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## “Which Way do the Letters Go?” A Study of Children Learning about Print Directionality

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### Abstract

Among the earliest concepts about reading and writing that children need to learn is the direction of print. This paper examines how print directionality is taught and learned in the lower primary levels in school, using observational data from two English-medium schools. The data indicate that the format of the textbooks and the lack of instructional support leave students with confused notions about the direction of print, which affects their reading skills.

### 1. Introduction

Despite the poor performance of Indian students on reading and writing tests in the Indian languages (ASER, 2011; NCERT, 2006, 2008) and English (Educational Initiatives, 2006), little attention is paid to literacy instruction in the lower primary levels. In both English and non-English medium schools, it is assumed that it is sufficient to teach children to form the letters of the script, after which they will be able to assemble them to read words and then read sentences and texts. However, there is more to literacy than merely assembling the symbols. Research shows that when children do not understand basic concepts about print, they lag behind in reading (Clay, 1993).

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One of the most basic concepts about print that children need to understand is directionality. Children are familiar with pictures, but not with print, often confusing the two (Ferreiro and Teberosky, 1982). Tolchinsky-Landsmann and Karmiloff-Smith (1999) draw on Goodman (1976) to point to two critical features of print that distinguish it from drawings/pictures—the element-string constraint and the referential-communicative constraint. First, in writing the elements can be segmented into discrete components with separate meanings (called characters or letters), whereas pictures do not have consistent decomposable elements. Second, the elements in writing have a referential function—in English they refer to the phonemes of the language. So, for example, the letter A is writing because it meets both criteria, whereas its graphic components (slanting lines and sleeping line) are drawings because they do not have a referential-communicative function. A third feature of writing is the linear order of the elements—letters and words are arranged in a linear order. The ordering of the elements varies across scripts: left to right for English and the Indic scripts, right to left for Urdu, Arabic and Hebrew, and from top to bottom ordered from right to left in Chinese and Japanese. Children learning to read and write need to realize that print runs in a particular direction; in environmental print, they may be able to recognize single letters based on the context (Lomax and McGee, 1987), but the linear order is something they need to learn or be taught. Once they understand this concept (as against merely practising it), it is transferred to writing in other languages and scripts. This realization should be followed up with practice in scanning in the correct direction, so that children can read texts. Common problems in reading, such as reading saw for was, and in writing, such as confusing the letters d, b, and p, arise from unstable scanning patterns (Clay, 1975).

This paper, which is part of a longer study on school instruction in early literacy, examines a single strand, namely, how the concept of print directionality is taught in the first two years of formal instruction. The study is based on observations in two English-medium schools. It is an attempt to document pedagogical materials and practices and, through the available research literature, to identify aspects of practice that hamper children’s acquisition of literacy.

## **2. Reading as the Base**

In English, we begin reading/writing at the top of the page, continue from left to right, and make a ‘sweep’, i.e., return to the left-hand position below the starting point. As Ferreiro and Teberosky (1982) point out, directionality (or spatial orientation) is one of the most arbitrary characteristics of writing and “there is nothing on a printed page that indicates where one must begin reading and where one must continue” (p.50). The four-year-olds in their study devised different strategies to follow print, with a marked tendency toward alternating directions -- both at the end of the line (as in boustrophedon writing) and across pages (top to bottom followed by bottom to top). By the age of six, middle class children follow the conventional direction, but

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this was less evident in children from lower class homes. The researchers argue that this knowledge of directionality does not come merely from exposure but from witnessing “acts of reading accompanied by specific gestural cues” (p:50).

Clay (1975) examined the written products of five-year-old children, who were predominantly English speaking, and identified directionality as one problem in beginning literacy. Briefly, she argues that the page is a two-dimensional space and, for writing, children have to organize themselves in this space. The crucial notion is the starting point for writing, which is the top left corner; without this anchor, children may start on the right and write in reverse. Until children gain some control over the directional pattern of movement, they devise a variety of approaches, and they may lapse into incorrect patterns when they encounter new difficulties. Clay found that children acquire the correct directional principles in writing with six months of school instruction.

