Cross-battery Achievement
Testing: The Forgotten G’s
Anise Flowers, Ph.D.
Tammy Stephens, Ph.D.

The Cross Battery Approach
Because the cross-battery approach is theory-focused (rather than test kit-focused), its principles and procedures can be used with any intelligence battery and in any assessment-related discipline.
Flanagan & Ortiz
Essentials of Cross-Battery Assessment

The Cross Battery Approach
The “crossing” of batteries is not a new method of intellectual assessment. Neuropsychological assessment has long adopted the practice of crossing various standardized tests in an attempt to measure a broader range of brain functions than that offered by any single instrument.
Flanagan, Ortiz, & Alfonso
Essentials of Cross-Battery Assessment, 2nd edition

CHC Factors & Achievement Tests
• Reading Ability (Grw-R)
• Writing Ability (Grw-W)
• Quantitative Knowledge (Gq)
• Auditory Processing (Ga)
• Long-term Storage & Retrieval (Glr)
• Crystallized Ability (Gc)
• Processing Speed (Gs)

KTEAII: Reading/Grw-R
<table>
<thead>
<tr>
<th>Narrow ability</th>
<th>Subtest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading Decoding</td>
<td>Letter &amp; Word Recognition</td>
</tr>
<tr>
<td></td>
<td>Nonsense Word Decoding</td>
</tr>
<tr>
<td>Reading Comprehension</td>
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</tr>
<tr>
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<td>Reading Comprehension</td>
</tr>
<tr>
<td>Reading Speed</td>
<td>Word Recognition Fluency</td>
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<tr>
<td></td>
<td>Decoding Fluency</td>
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</table>

WIAT-III: Reading/Grw-R
<table>
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<tbody>
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<td>Reading Decoding</td>
<td>Word Reading</td>
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<tr>
<td></td>
<td>Pseudoword Decoding</td>
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<td>Reading Comprehension</td>
</tr>
<tr>
<td>Verbal Language Comp.</td>
<td>Early Reading Skills</td>
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<td>Reading Speed</td>
<td>Word Reading</td>
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<td></td>
<td>Pseudoword Decoding</td>
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<tr>
<td></td>
<td>Oral Reading Fluency</td>
</tr>
</tbody>
</table>
Cross-battery Achievement

Reading Decoding
- Both KTEAII & WIAT III have 2 subtests measuring with individual words
  - Sight words
  - Nonsense words
- WRMT-III
  - Letter Identification (PreK-1)
  - Word Identification (1st – adult)
  - Word Attack (1st – adult)
- GORT-IV
  - Accuracy
  - Assessed within passages of text
- PAL-II
  - Pseudoword Decoding subtest (1st – 6th)

Reading Comprehension
- KTEAII
  - Begins at 1st grade
  - Administered from item set
  - Can drop back as far as needed
  - Student reads the questions
- WIAT-III
  - Begins at 1st grade
  - Administered from item set
  - Can on drop back 3 starting points
  - Examiner reads the questions
  - Graphics with text (more information on easel pages)

Reading Comprehension
- WRMT-III
  - Passage Comprehension test
    - Cloze procedure
    - Early items have pictures
    - Instructed to read silently
- GORT-IV
  - Comprehension score
  - Administered using passages

Verbal Language Comprehension
- KTEAII
  - Reading Comprehension subtest
  - Early items
- WIAT-III
  - Early Reading Skills subtest
- WRMT-III
  - Word Comprehension subtest (1st – 12th)
    - Antonyms
    - Synonyms
    - Analogies

Reading Speed
- KTEAII
  - Measured by 2 subtests (one sight words & one nonsense word)
  - Reported as standard score
  - Combined to form composite score: Reading Fluency
  - No measure for passages
- WIAT-III
  - For individual words, score is supplemental
  - Reported as cumulative percentage
  - For passages, measured by Oral Reading Fluency

Reading Speed
- WRMT-III
  - Oral Reading Fluency test
- GORT-IV
  - Fluency score
- PAL-II
  - Sentence Sense subtest
  - Measures Silent Reading Fluency
### PAL-2 Other Reading-related skills

<table>
<thead>
<tr>
<th>Morphological Decoding</th>
<th>Find the True Fixes</th>
<th>Measures child’s ability to differentiate spelling patterns that are not prefixes &amp; suffixes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphological Decoding Fluency</td>
<td>Measures child’s ability to pronounce words when different suffixes are added to the same base word.</td>
<td></td>
</tr>
</tbody>
</table>

