Improvement of schoolchildren’s reading and writing ability through the formation of linguistic awareness

Kyoshi Amano

Introduction

Reading and writing are complex, conscious speech activities that require awareness of various aspects of linguistic reality: the phonological structure of words, the meaning of words, and the syntactic-semantic structure of sentences. L. S. Vygotsky characterized the peculiarity of reading and writing in the sentence “written speech is the algebra of speech.” According to him, writing “is a more difficult and a more complex form of intentional and conscious speech activity” (1987, pp. 204–205). He also pointed out that the real cause of difficulties for children in learning written speech is that “when instruction in written speech begins, the basic mental functions that underlie it are not fully developed; indeed their development has not yet begun” (ibid., p. 205).

Vygotsky’s view of written speech is of particular importance when we construct literacy programs for teaching children with learning difficulties or learning disabilities. It suggests that if we can foster and develop a certain degree of linguistic awareness by some appropriate method before children begin to learn to read and write, we can decrease their difficulties and promote their success.

The idea of teaching phonological analysis of words to children at the beginning of literacy training originated historically with the phonological method for reading established by the Russian educator K. D. Ushinsky (1974) in the 19th century. For a long time, psychologists did not pay attention to his idea. It was A. R. Luria who first demonstrated the role of phonological analysis in writing in a psychological study. In 1948 he found that patients with lesions of the inferior part of the premotor zone had severe difficulty with phonological analysis of successions of words and could not spell words correctly. Based on this fact, he argued that phonological analysis of words is one of the necessary operations of writing activity (Luria, 1950).
Following Luria in 1956, D. B. El’konin (1956) proved in his experiment, using the stage-by-stage formation method of P. Ya. Gal’perin (1956, 1959), that phonological analysis forms the most important basis for acquisition of reading by children. He proposed a new teaching program for reading (El’konin, 1956, 1962, 1976). In the 1960s, I began to study phonological analysis and reading acquisition by preschool children in Japan (Amano, 1967). Only after 1970 did problems of phonological analysis and the acquisition of literacy by children become the object of systematic research by psychologists in the West, especially in English-speaking countries. Since then these issues have been investigated systematically by different methods, including confirmation test methods (e.g., Liberman, Shankweiter, Fisher, & Carter, 1974), cross-sectional correlational methods (Calfee, Lindamood, & Lindamood, 1973; Wallach & Wallach, 1979; Tunmer & Nesdale, 1985), and longitudinal methods (Share, Jorm, Maclean, & Mattews, 1984; Perfetti, 1985).

The important role of phonological analysis in learning literacy has also been confirmed by several teaching or training experiments using children learning different kinds of writing systems, for example Russian (El’konin & Zhurova, 1963; Zhurova, 1974), Japanese (Amano, 1977, 1978, 1986), English (Fox & Routh, 1984; Treiman & Baron, 1983; Gleitman & Rozin, 1973, 1977a, 1977b), and Swedish (Lundberg, Frost, & Peterson, 1988; Torne’us, 1984). These training studies showed that preparatory formation of awareness of the phonological structure of words in children promoted their learning in reading and writing words. On the basis of these findings, it is natural to think that the same relationship holds between the formation of linguistic awareness of the syntactico-semantic structure of sentences and learning to read and write sentences.

Over the past 10 years, I have been involved in a project to construct a teaching program for schoolchildren with learning difficulties and learning disabilities. The program consists of (1) an orthography program using syllabic letters, (2) a syntax program, and (3) a lexico-semantic cognitive program. The orthography program was designed to teach children the rules of reading and writing in Japanese syllabic letters (Hiragana) through the development of awareness of the syllabic structure of words. It was based on the idea of D. B. El’konin’s phonemic analysis method and the stage-by-stage formation method (Gal’perin, 1956, 1959). The syntax program, designed for forming and developing linguistic awareness of the syntactico-semantic structure of sentences in children and for teaching them to read and write sentences in Hiragana correctly, was based on the theory of case grammar (Fillmore, 1976) and the genetic modeling
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Figure 12.1. An example of a sentence written in the Japanese symbolic system.

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method (Davydov, 1990). Finally, the lexico-semantic cognitive program focused on helping children develop classification skills, including single and double classification, in order to master the concept of class inclusion and at the same time learn many kinds of lower- and higher-level concepts (e.g., animals and birds, men and women, tools, traffic facilities).

The purpose of this chapter is to outline the experimental training studies of this teaching program. I examine the role of phonological analysis of words and clarify the role of syntactico-semantic analysis of sentences in the acquisition of reading and writing skills by schoolchildren.

