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By: Charles A. MacArthur, Steve Graham, Jill Fitzgerald

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Chapter 6

The Emergence of Writing

Liliana Tolchinsky

“Writing” is a polysemous word, with many different meanings. It can refer to the process of tracing letters on a surface, and also to the system of letters (i.e., to the abstract set of signs) used for recording a language, such as when we speak about *writing systems*. The term can also refer to the process of producing novels, poetry, scientific articles, newspaper reports, and other types of text. When someone replies to the question “What are you doing?” with “I’m writing,” we assume that he or she is writing a novel and not simply a list of letters, although, in fact, either one could be the case. Yet another use of the term applies to the *language* used in writing. This is the sense that is implied when teachers complain about the way their students write, by which they usually mean that students are not producing the kind of constructions or vocabulary suitable for a written register. We can thus distinguish among writing (1) *as a notational system*, (2) *as a mode of production* (i.e., as a *process* of discourse production), and (3) *as a discourse style* or, more precisely, as a collection of *discourse styles* or genres (Ravid & Tolchinsky, 2002). Any of these aspects can be approached from a “developmental perspective,” which considers how individuals learn the writing system used in their community, and how they come to understand the way writing works as a notational system for producing a diversity of discourse modes.

A developmental approach to writing is based on two main assumptions: First, chil-

dren are sensitive to the presence and use of writing in their environment. Second, the ideas developed by children about writing and the different steps by which they come to understand how writing works cannot be equated with the way they happen to be taught to write.

Throughout the history of writing, “there was a constant concern for the structured transmission of the system from generation to generation and the method of instruction was passed along with the practical knowledge of the script” (Cooper, 1996, p. 37). Even among the earliest ancestors of our writing system, it was possible to find “writing manuals,” which were lists of words (lexical lists) used to teach people how to write. It is no exaggeration to say that schooling and writing were born hand in hand (Halliday, 1987). However, noting that literacy in general, and writing in particular, are institutionally supported cultural practices or wondering about the possible relation between learning and instruction is one thing; another, very different thing is believing that what children know about writing is what they are institutionally taught. A developmental approach makes little sense for those who believe that learning is created by teaching.

From this perspective of literacy, even children who have not yet had formal instruction in how to read or write are asked to “read” or to “write,” and their way of doing so can be observed and analyzed. The idea of

observing the development of a certain capacity as early as possible was attempted by German psychologists in the 1930s (Hildreth, 1936) and applied more extensively by Luria and Vygotsky at about the same time (Luria, 1929/1978). From the 1970s on, this notion was developed by Ferreiro and her associates (e.g., Ferreiro, 1986, 1988; Ferreiro & Teberosky, 1979) in Spanish and subsequently applied in different languages and orthographies (e.g., Levin & Korat, 1993), and Sandbank, 2001, in Hebrew; Pontecorvo & Zuccheromaglio, 1988, in Italian; and Chan, 1998, in Chinese), with parallel enterprises in North America, Australia, and New Zealand. Although these various scholars differed widely in approach and motivation, all have actively contributed to our appreciation of the general domain of "preliterate children's conceptions on literacy"—or what Vygotsky called "the prehistory of written language." My first goal in this chapter is to review some of the findings concerning the development of the diverse aspects of writing.

From the onset, writing is not merely a tool for transmitting knowledge; it is also a source of knowledge; it is not only a problem space but also a resource for dealing with language and thought. Thus, my second goal is to show that the study of writing can be a window for the mind and an important source of insight into key issues in human development. Research on writing helps us to understand how children acquire and use this important tool for communication and learning. Furthermore, such research also reveals properties of our mental operations and can demonstrate the role of cultural artifacts in these operations.

Writing as a Mode of Production

The fundamental difference between production of speech, signing, reading, and writing is that only writing leaves visible traces. By looking at the traces, reading can be performed and the original piece of discourse can be reconstructed. The permanence of the traces as opposed to the ephemeral character of speech is an essential feature of writing.

Sound production begins spontaneously in young infants as babbling; so does graphic production. At 18 months, or even earlier, a

child given a tool and a surface will produce graphic marks. The child will do that not for the sake of the activity, nor as a mere exercise, but for the traces. This was proved a long time ago, when children ranging in age from 15 to 38 months were studied in free play activities (Gibson & Levin, 1980). They were given a paper attached to a board and one of two tools, identical except that one left a trace, whereas the other did not. For all the subjects, elimination of the trace significantly reduced the graphic activity. Moreover, nontracing tools were rejected. While scribbling and afterwards, the infants pointed and named the products, but this behavior disappeared when no traces were left.

