



Five Types of Knowledge for Spelling: A Developmental Study

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Introduction

Research from the last two decades has dramatically changed our understanding of spelling development from a skill learned through rote memorization to a linguistically governed acquisition with a developmental pattern (Apel & Masterson, 2001; Beringer et al., 2010). *Triple Word-Form Theory* suggests that developmental growth in spelling knowledge occurs across three dimensions: phonological, orthographic, and morphological (Bahr et al., 2009; Bourassa & Treiman, 2001). To spell a word, a child integrates one or a combination of these underlying linguistic dimensions to produce the desired orthographic sequence and resulting word. A child's spelling errors occur as a byproduct of reduced knowledge in one or more of these dimensions.

English orthography, however, is a complex rule-governed language comprised of over 500 different spelling rules including irregularities like homophones, verbs, and vowel-consonant combinations requiring knowledge extending beyond triple word-form theory.

One of the most common and consistent misspellings for children involve homophones and compound words (Bahr et al., 2012) which would be coded as morphological in a triple word form theory approach. The limitation here is that labeling spelling errors as such does not account for the semantic knowledge required to differentiate meaning through changes in spelling for these word types (Henry, 2003). Similar limitations exist with irregular verbs and words that are exceptions to a rule which would be coded as orthographic. When spelling accuracy is contingent on memorization, the term Mental Graphemic Representations (MGR) is used (Apel, 2011). These two types of knowledge, semantic and MGR, are frequently acknowledged in the literature of triple word-form theory, however there are no current studies distinguishing their role during spelling development (Apel, 2010; Beringer et al., 2010; Bahr et al., 2012).

In the **current study**, spelling errors are analyzed across five knowledge types that contribute to spelling development augmenting triple word-form theory. These five areas of spelling knowledge are: *Phonological, Orthographic, Morphological, MGRs, and Semantic*. Spelling errors were extracted from a dynamic writing task allowing for observation of spelling at two different time points towards one writing goal. This provides an opportunity for observation of natural spelling abilities and revision of these skills consistent with the Hayes and Flower (1980) writing process model. The specific **research questions** were:

- 1) Do children decrease the total number and type of spelling errors from drafts to copies and does this differ by grade? If so, are there differences in the pattern of spelling error types across five categories by draft vs. copy and by 4th and 6th grade?
- 2) Is there evidence that higher level spelling development requires five types of knowledge in the intermediate grade children as evidenced by correlations among measures of spelling, and with reading, and writing quality scores?

Sample

N = 53	4 th Grade (n = 40)	6 th Grade (n = 13)
Age in Years*	9.55 (.50)	11.85 (.38)
Mother's years of education	14.80 (1.73)	14.17 (1.70)
GRADE Reading Test (Williams, 2001)		
Sentence Comprehension, Stanine	5.8 (1.44)	5.92 (1.32)
Passage Comprehension, Stanine	6.10 (1.53)	6.15 (1.34)
Vocabulary, Stanine	6.85 (1.72)	6.62 (1.45)
Listening Comprehension, Stanine	5.13 (1.91)	5.31 (1.65)

* p < .05

Procedures

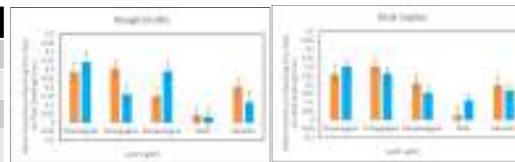
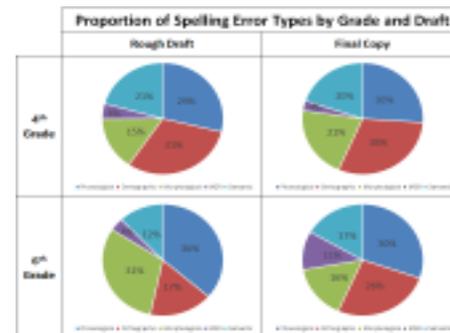
- An extant data set of writing samples from fourth and sixth grade children that included a draft and final copy in response to a narrative prompt were used for the current study.
- Spelling errors were coded by the first author using the 13 point nominal rating scale below.

Phonological	Orthographic	Morphological	MGR	Semantic
1. Correct				
2. 1-2 errors				
3. 3-4 errors				
4. 5-6 errors				
5. 7-8 errors				
6. 9-10 errors				
7. 11-12 errors				
8. 13 errors				
9. 14 errors				
10. 15 errors				
11. 16 errors				
12. 17 errors				
13. 18 errors				

Results

Writing Measures		
	4 th Grade	6 th Grade
Rough Drafts		
Total Number of Words*	283.10 (98.93)	377.31 (152.55)
Proportion of Total Spelling Errors	.02 (.03)	.02 (.02)
Final Copies		
Total Number of Words*	306.15 (127.26)	429.00 (169.22)
Proportion of Total Spelling Errors	.02 (.02)	.02 (.01)
Writing Quality Score	3.60 (1.85)	3.38 (1.76)

* p < .05



Correlation Matrix (Draft vs. Copy)	Phonological	Orthographic	Morphological	MGR	Semantic
Phonological	1.0				
Orthographic	-.32**	1.0			
Morphological	-.25	-.40**	1.0		
MGR	-.11	-.03	-.25	1.0	
Semantic	-.32**	-.27	-.21	-.12	1.0
Writing Quality Score	.20	-.11	-.33*	.11	-.11
Grade Reading Test (Vocabulary)	-.08	-.28*	.11	-.03	-.11

* p < .05, ** p < .01

Correlation Matrix (Draft vs. Copy)	Phonological	Orthographic	Morphological	MGR	Semantic
Phonological	1.0				
Orthographic	-.43**	1.0			
Morphological	-.35*	-.35	1.0		
MGR	-.15	-.03	-.32	1.0	
Semantic	-.37*	-.30*	-.25	-.15	1.0
Writing Quality Score	.08	-.18	.17	.01	-.26
Grade Reading Test (Vocabulary)	.11	-.12	-.10	-.30	-.09

* p < .05, ** p < .01

Discussion

This preliminary investigation analyzed spelling errors of students in grades 4 and 6 during the extended writing process to gain insight about misspellings during the revision process, and expansion to 5 types of knowledge that contribute to spelling development. Specifically, this study sought to determine the utility of adding two additional types of knowledge, Semantic and Mental Orthographic Representation, in combination with Triple Word-Form Theory utilized in higher level spelling development with the following key findings.

- Participants in this study were good spellers with no more than 2% of spelling on rough drafts and final copies.
- The lack of significant correlations observed between semantic, morphological, and MGR errors supports the utility of two additional types of knowledge (MGR, semantic) for higher level spelling analysis.
- Significant correlations between phonological, orthographic, morphological, and semantic suggests some relationship exists between the error types, perhaps indicating an underlying mechanism for spelling.
- The variability in linguistic patterns of misspellings observed during coding revealed that spelling development is also distinctive upon the individual speller, word, and context; something to be considered by the clinician when assessing and treating spelling difficulties in children.

Future work is needed to support the case for five types of knowledge for later spelling development including:

- The implementation of a controlled word list, consisting of developmentally common misspelling patterns
- The inclusion of students with language or articulation disorders to better detect phonological differences.
- The use of a sourcebook for common spelling pattern errors assembled from resources such as Moats (2005) or the Wilson Reading program.

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