Finiteness as a Clinical Marker of Language Impairment

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Background

- What is finiteness?
- What is a clinical marker?
- Evaluating finiteness
- Why care about finiteness?

Intervention rates for LI

- Underidentification of language impairment
  - 9% (Zhang & Tomblin, 2000)
  - 50% (Beitchman, Wilson, Brownlie, Walters & Lancee, 1996)

Financial Disclosure

- I have no financial relationships related to the content in this presentation

Average School Caseload

*Based upon average of ASHA Caseloads 2000-2012
Problematic

- Language deficiencies remain stable (Rice, Hoffman, & Wexler, 2009; Tomblin & Nippold, 2014)
- Early language problems linked to negative outcomes into adulthood
  - Poor reading
  - Lower education attainment
  - Higher rates of socioemotional/behavioral problems (Conti-Ramsden, Durkin, Simkin, & Knox, 2009; Law, Rush, Schoon, & Parsons, 2009)

Why?

- Factors unrelated to language ability influences who receives service
  - Gender
  - Behavioral issues (Tomblin, 2008)
- Standardized tests may not accurately identify LI
  (Spaulding et al., 2006; Betz et al., 2013)

20 years of research confirm that children with LI have difficulties with only a subset of Brown’s morphemes (Kahmi, 2014)

WHAT IS FINITENESS?

Finiteness

ENGLISH

- Rice & Wexler (1996)
  - Property of main clauses in most languages
  - Marked on verbs
- Crystal (1995)
  - Contrast on the verb that expresses that it is ‘limited’ in some way.
  FINITE or NONFINITE (INFINITIVE)
Finiteness (or nonfiniteness) is determined by the position of the form within the clause.

**She walks home**
- Finite
- Marked for finiteness with 3rd person singular present tense – *s* inflection

**walks**
- She likes long walks

**walk**
- Not finite
- Not nonfinite

Position of the verb in the clause is more important than the structural form of the word.

Finiteness: Limitations

Crystal (1995)
- Number
- Tense
- Person
- Mood
She walks

I walk

• Both forms are finite

*We walks

• Limits –s form
  – Violation person/number: 1st person/plural

Must have subject and verb agreement

English

• Two overt morphosyntactic markers for finiteness
  – 3rd person singular present tense –s
  – Past tense –ed

• Finiteness covertly marked
  – Irregular past
  – Copula BE
  – Auxiliary BE, DO HAVE

Auxiliary verbs

• Auxiliary + main verb
  – Finiteness is on the auxiliary form
  The dog walks were going to be fun.

  – Modal auxiliaries (e.g., can, could) carry covert marking
  You might go walking tomorrow morning

Finite verbs are always next to the subject
### Finiteness

- English has overt and covert finiteness marking for tense and agreement with the subject
- Finite forms are directly next to the subject
- All verbs next to the subject are finite
- English speaking children with LI have inordinate difficulties with this aspect of grammar

#### WHAT IS A “CLINICAL MARKER”?

LI as tail end of the distribution

Clinical marker distribution
Clinical marker

- Some overlap between impaired and normal performance, but should be minimal
- Involves key aspects of language, not all aspects
- Avoids using arbitrary cutoff scores

Finiteness as a clinical marker

- Children from 3-8 years
- 15 years of data
- Across finite forms
- Studies had to have a TD population to compare scores
- Z-score was calculated

12 of the 13 studies had performance at least -1.25 to -1.5 SD below the mean
- SS = 81 or 77
- Median z-score = -4.59
- SS = 31

Sensitivity and Specificity

- Sensitivity: correctly identifies children with LI as having LI
- Specificity: correctly identifies typical children as typical

Plante & Vance (1994) recommended 80%
Methods for evaluating finiteness

- Language sampling
  - Average 861 utterances
- Heilmann, Nockerts, & Miller (2010)
  - 1, 3, 7 minute samples
  - Productivity, lexical diversity, utterance length
  - *Errors and Omissions were undesirable*