Similar precocity is shown for reading practices. Even infants are intelligent participants in book-reading activities. Children grasp the physical acts involved in reading—gazing, pointing, monitoring—but also become familiar with the typical language associated with books (Bus, van IJzendoorn, & Pellegrini, 1995; Snow & Ninio, 1986). Children from 8 to 18 months of age engaged in reading picture books progress from an attempt to eat the page to being able to participate fully in verbal dialogue while looking at the books. Book reading is, however, a cultural practice that is not democratically distributed. It greatly depends on the community's access to reading materials and on the adults in charge of making them available to children. Children raised in isolated communities with no experience with book-reading practices develop a representation of writing before developing a meaning for reading. For 3-year-olds in these communities, writing means the production of marks on paper, but reading has no definite meaning; it is confused with writing (Ferreiro, 1986). For example, children who had just jotted down some marks on a sheet of paper and were asked to read them back responded that they had already done so. Other children claimed that pencils were needed for reading. Such manifestations are not terminological issues; rather, they indicate that the nature of writing is understood at an earlier age because it leaves visible traces; it changes the object visibly, while reading does not.

Certainly, other graphic activities, such as drawing, leave visible traces. It is thus crucial

to find out whether children make something different when writing or drawing. Levin and Bus (2003) analyzed the drawing and writing of 28- to 53-month old children, using tasks in which the children were asked to draw and write the same eight referents, in addition to writing their names. From the results, the authors concluded that children up to age 3 draw and write indistinguishable, nonrepresentational graphic products. However, the authors focused on only the products of drawing and writing. When the process of production is observed, a different picture emerges.

Even when their products are indistinguishable, however, 3- to 4-year-olds' motor plans can be clearly identified either for drawing or for writing. Brenneman, Massey, Machado, and Gelman (1996), who examined procedural competence through the analysis of children's videotaped action sequences, showed that children's action plans differ for writing and drawing. When drawing, children make wide, continuous, circular movements, whereas when writing, they lift their pencils off the page and interrupt their movements much more frequently; that is, although the graphic product does not look like writing to an external observer, children act differently when writing or drawing. The problem is that when the finished product is separated from the "writer" and the writing task, the traces "do not have meaning." Differentiation in action implies that 2- to 3-year-olds have implicit knowledge that drawing and writing are different activities even when they are unable to display these differences in their graphic products until a later age.

Because writing leaves traces, it is a very suitable mnemonic device. This basic feature enables planning, monitoring, revision, and editing in the process of composition. Writing makes it possible to reexamine whatever is expressed for further clarification or exploration.

Young children are also aware of the usefulness of such external memory strategies as note taking. When children were asked to suggest strategies to help them remember to perform a certain act (Kreutzer, Leonard, & Flavell, 1975), they were more likely to suggest external memory strategies (e.g., writing a note, asking someone to remind them) than internal memory strategies (e.g., rehearsal,

mental retracing). However, children do not take advantages of permanent tracing for mnemonics, planning, and editing until much later, and frequently only as a result of specific instruction.

Little research has been done on preschoolers' spontaneously resorting to writing to aid their own memory. In the pioneering study by Luria (1929/1978), children ages 3–5 years were given the task of remembering a certain number of sentences that exceeded their mechanical capacity to remember; once children realized that they were unable to remember the number of words given to them, the experimenter gave them each a sheet of paper and told them "to jot down" or to "write" the words he presented. According to the author, "in most cases the child was bewildered by our suggestion" (p. 149). Two reasons might be involved in children's bewilderment: that they did not know how to write, and that it did not occur to them that a way to remember is to jot down. In fact, Luria proceeded by pointing out to the children that writing is what adults usually do to help them remember. Only after the experimenter's instructions did children use writing to help them remember. Nevertheless, the younger children did not attempt to "read" what they had written when asked to recall the sentences. The kind of written displays these children produced (detailed in the next section) did not provide any clue for recalling the sentences, and the children were aware of this.

Attempts to modify a written product require a certain awareness on the part of the child that the interpretation of what has been jotted down depends on the graphic features of the product and not just the intention or willingness of the producer. This realization constitutes a developmental process. When children are required to read what they have just written, there is an interplay between what they have actually put on paper and what they wanted to write. Studies in which preschoolers and first graders have been asked to read back isolated words or texts they have just written have found that younger children repeat verbatim what they have been asked to write (Tolchinsky Landsmann, 1993) or what they wanted to write (Sandbank, 2001) irrespective of what was actually on the paper. Only with age did children attempt to modify the written texts and look

for a correspondence between what they said and what was written.