However, there are two crucial differences between the children in these two studies and the situation in India. The children in the studies already knew the language of the script (Spanish in the first study and English in the second), and were not learning a new language alongside literacy. Equally important, some of the children were already familiar with written texts through storybook reading with parents, and writing came at a later stage; Ferreiro and Teberosky (1982) note that the children who came from a lower socio-economic status did not have this advantage, which affected their performance. In the western middle class tradition, storybook reading is a common practice in middle-class homes (Heath, 1982). Children learn how to handle books; they open the book, turn the pages, and watch as parents run their finger beneath the words. This is one of the precursors of literacy, for here, children begin to understand the linearity of print. When they enter school, they already have this knowledge. However, in families and societies where parents and caregivers do not provide such incidental but steady exposure to the functions and features of print, children may not acquire these notions. They not only have to learn that the marks on paper are linked to meaningful social activities, but also that the marks are arranged in a linear order. The school is one site where this can be taught and learned.

In her later work, Clay (1993) identified basic concepts about print that many children may lack, such as knowing how to turn the pages, realizing when text is upside-down, knowing the difference between pictures and words, locating the first word in a text, identifying a letter, and identifying a word. Teachers take these insights for granted, but without these preliminary concepts children fall behind in their reading. These concepts are now recognized as some precursors of literacy, and for diagnostic purposes children are often tested on their conceptual knowledge of print, using versions of Clay (1985); an example can be found in Justice and Ezell (2001).

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Clay (1975) also discusses the importance of words in writing. It is difficult to identify words in speech, but in a script such as English they are easily identified by blank spaces on either side of the word in connected text. Note that this does not hold true of words seen in isolation. Studies show that children are aware of this convention and use spaces in their writing to separate words (Tolchinsky and Cintas, 2001), using spaces differently for narrative and descriptions (Sandbank, 2001). In formal school instruction, the concept of a word is taught explicitly by asking children to ‘cup’ their hands around a written word.

In short, through exposure to the written world and interactions with adults in acts of reading, children learn about the directionality of print.

### **3. The Study**

The data were collected at two English-medium schools in Karnataka. In the urban school, the children come from lower-middle class homes, where both parents are literate in an Indian language, but not in English. In the semi-rural school, the students’ parents are illiterate. Most of the students in the two schools come from Kannada-speaking homes, but in a few homes Tamil, Telugu, Malayalam, or Hindi is spoken. Hence, the condition of fluency in English is not met, and there may be low exposure to the written world.

Both schools have committed management and teachers, along with excellent infrastructure. This allowed me to focus on curriculum and instruction rather than getting distracted by structural issues.

#### **3.1 Data collection**

From June, when the school year began, to August I visited two sections of Lower KG and Upper KG in both schools (8 sections in all). Class sizes were 40 in the urban school and 30 in the semi-rural school. During the class, I unobtrusively videotaped individual children as they went through the class routines and collected their artifacts; when they were done with their class work, I tested a few students on their reading skills. From November to January, I visited the urban school again to observe and test children’s abilities.

I included one intervention in the urban school. For Section B in Upper KG, I brought in several storybooks from August; these books were 5-10 pages long, with one or two sentences on each page. Children were allowed to pick up the books and I merely observed how they handled the books. In January, as the school year was ending, I took similar storybooks into Section A, so that I could compare the effects of exposure to storybooks on two similar groups.

#### **3.2 Writing as the Base**

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#### 4.1. Forming Single Components

In the first phase, letter components (standing line, sleeping line, etc.) are introduced, but the two schools follow different approaches that impact the learning of print directionality. In the semi-rural school, the teachers write a letter component slowly on the blackboard, providing a model for the children. Further, as each new letter component is introduced, it is added to the sequence on the blackboard. The final sequence that the children see is shown in Figure 2.

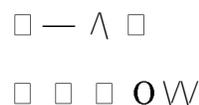


Figure 2. Sequence of letter components on blackboard

As a result, the children formed each component correctly, moving from left to right. However, since children are still at the scribbling/ drawing stage, they treat the letter components as drawings. For instance, one girl was trying to form the curve down shape, namely, □. Instead of doing this in one stroke, she ‘drew’ the top and then extended the lines down each side.

In the urban school, the focus was on the finished product and not the process. Teachers did not draw attention either to direction in forming individual letters or to moving from left to right, but merely instructed the children to open their textbooks and trace/copy the letter components. When the children completed a block, they show the finished product to the teacher who checked that the exercise had been completed.

Hence, the burden of instruction falls on the textbook. The textbook uses arrows to show children how to form each line; for example, the sleeping line has arrows from left to right. It then provides 6 lines with 7 boxes for children to fill in more lines (the same format is used throughout the book to teach the letters). Although this exercise is intended to teach children directionality in forming individual components and letters, at the same time it could be used to teach the directionality of print by requiring children to fill in the boxes starting from the leftmost box and working to the right.

