Exploring the overlap between SLI and dyslexia: The role of phonology

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Overlap between SLI and dyslexia

Substantial overlap between the two disorders

- 102 children: SLI (aged 6-9)
- 110 children: dyslexia (aged 7-14)

Studying comorbidity makes us think about how:
- We categorise disorders
- We understand the causes of disorders
(Pennington, 2006)
Plan of this talk

- Models of the overlap – the role of phonology
- How can these models be tested?
- 2 experiments
  - Non-word repetition
  - Compensation for assimilation
- Incorporating these results into a model of the overlap
Model 1: Severity model

Kamhi & Catts, 1986
Tallal, Allard, Miller & Curtiss, 1997
Model 2: Additional deficit model

Bishop & Snowling, 2004

- Phon. processing deficit
- Other cognitive deficits
- Dyslexia
- SLI
- Word reading problems
- Oral language difficulties
Model 3: Comorbidity model

Catts, Adlof, Hogan & Weismer, 2005

- Phon. processing deficit
- Other cognitive deficits
- SLI
- Dyslexia
- Word reading problems
- Oral language difficulties
Model 4: Multiple deficits
(Dyslexia & ADHD, Dyslexia & Speech Sound Disorder)

Pennington 2006

Genetic level – multifactorial, partial overlap of risk factors
Previous cognitive models – deterministic, single deficit

Cognitive processes

Complex behavioural disorders

Interactive development

Comorbidity
Testing models of the overlap
(Messaoud-Galusi & Marshall, in prep)

- Do children with SLI and dyslexia have the same or different phonological deficits? What is their nature?

- How exactly do phonological deficits contribute to
  - the language deficit?
  - the literacy deficit?

- Are phonological deficits evident in young children at risk of dyslexia? And are they the same as those found in young children with SLI?

- Does the pattern of phonological deficits change over time?
Critical to testing models of the overlap: SLI-only and dyslexia-only groups

<table>
<thead>
<tr>
<th></th>
<th>SLI+ Dyslexia</th>
<th>SLI-only</th>
<th>Dyslexia-only</th>
<th>LA1 controls</th>
<th>LA2 controls</th>
<th>CA controls</th>
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<tbody>
<tr>
<td>N</td>
<td>30</td>
<td>13</td>
<td>21</td>
<td>16</td>
<td>16</td>
<td>33</td>
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<tr>
<td>Age</td>
<td>11.22 (1.17)</td>
<td>11.04 (1.55)</td>
<td>10.82 (1.20)</td>
<td>6.43 (0.48)</td>
<td>7.84 (0.52)</td>
<td>10.58 (1.31)</td>
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<td>Grammar</td>
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<td>Vocab.</td>
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<td>Reading</td>
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</table>
Experiment 1: Non-word repetition

- 2 (word position: initial, medial) x 2 (stress: stressed, unstressed)
  - e.g.: *kletafa, klatefa, fa*kl*eta, feklata*
- Total: 16 three-syllable stimuli, identical in length
- Clusters: *kl, pr, dr, fr*
- Predictions:
  - initial > medial; stressed > unstressed
Results: Accuracy group x condition

- initial > medial; stressed > unstressed
- group x word position and group x stress interactions
Results: Group x position interaction

Initial > medial: SLI+dyslexia, SLI-only and dyslexia only
Results: Group x stress interaction

Stressed > unstressed: SLI+dyslexia and dyslexia-only
Not SLI-only
Experiment 2: Compensation for place assimilation
(Marshall, Harcourt-Brown, Ramus & van der Lely, in prep)

ten pins – tem pins
labial

green goats – greeng goats
velar

Language-specific

Are children with SLI and dyslexia able to compensate for place assimilation?

Measure of:
• phonological representations
• ability to learn phonological rules
Procedure

Unpublished study – details removed
Stimuli

Unpublished study – details removed
Results

Unpublished study – details removed
Interpretation

Unpublished study – details removed
Summary of results

Experiment 1: non-word repetition
- Qualitative differences between SLI and dyslexia (stress)
  - (Whitehouse et al, 2008: qualitative differences between SLI and ASD on a task of non-word repetition)

Experiment 2: compensation for place assimilation

Unpublished study – details removed
Model 1: Severity model

Kamhi & Catts, 1986
Tallal, Allard, Miller & Curtiss, 1997

Wouldn’t predict existence of SLI-only group
Model 2: Additional deficit model

Bishop & Snowling, 2004

- Phon. processing deficit
- Other cognitive deficits
- Phon deficit not identical

Dyslexia

Word reading problems

SLI

Oral language difficulties

Wouldn’t predict existence of SLI-only group
Model 3: Comorbidity model

Catts, Adlof, Hogan & Weismer, 2005

- Phon. processing deficit
- Other cognitive deficits
- SLI

Dyslexia

Word reading problems

Oral language difficulties

Children with SLI-only DO have phonological deficits
Model 4: Multiple deficits
(Dyslexia & ADHD, Dyslexia & Speech Sound Disorder)

Pennington 2006

Cognitive processes

Complex behavioural disorders

D1

C1

C2

C3

D2

D3

Interactive development

Comorbidity
A proposed model

- Morphological deficit
- Semantic deficit
- Syntactic deficit

- Phon. deficit A
- Phon. deficit B
- Phon. deficit C

SLI

Dyslexia
A final word

Pennington & Bishop (2009), p.284

“Placing comorbidity at the centre of enquiry leads to a new perspective on theoretical models of disorders”
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References: 1

References: 2

References: 3

- Pennington, B. F. (1006). From single to multiple deficit models of developmental disorders. *Cognition*, 101, 385-413.