A developmental process was also found when children were explicitly told and even encouraged to modify their texts. After having written a text read to them out of a book, preschoolers and first graders were asked to read back and correct what they had written in any way they liked (Sandbank, 2001). Although preschoolers were more concerned with graphic aspect of texts (e.g., the shape of the letters) and first graders, with graphophonemic correspondences and orthographic rules, both groups made modifications involving discourse level, that is, revision of the content and structure of texts. For example, one of the first graders wrote a list that was almost exclusively nouns written in a column (*Sweeties, Candies, Chocolates, on the roof was a chimney*). During the revision phase, however, he added an introductory phrase at the top of the text (*in the house there were*) and a conjunction (*and*) between the last noun and the short sentence to make the text more cohesive. Even children who were not writing conventionally were able to produce modifications at a discourse level. Young children, when asked to read and revise their texts, modified their texts in ways that more experienced writers do spontaneously.

An awareness of the basic feature of writing, that it leaves permanent traces, emerges spontaneously. But the perception of the enabling advantages of this feature for mnemonics, planning, and editing requires more developmental time and probably more experience with written language.

Writing as a Discourse Style

Unlike speech, the permanence of traces in writing enables a detachment in time and space between discourse products and discourse producers (Olson, 1997; Tolchinsky, 2003). As literate people, we have at our disposal pieces of discourse that were produced far away and a long time ago. These are encoded in the form of manuscripts, newspapers, books, and letters. Children growing up in a literate community are surrounded by these written products. To what extent are they aware that these material objects are carriers of discourse?

Texts are physical objects supporting discourse, and preschoolers have a notion of the type of discourse to be expected from certain types of physical supports. Therefore, if 4-to-5-year-olds are read a recipe from a storybook, or a typical fairytale from a newspaper, they might react with surprise and deny that these sorts of text are written there (Ferreiro & Teberosky, 1979). Preschoolers are also able to distinguish between different types of text. Hebrew-speaking 5-year-olds were asked to write a fairytale, *Ami ve'tami* ("Hansel and Gretel") and to describe the chocolate house in the tale. Their knowledge of phonographic conventions of written Hebrew was very poor; most of them could draw Hebrew letters, but they did not always know their phonic value. Nevertheless, their written outputs for narratives and for descriptions were very different. The narrative was written in long lines, one letter after the other, with hardly any internal spacing between them except for the names of the protagonists, which sometimes appeared with blanks on both sides. The description, on the other hand, looked very similar to a list of isolated words (Sandbank, 2001). Indeed, when asked to read what they had written, they interpreted the long lines as full utterances, parts of the tale.

When interpreting the description, however, they named the different elements in the house, saying that there were "chocolates, candies, and cookies." A similar graphic differentiation was found when researchers compared the way preschoolers wrote shopping lists and news, advertisements, and poetry (Pontecorvo & Zuccheromaglio, 1988; Tolchinsky Landsmann, 1993). Long before gaining a full command of the phonographic conventions of the written system, the graphic layout of children's text imitates the features of different genres.

Studies on young children's use of genre (Hudson & Shapiro, 1991; Pontecorvo & Morani, 1996; Sandbank, 2001) have revealed that children employ distinctly different forms to reflect different communicative purposes. The problem of placing information into a given genre is solved very early (Berman & Nir, 2004).

An interesting finding relative to young children's sensitivity to genre constraints is that this sensitivity prevented them from distinguishing between verbatim repetitions

and paraphrases. Lee, Torrance, and Olson (2001) asked children to distinguish between a verbatim repetition and a close paraphrase of an utterance. The success rate was higher in nursery rhymes, which highlight surface form, than in narratives, where content takes precedence over form. With age, the effect of genre diminished and success became more consistent across tasks. The authors interpret this as requiring the ability to reflect on texts, as a consequence of literacy. In fact, this genre sensitivity on the part of young children is remarkable: They seem to realize that paraphrasing is quite acceptable in narratives but inappropriate in the case of poetry.

A common assumption about writing development is that it progresses, starting with sensitivity to letter-sound correspondences, then moving to form words and, subsequently, sentences, before finally reaching the level of extended discourse. But the research discussed in this chapter suggests that writing actually develops at many levels simultaneously. In addition, throughout this development, the knowledge acquired at each level constrains learning at all other levels. Children do not move unidirectionally from smaller to larger units. Rather, what children come to know about texts guides and constrains their knowledge of letters and words, and what they grasp about letter-sound correspondences guides and constrains their way of writing texts.