The videotapes captured how children were forming the ‘sleeping lines’. Orientation varied, with about half the children drawing the lines in the reverse direction, i.e., from right to left, or switching between the two orientations. Further, most children filled the boxes in random order—right to left, left to right, from the bottom to the top, or wherever they found an empty box. As late as six months later, when children were forming the lower-case letters and had come to the letter i, two children were filling the boxes with standing lines, going back to the beginning, and then filling in all the dots. This was not evident to the teacher, who saw only the finished product.

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In short, explicit instruction helps children realize that print has directionality, but they may be too young to understand that these are letters and not pictures.

#### **4.2. Linear sequences**

In the first two months of formal instruction, children show little awareness that print has directionality. This emerged when I gave children sheets of paper where they were not constrained by the slate/textbook. Figure 3 shows a typical product; for two months the child would cover the page with symbols in no apparent order; when she found a gap, she inserted another symbol.

Figure 3. Lack of linear order

At the same time, children seek a pattern or order. The artifact from Week 2 (Figure 4) is not a drawing, but an attempt to mimic adult writing. The child moves systematically from left to right in forming these squiggles, which can be seen in the increasing size of the components.

Figure 4. Movement from left to right

In Figure 5 the child has imposed order on the elements. This child in the semi-rural school copied everything from the blackboard—letters and pictures— but arranged them systematically on horizontal lines. He then added a set of numbers in one corner, but these he arranged in columns.

Figure 5. Arranged symbols

This left-to-right directionality is not obvious to all children. Although the semi-rural school emphasized this concept while teaching the letter components, it may not transfer to the arrangement of other elements. One child, who attempted to write the letters of the English alphabet on his own, arranged the letters from top to bottom. This indicates that although children mimic the teacher's actions, they may not have acquired the concept because they do not apply/transfer it to other strings.

The first time children are faced with an explicit left-to-right sequence is when they start writing the alphabet sequence. Most children can do this correctly, but the confusion becomes apparent when they have to write on a blank sheet of paper. As Clay pointed out, children have to (a) locate themselves on a page and (b) they have to practise the ‘sweep’.

(a) Locating the starting point.

In August, children in the urban school could write parts of the alphabet sequence in the correct direction. Yet, sometimes they would write in the opposite direction. This would occur when they incorrectly began writing on the right end of the page. Figure 6 is an example of writing from right to left. The child (in the semi-rural school) copied what the teacher had written on the blackboard—but in the opposite direction—which can be seen in the standard sequence of standing line, sleeping line, etc.

Figure 6. Writing from right to left

Leela in the urban school wrote the alphabet sequence in the correct direction. The next day, she started at the right edge of the page and wrote the sequence from right to left. She got as far as the letter F, realized that something was wrong, turned the page, and began writing in the correct direction.

(b) The sweep.

The sweep from the end of the line presented a problem. Figure 7 shows what happens when the child reaches the end of the line—she proceeds from top to bottom, and then from right to left.

Figure 7. Combination of directions

A similar dilemma can be seen in Figure 8. The child starts writing in one direction, reaches the end of the line, and reverses the direction of writing, which shows up in the way the number 10 is written.

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### Figure 8. Boustrophedon writing

Even after they practice writing the alphabet sequence and can do it correctly, some children experiment with different orientations. Six months after school began, Leela suddenly produced the following artifact, where the letters are in both a linear sequence and in columns.

### Figure 9. Letters in two formats

Hence, observations show that six months after school instruction begins, the left-to-right directionality of English print still has not become the standard orientation for many children.

## 4.3. Directionality in words

After children have learned the alphabet sequence, they move to words, usually in Upper KG. At this stage, problems with print directionality become more evident.

### 4.3.1 Reading test

I will begin with the findings from a short reading test that I gave students in the urban school. In August, two months after they had begun to deal with words, I tested six children in the urban school on their ability to read two-word phrases. The phrases were arranged as follows:

red bag

small cat

The three girls read each word and then moved down the page instead of across, reading the phrases as:

Red

Small

Bag

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Cat

Although I repeatedly pointed to the words in sequence (red and then bag), the girls were unable to do so and treated the phrases as isolated words to be read downwards. The three boys, with some help, managed to spell out the two-word phrases. When I asked what the phrases meant, they were able to explain through actions—by pointing to a student’s red bag or through mime/ synonyms (small mouse was mimed as small plus the word rat). In other words, roughly half the students read words from left to right, but instead of continuing in this direction they sweep to the next line.