The Japanese writing system

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Usually we express the names of persons, objects, concepts, and the stems of verbs and adjectives using Chinese characters. Other parts of sentences representing the case relations of words, conjugations of verbs, adjectives, and so on are expressed by syllabic letters, Hiragana. But when we write the names of places, persons in foreign countries, and words of foreign origin, we usually use the second type of syllabic letter, Katakana.
As with other writing systems, many years are required to learn the Japanese writing system so that the children may master it in reading and writing. In particular, learning over 2,000 Chinese characters, which is the minimum essential to modern Japanese, requires much time and practice. But the Japanese have a so-called writing system for children, that is, a syllabic writing system, Hiragana. Books for preschool children are always printed in Hiragana, which has 71 symbols. Preschool children who have mastered it can easily learn to read picture books and write letters.

Learning of syllabic letters by children

In the preschool period, Hiragana is always used at home, in kindergarten, and in nursery school to represent the names of children, other persons, and objects. Children can often find sign boards and nameplates written in Hiragana in the streets. In any railway stations in Japan the names are always written also in Hiragana.

This cultural circumstance, of course, stimulates preschool children to learn to read and write Hiragana letters. Usually Japanese children begin to learn to read Hiragana in the early preschool period or, to be more exact, at about 4 years of age. Almost all of them can master the fundamental skills of reading in Hiragana before entering school without any systematic instruction in reading in kindergarten (Muraishi & Amano, 1972). Why can Japanese preschool children begin to learn to read syllabic letters when they are about 4 years old, and why can they acquire the most basic skills of reading in Hiragana before school without any systematic instruction? These were the first questions I had to answer when I began my research on child literacy in the National Language Research Institute 28 years ago.

A series of experimental studies (Amano, 1967, 1970, 1977) on the relationship between the development of syllabic analysis and the acquisition of reading in syllabic letters produced the following answers to these questions:

1. Syllabic analysis or, more exactly, the act of analyzing the succession of syllabic components of words, is the most important and necessary prerequisite condition for acquisition of reading and writing in Hiragana. Without syllabic analysis, children can never learn to use Hiragana letters.

2. Syllabic analysis and syllabic awareness begin to develop at the age of 4.
3. Development of rhythmic motor coordinate actions and the concept of order through different kinds of play between ages 3 and 4 at home and in kindergarten serves as the basis of development of syllabic analysis.

4. There is a strong reciprocal relationship between development of the act of analyzing the succession of syllabic components of words and reading and writing acquisition by children in Hiragana, particularly in the fundamental syllables (letters) that have a one-to-one correspondence between syllable and symbol. Analysis of the syllabic components of words is one of the necessary prerequisite conditions for acquisition of reading and writing by children in Hiragana. Conversely, reading and writing by children facilitates internalization of the act of syllabic analysis.

But these findings do not mean that Japanese children never have difficulty acquiring literacy in Hiragana. Our further studies (Amano, 1978, 1986) showed that preschool children and lower-grade schoolchildren, particularly those with learning difficulties and learning disabilities, encounter great difficulties in learning to read and write words with special syllables of Hiragana. In Japanese, besides the 71 fundamental syllables there are 4 kinds of special syllables – long, contracted, contracted long, and assimilated – which do not maintain a one-to-one correspondence between syllable and symbol. They are presented in a combination of fundamental syllabic letters. For example, long syllables are represented by two symbols and contracted long ones by three.

Our studies also showed that when children do not have linguistic awareness of the features of syllables, that is, length, contraction, and assimilation of syllables, they often make typical mistakes in spelling these syllables. For example, children with no awareness of long and short syllables often use the same spelling for the words *obasan* (an aunt) and *oba:san* (a grandmother), *ojisan* (an uncle) and *oji: san* (a grandfather), by omitting the vowel that should be added in the case of the long syllable. This fact suggested that it was necessary for children to acquire linguistic awareness of special syllables so that they can correctly write words, including those with special syllables. This holds true particularly for children with learning difficulties or learning disabilities.

But how can we form such linguistic awareness in children? We constructed a model corresponding to the syllabic structure of a word to serve this purpose. If we represent four kinds of syllables, short fundamental syllables including a nasal consonant, long ones, contracted ones,
Figure 12.2. Examples of the models of the syllabic structure of words.

and contracted long ones, with a square, a rectangle, a circle, and an oval, respectively, and a pause (or stop) mora in an assimilated syllable with a triangle, we can symbolize words with all kinds of syllabic structures in Japanese by combining these figures. For example, the syllabic structures of the words sakura (cherry), bo:shi (a hat), syo:bo:sya (a fire truck), and kyu:ko:ressya (an express) can be represented as shown in Figure 12.2.