### Orthographic Coding

<table>
<thead>
<tr>
<th>Receptive Coding</th>
<th>Ability to code whole written words into memory and then to segment each word into units of different size.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expressive Coding</td>
<td>Ability to code whole written words into memory and then to reproduce the words or parts of the words in writing.</td>
</tr>
</tbody>
</table>

### PAL-2 Other Reading-related skills

<table>
<thead>
<tr>
<th>Morphological/Syntactic Coding</th>
<th>Ability to understand morphemes and syntax presented both orally and in writing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are They Related?</td>
<td>Child decides whether one word is derived from another word and is related in meaning.</td>
</tr>
<tr>
<td>Does It Fit?</td>
<td>Child chooses one made-up word from a group that has a suffix that grammatically fits the sentence.</td>
</tr>
<tr>
<td>Sentence Structure</td>
<td>Child chooses sentence that could be a correct sentence because of word order and word endings.</td>
</tr>
</tbody>
</table>

### KTEAII: Writing/Grw-W

<table>
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<td>Spelling Ability</td>
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<tr>
<td>Writing Ability</td>
<td>Written Expression</td>
</tr>
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<td>English Language Usage</td>
<td>Written Expression</td>
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### WIAT-III: Writing/Grw-W

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<td>Spelling Ability</td>
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<tr>
<td>Writing Ability</td>
<td>Sentence Composition, Essay Composition</td>
</tr>
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<td>English Language Usage</td>
<td>Sentence Composition, Essay Composition</td>
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### Spelling

- Both KTEAII & WIATIII have a dictated spelling subtest
- PAL-II
  - Orthographic Spelling subtest called Word Choice
    - Multiple choice
    - Receptive/no writing required
**Writing Ability / English Language**

- **KTEAII**
  - Written Expression subtest
  - PreK – 12th
  - Contains sentence items & other items
  - Also has extended writing (5 or 10 min)
  - Writing within a story context
  - Yields a single standard score + error analysis in 5 categories

- **WIATIII**
  - Two separate subtests: Sentence Composition (1st – 12th) / Essay Composition (3rd – 12th)
  - Each subtest yields one standard score and 2 scores for subcomponents
  - Essay has optional Grammar/Mechanics score
  - No error analysis

**PAL-II Writing subtests**

- Compositional Fluency (1st – 6th)
  - Writes about 2 topics for 5 minutes each
  - Scaled scores
  - Number of Words
  - Correctly Spelled Words

- Expository Note Taking and Report Writing (3rd – 6th)
  - Scaled Scores
  - Note taking accuracy
  - Report Writing Quality
  - Report Writing Organization

**KTEAII: Auditory Processing/Ga**

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<thead>
<tr>
<th>Narrow ability</th>
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<tbody>
<tr>
<td>Phonetic Coding – Analysis</td>
<td>Phonological Awareness (Section 1,2,4,5) Nonsense Word Decoding</td>
</tr>
<tr>
<td>Phonetic Coding – Synthesis</td>
<td>Phonological Awareness (Section 3)</td>
</tr>
</tbody>
</table>

**WIAT-III: Auditory Processing/Ga**

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<tbody>
<tr>
<td>Phonetic Coding – Analysis</td>
<td>Early Reading Skills</td>
</tr>
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<td>Phonetic Coding – Synthesis</td>
<td>Early Reading Skills</td>
</tr>
</tbody>
</table>

**Auditory Processing: General**

- **KTEAII**
  - Phonological Awareness test (K-6th)
  - Rhyming (production & matching)
  - Sound Matching (final sounds)
  - Blending
  - Segmenting
  - Deleting Sounds
  - Uses Pepper the Puppy puppet

- **WIAT-III**
  - Early Reading Skills (PreK-3rd)
    - Identify and generate rhyming words
    - Identify words with the same beginning and ending sounds
    - Blend sounds

**Other Auditory Processing: General**

- **WRMT-III**
  - Phonological Awareness test (PreK-Znd)
    - 5 sections
      - First-Sound Matching
      - Last-Sound Matching
      - Rhyme Production
      - Blending
      - Deletion
Other Auditory Processing: General

- DAS-2
  - Phonological Processing subtest (3:6 – 17:11)

- NEPSY-2
  - Phonological Processing (3–16 yrs)
  - Repetition of Nonsense words (5-12 yrs)

Other Auditory Processing: Specific

- PAL-II
  - Phonological Coding subtests
    - Rhyming (K)
    - Syllables (K-6th)
    - Phonemes (K-6th)
    - Rimes (1st-6th)

