Lexical and Sublexical Orthographic Knowledge Across the Elementary Grades

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BACKGROUND

Orthographic knowledge (OK) is comprised of two components: lexical OK (stored mental representations of specific written words) and sublexical OK (understanding of the rules that govern how speech is represented in print). In a previous investigation (Apel, Henbest, & Reed, 2017), researcher-developed orthographic choice (e.g., Olson, Forsberg, Wise, & Rack, 1994) and word-likeness tasks (e.g., Treiman, 1993) did not capture 3rd through 6th grade students OK performance, potentially because of the tasks themselves (ceiling effects or OK knowledge peaks at third grade). Further, no measure of letter-sound correspondence (sublexical OK) was used.

To extend the past investigation, new tasks were developed that were grade-level specific. Further, the tasks were administered to a large sample of students.

RESEARCH QUESTIONS

• Can lexical and sublexical OK measures be developed that capture the range of OK skills of students in the 1st through 6th grade?
• How do those OK skills relate to students’ reading and spelling abilities?

METHOD

1,095 students (45% male; 55% female) (Grades: 1st = 174; 2nd = 218; 3rd = 165; 4th = 206; 5th = 175; 6th = 157)

5 exemplars of each of the following patterns represented on both orthographic-choice and word-likeness tasks:

- Legal vowel doublet ‘ee’
- Legal vowel doublet ‘oo’
- Legal spellings of syllabic /l/
- Rule for spelling /dʒ/ as ‘ge’ or ‘dge’
- Legal spellings of syllabic /r/
- Grapheme rules for representing /ŋk/ as ‘nk’ or ‘nc’
- 1 of each of the following presented on orthographic-choice task:
  - Positional rules for ‘ck, k, c’
  - ‘sch’ rule for long vs. short vowels
  - Grapheme rules for /ks/ vs. /k/ in position
  - Grapheme rules for representing /mf, nθ, ʒ/ as ‘ge’ or ‘dge’

Orthographic Knowledge Tasks

• Lexical: Orthographic-choice task (e.g., circal-circle; Cronbach’s alpha range = .64-.87)
• Sublexical:
  - Word-likeness task (e.g., seedle-seedl; Cronbach’s alpha range = .65-.86)
  - Alphabetic-generation task (Cronbach’s alpha range = .65-.83)
    - What letter or combinations of letters can you use to write the /t/ sound?
    - Alphabetic-identification task (Cronbach’s alpha range = .71-.81)
    - What letter or combinations of letters can you use to write the /m/ sound?

Reading Tasks

• Test of Word Reading Efficiency (TOIFE: 2; Torgesen, Wagner, & Rashotte, 2012)
• Sight Word Efficiency (SWE)
• Phonemic Decoding Efficiency (PDE)

Spelling Task

• Test of Written Spelling-5 (TW5: 5; Larsen, Hammill, & Moats, 2013)

RESULTS

Can lexical and sublexical OK measures be developed that capture the range of OK skills of students in the 1st through 6th grade?

Mean Scores and Standard Deviations (SD) on the Experimental OK Measures by Grade

<table>
<thead>
<tr>
<th>Grade</th>
<th>Orthographic-Choice</th>
<th>Word-Likeness</th>
<th>Alphabetic-Gen</th>
<th>Alphabetic-ID</th>
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<td>SD</td>
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DISCUSSION

• We were able to develop grade-level OK measures that captured a developmental range of OK within each grade-level. At each grade, a minimal number of students reached ceiling suggesting that OK knowledge continues to develop across the elementary school years. Further, task design is important when assessing OK knowledge.
• In general, lexical OK as measured by the orthographic-choice task, appears to be an important predictor for reading and spelling performance across the six grade levels (with the exception of SWE in 6th grade) after accounting for other variables. Whether the word-likeness and alphabetic tasks predicted literacy performance was variable across grades and tasks making it difficult to interpret these findings with a simple explanation.
• Researchers may wish to begin to use these measures when assessing lexical and sublexical OK.