Writing as Notation

In our culture, the alphabet is the notation used in writing for encoding discourse. Thus, the development of writing as a notation reflects children's path in grasping the alphabetic principle.

As mentioned, Luria (1929/1978) and Vygotsky were among the first psychologists to undertake this endeavor. Their studies were carried out with Russian-speaking children just 10 years after the Soviet revolution. The time was ripe to demonstrate that the acquisition of cultural tools might lead to cognitive revolutions. They performed a surprisingly simple though daring test. They had 3-, 4-, and 5-year-olds listen to sentences. When they thought the children were unable to recall them, they instructed the

children to write the sentences down, *so that they could remember them better*. The request was strictly instrumental, because children had to write *so as to remember*. They found that regardless of the sentence, the youngest children produced similar "scrawls" for every word. This is why the children could not make use of their notes in recalling the sentences; their notes did not serve any mnemonic function. For this same reason, Luria described this written output as *undifferentiated-noninstrumental*.

Fifty years after Luria's pioneering experiments, a group of Argentinian psychologists made very similar findings, though guided by Piagetian rather than Vygotskian thinking (Ferreiro & Teberosky, 1979). Specifically, they worked with the belief that even when children have to incorporate conventional knowledge of a conventional kind derived from their membership in a social community (e.g., through language), they must make that knowledge their own and reconstruct it in their own terms. They believed that no knowledge begins from nothing, and all knowledge has a developmental story.

Many different tasks were used to explore this development. Children were asked to write words and sentences in the context of clinical interviews. But, in contrast with Luria, there was no functional aim to the request; children were not required to write for mnemonic or communicative purposes. It turned out that many of the young Argentinian native-Spanish speakers made similar "scrawls" regardless of the word or sentence they were asked to write. Ferreiro (Ferreiro & Teberosky, 1976) also termed this type of production "undifferentiated writing," because neither the child nor the adult could distinguish what had been written.

Nevertheless, children's writing displays the features of form common to writing in almost any language: linearity, presence of distinguishable units, regularity of blanks, and directionality (Gibson & Levin, 1980). By the age of 4, children's writing already appears as a linearly arranged string of distinctive marks separated by regular spacing. These findings are supported by numerous studies carried out in a variety of languages, including English, and seem to hold true independent of socioeconomic status or microcultural milieu (Bissex, 1980; Clay, 1982; Chan, 1998; Gibson & Levin, 1980;

Goodman, 1982; Harste, Woodward, & Burke, 1984). These studies demonstrate that the graphic pattern of writing is part of a child's mental space very early on. At age 4, writing has been internally grasped by the child as a particular activity that produces a specific formal output distinct from drawing, in that it is linear and discrete.

How do children interpret their own written words during the stage of *undifferentiated writing*? They behave as though the place where writing stands or the writer himself, rather than any particular feature of the written display, determines the interpretation. Three- to 4-year-olds were shown pictures with a caption (e.g., a picture of a boat with the caption BOAT). Either as a result of their own guesswork or following a suggestion from an adult, children agreed that the word *boat* was written under the drawing of a boat. However, when the written word was "accidentally" moved to another picture, the reading of the word also changed (Bialystock, 1992; Ferreiro, 1988). So the same written word could come to mean *pipe*, under the drawing of a pipe. Apparently, they did not see the written word *boat* as being a representation of a boat, independent of the changes in contexts, referents, or conditions of productions.

Another typical behavior during the period of *undifferentiated writing* shows that children seem to believe that the writer determines the interpretation of what is written.

When asked to read back what they have written, children usually repeated verbatim the words they were asked to write, irrespective of the graphics they had produced.

One of the main contributions made by Ferreiro was her recognition of the formal work involved in early writing. She discovered that even children who do not know how to write conventionally hold certain criteria concerning the *distinctive features* that graphic displays must fulfill in order to be readable. In order for a string of letter-like forms to be readable, it must be of a limited number and have sufficient variety. These two constraints also regulate children's writing and seem to hold true across languages and scripts. A number of examples drawn from a study examining the development of word writing in Hebrew and Spanish (languages that use different scripts) serve to illustrate this claim. Participants were Spanish- and Hebrew-speaking preschool-age through second-grade children living in Barcelona and Tel Aviv (Tolchinsky & Teberosky, 1998).