- CTOPP
  - 3 Phonological Coding subtests
    - Elision (5:0 – 24:11)
    - Blending Words (5:0 – 24:11)
    - Sound Matching (5:0 – 6:11)
  - Also Nonword Repetition (5:0 – 24:11) for Phonological memory

KTEAII:
Long-term Storage & Retrieval/Glr

<table>
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<td>Naming Facility</td>
<td>Naming Facility/RAN</td>
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</tr>
<tr>
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<td>Associational Fluency</td>
</tr>
<tr>
<td>Meaningful Memory</td>
<td>Listening Comprehension</td>
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WIAT-III:
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<td>Meaningful Memory</td>
<td>Listening Comprehension</td>
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Associational Fluency

- KTEAII
  - 2 Semantic & 2 Phonological items
  - 30 seconds
  - Yields standard score

- WIATIII
  - 2 semantic items: Animals & Colors
  - No Phonological
  - 60 seconds
  - Part of Oral Expression score
  - Can be scored as subcomponent

Associational Fluency

- NEPSY-2 Word Generation
  - Separate scaled scores for:
    - Semantic (2 items)
    - Initial Letter (2 items)
  - Each item is 60 seconds
  - Also yields Contrast score to compare Semantic vs. Initial Letter fluency
Rapid Automatic Naming (RAN)

- **KTEA-II**
  - Naming Facility (4th – 12th)
  - One subtest with 3 tasks
    - Objects, Colors, Letters

- **WRMT-III**
  - Rapid Automatic Naming (PreK-2nd)
  - One subtest with 4 tasks
    - Objects, Colors, Numbers, Letters

Rapid Automatic Naming (RAN)

- **CTOPP Rapid Naming**
  - 4 separate subtests
    - Rapid Color Naming (5:0 – 24:11)
    - Rapid Object Naming (5:0 – 24:11)
    - Rapid Digit Naming (7:0 – 24:11)
    - Rapid Letter Naming (7:0 – 24:11)

Rapid Automatic Naming (RAN)

- **PAL-II RAN (1st – 6th)**
  - Three tasks
    - Single letters
    - Letter groups
    - Words
  - Scores
    - Rate Change
    - Total Errors
    - Total Time

- **PAL-II RAS: Rapid Automatic Switching (1st – 6th)**
  - Words & Digits

Rapid Automatic Naming (RAN)

- **NEPSY-2 Speeded Naming (3-16 yrs)**
  - **Item 1**
    - Simple color naming and shape naming
  - **Item 2**
    - Then color/shape naming
  - **Item 3**
    - Naming size, color, & shape of each shape in an array
  - **Item 3**
    - Letter/number naming

Rapid Automatic Naming (RAN)

- **DAS-2 Rapid Naming subtest**
  - (5:0 – 17:11)
    - 3 sections: Color Naming, Picture Naming, and Color-Picture Naming
    - Yields a Rapid Naming subtest score
    - Can also determine if differences between simple versus complex naming is statistically significant

KTEA-II: Crystallized Ability/Gc

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<tr>
<td>Listening Ability</td>
<td>Listening Comprehension</td>
</tr>
<tr>
<td>Oral Production &amp; Fluency</td>
<td>Oral Expression</td>
</tr>
<tr>
<td>Grammatical Sensitivity</td>
<td>Written Expression</td>
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**WIAT-III: Crystallized Ability/Gc**

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<td>Listening Ability</td>
<td>Listening Comprehension</td>
</tr>
<tr>
<td>Lexical Knowledge</td>
<td>Oral Expression, Listening Comprehension</td>
</tr>
<tr>
<td>Language Development</td>
<td>Oral Expression</td>
</tr>
</tbody>
</table>

**Listening Comprehension**

- **KTEAII**
  - Passages presented on CD
  - Questions asked by examiner
  - Multiple questions per passage
  - Error analysis for inferential vs literal questions
- **WIATIII**
  - Passages presented on CD
  - Questions asked by examiner
  - Multiple questions per passage
  - No error analysis
  - Also includes Receptive Vocabulary task

**Listening Comprehension**

- **WRMT-III**
  - Listening Comprehension test
  - Early items, student points to 1 of 4 pictures to answer a prompt
  - Later items administered from audio CD
  - Examiner asks 1 question about each passage

**Oral Expression**

- **KTEAII**
  - Questions about a series of related incidents with set of characters
  - Error analysis in 4 categories
    - Task
    - Structure
    - Word Meaning
    - Word Form
  - Utilizes pictures
- **WIATIII**
  - Three subcomponents
    - Expressive Vocabulary
    - Oral Word Fluency (separate subtest on KTEAII)
    - Sentence Repetition
  - No error analysis

