  – Binder, Iverson, and Brooks (2009)

• At least two statistically significant differences in one’s cognitive ability profile is common in the general population  
  – Oakley (2000)
Level IV of Flanagan et al.’s Operational Definition of SLD: Pattern of Strengths and Weaknesses

Pattern of Discrepancy-Consistency Aligns with SLD Construct (particularly when supported by history), and may suggested Gifted SLD, especially if overall cognitive ability is 130 or higher, cognitive area(s) of deficiency is approximately 1SD below the mean (or lower), achievement is significantly lower than what is expected based on overall cognitive ability (particularly in the absence of intervention/compensatory strategies/accommodations etc). If individual has been receiving intervention and has learned compensatory strategies, for example, the pattern may not show a discrepancy between predicted and actual achievement.

\[ SS = 85 \]
Research on G/LD
(Lovett & Sparks, 2010, in press)

• Nearly 1000 studies on G/LD since 1970’s
  – Only about 5% were data based
  – Most were case studies

• Data show that samples of G/LD have IQ’s of about 120 and achievement in the Average range
Research on G/LD (Lovett & Sparks, 2010, in press)

- Most G/LD met 1SD ability-achievement discrepancy criterion
- The higher the IQ, the greater the likelihood of meeting discrepancy criterion
- Very few met DSM criteria due to absence of low achievement

<table>
<thead>
<tr>
<th></th>
<th>IQ &lt; 120</th>
<th>IQ &gt; 120</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 SD</td>
<td>35.6</td>
<td>66.3</td>
</tr>
<tr>
<td>1.5 SD</td>
<td>16.2</td>
<td>47.1</td>
</tr>
<tr>
<td>2.0 SD</td>
<td>6.3</td>
<td>19.2</td>
</tr>
<tr>
<td>DSM-IV</td>
<td>8.3</td>
<td>4.8</td>
</tr>
</tbody>
</table>
No Consensus on How to Identify Students Who Should be G/LD

Evidence of Impairment Relative to Most People (or the Average Person) is Necessary (Lovett & Sparks)
McCloskey’s Representation of a Cognitive Neuropsychological Discrepancy Model for SLD Identification

Defining Processes in a Cognitive Context

• Processes and Abilities both refer to mental capacities that enable learning and production

• Processes are narrower, more specific mental capacities; Abilities are broader, more overarching mental capacities

(McCloskey, 2007)
Defining Processes in a Cognitive Context

- Ability deficits *constrain learning and production*; the degree of deficit places an upper limit on learning and production; compensatory or by-pass strategies typically are not very effective in countering ability deficits.

- Severe ability deficits result in *cognitive impairments*, that greatly constrain learning and production, such as severe language impairment or mental retardation.

Defining Processes in a Cognitive Context

- Process deficits *obstruct learning and production*, but often can be by-passed or compensated for at least to some degree; in some instances their effects can be significantly reduced if addressed during early developmental stages with a good intervention program.

- Severe process deficits result in *learning disabilities and/or producing disabilities* involving slowed and/or inconsistent learning and production.

## Identification of Learning and Producing Difficulties Related to Reading Achievement

<table>
<thead>
<tr>
<th>Ability to Reason with Verbal Info (g)</th>
<th>Basic Processing (PA, OP, OMP)</th>
<th>Working Memory</th>
<th>Executive Function Processing</th>
<th>McCloskey, 2007, 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deficit</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>Ability Deficit</td>
</tr>
<tr>
<td>Deficit</td>
<td>Deficit</td>
<td>OK</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>Deficit</td>
<td>OK</td>
<td>Deficit</td>
<td>OK</td>
<td></td>
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<tr>
<td>OK</td>
<td>Deficit</td>
<td>OK</td>
<td>OK</td>
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</tr>
<tr>
<td>OK</td>
<td>OK</td>
<td>Deficit</td>
<td>OK</td>
<td></td>
</tr>
<tr>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td></td>
</tr>
</tbody>
</table>

- **Ability Deficit**: Achievement constrained by ability deficit
- **Ability Deficit and Process Deficits**: Achievement constrained by ability deficit despite efforts to compensate for process deficits through adequate EFs
- **LD Only**: Achievement can be adequate as skill weaknesses resulting from process deficits may be minimized through compensatory efforts enabled by adequate EFs

---

### Identification of Learning and Producing Difficulties Related to Reading Achievement

<table>
<thead>
<tr>
<th>Ability to Reason with Verbal Info ($g$)</th>
<th>Basic Processing (PA, OP, OMP)</th>
<th>Working Memory</th>
<th>Executive Function Processing</th>
<th>McCloskey, 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>Deficit</td>
<td>OK</td>
<td>Deficit</td>
<td>LD and PD</td>
</tr>
<tr>
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</tr>
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<td>Deficit</td>
<td>Deficit</td>
<td>Deficit</td>
<td></td>
</tr>
<tr>
<td>Deficit</td>
<td>Deficit</td>
<td>OK</td>
<td>Deficit</td>
<td></td>
</tr>
<tr>
<td>Deficit</td>
<td>OK</td>
<td>Deficit</td>
<td>Deficit</td>
<td></td>
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<tr>
<td>Deficit</td>
<td>Deficit</td>
<td>Deficit</td>
<td>Deficit</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ability to Reason with Verbal Info</th>
<th>Basic Processing (PA, OP, OMP)</th>
<th>Working Memory</th>
<th>Executive Function Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK</td>
<td>OK</td>
<td>OK</td>
<td>Deficit</td>
</tr>
</tbody>
</table>

McCloskey, 2007

Identification of Learning and Producing Difficulties Related to Reading Achievement

PD Only
Inconsistent achievement Likely due to EF deficits

Attention should be directed at “the specific cognitive and linguistic processes [that] are accessed and used by individuals to collect, sort, process, store, and retrieve various types of information…[b]y analyzing the pattern of strengths and weaknesses that exist within a person or the intraindividual discrepancies, one can begin to determine how specific differences influence functioning and academic performance” (p. 99)
Identification of SLD

- Involves more than just examining scores from standardized tests
  - A convergence of data sources is necessary
  - Data should be gathered via different methods
  - Exclusionary factors must be considered and examined systematically
Flanagan et al.’s Operational Definition: Level I Based on a Convergence of Data Sources

Examples

- Standardized Achievement Tests (Indiv. and Group)
- Progress Monitoring Data; CBM Data
- Work Samples; Classroom Observations: Parent/Teacher/Student Report
- Criterion Referenced: Benchmark Assessment

ACADEMIC WEAKNESS/FAILURE
About ONE Standard Deviation below the mean or lower

Other Factors (e.g., Exclusionary)
Flanagan et al.’s Operational Definition: Level II – Review of Exclusionary Factors

