

Cognitive Reorganization during Early Writing Development: A Comparison of English-Speaking and Spanish-Speaking Children with Implications for Research and Instruction

Framed within a dynamic systems approach to understanding cognitive development (Thelen & Smith, 1996) and utilizing a microgenetic multiple case-study design (Seigler & Crowley, 1991), I mapped the development of children as they emerged toward being conventional writers. More specifically, I studied the simultaneous and interdependent development of children's understanding and use of English orthography, concept of word, and metalinguistic awareness. Data from 105 English-speaking and Spanish-speaking children were collected and analyzed using repeated measures ANOVAs. Key findings include evidence for arguing (a) that early writing development is best characterized as a complex, non-linear, emergent process, (b) that phonological and orthographic knowledge plays a crucial role in early writing development, especially around the time children are transitioning from emergent to more conventional writing (c) that concept of words play much larger roles in early writing development than extant research has shown, and (d) that children's metalinguistic awareness of lower levels of linguistic organization (e.g., phoneme-grapheme relations and mental orthographic representations) may be partially dependent on their understandings of higher levels of linguistic organization (e.g., morphology, semantics, syntax, text structure). Several implications for research and instruction follow from these findings. If writing development is a complex, emergent process and if key dimensions of development are partially interdependent, then future research should include more dynamic systems approaches that utilize more multiple variable designs. If teachers understood the complex and dynamic nature of early writing development more fully, then they could become more observant, more responsive, and thus more strategic in helping children become self-extending learners.

Introduction

One of the most exciting moments in the development and learning of young children is when they become conventional writers (and readers). Although this developmental milestone seems to occur almost miraculously for many children, investigations into early writing as a dynamic system that involves multiple interrelated processes remains under-researched and under-theorized. Learning to write is a complex process involving a variety of factors, such as relevant linguistic knowledge, cognitive strategies, sociocultural experiences, and motivation. Such factors are often contingent and uneven in relation to each other. Sometimes, children's understandings and use of some dimensions of writing seem to outstrip their understandings and use of others. At any given time, a child may hold different, even competing, understandings of the strategies and processes involved in writing.

1 And different children's developmental paths may differ in significant ways even
2 though they eventually achieve common outcomes (e.g., Clay, 1998).

3 Despite the fact that this process has been theorized as complex and to involve
4 qualitative changes in children's thinking about multiple dimensions of language and
5 literacy (e.g., Connor 2016; McGee & Purcell-Gates, 1997), most research on early
6 writing development has focused on isolated, single dimensions of the dynamic
7 developmental system such as phonemic awareness (e.g., Blachman, 2000; Foy &
8 Mann, 2009), orthographic knowledge (e.g., Sharp, Sinatra, & Reynolds, 2008),
9 concept of word (e.g., Flanigan, 2007), or metalinguistic awareness (e.g., Rowe,
10 2008; Tunmer, Herriman, & Nesdale, 1988). Although many studies have shown
11 that each dimension contributes significantly to becoming conventionally literate,
12 only a handful of studies have focused on two or more of these dimensions
13 simultaneously. And very few studies have addressed the issue of how some
14 dimensions can enable or impede the development of other dimensions (e.g., Clay,
15 1998; Ferreiro & Pontecorvo, 2002; Kamberelis, 2002), this process is perhaps best
16 characterized as complex, multidimensional, and dynamic, and it merits research
17 efforts that are equally complex, multidimensional, and dynamic.

18 Motivated by a desire to understand this complexity and multidimensionality
19 more fully, I paid close attention to young children's literacy behaviors and activities
20 in all settings where we found them—classrooms where we were working, homes,
21 community centers, etc., and I noticed several salient constellations of actions and
22 activity. When children "told" us the stories they were going to write, these stories
23 were usually both rich and well formed. When children wrote their stories, however,
24 they often labored intensely, even painfully, to represent each phoneme of each word
25 with a grapheme. And when children tried to read the stories, they had just written,
26 they tended to exhibit one of several patterns. Sometimes they focused almost
27 exclusively on constructing meaning and paid little attention to the actual print in
28 front of them. Sometimes they struggled to decode the writing they had labored to
29 produce, usually sounding out some words, guessing at others, and rendering a text
30 whose meaning was either jabberwocky or quite different from the one they had
31 encoded. And sometimes they began decoding words (or parts of words) in their
32 stories but quickly abandoned this strategy in favor of "reading" emergently without
33 really using the print in front of them. During the ensuing weeks, however, these
34 children moved across writing and reading tasks with considerable ease. They
35 seemed to have coordinated previously uncoordinated knowledges and strategies
36 into a smooth-running functional system.

37 Based on these insights, I designed the present study to document with
38 considerable precision just how children emerged into becoming conventional
39 writers who could compose meaningful alphabetic-based texts and read back what
40 they wrote. More specifically, I designed the study to map changes in children's
41 overt actions and inferred cognitive processes while working on specific writing
42 tasks from the time they were on the verge of becoming conventional writers to just
43 after they were judged to be writing conventionally. Finally, I used a sample of
44 children with different first languages—English and Spanish. Because these two
45 languages differ considerably with respect to orthographic patterns and grammar,
46 whether significant differences were found on key variables would help me

1 understand whether (and perhaps how) different language systems affect or do not
2 affect basic developmental processes.