Method for evaluating finiteness

- Rice Wexler Test of Early Grammatical Impairment (TEGI: Rice & Wexler, 2001)

  **IT’S FREE!!!**

  [http://www2.ku.edu/~cldp/MabelRice/screener_pack](http://www2.ku.edu/~cldp/MabelRice/screener_pack)

TEGI

- 3rd person singular probe
- Past tense probe
- Be/Do probe
- Grammaticality judgment probe
- Two composite scores
  - Screening Test (3S and PT probes)
  - Elicited Grammar Composite (3S, PT, Be/Do probes)

TEGI

- Sets up obligatory context for finite forms
- Scoring is based upon opportunities to produce form
  - Lexical form child responds with doesn’t matter
  - Finiteness marking
Third Person Probe

• 10 items
• Here is a ___. Tell me what a _____ does.

C: cleans teeth.
C: clean teeth.
C: He clean teeth.
C: He cleans teeth.
C: Looks at teeth.
C: look at teeth.
C: (He) look at teeth.
C: (The dentist) look at teeth.

Example: PT Probe

• 18 items
  – 10 Regular past
  – 8 Irregular past
• Here the boy is ______. Now he's done. Tell me what he did.

Responses

<table>
<thead>
<tr>
<th>Suitable Response</th>
<th>Unsuitable Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Painted, she painted</td>
<td>Paint, painting, Painted</td>
</tr>
<tr>
<td>Painted, she painteded</td>
<td>She is painting, She was painting</td>
</tr>
<tr>
<td>He paint</td>
<td>She's done</td>
</tr>
<tr>
<td>Other marked verb (e.g., colored, built)</td>
<td>She will/could/might/did paint</td>
</tr>
<tr>
<td>Gave, She gave, She gave, Give</td>
<td>She paints, She put paint on, Give</td>
</tr>
</tbody>
</table>

Prompts

<table>
<thead>
<tr>
<th>Child’s response</th>
<th>Prompt</th>
</tr>
</thead>
<tbody>
<tr>
<td>She is skating/She was skating.</td>
<td>Tell me what she did with the skates.</td>
</tr>
<tr>
<td>Tell me what she did on the ice.</td>
<td></td>
</tr>
<tr>
<td>He rakes.</td>
<td>Tell me what he did to the leaves.</td>
</tr>
<tr>
<td>He put them in a pile.</td>
<td>Tell me what he did with the rake.</td>
</tr>
<tr>
<td>He's done eating the cookies.</td>
<td>What did he do to the cookies?</td>
</tr>
<tr>
<td>He skated.</td>
<td>Tell me what he did with the skates.</td>
</tr>
</tbody>
</table>

Be/Do Probe

• Be copula singular questions
• Be copula plural questions
• Be copula singular statements
• Be copular plural statements
• Be auxilliary singular questions
• Be auxiliary plural questions
• Be auxiliary singular statements
• Be auxiliary plural statements
• Do auxiliary singular questions
• Do auxiliary plural questions
Be/Do Probe

<table>
<thead>
<tr>
<th>Criterion cutoff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest level of sensitivity and specificity at that age</td>
</tr>
<tr>
<td>You can choose the level of sensitivity and specificity best for your practice</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Be/Do Probe Scoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name Subtotals</td>
</tr>
<tr>
<td>Subtest Items 1-3</td>
</tr>
<tr>
<td>Subtest Items 1-6</td>
</tr>
<tr>
<td>Subtest Items 11-18</td>
</tr>
<tr>
<td>Subtest Items 19-29</td>
</tr>
<tr>
<td>Subtest Items 30-32</td>
</tr>
<tr>
<td>Total Criteria</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Summary Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physiological Probe</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pass</th>
<th>Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>78</td>
<td>78</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Screening Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third Person Singular</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Probe Score</th>
<th>Criterion Score</th>
<th>Above/Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td>66</td>
<td>66</td>
</tr>
</tbody>
</table>