Evaluation and Consideration of Exclusionary Factors for SLD Identification

An evaluation of specific learning disability (SLD) requires an evaluation and consideration of factors, other than a disorder in one or more basic psychological processes that may be the primary cause of a student’s academic skill weaknesses and learning difficulties. These factors include (but are not limited to), vision/hearing\(^1\), or motor disabilities, intellectual disability (ID), social/emotional or psychological disturbance, environmental or economic disadvantage, cultural and linguistic factors (e.g., limited English proficiency), insufficient instruction or opportunity to learn and physical/health factors. These factors may be evaluated via behavior rating scales, parent and teacher interviews, classroom observations, attendance records, social/developmental history, family history, vision/hearing exams\(^1\), medical records, prior evaluations, and interviews with current or past counselors, psychiatrists, and paraprofessionals who have worked with the student. Noteworthy is the fact that students with (and without) SLD often have one or more factors (listed below) that contribute to academic and learning difficulties. However, the practitioner must rule out any of these factors as being the primary cause of a student’s academic and learning difficulties to maintain SLD as a viable classification/diagnosis.
Flanagan et al.’s Operational Definition: Level II – Review of Exclusionary Factors

Vision (Check All that Apply):

- Vision test recent (within 1 year)
- Vision test outdated (> 1 year)
- Passed
- Failed
- Wears Glasses
- History of visual disorder/disturbance
- Diagnosed visual disorder/disturbance

Name of disorder: ______________________

(\[e.g.,\] difficulty with far or near point copying, misaligned numbers in written math work, squinting or rubbing eyes during visual tasks such as reading, computers)

NOTES: ____________________________________________________________

__________________________________________________________
Flanagan et al.’s Operational Definition: Level II – Review of Exclusionary Factors

**Hearing (Check All that Apply):**

- [ ] Hearing test recent (within 1 year)
- [ ] Hearing test outdated (> 1 year)
- [ ] Passed
- [ ] Failed
- [ ] Uses Hearing Aids

- [ ] History of auditory disorder/disturbance
- [ ] Diagnosed auditory disorder/disturbance
- [ ] Name of disorder: ____________________
- [ ] Hearing difficulties suggested in the referral (e.g., frequent requests for repetition of auditory information, misarticulated words, attempts to self-accommodate by moving closer to sound source, obvious attempts to speech read)

**NOTES:**

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Flanagan et al.’s Operational Definition: Level II – Review of Exclusionary Factors

Motor Functioning (Check All that Apply):

- Fine Motor Delay/Difficulty
- Gross Motor Delay/Difficulty
- Improper pencil grip (Specify type: __________)  
- Assistive devices/aids used (e.g., weighted pens, pencil grip, slant board)
- History of motor disorder
- Diagnosed motor disorder
- Name of disorder: __________
- Motor difficulties suggested in the referral (e.g., illegible writing, issues with letter or number formation, size, spacing; difficulty with fine motor tasks such as using scissors, folding paper)

NOTES: ________________________________________________________________
__________________________________________________________________
__________________________________________________________________
Flanagan et al.’s Operational Definition: Level II – Review of Exclusionary Factors

Cognitive and Adaptive Functioning (Check All that Apply):

☐ Significantly “subaverage intellectual functioning” (e.g., IQ score of 75 or below)

☐ Pervasive cognitive deficits (e.g., weaknesses or deficits in many cognitive areas, including Gf and Gc)

☐ Deficits in adaptive functioning (e.g., social, communication, self-care)

Areas of significant adaptive skill weaknesses (check all that apply):

☐ Motor Skill     ☐ Communication     ☐ Socialization

☐ Daily Living Skills ☐ Behavior/Emotional Skills ☐ Other

NOTES: ______________________________________________

________________________

________________________

________________________
Flanagan et al.’s Operational Definition: Level II – Review of Exclusionary Factors

Environmental/Economic Factors (Check All that Apply):

- Limited access to educational materials in the home
- Caregivers unable to provide instructional support
- Economic considerations precluded treatment of identified issues (e.g., filling a prescription, replacing broken glasses, tutoring)
- History of educational neglect
- Frequent transitions (e.g., shared custody)
- Environmental space issues (e.g., no space for studying, sleep disruptions due to shared sleeping space)
- Temporary Crisis Situation

NOTES: ______________________________________________________________
______________________________________________________________
Flanagan et al.’s Operational Definition: Level II – Review of Exclusionary Factors

**Cultural/Linguistic Factors (Check All that Apply)**:

- [ ] Limited Number of Years in U.S. (___)
- [ ] No History of Early or Developmental Problems in Primary Language
- [ ] Current Primary Language Proficiency:
  - Dates: __________ Scores: __________
- [ ] Acculturative Knowledge Development
  - (Circle one: High – Moderate – Low)
- [ ] Language(s) Other than English Spoken in Home
  - (# of years ___)
- [ ] Lack of or Limited Instruction in Primary Language
  - (Date: __________ Scores: __________)
- [ ] Current English Language Proficiency:
  - (Circle one: High – Moderate – Low)
- [ ] Parental Educational and Socio-Economic Level

**NOTES:**

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
Flanagan et al.’s Operational Definition: Level II – Review of Exclusionary Factors

### Flanagan et al.’s Operational Definition: Level II – Review of Exclusionary Factors

<table>
<thead>
<tr>
<th>Instructional Factors (Check All that Apply):</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Interrupted schooling (e.g., mid-year school move) Specify why: __________________________</td>
</tr>
<tr>
<td>□ New teacher (past 6 months)</td>
</tr>
<tr>
<td>□ Nontraditional curriculum (e.g., homeschooled) □ Retained or advanced a grade(s)</td>
</tr>
<tr>
<td>□ Days Absent ______</td>
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<tr>
<th>NOTES:</th>
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**Determination of Primary and Contributory Causes of Academic Weaknesses and Learning Difficulties (Check One):**

- □ Based on the available data, it is reasonable to conclude that one or more factors *is primarily* responsible for the student’s observed learning difficulties. Specify: __________________________
- □ Based on the available data, it is reasonable to conclude that one or more factors *contributes* to the student’s observed learning difficulties. Specify: __________________________

□ No factors listed here appear to be the primary cause of the student’s academic weaknesses and learning difficulties
Flanagan et al.’s Operational Definition: Level III Based on a Convergence of Data Sources

**Examples**

- Standardized Intelligence or Cognitive Tests
- More than one subtest of the presumed ability deficit
- Manifestations of the deficit
- Previous reports/evaluation corroborate finding

**COGNITIVE WEAKNESS/DEFICIT**
About ONE Standard Deviation below the mean or lower
Level IV of Flanagan et al.’s Operational Definition of SLD

**COGNITIVE STRENGTHS**

- Average or better overall ability

**Examples**

- Total Test Score on Intelligence Test (e.g., FSIQ)
- Alternative Ability Score (e.g., GAI)
- \( g \)-value of \( > 1.0 \)
- Strengths in Some Academic Areas

**Other Factors**
(e.g., motivation/effort, familial support; language; early enrichment; creativity)
Is Average or Better Overall Ability Consistent with the SLD Construct?