3 Determined not to foreclose on the apparent complexity, multidimensionality,
4 and dynamism of this process, we chose to focus simultaneously on several key
5 dimensions of early literacy learning typically reported in the literature—
6 orthographic knowledge (phoneme-grapheme relations and mental orthographic
7 representations [MORs] [because not all words can be spelled conventionally using
8 phonics strategies alone]), concept of word (both its perceptual and its semantic or
9 morphosyntactic dimensions), and metalinguistic awareness. The following research
10 questions guided our study. First, how did children's knowledge of English
11 orthography change as they became more conventional writers? Second, how did
12 their concept of word change during this emergence process? Third, how did their
13 metalinguistic understandings change as during this emergence process? Fourth,
14 what might be inferred about the relations among these different dimensions of
15 writing development as children became more conventional writers?

17 **Method**

19 **Research Design**

21 To understand the complex and integrative nature of early writing
22 development with reasonable precision, I conducted microgenetic case studies
23 (e.g., Siegler, 1996; Siegler & Crowley, 1991; Vygotsky, 1962) of children as they
24 became conventional writers. Microgenetic case studies are intensive, mini-
25 longitudinal studies that involve following children very closely for relatively short
26 periods of time, carefully documenting their actions, their talk, and what they
27 produce while accomplishing some particular task or learning some particular
28 concept. What I mean by children becoming conventional writers involves
29 complex judgments about when children seem to have reorganized their cognitive
30 structures such that they understand the nature and functions of written language
31 well enough to use it fluidly and flexibly if not flawlessly. To make determinations
32 about when children were conventional writers, we used Sulzby, Barnhart, and
33 Hieshima's (1989) operational definition. According to them, a child is considered
34 a conventional writer when s/he produces a written text at least three clauses in
35 length that both the child and a literate adult (with some knowledge of invented
36 spelling) can read.

37 The following research questions guided the investigation: How did
38 children's orthographic patterns change during the transition? How did children's
39 concept of word change during the transition? How did children's metalinguistic
40 activity change during the transition? What might be inferred about the relations
41 between and among these different dimensions of development during the
42 transition?
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Setting and Participants

105 children in kindergarten or first grade participated in the study. Mean age of these children was 6; 2 (5;2--6;6). 49 children were native English speakers from the United States. 56 children were native Spanish speakers from Spain.

Data Collection

Either a graduate student or I worked with each case-study child approximately once every two weeks for however long it took the child to transition from emergent to conventional writing processes and products. The average time for children to make this transition was 12 weeks. The shortest time was four weeks. The longest time was 14 weeks. Children who made the transition in less than four weeks were eliminated from the study because we wanted at least four weeks of data prior to the time when children were judged to be conventional writers.

During each data collection session and using a script to ensure consistency, the researcher first asked the child to tell a story about something s/he had done recently that was fun or exciting. Next, the researcher asked the child to write the story down. After the child had written the story, the researcher asked the child to read it. To assess story stability the researcher asked for a second reading. Finally, the researcher asked the child to locate at least one token of each word of the written story. Words were elicited in random order, and this task was repeated two times. All data collection sessions were audiotaped or videotaped, and all audiotapes or videotapes were transcribed.

Data Organization and Analysis

Based on my research questions, I focused on three specific dimensions of children's composing processes and products during this transitional period: (a) orthographic representations (semi-phonetic, phonetic, transitional, and conventional spellings) (b) concept of word (perceptual and morphosyntactic dimensions), and (c) metalinguistic awareness (comments focused on linguistic elements smaller than a word and linguistic elements as large or larger than a word).

I organized the entire data set according to three developmental moments: early (Moment 1), intermediate (Moment 2), and late (Moment 3). Moment 2 consisted of the session during which the child was judged to be a conventional writer plus one session before and one session after that. Moment 1 consisted of the three sessions prior to Moment 2. Moment 3 consisted of the three sessions following Moment 2. Once I had organized our data set in this way, I conducted separate repeated measures ANOVAs on the dimensions of development focused on in the study. Dependent variables included percentages of semi-phonetic and phonetic/transitional/conventional spellings (Gentry, 2000), percentages of words marked by perceptually distinct word boundaries, percentages of words correctly located on the word location task, percentages of metalinguistic comments about

linguistic units smaller than a word, and percentages of metalinguistic comments about linguistic units as large or larger than a word.