We found that the written products of preschoolers, both in Spanish and in Hebrew, were constrained by the same formal features of number and variety. These initial similarities were followed by an increasing divergence as the distinctive features of the respective languages began to exert their influence. Figure 6.1 illustrates two series of written productions highlighting these initial



FIGURE 6.1. Written productions illustrating initial similarities in writing.

similarities. Those on the left were produced by an Israeli girl, Maya; those on the right were produced by a Spanish-speaking boy, Christopher, of the same age. The letters used by each child are the conventional letters of each script. In general, children do not invent forms for letters; rather, they use those provided by the environment. Yet in spite of the different letters, the written outputs reflect both formal constraints: (1) Every string should contain a similar amount of letters, and (2) adjacent letters should not be the same. The most striking observation was that children used the letters in their own names as a sort of repository of conventional letter shapes. Both the Israeli girl and the Spanish boy used the letters in their respective names when writing each word. It was rather shocking to find such an original solution appearing in two different scripts.

In all studies in the different languages explored, whenever a child is required to write his or her own name along with other words or sentences, the child's name always shows a higher level of development in any of the features being considered. If the study is concerned with superordinate features, they emerge earlier in children's own names. If conventional letters are the focus of study, it is also the first place where children use them (Chan, 1998; Ferreiro & Teberosky, 1979; Tolchinsky Landsmann & Levin, 1985).

Certainly, this might be related to the strong affective meaning we attach to our own names. But personal names also constitute the first clearly meaningful text that is resistant to being forgotten and unchanging in pronunciation. A 3- or 4-year-old who is told that a set of letters is his or her name, even circumstantially, will remember it when presented with the written name at a later date, whereas this is not usually the case for any other word (Tolchinsky Landsmann, 1993).

The rules that children impose on number and variety are not mere inventions, they reflect the actual distribution of word length and intraword variation found in real texts. English orthography also contains examples of this constraint. The only reason for repeating letters in the word *egg* is to fulfill the constraint that nouns, verbs, and adjectives must have at least three letters. In Spanish, no written word contains the same letter repeated more than twice in consecutive posi-

tion, while in Hebrew, very few words contain the same letter repeated three times in consecutive position. But this use of formal constraints is not a direct application of social learning. It reflects an active selection because, although it is true that there are very few single-letter words, they are the most frequently used in any text.

As they explore the features of writing, the discovery that some features are distinctive helps children to organize their written materials. Under these self-imposed limitations on number and variety, children start using, time and again, the same forms in different combinations rather than creating new forms. This is one of the necessary conditions of a notation, but, more importantly, it facilitates the attribution of meaning to individual letters. Before the application of the two constraints, writing was a discontinuous, linear pattern. After their application, however, writing is made up of a small number of distinguishable and therefore manageable elements.

During the period in which children are engaged in exploring the formal features of writing, their behavior shows that they are aware that writing is *somehow* related to language. Three- to 4-year-olds, when required to read what they have written, will repeat verbatim the words they were asked to write. The occasion is created for a mapping of a verbal utterance onto a written display. Something said (a word, a sentence) is put into correspondence with a graphic pattern.

We must recall that children are at a stage in which reduction in number and variety of letters has already been established; therefore, they pronounce the utterance from a reduced number of written marks in front of them. And because the number of marks is reduced, parts of the utterance can be mapped more easily onto parts of the written display and, vice versa, parts of the written display can be mapped onto parts of the utterance.

When children turn to the letters and seek sound correspondences to guide their writing, they turn to a general model, a model suitable for every writing task, because every word and sentence has a phonic aspect. Children have discovered that the number and variety of graphic elements (letters) are related to the phonological aspect of words.

But how do children segment words so as to make these segments correspond to the

graphic elements in the written string? On which "units" is the mapping based?

The Syllabic Hypothesis

According to Ferreiro (1988), once children have grasped the idea that writing is a representation of sound, they initially believe that each written mark roughly corresponds to a spoken syllable. Evidence for the syllabic hypothesis is provided by case and in-depth longitudinal studies of Argentine and Mexican children carried out by Ferreiro and her collaborators, by studies with Israeli children, and by further studies comparing Spanish- and Hebrew-speaking children (Tolchinsky & Teberosky, 1998).

It is not surprising that the syllable is the initial unit of correspondence. Since the earliest studies reported by Bruce in 1964, it has been established that when children are asked to break spoken words down into smaller parts, they tend to segment words into syllables before they segment into phonemes. Syllables are natural units of segmentation, because they have a phonetic substrate, whereas phonemes are linguistic constructs. Therefore, it is understandable that when children start segmenting words to map onto letters, they do so in terms of syllables.