*ONCAP – Otherwise Normal Cognitive Ability Profile*
Individuals with SLD have At Least Average Overall Ability

- The children often have average or above intelligence and good memory in other respects
- Hinshelwood, 1902

“Historical Perspective” Information from Nancy Mather, NYASP 2011
Individuals with SLD have At Least Average Overall Ability

Many of the children have a high degree of intelligence

Orton, 1937

“Historical Perspective” Information from Nancy Mather, NYASP 2011
Individuals with SLD have At Least Average Overall Ability

“it seems probably that psychometric tests as ordinarily employed give an entirely erroneous and unfair estimate of the intellectual capacity of these children” (p. 582)

Orton, 1925

“Historical Perspective” Information from Nancy Mather, NYASP 2011
Individuals with SLD have At Least Average Overall Ability

• “The children of superior mental capacity who fail to learn to read are, of course, spectacular examples of specific reading difficulty since they have such obvious abilities in other fields.” (p. 23)

• Monroe, 1932

“Historical Perspective” Information from Nancy Mather, NYASP 2011
Individuals with SLD have At Least Average Overall Ability

• Remedial training must continue until reading is in harmony with the child’s other capacities and achievement

• Some children of superior intelligence struggle to learn to read

• Monroe, M. (1932)

“Historical Perspective” Information from Nancy Mather, NYASP 2011
Individuals with SLD have At Least Average Overall Ability

• “Sometimes children of good general intelligence show retardation in some of the specific skills which compose an intelligence test” (p. 22)

• Monroe and Backus (1937)
Individuals with SLD have At Least Average Overall Ability

“The clearest expression of a special disability is consistently low scores on a series of tests in a given subject conjoined with average or superior scores on tests in other subjects. Such scores can be arranged in an ‘educational profile.’ For example, in case of a reading disability, a child might obtain scores placing him in the ninth grade in arithmetic and in the third grade in reading. Here we would have evidence of a striking reading disability.” (p. 43).


“Historical Perspective” Information from Nancy Mather, NYASP 2011
Overall Ability and RTI


**Implications for Research and Practice**

So, findings from our review suggest that IQ frequently predicts responsiveness to reading instruction, and it can explain important variance in such responsiveness. Put differently, IQ often mediates or influences the effectiveness of reading instruction such that it is more or less effective for children with higher versus lower IQ scores.
The rate of progress under remedial instruction was found to be a function of:

- the child’s intelligence
- how early intervention is provided
- number of hours of training
- severity of the disability
- behavior and personality difficulties
- supervision of the remedial techniques

(Source: Monroe, 1932, p. 157)
When a student does not meet the discrepancy criterion and, therefore, cannot be deemed an underachiever, there is the strong possibility that the student is a “slow learner” (SL; i.e., a student with an IQ level between about 70 and 85). About 14% of the school population may be deemed SL, but this group does not demonstrate unexpected learning failure, but rather an achievement level consonant with IQ level. Although NCLB makes such low achievement problematic, slow learner has never been a special education category, and “What should not happen is that a designation of SLD be given to a slow learner” (Kavale, 2005, p. 555).
What are the Criteria for Discrepancy and Consistency? *See PSW-Analyzer Program*
Level V Criteria for Eligibility Under SLD Label

• Child demonstrates significant difficulties in daily academic activities that cannot be remediated, accommodated, or otherwise compensated for without the assistance of individualized special education services.
On the Flanagan et al. Operational Definition of SLD…

[This] operational definition provides an inherently practical method for SLD identification that carries the potential for increased agreement about the validity of SLD classification

Kavale, Holdnack, & Mostert (2005, p. 12)
The Importance of Assessing Cognitive Abilities and Processes and Academic Skills…

By identifying specific targets for remediation, the possibilities for truly individualized intervention are increased significantly.

Kavale, Holdnack, & Mostert (2005, p. 12)
The Value of Assessing Cognitive Abilities and Processes…

Even if a student never enters the special education system, the general education teacher, the student’s parents, and the student him- or herself would receive valuable information regarding why there was such a struggle in acquiring academic content, to the point of possibly needing special education.

Kavale, Holdnack, & Mostert (2005, p. 12)
Determining a Specific Learning Disability

- Discrepancy between “ability” and “achievement”
- Failure to respond to scientific research-based intervention
- May permit the use of other alternative research-based procedures for determining whether a child has a specific learning disability [PSW], as defined in §300.8(c)(10) (OSERS Final Regulations-8/06)
  - Flanagan and colleagues
  - Hale and Fiorello
  - McCloskey
  - Naglieri
  - Feifer and Della Tofallo
  - Miller
  - Berninger
  - Geary
  - Mather

All value RTI approach; All consider RTI data for diagnosis and treatment
On Third Method Approaches

Della Tofallo (2010; pp. 180-181) – RTRI or Response to the Right Intervention

Make no mistake...integrated models [third method approaches] of identifying (and serving) students with LDs do not arrive prepackaged along with dozens of studies touting their “scientific validation.” However, they are evidence-based because they emanate from the marriage of a collective body of knowledge that has been acquired through research in the fields of neuroscience, pedagogy, assessment, and intervention.
“At the current state of scientific knowledge, it is only through a comprehensive evaluation of a student’s cognitive and psychological abilities and processes that insights into the underlying proximal and varied root causes of [academic] difficulties can be ascertained and then specific interventions be provided targeted to each student’s individual needs, a process long advocated.”

From Reynolds and Shaywitz (2009)
Don’t Forget

• *There is no LD litmus test*; the more well-versed you are in different approaches and methods, the more information you will gain about the child (including how to best help him or her)
Don’t Forget

• Not all children are Average and Above Average

"all the women are strong, all the men are good looking, and all the children are above average."
A diagnosis identifies the nature of a specific learning disability and has implications for its probable etiology, instructional requirements, and prognosis. Ironically, in an era when educational practitioners are encouraged to use evidence-based instructional practices, they are not encouraged to use evidence-based differential diagnoses of specific learning disabilities.

Don’t Forget

• Comprehensive evaluation (including cognitive assessment) is important and necessary for students who do not respond well to instruction and intervention
... there is a demand for the comprehensive assessment to drive intervention. This is the way it has always been, and this is the way it will always be because the referral questions for children with SLD have always asked, What is wrong? And how can we help? These questions demand differential diagnosis, a large part of which is determined by the cognitive abilities present in the individual child (p. 211).

What is the Utility of Test Results for Teachers?

Linking Assessment to Intervention
Instructional Planning is Complex and Requires a Team of Experts

Mascolo and Flanagan (2011)

- Regular Ed Teacher
- Special Ed Teacher
- Diagnostician
- Parents and Other School Personnel

Knowledge of and Access to Appropriate Resources

Multiple Data Sources

Child Environment

Home and Community
Linking Assessment to Intervention

• Requires good instruments
• Well trained clinicians
• Well trained teachers and special educators
• A mechanism in place for bringing data together to problem-solve in an attempt to offer the most effective instruction and interventions to children

Mascolo and Flanagan (2011)
Intervention Types

• Need to differentiate between
  – Direct Interventions (remediation)
  – Accommodations
  – Compensation
  – Instructional/Curricular Modifications

• **Intervention**: any technique, product, or approach that intends to address *directly* an identified area of weakness through *remediation*

• **Accommodations**: any technique or support that intends to alleviate the symptomatology associated with an identified area of weakness (e.g., circumventing the impact of a processing speed weakness via extended time - - the symptom is not “Gs deficit” – that’s the problem; the symptom is “unfinished assignments” - - when you extend time you alleviate the symptom and assignments are completed.