#### 4.3.2 Sources of confusion

On the surface it appears that children are being taught and do learn about print directionality. In the semi-rural school, children are taught to copy sentences, such as This is a pot from their first month in Upper KG. The teacher explicitly told them to write a word, ‘leave one-finger space’, and write the second word. In the urban school, the textbook includes a phrase on every page; for the –all family the textbook has a phrase, ball on the wall, but this is almost an afterthought—and is treated as such by the teacher. In both schools, the focus remains firmly on reading out/ copying isolated words.

When we examine the instructional material and pedagogical practice through the lens of print directionality, we find that several established routines subvert the process of acquisition. Many of their assumptions are based on methods used to teach children who already know English and have extensive exposure to books and print in the home, which the students in this study lack. Here I examine two sources of confusion: features that confuse students: the vertical arrangement of words and the vertical arrangement of letters.

(a) Words are arranged in columns.

At this stage, both the instructional material and pedagogical practices focus on teaching isolated words with no reference to connected text. In both schools, the textbooks/ worksheets present words in columns. So, for example, the textbook in the urban school organizes words into word families (for example, the –all word family has the words ball, hall, mall, tall, fall, call, and wall), but the words are arranged in columns that the children read out downwards. This is followed by an exercise in which the children draw three columns in their copybooks, and copy the different words in one column; then they fill in the other columns with the same words. In the semi-rural school, lists of words have been put up in the classroom—but they are isolated words written in columns.

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In effect, children are taught two different strategies: to read/write letters from left to right, but read/write words from top to bottom. This strategy then has to be undone later when the children have to grapple with sentences that run from left to right.

(b) Manipulating symbols

With the focus on isolated words, some textbooks attempt to liven up learning with ‘interesting activities’. An activity such as ‘fill in the missing letters’ preserves the direction of print, but re-arranging scrambled letters to form a word and finding words in a matrix of letters do not.

As a result, children wait for the teacher to write the answer on the blackboard and copy it into their worksheets; only one child in a class of 30 students was able to do the activities on her own. This became evident when the worksheet contained an incorrect word: the letters lbul were given with a picture of a light bulb. In their worksheets, all the children have written the correct word—bulb—which they copied from the blackboard. An additional problem emerged—children do not have sufficient vocabulary to do the exercises on their own. Before the activity, the teacher has to give the English word for each picture (“What is this picture? No, it is not a switch. It is a plug. P-l-u-g.”).

Finding words in a matrix of letters is even more problematic, because children now have to read letters downwards. A sample is shown below (without the pictures). Children circled arbitrary strings (LO, AM, LHJ, or the entire box), while they waited for the teacher to provide the answer.

L	O	G
H	X	U
J	A	M

Figure 10. Activity in textbook to identify words

This exercise highlighted an additional problem: the notion of a word. One boy kept insisting that JCZ was a word; to him, this set had three letters with a beginning, middle, and an end, so it qualified as a word and, at a pinch, it could even be pronounced. The teacher tried to convince him that it was not a word, because it was ‘nothing’. Without going into the intricacies of the need for a vowel in English words and given that students do not have enough proficiency in English to appeal to meaning, the only convincing explanation would be the use of spaces—which are missing in a matrix.

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To summarize, when children move beyond letters to words, the written world that they encounter is limited to isolated words and does not resemble authentic texts. Since the words are organized by sound similarity, they become a list of semantically unrelated items that have to be memorized as a vocabulary list. In terms of directionality, the textbooks actually confuse the students, by arranging words (and even letters) in columns. This breaks up the scanning pattern for reading that students are trying to learn, and does not allow children to use spaces to understand the concept of a word. The next section shows that when the children try to read authentic texts, they lack many of these basic concepts and are unprepared for the task.

#### 4.4 Reading storybooks

The urban school has two sections in Upper KG. From the month of August, I began to bring in simple storybooks only for Section B. In January, I took a similar set into Section A. These storybooks (such as Hop on Pop by Dr. Seuss) had a single sentence on each page. The purpose was to see what children did with non-school material—how they handled books, and if (and how) they could go beyond isolated words to read (and understand) sentences. Note that in the urban school, children are taught to spell out words in the following format: b-a-l-l ball, and so they used a spelling strategy in their reading.

##### (a) Section A

Storybooks were introduced in January, by which time the children had been through almost two years of literacy instruction in English. Since this was their first exposure to material beyond the textbook, children were unsure of their purpose and many asked if these were coloring books. When children picked up a book, they took it to their desks and tried to read it on their own.