Mainly on the basis of this idea, we constructed an experimental reading and writing teaching program for preschool children (Amano, 1977b) and for lower-grade schoolchildren with learning difficulties (Amano, 1982). This program consisted of seven parts comprising 26 steps. In the first part, children learn to analyze the succession of syllabic components of words consisting of only fundamental syllables, and to read and write these words correctly. In the second part, they learn to construct models of words with assimilated syllables and to read and write them correctly. Then they do the same with words containing a long syllable, a contracted one, and a long-contracted one, respectively, in the third to fifth parts of the program. And in the last part of the program, they learn to make syllabic models of words and to read and write them with complex words including two or three kinds of special syllables in one word.

Using the stage-by-stage formation method (Gal’perin, 1956, 1959), we organized children’s learning of model construction of words with a special syllable in the following five stages.

1. First, children are taught the linguistic features of each special syllable necessary to identify it in a word.
2. Second, they learn to construct models of syllabic structures of words using different forms of wooden blocks (or small plastic plates), with the help of a visual schema of models of words drawn under pictures.

3. At the third stage, the visual schema of the model is simplified into series of dots expressing only the number of syllables in the words and requiring the children to construct models by analyzing the syllabic structure of words orally.

4. At the fourth stage, the visual schema of the models is omitted completely and children are required to construct models by analyzing the syllabic structure of words only.

5. Finally, the children are required to construct models of words without any help immediately on recognizing words presented orally.

After learning model construction with words, children learn the correspondence between syllables and symbols or the orthographic rules of these syllables. For example, in the program on the orthographic rules of a long syllable, training proceeds in the following steps.

1. First, children learn the features of symbols and sounds and the differences between them.

2. Second, they learn the vowels and identify long vowels contained in a long syllable of the word.

3. Third, they learn to classify words according to the long vowel in the long syllable of the word.

4. Then they learn the orthographic rules of long syllables.

5. Finally, they repeat the practice of reading and writing words containing long syllables.

We repeated such teaching experiments first with preschool children and then with children with learning difficulties. Figure 12.3 shows the results of the experimental training of long syllables with preschool children. In this study (Amano, 1977b), based on data from preliminary tests, seven pairs of 4- and 5-year-old children, each equal in terms of level of acquisition of Hiragana letters, level of acquisition of awareness, and word construction of long syllables, were selected and randomly divided into training and control groups. Children in the training group were trained in model construction and then in spelling long syllables individually. Their performance (mean percentage correct) in the model construction and word construction tasks during the study period was
Figure 12.3. The effect of training in model construction and word construction on learning of long syllables by preschool children.

Figure 12.4. The effect of training in model construction of syllabic structure of words on school children.

compared with that of children in the control group, who did not undergo any training.

Figure 12.4 shows the results of the experimental training in special syllables in schoolchildren with learning difficulties. In this study (Amano,
Improvement of children's reading and writing

1982), six second-grade children underwent individual training under the previously mentioned seven-part program. The figure compares the progress (mean percentage correct) of the training group on model construction of words containing different kinds of special syllables with that of the control group. In Figure 12.4 the results (mean percent correct) of a control test administered to both groups after the training, using 20 tasks of model construction of words with various kinds of special syllables, is also shown.

These studies revealed that even preschool children and children with learning difficulties could acquire linguistic awareness of the syllabic structure of words with special syllables through model construction of words. After becoming aware of special syllables, they could learn to read and to write words containing different kinds of special syllables.

Phonological analysis in the acquisition of reading and writing

We may now define the role of phonological analysis in the acquisition of reading and writing by children as follows.

1. Phonological analysis, as D. B. El’konin (1956) pointed out, consists of two kinds of analysis: analysis of the succession of phonological components of words and analysis of the phonological structure of words.

2. The role of phonological analysis of words in developing children’s literacy in phonological symbol systems is due to the fact that reading and writing in phonological symbol systems always contain the transformation of codes, from graphic to phonological and from phonetic or phonological to graphic.

3. Phonological analysis in the process of writing prepares students for the transformation from phonological code into symbols. The links of phonological analysis in the transformation of word codes from perceptive-acoustic code to phonological symbol code in writing are schematically illustrated in Figure 12.5.