• **Compensation**: strategies taught to a student that he or she is expected to apply independently to by pass or minimize weaknesses

  Mascolo and Flanagan (2011)
## Manifestations of Cognitive Weaknesses and Examples of Recommendations and Interventions (Flanagan, Alfonso, & Mascolo, 2011, 2012)

Definitions of CHC Cognitive Abilities and Neuropsychological Functions, Manifestations of Cognitive Weaknesses and Examples of Recommendations and Interventions (Based on Flanagan, Alfonso, & Mascolo, 2012; *Contemporary Intellectual Assessment*, 3rd edition)

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Fluid Reasoning (Gf)</td>
<td></td>
<td><strong>Difficulties with:</strong></td>
<td><strong>Reading Difficulties:</strong></td>
<td></td>
</tr>
<tr>
<td>• Novel reasoning and problem solving; ability to solve problems that are unfamiliar</td>
<td>• Higher level thinking and reasoning</td>
<td>• Drawing inferences from text</td>
<td>• Developing a theme</td>
<td>• Develop student’s skill in categorizing objects and drawing conclusions</td>
</tr>
<tr>
<td>• Processes are minimally dependent on prior learning</td>
<td>• Transferring or generalizing learning</td>
<td>• Abstractive main idea(s)</td>
<td>• Developing a theme</td>
<td>• Use demonstrations to externalize the reasoning process</td>
</tr>
<tr>
<td>• Involves manipulating rules, abstracting, generalizing, and identifying logical relationships</td>
<td>• Deriving solutions for novel problems</td>
<td>• Internalizing procedures and processes used to solve problems</td>
<td>• Comparing and contrasting ideas</td>
<td>• Gradually offer guided practice (e.g., guided questions list) to promote internalization of procedures or process(es)</td>
</tr>
<tr>
<td>• Fluid reasoning is evident in inferential reasoning, concept formation, classification of unfamiliar stimuli, categorization, and extrapolation of reasonable estimates in ambiguous situations (Shneider &amp; McGrew, 2012)</td>
<td>• Extending knowledge through critical thinking</td>
<td>• Reasoning with quantitative information (word problems)</td>
<td>• Targeted feedback</td>
<td>• Cooperative learning</td>
</tr>
<tr>
<td>• Narrow Gf abilities include Induction, General Sequential Reasoning (Deduction), and Quantitative Reasoning</td>
<td>• Perceiving and applying underlying rules or process(es) to solve problems</td>
<td>• Internalizing procedures and processes used to solve problems</td>
<td>• Reciprocal teaching</td>
<td>• Use graphic organizers to arrange information in visual format</td>
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</table>


Fluid Intelligence

• Novel reasoning and problem solving; ability to solve problems that are unfamiliar
• Processes are minimally dependent on prior learning
• Involves manipulating rules, abstracting, generalizing, and identifying logical relationships
• Fluid reasoning is evident in inferential reasoning, concept formation, classification of unfamiliar stimuli, categorization, and extrapolation of reasonable estimates in ambiguous situations (Schneider & McGrew, 2012)
Fluid Intelligence (Gf)

• General Sequential Reasoning (RG)
  – Ability to start with stated rules, premises, or conditions and to engage in one or more steps to reach a solution to a novel problem (also called deduction)

• Induction (I)
  – Ability to discover the underlying characteristic (e.g., rule, concept, process, trend, class, membership) that governs a problem or set of materials

• Quantitative Reasoning (RQ)
  – Ability to inductively and deductively reason with concepts involving mathematical relations and properties
Selected Measures of $Gf$

- **WISC-IV PRI**
  - Matrix Reasoning (I, RG)
  - Picture Concepts (I)
- **WJ III $Gf$ Cluster**
  - Analysis Synthesis (RG)
  - Concept Formation (I)
- **KABC-II**
  - Pattern Reasoning (I)
  - Story Completion (I, RG)
- **DAS-II**
  - Picture Similarities
  - Matrices
  - Sequential and Quantitative Reasoning
General Manifestation of Deficit in $Gf$

• Higher level thinking and reasoning
  – Difficulties with deductive reasoning (general to specific)
  – Difficulties with inductive reasoning (specific to general)
• Transferring or generalizing learning
• Deriving solutions for novel problems
• Extending knowledge through critical thinking
• Perceiving and applying underlying rules or process(es) to solve problems
Academic Manifestations of \( Gf \) Deficit

• Reading
  – Difficulties with inferential reading comprehension
  – Difficulty abstracting main idea

• Writing
  – Difficulty with essay writing and generalizing concepts
  – Difficulty developing a theme
  – Difficulty with comparing and contrasting ideas

• Math
  – Difficulties with math reasoning (word problems)
  – Difficulties with internalizing procedures and processes used to solve problems
  – Difficulty apprehending relationships between numbers
Recommendations for $G_f$ Deficit

• Develop student’s skill in categorizing objects and drawing conclusions

• Use demonstrations to externalize the reasoning process
  – Gradually offer guided practice (e.g., guided questions list) to promote internalization of procedures or process(es)
Recommendations for Gf Deficit

- Targeted feedback
- Cooperative learning
- Think Alouds
- Reciprocal teaching
- Graphic organizers to arrange information in visual format
Targeted Feedback

• Feedback to students is important and needs to be *concrete* and *specific*
  – Highlight parts of the task that they executed appropriately
  – Identify where things went “wrong” or off-course
  – Describe how to correct the mistakes
  – Provide opportunity for self-correction and/or practice
Targeted Feedback Example

1. Read the Problem
2. Select Important Information
3. Select Operation to Use
4. Solve the Problem
5. Check your work (ask yourself: does my answer make sense?)

Ann baked 12 cookies for her school’s bake fair. She had 3 customers in her line that each wanted a cookie. How many cookies did she have left after she served the customers?

12
X 3
___
36
1. Read the Problem
2. Select Important Information
3. Select Operation to Use
4. Solve the Problem
5. Check your work (ask yourself: does my answer make sense?)

Ann baked 12 cookies for her school’s bake fair. She had 3 customers in her line that each wanted a cookie. How many cookies did she have left after she served the customers?

12
X 3
___
36

Feedback:
Great job of selecting important information (numbers 12 and 3)
Did not identify the appropriate operation (used multiplication instead of subtraction)
I think you might have seen the word “each” first and selected multiplication, but if you read on you would have realized that the question was asking about “how many left” and could have selected subtraction.
Focus on reading the whole problem first, then going back to reread for what the problem is asking for.
Also, if you checked your work, you might have seen that the answer 36 did not make sense in the context of the problem. Your computation was correct, but how could she have more cookies left than what she started with?
Shapes That Belong

triangle

rectangle
Sort by Color and Shape

- Red
  - [ ] red
  - [X] red

- Blue
  - [ ] blue
  - [X] blue

- Yellow
  - [ ] yellow
  - [X] yellow

- Green
  - [ ] green
  - [X] green

- Blue
  - [ ] blue
  - [X] blue

Color the shapes. Then color the shape that belongs in each group the same color.
Targeted Feedback is Critical For Student Success
Cooperative Learning

• Can be in pairs or small group
• Students with $Gf$ deficits can be matched with students who have good reasoning skills and who are comfortable with “thinking aloud” and contributing to the group
• Important to assign tasks that capitalize upon student’s strengths and assist in accomplishing your goal (e.g., student who needs help with reasoning may read well)
• Feedback/Processing of experience is important
Reciprocal Teaching Cards

www.adrianbruce.com/reading/room4/recip

1. Predicting

**Leader:** Read the next topic sentence or sub-heading and, based on that, predict what you think the next paragraph will be about.