Figure 6.2, which contains a number of examples of the "syllabic period" in two lan-

guages with different scripts, illustrates this period in the development of writing. The children were asked to write common nouns that form part of their typical out-of-school vocabulary and are similar in meaning and sound in the two languages. Two series of written productions can be seen for the same words. Those on the left were produced by a 5-year-old Hebrew-speaking girl, while those on the right were produced by a Spanish-speaking boy of the same age. The girl uses Hebrew letters and the boy, Roman letters. Nevertheless, the two sets of products are regulated by syllabic correspondence. We can prove this by repeating the word the children were asked to write and breaking it down into syllables (e.g., *sa-la-mi*). We see that the number of letters maps onto the number of syllables. Initially, the main concern within this age group is the correspondence between the *number* of syllables and the *number* of letters. When children are concerned mainly with quantitative correspondence, any letter will apparently do. At this point, a child's specific knowledge about letter names and their respective sound values plays an important role.

Two processes are active in this undertaking. On one hand, there is the analysis of the word, and on the other, the child's knowledge of the conventional sound value of the letters. At this point, a child's specific knowledge about letter names and their respective sound values plays an important role. It may

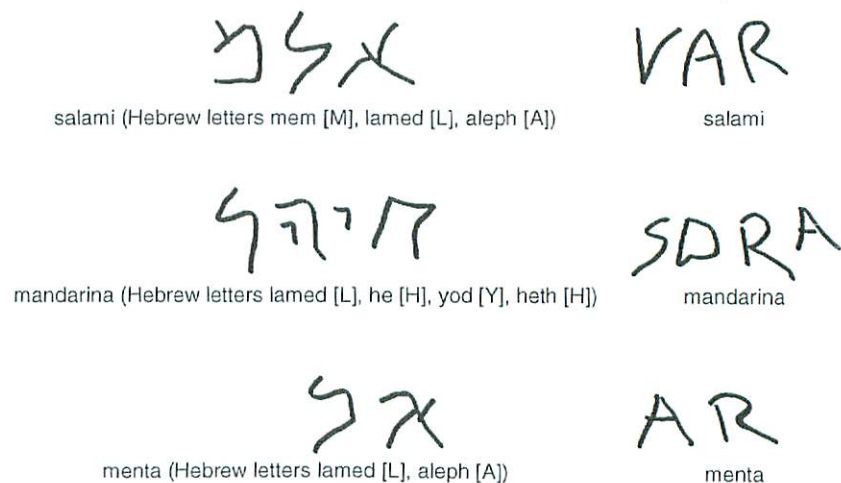


FIGURE 6.2. Examples of the "syllabic period."

be the case that some syllables—usually the initial one—are written with the corresponding conventional letters, while others are written with any letter some children may also identify one or more letters by their sound value and use them in a nonsystematic way when they recognize the presence of that sound in a word. For example, the Spanish boy whose writings appear in Figure 6.2 seems to have identified the letter A. He uses it in every word, but only one time instead of two in the first and second words (*salami* and *mandarina*), and not in the right place in the third word (*menta*). We may therefore find that some words have not yet been analyzed and are written with any letters; others have been partially analyzed, so that, since the child knew some letters, he or she used these; and still other words in which, by chance, the child knew all the letters. These various possibilities are typical of any process of transitional knowledge. Eventually, the two processes concur. Then, the written product will include a letter with its conventional sound value for each syllable.

There is no doubt that children's knowledge of letter names plays an important role in the acquisition of writing. Knowledge about letter names is one of the factors that influences writing development, but it does not operate identically in every language and script.

The syllabic hypothesis has not gone unchallenged. It has been called into question mainly by studies carried out in English (Kamii, Long, Manning, & Manning, 1993; Treiman, Tincoff, & Richmond-Welty, 1996), which suggest that children use alternative methods to understand the relation between written and spoken words.

One possibility is that the syllabic hypothesis is language-specific: a hypothesis that holds true for syllable-timed languages such as Spanish, Italian, and Chinese, but not English. This is highly probable, because segmentation strategies are influenced by the phonological structure of the language. Many more cross-linguistic studies are needed before we can reach a definitive answer.

The Alphabetic Principle

Children's discovery of links between letters and sound is a turning point in the conceptualization of writing. It means discovering a

stable principle that is useful for representing any word. There is not a sudden shift from a stage in which words are regulated by syllabic correspondences to a stage in which words are regulated by alphabetic correspondences. Intermediate phases can be identified in which children produce syllabic-alphabetic mapping; that is, some syllables are fully represented, while others are not—for example, the word *gato* (*cat*), written GAO, where the first syllable is completely represented (*ga-*, written GA), but the second (*to*) is not. The transition is word-sensitive; certain words are regulated by alphabetic correspondences before others, depending on the structure of the word, the extent to which word components present any pronunciation difficulty, the way word components are represented orthographically, the child's previous knowledge of the word (i.e., whether this word is part of a child's inventory of well-written meaningful texts), and the child's previous knowledge of the letters used to represent the word.