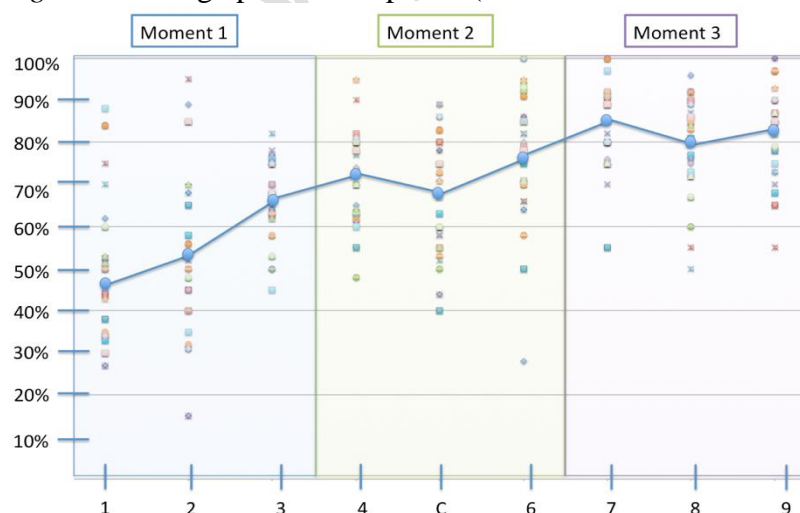
Findings and Discussion

Development of Orthographic Knowledge

I used an adapted version of Gentry's (2000) five stages of spelling stages to analyze the data. More specifically, I reduced Gentry's taxonomy to two categories. The first category included pre-communicative spellings and semi-phonetic spellings. The second category included phonetic spellings, transitional spellings, and conventional spellings. I analyzed only the latter category based on the assumption that children who are encoding words based both on knowledge of phonetic and visual dimensions of spelling have developed sufficient working knowledge of English and Spanish orthography to compose alphabetic texts and read them back.

Mean percentages per text of phonetic/transitional/conventional spellings increased significantly across the study, $F(103) = 209.008$, $p < .001$ (See Figure 1). Tukey post hoc analyses revealed statistically significant differences between Moment 1 versus Moment 2 ($p < .000$), Moment 2 versus Moment 3 ($p < .000$), and Moment 1 versus Moment 3 ($p < .000$). Scrutiny of actual changes in orthography across time revealed a positive developmental slope prior to the achievement of conventional literacy, which increased for about a month after that, and a leveling off thereafter. There were no significant between-group differences. Percentage of accurate/reasonable and complete representations of sounds at the conventional point was roughly 70%.

Figure 1. Orthographic Development (Transitional/Conventional Spellings)



As Figure 1 shows, there was a modest but steady increase in the percentages of children's phonetic/transitional/conventional spellings for the first few sessions

of the study. This increase leveled off around the conventional point, rose again during the two sessions following conventionality, and then leveled off again. Additionally, there was a general trend for the variance around the mean to decrease throughout the course of the study. This differential clustering of data is an indication of the self-organizing integration and stabilization of orthography as a dynamic system (Smith & Thelen, 2003; Thelen & Ulrich, 1991; Yaden, 1999).

Also worth noting here is the fact that increases in these higher-level spellings, especially after the conventional point, were accounted for almost entirely by an increase in conventionally spelled, one- or two-syllable, high-frequency words in both languages (e.g., an, the dog; un, el, pero). This suggests that, once they became conventional writers (according to our operational definition), children were spending less time puzzling over phonological/phonemic aspects of spellings (e.g., phoneme-grapheme relations) and more time thinking about visual markers (e.g., digraphs and consonant blends) and morphosyntactic markers (e.g., verb inflections) or words as whole visual/semantic units. This finding is important and will be discussed in greater detail when I consider children's developing concept of word.

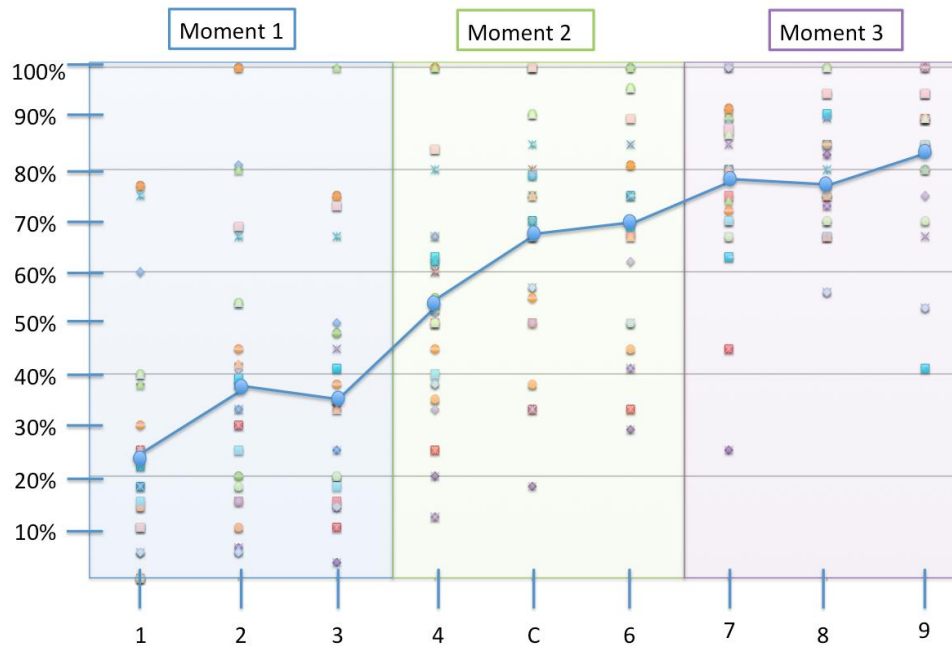
Taken together, findings from analyses of children's spellings suggest several things. First, some "critical mass" of knowledge about phoneme grapheme relations and mental orthographic representations seemed necessary for children to be considered conventional writers. If this is the case, looking at Figure 1, it seems like such a critical mass might be approximately 70%. However, the sharp increase in the quality of orthographic representation that occurred right after they were judged to be conventional writers suggests that the transition itself may have facilitated children's developing phonological/phonemic awareness and orthographic knowledge as much, if not more than, the converse.