**Group:** “My prediction is that the rest of the paragraph will be about …”

“Based on the topic sentence, I think the paragraph will be about …”

2. Reading

**Leader:** “Can you read the next paragraph for us please *(name)*?”

or

“(name) can you read up to ..........”

With each new leader the group alternate between reading:
- silently
- to a partner
- to the group
- in unison

**Wow! Interesting!**
Reciprocal Teaching Cards

www.adrianbruce.com/reading/room4/recip

3. Clarifying

Leader: “What aspects of this paragraph do you need to clarify?” (make clear)

Group Members:

“I’d like to know what the word .......... means?”
“Where is ................... located?”
“How is this word pronounced?”

Mmmm, that’s clearer.

4. Questioning

Leader: “In order to check if someone has fully understood this passage, what questions could you ask them?”

Group Members:

What...? Why...? When...?
Which...? Where...?
Who...? How...?

(Then the whole group answer the questions)
Reciprocal Teaching Cards

www.adrianbruce.com/reading/room4/recip

5. Summarizing

Leader

“(name) would you please say / write a sentence or two to summarize this passage.”

“State the main points of this paragraph please (name)”

“What are the most important facts / pieces of information in this paragraph (name) ?”
Graphic Organizers

• Make use of graphic organizers (Venn diagrams, concept maps) to help the student
  – Understand the information conceptually through a visual modality
  – More readily link new information to known information
  – Make links from specific to general
OXYGEN
- is important to
  - give

WOOD
- is used to build:
  - Houses
- is used to make:
  - Paper
  - Furniture
Programs/Techniques for $Gf$ Deficits

• When selecting a program or a technique to intervene with a student with a $Gf$ deficit, it may be helpful to consider one that
  – includes explicit strategy instruction
  – focuses on the application of higher level thinking skills to the reading (e.g., making predictions, drawing inferences, abstracting, inferring character feelings) and writing process (e.g., persuasive writing, compare/contrast)
  – is multi-staged and includes modeling up through independent application of the strategy/technique
Reading and Writing Examples (Gf)

• Inspiration/Kidspiration software (www.inspiration.com)
  – “Created for K-5 learners, Kidspiration® develops thinking, literacy and numeracy skills using proven visual learning principles. In reading and writing, Kidspiration strengthens word recognition, vocabulary, comprehension and written expression. With new visual math tools, students build reasoning and problem solving skills.”
Kidspiration provides a cross-curricular visual workspace for K-5 learners. Students use visual tools combining pictures, text, numbers and spoken words to develop vocabulary, word recognition, comprehension, reasoning and problem solving skills.

Kidspiration works the way students think and learn and the way teachers teach. As students make visual connections, they build fundamental skills in reading, writing, math, science and social studies. Kidspiration offers activities in all curriculum areas, so students use visual learning naturally and confidently.

[Image of Kidspiration software interface with a diagram labeled "Where I Live" and a box labeled "Integrated Picture and Writing Views"]
Develop Strong Thinking Skills

With Kidspiration, students use graphic organizers to express thoughts and explore ideas and relationships. They create graphic organizers including webs, concept maps and Venn diagrams to clarify thoughts, organize information, apply new knowledge and build critical thinking skills.

- 3,000+ symbols in Kidspiration's Symbol Library provide visual support for concepts taught in K-5 language arts, social studies and science. Students can also import symbols from other sources.

- Symbol Search helps students search and find just the right symbols to express their thoughts and ideas.
Math View
Students use visual math tools to understand essential math concepts.

Picture View
Students create maps, diagrams and webs.

Integrated Picture and Writing Views

Writing View
Students expand their ideas into written expression.
<table>
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<tr>
<th>CHC Broad Cognitive Abilities/Neuropsychological Functions</th>
<th>Brief Definition</th>
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<tbody>
<tr>
<td>Auditory Processing (Ga)</td>
<td>• Ability to analyze and synthesize auditory information&lt;br&gt;• One narrow aspect of Ga is a precursor to oral language comprehension (i.e., parsing speech sounds or Phonetic Coding)&lt;br&gt;• In addition to Phonetic Coding, other narrow Ga abilities include, Speech Sound Discrimination, Resistance to Auditory Stimulus Distortion, Memory for Sound Patterns, (and others related to music)</td>
<td><strong>Difficulties with:</strong>&lt;br&gt;• Hearing information presented orally, initially processing oral information&lt;br&gt;• Paying attention especially in the presence of background noise&lt;br&gt;• Discerning the direction from which auditory information is coming&lt;br&gt;• Discriminating between simple sounds&lt;br&gt;• Foreign language acquisition</td>
<td><strong>Reading Difficulties:</strong>&lt;br&gt;• Acquiring phonics skills&lt;br&gt;• Sounding out words&lt;br&gt;• Using phonetic strategies&lt;br&gt;<strong>Math Difficulties:</strong>&lt;br&gt;• Reading word problems&lt;br&gt;<strong>Writing Difficulties:</strong>&lt;br&gt;• Spelling&lt;br&gt;• Note taking&lt;br&gt;• Poor quality of writing</td>
<td>• Phonemic awareness activities&lt;br&gt;• Emphasis on sight-word reading&lt;br&gt;• Teach comprehension monitoring (e.g., does the word I heard/read make sense in context?)&lt;br&gt;• Annunciating sounds in words in an emphatic manner when teaching new words for reading or spelling&lt;br&gt;• Use work preview/text preview to clarify unknown words&lt;br&gt;• Provide guided notes during note taking activities&lt;br&gt;• Build in time for clarification questions related to “missed” or “misheard” items during lecture&lt;br&gt;• Supplement oral instructions with written instructions&lt;br&gt;• Shortening instructions&lt;br&gt;• Preferential seating&lt;br&gt;• Localizing sound source for student&lt;br&gt;• Minimizing background noise</td>
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## Manifestations of Cognitive Ability Weaknesses and Empirically-based Recommendations and Interventions

(Flanagan, Alfonso, & Mascolo, 2011, 2012)