With the discovery of the alphabetic principle, children find a stable frame of reference that is useful for representing any word. But it is in this transition to the alphabetic principle that the specific characteristics of the phonological and morphological structures of a language, and the way in which these characteristics are reflected in the script, play a crucial and distinctive role.

Learning Separation between Words

Developmental studies can disclose how children assimilate the convention of writing systems through their linguistic intuitions and, at the same time, how they must reformulate their intuitions to accommodate to the conventions of writing. The way children learn one of the main conventions of our writing system—that of graphic separation between words—illustrates these interactive processes between writing systems and users. If we ask 4- and 5-year-olds to write a story (rather than merely isolated words!), they will usually produce long strings of letters or letter-like elements with almost no graphic separation between them, in a form termed *scriptio continua*. This is true in English, and in

Hebrew as well. The question is how they move from this kind of writing to the conventional separation between words.

Words are relatively easy to define in the context of a particular writing system: one or more letters with blank spaces on both sides. But imagine for a moment that we want to explain what such graphic words correspond to in the sense of their corresponding linguistic units. This very much depends on the particular language. In English, as in other European languages, prepositions and articles are written as separate words, with blanks on both sides (*to the beach*), but in Hebrew, many prepositions, the definite article, and also some conjunctions are written as prefixes bound to the next word (e.g., *layam*). And even in Spanish and Italian, both Romance languages, the same elements *to* and *the* would be written separately in Spanish—*a la playa* (*to the beach*)—but all together—*alla spiaggia*—in Italian.

Another source of difficulty in establishing correlates between linguistic elements and written words beyond the limits of a particular language is that graphic words cover a range of units with different morphological status depending on a language. In Spanish, a graphic word may represent a single morpheme (e.g., *fin* = *end*), more than one morpheme (e.g., *cumpleaños* = *birthday*), or even an entire clause (e.g., *dámelo* = *give it to me*). There is no unique morpholexic correlate to a graphic word outside the writing system of a particular language. So it is hard to see exactly what is meant by saying that words are separated by spaces, and it is even harder to imagine how this could be explained to a 6-year-old.

Besides, we cannot tell children to listen carefully to how we talk and then, whenever they hear a pause, to put a space, because in normal speech, people generally *do not* pause between words. Rather, in the course of speaking, words are typically grouped into prosodic units or intonational phrases that rarely coincide with what would constitute a grammatical “word” (Nespor & Vogel, 1986) and that, again, differ from one language to another. Thus, there is no simple physical basis in the input to cue children about how to isolate words (Tunmer, Bowey, & Grieve, 1983).

If children were “strict behaviorists,” this would pose a serious problem, and segmen-

tation errors would pervade their output. Yet, although segmentation errors do occur in the very early stages of language acquisition (Peters, 1983), they are rare once children start using grammatical inflections and closed-class items more productively; that is, once young children are beyond the very initial stage of language acquisition and can consistently produce both content words (nouns, verbs) and function words (articles, conjunctions), there can be no question but that these are represented as *words* (Karmiloff-Smith, 1992).

Nonetheless, when preschool children are explicitly asked about what counts as a word, they will not consider each relevant item as belonging to the category of word. When asked directly if *table* is a word, they will agree; but when asked if *the* is a word, they typically answer in the negative. And even though 3-year-olds can correctly perceive, use, and combine words like *the*, when asked to count words in a sentence, they fail to count these as words.

Learning the conventional forms for separation between words constitutes a milestone in children’s developing writing (as it was in the history of writing). Without such separation between words, texts are almost impossible to understand, whereas once words are written separately, even with gross mistakes in spelling, children’s texts become far more legible.

Studies on the development of separation between words (Clemente, 1984; Ferreiro, Pontecorvo, Ribeiro Moreira, & Garcia Hidalgo, 1996) have shown that word class plays an important role in children’s decisions about whether and where to make spaces. By and large, children tend to write proper nouns, nouns, and verbs with spaces between them, but they are less likely to separate articles from nouns or auxiliaries from main verbs; rather, they tend to attach these to one another in a kind of “hypossegmentation.” In fact, this is a very reasonable assumption, since content words such as nouns and verbs typically have some delimited reference outside of any context, whereas function words or closed-class items can only be interpreted in relation to the other words with which they occur.