Some children realized that this was a new activity and that they needed help. One girl asked me shyly, ‘Show me to read’; she did not know how to turn the pages, and I had to show her the beginning of the book and turn the pages for her, but she merely looked at the pictures and refused to look at the words. Other requests for help were more silent: two girls spelled out a word like see and then looked at me for help in pronouncing it. In terms of words, all the children I observed (four boys and two girls) spelled out the words in a stream without stopping to say the word. Once the teacher reminded them to stop and say the word, the children showed

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that they were able to do so. None of the children pointed to the words or ran their finger beneath the words.

The most disturbing fact was that the children seemed unable to link the storybooks to their textbooks. Although the children had learned to spell and chant the –all word family in July (all, ball, fall, wall) and had now reached as far as seven-letter words (whisper, etc), when faced with the words all, ball, fall and wall in the storybook one girl pronounced them as if they were new words (b-a-l-l /bæl/) and was unable to name these items in the accompanying picture.

(b) Section B.

For Section B, storybooks were brought into class as early as August and from November the teacher began allowing children to pick up storybooks during activity time. Neither the teacher nor I helped the children during this activity.

In August, the children merely looked at the pictures and could not turn the pages in sequence, but in November, all the children were turning the pages correctly. Their dominant strategy was pointing to single words. Some children could ‘read’ words from left to right and one child could do the sweep correctly. However, two children did not use the spaces between the words, but spelled out the letters without a break (m-a-n-y-f-e-e-t). In January, all the children were running their finger below the words to help them follow the print.

Since there was no explicit instruction for the storybooks, how and where did the children learn to handle sentences given that school instruction is limited to single words? The explanation appears to be diffusion of knowledge from caregivers to the school and then through the class, which is similar to the effects described in Lower KG of the same school (Gupta, 2012). The role of parents can be seen in two children. In November, one boy ran his finger below the words as he spelled them out; this was clearly a strategy he had been taught at home, because his spelling strategy – double O double L – was not used in school. Also, one girl was reading much above her level—she could sight read most words, and resorted to spelling only to decode unfamiliar words. This again was through parental help, for the teacher explained that the mother had taught both her daughters to read. Diffusion through the class occurred over the months because the children began to insist on reading the books with their friends. By January, no child was reading

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alone. In groups of two or three, the children practised reading out the words, learning from one another. Some children extended this collaboration to the ‘display’ of knowledge; they came to me in pairs to jointly recite from the book.

In short, the storybooks provided authentic texts that enabled the children to learn about the directionality of print. This is done not merely through the use of words and spaces that are arranged in the conventional order, but by bringing in meaning rather than a vocabulary list, the children were motivated to move linearly through the text. The caveat is that this does not come naturally, but has to be taught—either by peers via parental input or through the school curriculum.

## 5. Discussion and Conclusion

Although the concept of print directionality is now accepted as an essential precursor for literacy, this study found that both teachers and the textbook pay inadequate attention to this area. In Lower KG, textbook instruction is limited to using arrows to show children how to form each letter, but even this is not taken up by the teacher who only views the children’s finished product. When instruction moves to words, print directionality is not just ignored but undercut by restricting text to isolated words and arranging words and letters in a vertical direction.

It is tempting to conclude that textbooks and instruction should help children develop notions of print directionality, but the approach has to be consistent. There is no point trying to teach a concept and then abandoning it the following year. What we are talking about here is a coherent curriculum based on pedagogical principles rather than a pastiche of activities culled from similar textbooks.

Practice at the Kindergarten level in India has chosen to strip literacy down to the bare bones and teach isolated components in a rigid sequence that is more appropriate for training skills in adults than a pedagogical model appropriate for children acquiring literacy. The obvious place to start is to expose children to meaningful texts, even if they do not understand them; this could be as simple as using familiar environmental print—single-word logos, short phrases in advertisements, the name of the school etc.—that preserves print directionality and is meaningful. Following Ferreiro and Teberosky (1982), children need to observe the act of reading—how adults read authentic texts—and get support through gestural cues—pointing to words, running the finger beneath the words, following a sweep, etc.

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What is required is an understanding of the extraordinary difficulty of becoming literate, because the conventions and assumptions underlying written text are not obvious to the learner. One tactic is to observe what children do as they search for order in the written marks, much as was described in this paper. Once we begin to understand the problems not just of print directionality but also of the entire process of becoming literate, we need a coherent curriculum that integrates these concepts.

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