Development of Concept of Word

I operationalized concept of word according to two important dimensions—a perceptual dimension and a morpho-syntactic dimension. I used the presence (or absence) of clear-cut perceptual boundaries between words (e.g., spaces, dashes, column formatting) as a rough index of the perceptual dimension of children's concept of word.

There was a significant difference between the presence of clear-cut word boundaries (a measure of the perceptual component of children's concept of word) in children's texts before and after the achievement of conventional literacy, $F(103) = 198.300$, $p < .001$ (See Figure 2). Tukey post hoc analyses revealed significant differences between developmental moments 1 and 2 ($p < .000$), 2 and 3 ($p < .000$), 1 and 3 ($p < .000$). Importantly, the most growth with respect to the mean number of words in the children's texts marked by clear-cut boundaries occurred before the achievement of conventional literacy. After that, relatively little change occurred. There were no significant between-group differences. Percentage of words marked by clear-cut boundaries at the conventional point was roughly 70%.

Figure 2. Perceptual Dimension of Children's Developing Concept of Word



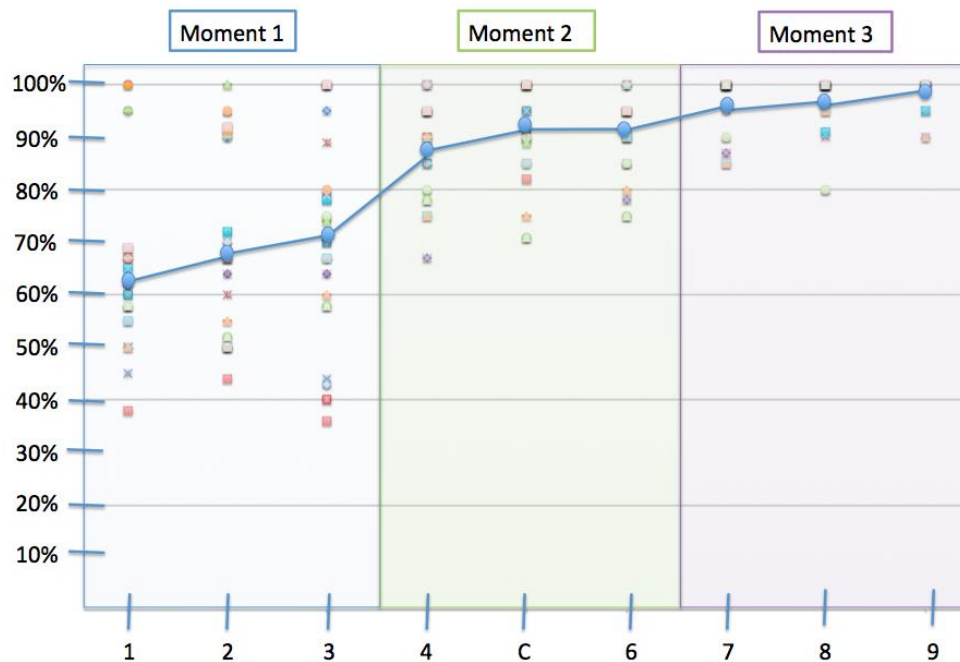
As Figure 2 illustrates, less than 40% of children's words were marked with clearcut word boundaries in Moment 1. The most substantial increase happened in Moment 2. At the conventional point, approximately 70% of children's words were marked with clear-cut boundaries. After that, the rate of increase in the number of words marked with clear-cut boundaries leveled off considerably. At the end of Moment 3, approximately 83% of children's words were clearly bounded. Additionally, the variance around the mean percentage score for each session tended to decrease systematically as the study unfolded, which is an indication that concept of word as a dynamic system was becoming increasingly integrated and stabilized. Together, these findings suggest that the development of an increasingly stable perception of a word as a bounded unit was instrumental during children's early writing development. However, precisely what role (or how large a role) it played remains unclear.

As noted in the Method section, I used performance on a word location task as a rough index of the semantic or morphosyntactic dimension of children's developing concept of word.

There was a significant difference in children's word recognition performance before versus after the achievement of conventional literacy, $F(103) = 347.791$, $p < .001$ (See Figure 3). Tukey post hoc analyses revealed statistically significant differences between Moment 1 versus Moment 2 ($p < .000$), Moment 2 versus Moment 3 ($p < .001$), and Moment 1 versus Moment 3 ($p < .000$). Children exhibited a substantial increase in the mean number of words located correctly before achieving conventional literacy with little increase after that. There were no significant between-group differences. 90% of words were located correctly at the conventional point. This suggests that the semantic or morphosyntactic dimension of concept of word runs ahead of the perceptual dimension. It also

suggests that a firm grasp of the semantic dimension of concept of word is particularly important for making the transition to conventional literacy.