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<tr>
<td>Long-Term Retrieval (Glr)</td>
<td>• Ability to store information (e.g., concepts, words, facts), consolidate it, and fluently retrieve it at a later time (e.g., minutes, hours, days, and years) through association. In Glr tasks, information leaves immediate awareness long enough for the contents of primary memory to be displaced completely. In other words, Glr tasks (unlike Gsm tasks) do not allow for information to be maintained continuously in primary memory. (Schneider &amp; McGrew, 2012) • Glr abilities may be categorized as either “learning efficiency” or “fluency”. Learning efficiency narrow abilities include Associative Memory, Meaningful Memory, and Free Recall Memory; fluency narrow abilities involve either the production of ideas (e.g., Ideational Fluency, Associational Fluency), the recall of words (e.g., Naming Facility, Word Fluency), or the generation of figures (e.g., Figural Fluency, Figural Flexibility) (Schneider &amp; McGrew, 2012)</td>
<td><strong>Difficulties with:</strong> • Learning new concepts • Retrieving or recalling information by using association • Performing consistently across different task formats (e.g., recognition versus recall formats) • Rapid retrieval of information • Learning information quickly • Paired learning (visual-auditory) • Recalling specific information (words, facts) • Generating ideas rapidly</td>
<td><strong>Reading Difficulties:</strong> • Accessing background knowledge to support new learning while reading • Slow to access phonological representations during decoding • Retelling or paraphrasing what one has read <strong>Math Difficulties:</strong> • Memorizing math facts • Recalling math facts and procedures</td>
<td>• Repeated practice with and review of newly presented information • Teach memory strategies (verbal rehearsal to support encoding, use of mnemonic devices) • Use multiple modalities when teaching new concepts (pair written with verbal information) • Limit the amount of new material to be learned; introduce new concepts gradually and with a lot of context • Be mindful of when new concepts are presented • Make associations between newly learned and prior information explicit • Use lists to facilitate recall (prompts) • Expand vocabulary to minimize impact of word retrieval deficits • Build in wait-time for student when fluency of retrieval is an issue • Use text previews to “prime” knowledge • Provide background knowledge first before asking a question to “prime” student for retrieval</td>
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Academic Manifestations (Glr)

• Language
  – Expressive – circumlocutions, speech fillers, “interrupted” thought, pauses
  – Receptive – making connections throughout oral presentations (e.g., class lecture)
Interventions for Glr

- **Active learning** *(Marzano, et al., 2001)*
- **Rehearsal, overlearning, elaboration** *(Squire & Schacter, 2003)*
- **Mnemonics** *(Wolfe, 2001)*
- **Visual representation** *(Greenleaf & Wells-Papanek, 2005)*
- **Organizational strategies**

*Wendling and Miller (2010)*
Glr Recommendations

• Repeated practice with and review of newly presented information
• Teach memory strategies (verbal rehearsal to support encoding, use of mnemonic devices)
• Use multiple modalities when teaching new concepts (pair written with verbal information)
• Limit the amount of new material to be learned; introduce new concepts gradually and with a lot of context
• Make associations between newly learned and prior information explicit
• Use lists to facilitate recall (prompts)
Glr Recommendations

• Expand vocabulary to minimize impact of word retrieval deficits
• Build in wait-time for student when fluency of retrieval is an issue
• Provide background knowledge first before asking a question to “prime” student for retrieval
Programs/Techniques for Glr Deficits

• When selecting a program or a technique to intervene with a student with a Glr deficit, it is helpful to ensure that it
  – includes encoding strategies (e.g., mnemonics, visuals)
  – uses some form of strategy instruction for accessing information
Reading and Writing Intervention Examples (Glr)

• Reading
  – Teaching text structure which, “organizes the reader’s thinking, and enhances understanding and recall of the information” (Wendling & Mather, 2009, p. 108)
Reading and Writing Examples (Glr)

• Story Map
  • Type of graphic organizer that can be used to teach narrative text structure
  • Focuses on 4 elements including (1) characters and their personalities/motivations; (2) main problem; (3) characters’ attempts to problem solve; (4) outcome/conclusion
Advanced Story Map Worksheet (Adapted from Gardill & Jitendra, 1999)

Student: ___________________________ Date: ______________ Class: ______________

1. Who is the central character? ____________________________

2. What is the main character like? (Describe his/her key qualities or personality traits).
   ________________________________________________________

3. Who is another important character in the story? ________________
   ________________________________________________________

4. What is this other important character like? ____________________
   ________________________________________________________

5. Where and when does the story take place? ________________
   ________________________________________________________

6. What is the major problem that the main character is faced with? ________________
   ________________________________________________________

7. How does the main character attempt to solve this major problem? ________________
   ________________________________________________________

8. What is the twist, surprise, or unexpected development that takes place in the story?
   ________________________________________________________

9. How is the problem solved or not solved?
   ________________________________________________________

10. What is the theme or lesson of the story?
   ________________________________________________________
Reading and Writing Examples (Glr)

• Writing
  – Use programs with generated word banks so that the retrieval demands during writing are lessened and vocabulary is indirectly expanded by having the student use target words in sentences (e.g., ClozePro)
Volcanoes

A volcano is an opening in the Earth’s _______ that allows hot, _______ rock to escape from _______. Most volcanoes are mountains of _______ and ash. When _______ builds beneath the surface, the volcano _______. The molten rock, called _______, explodes out of the _______. As the magma flows it becomes _______. The hot lava _______ buildings and houses. Volcanic _______ also shoot out _______ and _______. For weeks after eruptions there may be dark _______, strong _______ and heavy _______.

surface
ash
buries
rock
pressure
skies
molten
volcano
lava
gases
Type or paste some text into ClozePro.

The emperor penguin is the largest of all penguins and can grow to be over one metre tall. It can't fly but it can swim very well. It spends most of its life in the sea. It has thick, waterproof feathers, which keep its skin dry. It also has a layer of fat underneath its skin to help keep it warm. The emperor catches prey easily with its powerful beak.
The text you remove is placed automatically in a 'grid'.

The emperor penguin is the _______ of all penguins and can _____ to be over one metre tall. It can’t fly but it can _____ very well. It spends most of its life in the ___. It has thick, waterproof _______, which keep its skin dry. It also has a layer of fat to help keep it warm. The emperor catches prey easily with its powerful beak.
Run the activity, or print it as a worksheet for the whole class to use.

The emperor penguin is the _______ of all penguins and can ____ to be over one metre tall. It can’t fly but it can ____ very well. It spends most of its life in the ____. It has thick, waterproof ______, which keep its skin dry. It also has a layer of ___ underneath its skin to help keep it _____. The emperor catches ___ easily with its powerful beak.

- feathers
- prey
- largest
- grow
- warm
- fat
- swim
- sea
Using Instructional Materials (Glr)

• Use chapter terms such as “word banks” for writing activities to facilitate retrieval
• Use *chapter previews* to “prime” background knowledge and help student make associations
• Use *online tools* (e.g., writing prompts)
Harcourt Language (Grade 4)

Ideas for Personal Narratives

Grade 4

Need ideas? Find lots of writing ideas right here.

- Picture Prompts
- Title Ideas
- Mind Nudgers
- Starters

Mind Nudgers

Let one of these questions nudge your mind into writing a personal narrative.