In the studies we undertook to examine the development of word separation in Spanish (Cintas, 2000; Tolchinsky & Cintas,

2001), we wanted to find out whether children would apply their implicit knowledge to such tasks, the kind they reveal when talking, or whether they would apply explicit notions of what counts as a word in order to decide where to put a space. The participants in the study were 5- to 8-year-old children, from preschool to third grade. They had to write two-word expressions and four-word sentences dictated to them and to rewrite a short fable read to them.

We found that when word classes are systematically controlled, children make distinctions inside the overall category of function words. Those that are used to modify nominals (e.g., determiners, personal pronouns) are written with spaces on both sides sooner than those that are part of verb groups. Proper nouns were conventionally separated with the highest frequency, followed by personal pronouns and adjectives, all of which are nominal categories, whereas verb clitics were the most frequently hyposegmented and least often conventionally separated, with adverbs lying between these two classes.

To illustrate this kind of selective “hypossegmentation,” consider this excerpt from a text written by a first grader who was asked to rewrite a fable (Figure 6.3 and translation). The text—about a mule carrying gold

stolen by two robbers—is written conventionally, though with some spelling mistakes. Underlined are the words she wrote together instead of separated. Auxiliaries are attached to main verbs; prepositions to other preposition, to nouns, and to verbs; and some conjunctions are attached to articles, as are possessive pronouns to nouns; that is, function words in general are hyposegmented more than content words. Yet children seem to make an even finer distinction than merely these two broad classes of words (open vs. closed). For example, the same form *la* is written separately when it functions as a determiner (*la otra = the other [one]*), but it is written together with the next word, when it functions as an indirect object clitic pronoun (*la robaron = it to steal = to steal it, la queria = it wanted to defend it = wanted to defend it*).

This is a clear instance of a kind of knowledge that is represented at various levels of accessibility. In speech, children segment and combine all kind of words, but their metalinguistic knowledge leads them to treat different classes of words differently. These same metalinguistic notions do motivate their decisions about where to put spaces when writing. The study further shows that children make subtle distinctions between syntactic categories and relations, and that they assume that the graphic separation between letters should reflect different syntactic relations between words.

In the domain of writing, as in other knowledge domains, children’s errors do not simply indicate “ignorance”; rather, they reflect a different kind of reasoning. Certainly, in order to master the conventions of their system, children need to reformulate their original hypotheses. The question is: How can children come to reformulate this kind of linguistically motivated model of separation between words? I feel sure that they can do so by reading and writing texts of differing length and structure, texts that involve diverse classes of words in different syntactic contexts. It does not seem possible to grasp the conventions of a given writing system—Spanish or any other—by any form of explicit reasoning as to why spaces are obligatory in certain contexts. This kind of knowledge, I believe, can only be derived through actual use of and experience with writing.

...
 la otra wasigiendo la gloria
depronto un par deladrones
saliero arrovar el dinero
dela mula larrovaron
y la castigaron suamo
lequeria defederlo pero
 los ladrones sellevaron
 el oro

FIGURE 6.3. Example of lack of separation between words. Translation: “... the other *was* following the glory [= went after fame] *of* sudden [= suddenly] a pair *of* robbers went *to* steal the money *of* the mule (they) *robbed* it and *punished* its owner *wanted* it *to* defend [= wanted to defend it] but the thieves *se + took* [= for themselves] the gold.”

Concluding Remarks

Children who grow up in a literate environment will not wait until the beginning of formal instruction to explore the features of writing. The graphic patterns of writing are part of their mental space from very early on—before the age of 3. At this initial stage, the meaning of the written pattern is determined by the place where it appears or by the child's intention as a writer, rather than by its features. Gradually, children become more selective as to what forms or combinations of forms are accepted as "writeable." Their writing becomes constrained by the same self-imposed criteria of number and variety. It is usually during this phase that children start looking for some correspondence between the length of words or phrases and the number of marks they put on paper. At the beginning, this correspondence is very global; if attempting to read, children will start saying a sentence, pointing at the beginning of what they have written, and will attempt to finish saying the sentence at the same time as their finger reaches the end of the written pattern. Slowly, however, they start looking for more articulated correspondences between parts of the utterance and elements in the written string. At this third stage, when children find a stable frame of reference that is useful for representing any word, they realize that number and variety of letters relate to the sound patterns of words. Finally, at a fourth stage, children discover the alphabetic principle, in which a letter represents each consonant and vowel in a word.

Throughout the development of writing, there are more opportunities for interaction and more developmental time, but the main source of this development is the act of writing, the interpretation and the uses of writing to which children are exposed. The conventions of writing—letter-sound correspondences, word separation—cannot be learned outside the written system. There is no way to acquire the conventions of a particular system except by discovering them in the system.

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