Figure 3. Semantic or Morphosyntactic Dimension of Children's Developing Concept of Word



These patterns show a substantial, systematic increase in the mean number of words that children located long before they were judged to be conventional writers. In fact, most children were close to the performance ceiling at this point in their development. Equally important here is the fact that the variance around the mean percentage scores for each session decreased systematically and dramatically around and beyond this point. Clearly, children's understanding of the lexicon and grammar of written English as a dynamic system became consolidated (even more than other cognitive dimensions of development) as they became conventional writers. Among other things, these findings suggest that, perhaps even more than the perceptual dimension of their developing concept of word, a firm grasp of its semantic or morpho-syntactic dimension plays a crucial role in early writing development. This possibility becomes increasingly plausible if we view word location performance in relation to other findings in this study. For example, although clearly related based on their parallel developmental trajectories, children's excellent word recognition performances did not seem to depend in any significant way on whether their words were marked with clear-cut perceptual boundaries. In the beginning of the study, children located approximately 61% of the words in their texts even though only 24% were marked with clear-cut perceptual boundaries. At the point when they were judged to be conventional writers, they located approximately 90% of the words in their texts when only 65% were marked with clear-cut boundaries.

1 If perceptual clues played a relatively limited role in children's word location
 2 performances, what other clues might they have used to accomplish this task?
 3 Based on their changing search behaviors and metalinguistic commentary across
 4 the study, the data suggest that they were increasingly using several specific
 5 syntactic and semantic clues. Early in the study, most children seemed to conduct
 6 random searches when asked to locate words in their texts. As children became
 7 more proficient writers, they began to conduct more systematic searches. For
 8 example, they read their texts (or sections of their texts) until they found the word
 9 they were looking for. Children also began to rely more heavily on lexical and
 10 syntactic markers such as using definite articles and prepositions to search for
 11 nouns and using nouns and noun phrases in relation to their efforts to locate verbs.
 12 In addition to becoming more systematic in their word search strategies, children
 13 also became more thorough. Early in the study, most children stopped searching
 14 after they found a single token of a given word, even if multiple tokens of the word
 15 were present in the texts. As the study progressed, many children continued
 16 searching until they had located all tokens of each word in their texts.

17 Also worth noting here is the fact that, early in the study, children's
 18 performances on the word location task were quite a bit better than their
 19 developmental spelling patterns might have predicted. At the beginning of the
 20 study, for example, children located approximately 64% of the words in their texts,
 21 even though all phonemes were represented in only 56% of these words. At the
 22 point they were judged to be conventional writers, they located approximately
 23 91% of the words in their texts even though all phonemes were represented in only
 24 66% of these words.

25 Another interesting finding from these data is the fact that the largest increase
 26 in spelling development occurred just after children were judged to be
 27 conventional writers. This suggests that children's morpho-syntactic knowledge
 28 may not only have developed somewhat independently of their phonemic
 29 awareness/orthographic knowledge but also that having a more stable,
 30 consolidated dynamic system of morpho-syntactic knowledge may have facilitated
 31 the development of their phonological/phonemic awareness and orthographic
 32 knowledge. To understand the complex relations between these two dimensions
 33 of development requires more and different kinds of research.

34 Finally, even though the children in this study were quite successful on the
 35 word location task during the few sessions prior to being judged to be
 36 conventional writers (between 70% and 93% success rate), they often struggled
 37 (and sometimes failed) to read their texts back fluently during the rereading task.
 38 This finding is probably related to the fact that word location requires less
 39 cognitive "space" and coordination of fewer cognitive strategies than reading and
 40 making sense of extended text (e.g., Ferreiro & Teberosky, 1982; Sulzby, Barnhart
 41 & Hieshima, 1989; Vernon & Ferreiro, 1999).

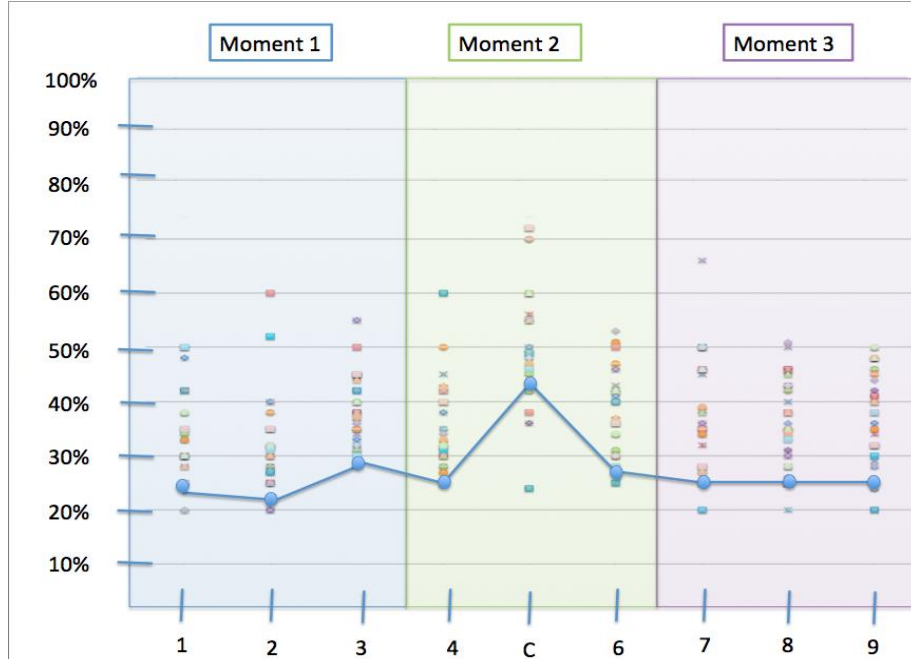
42 Taken together, these various findings offer compelling evidence to support
 43 the claim that developing a consolidated understanding of the morpho-syntactic
 44 dimension of concept of word (and the morpho-syntax of written English and
 45 Spanish generally) was particularly crucial as the children in this study became
 46 more competent writers. Moreover, consolidating this understanding did not seem