- What happened when you had to pass a hard test?
- What did you do that surprised your parent?
- What happened when you got mad?
- What happened when you lost the big game?
- What happened when you were a stranger?
- What happened when you helped someone?
- What happened when you worked very hard?
- What happened when someone helped you?
<table>
<thead>
<tr>
<th>CHC Broad Cognitive Abilities/Neuropsychological Functions</th>
<th>Brief Definition†</th>
<th>General Manifestations of Cognitive/Neuropsychological Weakness</th>
<th>Specific Manifestations of the Cognitive/Neuropsychological Weakness</th>
<th>Recommendations/Interventions</th>
</tr>
</thead>
</table>
| Visual Processing (Gv)                                  | Ability to analyze and synthesize visual information. The ability to make use of simulated mental imagery (often in conjunction with currently perceived images) to solve problems (Schneider & McGrew, 2012). There are many narrow Gv abilities, some of which include Visualization, Speeded Rotation, Closure Speed, Flexibility of Closure, Visual Memory and Spatial Scanning. | **Difficulties with:**  
- Recognizing patterns  
- Reading maps, graphs, charts  
- Attending to fine visual detail  
- Recalling visual information  
- Appreciation of spatial characteristics of objects (e.g., size, length)  
- Recognition of spatial orientation of objects | **Reading Difficulties:**  
- Orthographic coding (using visual features of letters to decode)  
- Sight-word acquisition  
- Using charts and graphs within a text in conjunction with reading  
- Comprehension of text involving spatial concepts (e.g., social studies text describing physical boundaries, movement of troops along a specified route)  
- **Math Difficulties:**  
- Number alignment during computations  
- Reading and interpreting graphs, tables, and charts  
- Writing Difficulties:  
- Spelling sight words  
- Spatial planning during writing tasks (e.g., no attention to margins, words that overhang a line)  
- Inconsistent size, spacing, position, and slant of letters | Capitalize on students phonemic skills for decoding tasks.  
- Teach orthographic strategies for decoding (e.g., word length, shape of word); Use “cover, copy, compare” technique – go to: http://www.amblesideprimary.com/amblesideprimary/lookcover/lookcover.html  
- Provide oral explanation for visual concepts.  
- Review spatial concepts and support comprehension through use of hands-on activities and manipulatives (e.g., using models to demonstrate the moon’s orbital path).  
- Highlight margins during writing tasks.  
- Provide direct handwriting practice.  
- Use graph paper to assist with number alignment. |

Reading and Writing Examples (Gv)

- **Writing**
  - Cover, Copy, and Compare

<table>
<thead>
<tr>
<th></th>
<th>Trace</th>
<th>Copy</th>
<th>Recall</th>
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<tbody>
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Look because

Cover

Go back
Write

Check

Go back
How to Use Instructional Materials

- Visual Features of texts (maps, graphs, models)
- Graphic Organizers online
- “Using Tables, Charts, and Graphs” in Harcourt Science text
Houghton Mifflin Math Expressions

Teaching Tools
- Challenge Masters
- Accessible Algorithms
- Visual Support
- eGlossary
Visual Support

- Dot Array
- Ten Frame
- Demonstration Secret Code Cards 1
- Demonstration Secret Code Cards 2
- Secret Code Cards
- Centimeter Rulers
- Pattern Blocks
- Centimeter Dot Paper
- Venn Diagram
- Tangrams
- Centimeter Grid Paper
- Quadrilaterals
- Hundred Chart
- Number Path
- Coin Strips
- Inch Grid Paper
- 10x10 Grid
- Pattern Block Paper
- Hundred Grid
- Class Multiplication Table
- 120 Poster
- Multiplication and Division Strategy Cards 1
- Multiplication and Division Strategy Cards 2
- Paper Clock
- Fraction Circle Model
- Fraction Strips

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Johnny has perceptual-motor, graphomotor difficulties – OT intervention seems warranted; needs visual supports
3 + 3 = 6  
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6 + 3 = 9  
6 + 3 = 10  
7 + 3 = 10
### Manifestations of Cognitive Ability Weaknesses and Empirically-based Recommendations and Interventions (Flanagan, Alfonso, & Mascolo, 2011, 2012)

|----------------------------------------------------------|-----------------------|---------------------------------------------------------------|---------------------------------------------------------------|------------------------------|
| Processing Speed (Gs)                                    | • Speed of processing, particularly when required to focus attention for 1-3 minutes  
• Usually measured by tasks that require the ability to perform simple repetitive cognitive tasks quickly and accurately  
• Narrow Gs abilities include Perceptual Speed, Rate-of-Test-Taking, Number Facility, Reading Speed, and Writing Speed (note that the latter two abilities are also listed under other broad CHC domains, including Gw) | **Difficulties with:**  
• Efficient processing of information  
• Quickly perceiving relationships (similarities and differences between stimuli or information)  
• Working within time parameters  
• Completing simple, rote tasks quickly | **Reading Difficulties:**  
• Slow reading speed, which interferes with comprehension  
• Need to reread for understanding  
**Math Difficulties:**  
• Automatic computations  
• Computational speed is slow despite accuracy  
• Slow speed can result in reduced accuracy due to memory decay  
**Language Difficulties:**  
• Cannot retrieve information quickly – slow, disrupted speech; cannot get out thoughts quickly enough  
• Is slow to process incoming information, puts demands on memory store which can result in information overload and loss of meaning | • Repeated practice  
• Speed drills  
• Online activities/games (e.g., [http://www.arcade...](http://www.arcade...))  
• Computer activities that require quick, simple decisions  
• Extended time  
• Reducing the quantity of work required (including homework)  
• Increasing “wait” times both after questions are asked and after responses are given  
• Choral Repeated Reading  
• Books on tape |

Reading and Writing Examples (Gs)

• Writing
• Wordy Qwerty from Talking Fingers

The overall purpose of *Wordy Qwerty: Foundations for Reading and Writing Fluency*, is to improve phonological and morphological sensitivity, to develop a deeper understanding of how words are constructed in English, and to provide reading and writing activities with helpful feedback, in order to increase fluency and comprehension in reading and writing. *Wordy Qwerty* has 20 lessons, with six activities per lesson, that present the following foundations for fluency:
Write Stories: In these cleverly illustrated 8-line rhymes, children hear and see the first line, and have to type out the second line after it is dictated. They can see and hear the dictated line as often as they need, but get more points if they remember the sentence and try to spell the words correctly. These little stories are full of words that require using the spelling rule just presented.
<table>
<thead>
<tr>
<th>AAA Math-Addition</th>
<th>Addition Surprise</th>
<th>Addition Math-O</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA Math-Subtraction</td>
<td>Math Magician</td>
<td>Hidden Picture Addition and Subtraction</td>
</tr>
<tr>
<td>Math Baseball</td>
<td>Martini’s Math Flashcards</td>
<td>Addition Concentration</td>
</tr>
<tr>
<td>Arithme Tick</td>
<td>Alien Addition</td>
<td>Simple Kids Math</td>
</tr>
<tr>
<td>Little Animals Addition and Subtraction</td>
<td>Play Kids Games</td>
<td>Addition Attack</td>
</tr>
<tr>
<td>Math Popper</td>
<td>Minus Mission</td>
<td>That’s a Fact</td>
</tr>
<tr>
<td>Arithmetic Four</td>
<td>ArithmAttack</td>
<td>SpeedMath</td>
</tr>
<tr>
<td>Subtraction Drills</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Pitch Is: 1 + 3
Level: Easy

Click here for more games.
Jet Ski Addition is a multi-player racing game for addition. How quickly the student correctly answers the addition problems determines how quickly the jet ski will go.