| Sum of Screening Probe Scores |

| 66 |

| 78 |

<table>
<thead>
<tr>
<th>Elicited Grammar Composite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Be/Do Probe Scoring</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Third Person Singular</th>
</tr>
</thead>
</table>

| Be/Do Probe (Be Score) |

| Third Person Singular |

<table>
<thead>
<tr>
<th>Probe Score</th>
<th>Criterion Score</th>
<th>Above/Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>66</td>
<td>66</td>
<td>66</td>
</tr>
</tbody>
</table>

| Sum of Screening Test Score |

| 66 |

| 78 |

<table>
<thead>
<tr>
<th>Screener at age 5;0-5;5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criterion cutoff: 78</td>
</tr>
<tr>
<td>Conversely, you can also see where the child’s score is in relation to the impaired or typical distribution</td>
</tr>
</tbody>
</table>
TEGI does not provide a standard score
...but it does provide the information used to calculate one

Calculating a standard score

- Calculate a z-score
  \[(\text{raw score} - \text{group mean}) / \text{group SD}\]

- Convert to a standard score
  \[(z\text{-score} \times 15) + 100\]

Group means and SDs

- TEGI manual: Table 4.17 (p74)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.06-3.11</td>
<td>M</td>
<td>0.65</td>
<td>0.56</td>
<td>4.05</td>
<td>61</td>
<td>0.0002</td>
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<td></td>
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<td>3.06-3.11</td>
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<td>0.11</td>
<td>8.27</td>
<td>72</td>
<td>0.0001</td>
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<td></td>
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<tr>
<td>4.06-4.11</td>
<td>M</td>
<td>0.64</td>
<td>0.36</td>
<td>9.15</td>
<td>98</td>
<td>0.0001</td>
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<tr>
<td>4.06-4.11</td>
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<td>0.20</td>
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<td>10.48</td>
<td>98</td>
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<td>5.06-5.11</td>
<td>M</td>
<td>0.78</td>
<td>0.45</td>
<td>9.99</td>
<td>98</td>
<td>0.0001</td>
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<tr>
<td>5.06-5.11</td>
<td>M</td>
<td>0.49</td>
<td>0.31</td>
<td>10.08</td>
<td>98</td>
<td>0.0001</td>
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<tr>
<td>6.06-6.30</td>
<td>M</td>
<td>0.80</td>
<td>0.42</td>
<td>9.18</td>
<td>98</td>
<td>0.0001</td>
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</tr>
<tr>
<td>6.06-6.30</td>
<td>M</td>
<td>0.20</td>
<td>0.10</td>
<td>9.56</td>
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<td>0.0001</td>
<td></td>
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<td>0.0001</td>
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</table>

Example

- Child is 5;9
- Past tense probe raw score = 75
- Z-score
  \[(75 - 93) / 8 = -2.25\]
- Standard score
  \[(-2.25 \times 15) + 100 = 66.25\]

Why care about finiteness?

- It can be used as a clinical marker
- It can be used across developmental disorders
  - Down syndrome, autism, hearing impairment, fragile X (Rice et al. 2005)
- It is capable of differential diagnosis, separating cases of LI from ADHD (Redmond et al. 2011)
Finiteness and “Functional Communication”

• Crucial aspect of adult-like formation of questions and speaking about the past
• Children with LI may be able to “get their message across” but...
  – LI children will struggle academically in reading, writing, mathematics
  – Negative social consequences

Negative Social Consequences of LI

• Greater risk of being bullied
• Higher rates of victimization
  – Neglect
  – Physical abuse
  – Sexual assault
  – Emotional maltreatment

Higher rates than children with learning disabilities, mental retardation, hearing impairment, visual impairment, or autism

(Brownlie et al., 2007; Knox & Conti-Ramsden, 2007; Redmond, 2011; Sullivan & Knutson, 2000)

GOAL:
Children with language impairment get intervention

Average School Caseload

References