particularly dependent on the prior or commensurate development of phonemic awareness/orthographic knowledge. In fact, the converse may be true, especially with respect to learning the medial and final sounds of words and the graphemes that represent them (e.g., Morris, 1993; Sharp, Sinatra, & Reynolds, 2008). Finally, the findings from the study suggest that writing (and reading one's own writing) may be especially crucial to developing the cognitive capacity for reflecting on language and for becoming consciously aware of language as a system of relations between and among various linguistic units and levels of linguistic organization, which brings us to the topic of metalinguistic awareness.

Development of Metalinguistic Awareness

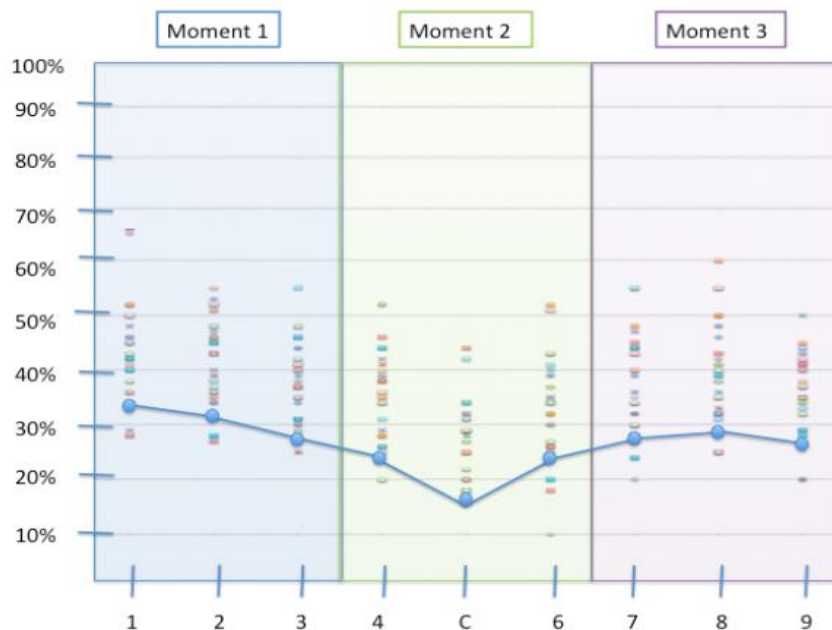
Metalinguistic awareness involves both tacit and explicit understandings of the forms and functions of various dimensions of oral and written language. There are many ways in which children demonstrate their metalinguistic awareness—verbally, with gestures, with self-corrections, etc. To assess children's metalinguistic awareness in this study, I focused only on their spontaneous verbalizations while working on our tasks because, unlike gestures, self-corrections, and the like, these comments are relatively unambiguous. Thus, my measure of metalinguistic awareness was very conservative. Still, operationalizing metalinguistic awareness in this way allowed us to see patterns of change over time. As mentioned in the Method section, I coded for metalinguistic comments about linguistic units smaller than a word and metalinguistic comments about linguistic units as large or larger than a word. Differences in mean percentages per session of comments about linguistic units smaller than a word before versus after children were judged to be conventional writers were significantly different from each other, $F(103) = 29.587, p < .01$ (See Figure 4). This suggests that children were focusing intensely on phoneme-grapheme relations during the intermediate developmental moment or right about the time they were transitioning to be conventional writers. Tukey post hoc analyses revealed statistically significant differences between Moment 1 versus Moment 2 ($p < .000$) and Moment 2 versus Moment 3 ($p < .000$), but not between Moment 1 versus Moment 3 ($p < .867$). The largest means for comments about these units were right around the time children were judged to be conventionally literate. 69% of all comments about these linguistic units focused on onsets (or beginning sounds of words).

1 *Figure 4. Spontaneous Talk about Linguistic Units Smaller than a Word*



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3
4 Differences in mean percentages per session of comments focusing on
5 linguistic units as large or larger than a word before versus after children were
6 judged to be conventionally literate were also significantly different from each
7 other, $F(103) = 74.591$, $p < .001$. Tukey post hoc analyses revealed statistically
8 significant differences between Moment 1 versus Moment 2 ($p < .000$), Moment 2
9 versus Moment 3 ($p < .000$), and Moment 1 versus Moment 3 ($p < .001$).