Game Info | Play

Island Chase Subtraction is a multi-player racing game for subtraction. How quickly the student correctly answers the subtraction problem determines how quickly the jet ski will go.

Game Info | Play

Kitten Match is a multi-player game for addition. The Student with the most correct combinations wins.

Game Info | Play

Orbit Integers is a multi-player racing game practicing integer addition. How quickly the student correctly answers the problem determines how fast the spaceship will go.

Game Info | Play

http://www.arcademic.skillbuilders.com/games/
Kitten Match is a multi-player game for addition. The Student with the most correct combinations wins.

Game Info | Play

<table>
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<tr>
<th>CHC Broad Cognitive Abilities/Neuropsychological Functions</th>
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</thead>
</table>
| Short-Term Memory (Gsm)                                  | Ability to hold information in immediate awareness and use or transform it within a few seconds | **Difficulties with:**
- Following multi-step oral and written instructions
- Remembering information long enough to apply it
- Remembering the sequence of information
- Rote memorization
- Maintaining one’s place in a math problem or train of thought while writing | **Reading Difficulties:**
- Reading comprehension (i.e., understanding what is read)
- Decoding multisyllabic words
- Orally retelling or paraphrasing what one has read
**Math Difficulties:**
- Rote memorization of facts
- Remembering mathematical procedures
- Multi-step problems and regrouping
- Extracting information to be used in word problems
**Writing Difficulties:**
- Spelling multisyllabic words
- Redundancy in writing (word and conceptual levels)
- Identifying main idea of a story
- Note taking | **Use meaningful stimuli to assist with encoding and allow for experiential learning (i.e., learning while doing)**
**Provide opportunities for repeated practice and review**
**Provide supports (e.g., lecture notes, guided notes, study guides, written directions) to supplement oral instruction**
**Break down instructional steps for student**
**Provide visual support (e.g., times table) to support acquisition of basic math facts**
**Outline math procedures for student and provide procedural guides or flashcards for the student to use when approaching problems**
**Highlight important information within a word problem**
**have student write all steps and show all work for math computations**
**Use writing programs or techniques that emphasize drafting first (e.g., Draft Builder 6)**
**Teach chunking strategies** |


# Manifestations of CHC Ability Weaknesses and Empirically-based Recommendations and Interventions (Flanagan & Mascolo, 2012)

<table>
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<th>Recommendations/Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention</td>
<td>•Attention is a complex and multifaceted construct used when an individual must focus on certain stimuli for information processing. In order to regulate thinking and to complete tasks of daily living such as schoolwork, it is necessary to be able to attend to both auditory and visual stimuli in the environment. Attention can be viewed as the foundation of all other higher-order processing. Attention can be divided into five subareas: selective/focused attention, shifting attention, divided attention, sustained attention, and attentional capacity (Miller) •It is important to identify the exact nature of the attentional problem(s) prior to selecting an intervention, teaching strategies, modifying the curriculum, or making accommodations.</td>
<td>•Easily distracted •Lacks attention to detail; makes careless mistakes •Difficulty discerning demands of a task (e.g., where to begin or how to get started) •May only be able to attend to task in short intervals •Difficulty changing activities •Difficulty applying a different strategy when task demands change •Difficulty attending to more than one thing or task at a time •Cannot perform well with faced with multiple stimuli or an abundance of detail</td>
<td><strong>Reading Difficulties:</strong> •Loses one’s place easily •Easily distracted while reading •Does not pick up important details in text <strong>Math Difficulties:</strong> •Does not consistently attend to math signs •Frequent mistakes on word problems <strong>Writing Difficulties:</strong> •Has difficulty completing long assignments; difficulty following time lines</td>
<td>•Provide a quiet place to work in the classroom during seatwork •Provide reinforcement for timely completion of work •Make sure student understands oral directions and has the same directions in written form for reference •Provide a cue when transitioning •Work with student to develop a time line for longer assignments •Allow student to use a computer or dictate longer assignments •Assist student in proofing math and writing assignments •Reduce amount of repetitive seatwork •Build in breaks during longer assignments •Provide structure and highlight critical information in all academic tasks •Provide student with a monitor with whom he or she can check in with once or twice a day (e.g., keeping track of assignments, books, schedule)</td>
</tr>
<tr>
<td>CHC Broad Cognitive Abilities/Neuropsychological Functions</td>
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| Executive Functioning                                    | •Executive functioning is often understood as two broadly conceptualized areas that are related to the brain’s frontal lobes: cognitive control and behavioral/emotional control. The cognitive aspects of executive functioning include concept generation (Ge/Glr); problem solving (Gf); attentional shifting (attention; Gs); planning; organizing; working memory (Gsm); and retrieval fluency (Glr). The behavioral/emotional aspects of executive functioning relate to the inhibitory controls of behavior (e.g., impulsivity, regulation of emotional tone, etc.). (see Miller, 2010; KIDS Inc.) | **Difficulty with:**  
• learning new activities, generating concepts, and solving problems  
• identifying goals and setting goals  
• planning (e.g., begins project without necessary materials; does not allocate sufficient time to complete task)  
• sequencing (e.g., may skip steps in multi-step problems)  
• prioritizing (e.g., not sure what’s important when taking notes)  
• organization (e.g., loses important papers; fails to turn in completed work; creates unrealistic schedule)  
• initiation (e.g., has difficulty getting started on tasks, assignments, etc.)  
• pace (e.g., often runs out of time on seatwork and exams; has difficulty completing homework due to unrealistic timeline)  
• shifting between activities flexibly; coping with unforeseen events  
• self-monitoring (e.g., doesn’t check to insure that each step was completed; doesn’t check work before submitting it)  
• emotional control (e.g., may exhibit inappropriate or over-reactive response to situations) | **Reading difficulties:**  
• sequencing; telling a story chronologically  
• prioritizing; extracting main idea and other important information  
• problem solving; drawing inferences from text  
**Math difficulties:**  
• sequencing; remembering order of operations  
• prioritizing; figuring out what is important when solving word problems  
• shifting; attending to math signs on a page  
**Writing difficulties:**  
• generating ideas to write about  
• sequencing a story  
• prioritizing main events in a story | •Assist student in organizing work by explaining (verbally and in writing or through visuals) the steps necessary to complete a task  
• Use visual schedules and build in time throughout the day to review  
• Use graphic organizers  
• Set alarm (on watch or computer) to regulate timing of projects and tasks  
• Plan and structure transition times and shifts in activities  
• Break long assignments into smaller, mini-assignments and provide time frames for completing each  
• Organize work space and minimize clutter; do this on a daily or weekly basis.  
• Make a checklist for getting through assignments. For example, a student’s checklist could include such items as: get out pencil and paper; put name on paper; put due date on paper; read directions; etc. |

Examples adapted from LD Online: Copyright 2008 by the National Center for Learning Disabilities, Inc. All rights reserved.
Conclusions