**WIAT-III: Processing Speed/ Gs**

<table>
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<tbody>
<tr>
<td>Number Facility</td>
<td>Math Fluency</td>
</tr>
<tr>
<td>Writing Speed</td>
<td>Alphabet Writing Fluency</td>
</tr>
</tbody>
</table>

**Writing Speed**

- **WIAT-III**
  - Alphabet Writing Fluency
  - PreK – 3rd
  - 30 second time limit
  - Student may write letters in any order, in cursive or print, in upper- or lowercase
  - Yields subtest standard score
- **PAL-II**
  - Alphabet Writing subtest
  - K – 6th
  - 3 minute time limit
  - Must be
    - Alphabetical order
    - Lowercase
    - Printed
  - Yields 3 subtest scaled scores
**Additional PAL-2 Handwriting subtest**

- Copying
  - Task A
    - Copy a sentence containing all the letters of the alphabet
  - Three scaled scores (same as Alphabet)
    - Automatic Legible Letter Writing at 15 sec
    - Legible Letter Writing
    - Total Time
  - Task B
    - Copy a paragraph

**KTEAII: Quantitative Knowledge/Gq**

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<tr>
<td>Mathematical Knowledge</td>
<td>Math Concepts &amp; Applications</td>
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<tr>
<td>Mathematical Achievement</td>
<td>Math Computation</td>
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**Fluid Reasoning/Gf**

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**WIAT-III: Quantitative Knowledge/Gq**

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<td>Mathematical Knowledge</td>
<td>Math Problem Solving</td>
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<td>Mathematical Achievement</td>
<td>Numerical Operations</td>
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**KeyMath3 Diagnostic Assessment**

- Nationally standardized and criterion referenced diagnostic assessment of mathematics concepts and skills
- Age Range: 4:6 through 21:11
- Aligned to the National Council of Teachers of Mathematics (NCTM) Principles and Standards of Mathematics
- Ability to measure progress in 3 month intervals
- Links to KeyMath3 Essential Resources intervention material

**KeyMath™-3 Content Areas & Subtests**

<table>
<thead>
<tr>
<th>Total Test</th>
<th>BASIC CONCEPTS</th>
<th>OPERATIONS</th>
<th>APPLICATIONS</th>
</tr>
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<tbody>
<tr>
<td>Numeration</td>
<td>Mental Computation &amp; Estimation</td>
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</tr>
<tr>
<td>Algebra</td>
<td>Addition &amp; Subtraction</td>
<td></td>
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<tr>
<td>Geometry</td>
<td>Multiplication &amp; Division</td>
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<tr>
<td>Measurement</td>
<td>Data Analysis &amp; Probability</td>
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<tr>
<td>Data Analysis &amp; Probability</td>
<td>Foundations of Problem Solving</td>
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<tr>
<td>Data Analysis &amp; Probability</td>
<td>Applied Problem Solving</td>
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Cross-battery Achievement

**KeyMath3 ASSIST Item and Functional Range Analysis**

- Identifies KeyMath–3 DA items that fall within an individual’s functional range
- Presents the behavioral objective measured by each of the items included in the analysis
- Identifies appropriate lessons in the KeyMath–3 Essential Resources

**Keymath3 ASSIST Progress Report**

- Report can be obtained for Total Test and each of the 3 Areas
- Progress report shows
  - How much gain occurred (GSV units per year)
  - Whether that gain was significant
  - How does the student’s growth compare to the population?

**PAL-II MATH**

- Measures the development of cognitive processes that are critical to learning math skills and actual math performance.
- Novel quantitative and spatial working memory tasks
- K to 6th grade

**PAL-II Math Skills Subtests**

- **Oral Counting**
- **Fact Retrieval Fluency**
  - multi-sensory
- **Computational Operations**
  - visual-spatial representation
  - temporal-sequential algorithms
  - written solutions for written problems
- **Place Value**
  - oral and written response and application during written problem solving
**PAL-II Math Skills Subtests**

- **Part-Whole Concept**
  - relative rather than absolute magnitude
  - applied to mixed numbers, fractions, time
- **Finding the Bug**
  - executive monitoring to detect and repair problems
- **Multi-Step Problem Solving**
  - problem representation and plan for solving it

**PAL-II Additional Processes Related to Math**

- Numeral Writing
- Numeric Coding
- RAN (Digits and Double Digits)
- RAS (Words and Digits)
- Fingertip Writing
- Quantitative Working Memory
- Spatial Working Memory

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**Questions?**

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