10
11 *Figure 5. Spontaneous Talk about Linguistic Units as Large or Larger than a Word*



As Figure 4 illustrates, very little of children's spontaneous talk focused on linguistic units smaller than a word except for right around the point when they were judged to be conventional writers. From a cultural-historical perspective (e.g., Vygotsky, 1962), this is not surprising given that private speech diminishes once it is no longer functional in scaffolding cognitive activity. Additionally, compared to other dimensions of development, the variance around the mean for this variable was relatively small throughout the study and decreased only slightly as a function of development, suggesting the dynamic system of children's metalinguistic awareness was quite stable at the outset of our study.

Another interesting finding from these data that is not shown in the figure is the fact that 68% of the metalinguistic comments about linguistic units smaller than a word focused on *onsets* (which makes sense given the primacy of initial phonemes. Additionally, most of these comments were uttered during the word location task.

Based on this set of findings, it seems that an increased awareness of phonological, phonemic, and orthographic knowledge played an especially significant role right around the time children were judged to be conventional writers. However, exactly how this knowledge functioned is difficult to say. One plausible hypothesis is the obvious one, namely that children needed to develop sufficient working knowledge of both the encoding and decoding dimensions of phoneme-grapheme relations and mental orthographic representations to achieve higher levels of writing competency. However, an alternative hypothesis seems to fit somewhat better with other findings in this study. Recall, for example, that in the intermediate moment of the study, children's spontaneous talk was largely focused on onsets, especially during the word location task. This finding suggests that children may have been using their knowledge of linguistic units smaller than a word to consolidate their concept of word. In other words, voicing onsets might have been a proxy for voicing words. If so, sounding out and talking about onsets may have functioned much like using determiners as clues when searching for nouns in the word location task, or verbalizing onsets might be a direct strategy for evoking words.

Figure 5 also shows the percentages of children's spontaneous comments about linguistic units as large or larger than a word. As you can see, early in the study, most of children's metalinguistic comments focused on such units. This focus declined as children reached the point when they were judged to be conventional writers, after which it increased significantly but then leveled off, remaining both modest and equal to children's focus on linguistic units smaller than a word for the remainder of the study. Much like findings from data on linguistic units smaller than a word, the variance around the mean for data on linguistic units as large or larger than a word was relatively small throughout the study and decreased only slightly as a function of development, suggesting the dynamic system of children's metalinguistic awareness was quite stable at the outset of our study.

Also important here are the specific problems or issues that children encountered and puzzled over in relation to linguistic units as large or larger than a word. Recall that, before I collapsed the coded data into the two general categories

used in this analysis, I had coded children's metalinguistic comments into more fine-grained categories. Analyses of these categories revealed that 76% of children's comments about linguistic units as large or larger than a word focused either on word choice (41%) or text meaning (35%).

Taken together, the distribution patterns of children's metalinguistic comments suggest a counterintuitive but plausible relation between knowledge about linguistic units smaller than a word and knowledge about linguistic units as large or larger than a word. Because children's metalinguistic talk during the early developmental moment focused primarily on linguistic units as large or larger than a word, and because their comments during the intermediate developmental moment focused almost exclusively on linguistic units smaller than a word, it seems that the consolidation of phonological, phonemic, and orthographic knowledge might have required the prior establishment of a rich substrate of knowledge about higher levels of linguistic organization (e.g., lexical items, syntax, semantics, pragmatics) and perhaps the relations among them. Though speculative, we find this suggestion particularly intriguing. Alternatively, these findings may simply reflect a lexical part-to-whole phenomenon where the word is an earlier, easier learned linguistic unit, whereas the more elusive, abstract phoneme is a linguistic unit that requires greater cognitive effort and develops later.

Conclusions

Several conclusions may be drawn from these findings. First, they suggest an important role for phonological, phonemic, and orthographic knowledge during early writing development. Such knowledge appears to be especially crucial (and perhaps rapidly developing) at just the point when children are about to make the transition to conventional literacy, as was evidenced especially by the relatively high percentages of metacognitive comments about linguistic units smaller than a word produced at this point in their development.

Second, children's intense focus on linguistic units smaller than a word around the conventional point may have served a couple of different functions. It may have functioned to support children's encoding or decoding of onsets, rimes, or specific phonemes. Or, less obviously, it may have functioned to encode and/or index more global units such as words or syntax. Indeed, children's predominant focus on onsets in their private speech during the word location task suggests the plausibility of this latter interpretation. The following evidence supports this suggestion: During the early moment of the study, children often uttered entire target words as they searched for them in their texts. During the intermediate moment, children more commonly uttered the onsets of target words as they searched them. During the late moment, children engaged in less private speech about target words or their onsets during the word location task, and they were much more efficient in their searches.

Third, children produced many metalinguistic utterances about higher levels of linguistic organization (e.g., words, syntax, semantics) both before and after

achieving conventional literacy, suggesting that their short-lived but intense focus on phoneme-grapheme relations required a certain substrate of knowledge about higher levels of linguistic organization for their knowledge of phoneme-grapheme relations to be effective within the overall developmental process (e.g., Bourke & Adams, 2010; Ehri & Sweet, 1991).

Fourth, except during the intermediate developmental moment, the content of children's metalinguistic activity often focused on issues related to concept of word (especially its morpho-syntactic dimension). This suggests that concept of word plays a particularly important role in becoming a conventional writer. Indeed, this is an area that seems rife with opportunities for additional research.

Fifth, because Spanish words embody the consonant-vowel-consonant (C-V-C) pattern much more systematically than English words, we were surprised to find no differences between English-speaking and Spanish-speaking children on measures of orthographic representation (or spelling). Looking at the words in children's texts, however, suggests that both groups of children encoded mostly simple C-V-C words (e.g., *cat*, *gato*), names (e.g., *Mona*, *Tom*, *Jorge*, *Maria*) and high frequency words (e.g., *and*, *the*, *y*, *el*). If they show up at all, differences in spelling and vocabulary development might not show up until children are older and have larger vocabularies with more complex orthographic patterns (especially in English). In this regard, one frontier for future research include investigating orthographic development with English-speaking and Spanish-speaking children slightly older than the children in this study. Another frontier would involve a replication of this study with children who speak many different first languages; among other things, such work would help us better understand the relations between basic developmental processes and the effects of language systems with different phonologies, orthographies, and other aspects of linguistic organization.

These various trends or patterns based on aggregated data notwithstanding, when we consider that each child in the study was recruited at a different point in time during their literacy learning journey, we can also conclude that as similar as children may look during this critical developmental period, how each dimension of early writing development unfolds for any individual child and whether and how the relations among these dimensions are enabling or impeding for each child can vary tremendously. Therefore, when considering how the findings from this study relate both to future research and to instruction, we must consider both global patterns and individual differences. In this regard, future research using non-linear statistical analysis methods and multiple, comparative qualitative case studies are sorely needed.

Implications

With respect to implications for research, given the complex and dynamic nature of children's early writing development illuminated by this study, future research should include more integrated approaches to explore more fully and in greater detail the intricacies of early writing development. Most previous research efforts that have focused on a single dimension of literacy have served to highlight

1 a developmental view from above. Yet much can be learned from a view from
 2 below that could help us understand the specific details of the complex trajectories
 3 that characterize children's development as they become increasingly conventional
 4 writers.

5 In this regard, discovering and demonstrating how various cognitive and
 6 linguistic processes seemed to operate interdependently as children moved closer
 7 and closer toward being conventional writers was possible, in part, because of the
 8 holistic approach I adopted. If I had limited my focus to one or even two
 9 dimensions of this process instead of focusing on multiple dimensions
 10 simultaneously, I would have missed some of the complexity, multidimensionality,
 11 and dynamism I was able to document or infer. And if I had not conducted
 12 microgenetic case studies—following children closely and at frequent intervals—I
 13 would have sacrificed considerable precision in showing how children's various
 14 knowledges and strategies about the various dimensions of written language
 15 structures and functions developed and were related to each other.

16 In addition to these implications for research, this study has some pedagogical
 17 implications. First, it indexes the need for teachers to be highly knowledgeable of
 18 the complex and dynamic nature of early writing development if they want to
 19 design effective learning opportunities for all young children. As I noted above,
 20 there has been much more research on orthographic knowledge/skills (especially
 21 phonemic awareness) than on concept of word and metalinguistic awareness.
 22 Similarly, many more curricular resources are available for teaching phonemic
 23 awareness and orthographic dimensions of literacy than for teaching concept of
 24 word or metalinguistic awareness. It stands to reason, then, that teachers would
 25 hold more knowledge in this single dimension and thus privilege it as they design
 26 learning opportunities for young writers. If teachers had more knowledge of the
 27 multiple dimensions (and the relations among them) involved in early writing
 28 development, then they might be able to design and time instructional activities
 29 more effectively—especially with respect to the watershed moment of making the
 30 transition from being an emergent writer to a more conventional one.

31 Second, the use of authentic literacy tasks, such as the ones used in this study,
 32 could provide teachers with assessment data that not only can be quantified to
 33 show developmental patterns but also can be used to understand and respond to
 34 children's different literacy learning trajectories and thus to scaffold their
 35 development more strategically. As suggested by Craig (2006) and Reyes and
 36 Azuara (2008), many formalized assessments typically used in school settings
 37 require children to work with language in decontextualized ways. These
 38 assessments do not help teachers learn about many of the knowledges, strategies,
 39 and skills that children have and use when learning about language and literacy. A
 40 shift in orientation toward more authentic tasks would help teachers to focus not
 41 only on the products of literacy activity (including formalized assessments) but
 42 also on the processes children enact as they figure out the logics of written
 43 language (Harste, Woodward, & Burke, 1984). Essentially, this type of assessment
 44 could allow teachers to become even better "kid watchers" (Goodman, 2005) who
 45 "know the signs of growth, of learning, of teachable moments" (p. 83). In this
 46 way, teachers could more flexibly adapt their approaches to both whole-class and

individual instruction. As Clay (1998) stated, “if we notice children taking different paths, we can interact with their different journeys just as we would alter our talking to adapt to our listeners, and in a couple of years expect them to arrive at common outcomes” (p. 3).

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