4. Phonological analysis of words in learning to read prepares students for the transformation of codes from graphic to phonological through the development of linguistic awareness of the phonological succession and structure of words.
Figure 12.5. Schema of processes of transformation of a word from an acoustic or phonological code into a graphic one in writing a word.
In our experimental teaching, we give children a sentence model construction task under what we call the *syntax program*. The main aim of this program is to develop in children linguistic awareness of the syntactico-semantic structure of sentences. In this program we use 10 or 11 kinds of symbols that represent the syntactico-semantic categories of sentences: agent, object, partner, patient, instrument, material, purpose, cause and reason, time, place, and action. They are shown in Figure 12.6.
With the aid of these symbols, one can easily construct a model of the syntactico-semantic structure of a sentence, as long as one has more or less obvious linguistic awareness of the syntactico-semantic components of sentences. The following examples, shown in Figure 12.7, serve as an explanation.

As the reader can see in these examples, in Japanese the case relations of words, that is, the syntactico-semantic meaning of words, is expressed not by prepositions or word order as in English, but by
postpositions, for example, *ga, wa, de, ni, wo, kara*, and so on. There are some 15 postpositions in Japanese. But like prepositions in English, Japanese postpositions are always multivocal and represent different kinds of syntactico-semantic categories. For example, the postposition *de* sometimes represents "place" but at other times "cause and reason" or "instrument" or "material," depending on the context of a word in the sentence. Moreover one syntactico-semantic category can often be expressed by different kinds of postpositions. For example, the "place" can be expressed by *de, ni, he, kara*, and so on.

Usually children with learning difficulties or learning disabilities have serious difficulty not only in writing but also in oral speech. They can hardly compose and write any sentence, or at best can write a simply constructed sentence. Related to the previously mentioned characteristics of Japanese syntax, they often show errors or ellipses of postpositions in written sentences and in oral speech. This defect in their syntactic ability may result, on the one hand, from poor development of sentence construction but also, on the other hand, from nonawareness of syntactico-semantic categories and components of sentences. Of course, in Japan children learn grammar in elementary school, but usually the lessons in grammar begin with teaching the concepts of the *subject* and *predicate* of sentences in the third grade. These concepts of formal grammar never help children with learning difficulties acquire the necessary linguistic awareness in sentence composition. For these reasons, we intended to develop this new type of syntax program in order to promote the development of linguistic awareness in children with learning difficulties or learning disabilities in reading and writing.

But how can we teach children to construct a syntactico-semantic model of sentences? Over the past 10 years, we repeated many teaching experiments with different categories of children: normal elementary schoolchildren, preschool children, children with learning difficulties, and children with mental retardation. The methods of teaching were slightly different, depending on the degree of their development. When we teach Japanese adults or students to construct models, it may be sufficient to give them a brief explanation of each category with the aid of the illustrative figure. But when teaching lower-grade schoolchildren, much less children with learning difficulties, it is clearly insufficient to give them only explanations of the meaning of each symbol. It is necessary to teach some objective acts or operations, by which they can identify correctly each of the syntactico-semantic components or categories in the sentences. The following two acts or operations serve this purpose.
1. The act of analyzing and identifying the syntactico-semantic category of a certain component of a sentence by composing an interrogative sentence with the interrogative word corresponding to the category of the component in question. For example, when a child is required to identify the category of *kawa-he* ("to the river") in the following sentence,

Kino Taro-wa kawa-he turi-ni itta.
(Yesterday Taro went to the river fishing.)

he or she can identify it by constructing the interrogative sentence with the interrogative word, which corresponds to the category of *kawa-he*, by asking "Kino Taro-wa doko-he ittanodesuka?" ("Yesterday where did Taro go fishing?"). In order to help children learn this act, a supplementary illustrative figure representing the correspondence between the symbol mark of category and interrogative words is shown to children in the training programs.

2. The act of analyzing and identifying the syntactico-semantic category of a certain component of a sentence by composing a sentence expressing an unfolded syntactico-semantic meaning of the category of the component in question. For example, when a child is required to identify the category of "to the river" in the previously mentioned sentence, he or she can do so by constructing the sentence "Kino Taro-ha kawato iu basyo-he turi-ni itta" ("Yesterday Taro went fishing to the place of a river"). In order to help children learn this act, we prepare a supplementary illustrative figure representing the meaning of each symbol mark of category words in teaching.

In addition to these acts, a concrete pretending act, in which a child makes small toy dolls play the role of agent, partner, or patient in the same miniature situation as in a given sentence, is used to help children learn the function of each syntactico-semantic category.

In training normal lower-grade schoolchildren, the content of a sentence is presented in printed text. For children with learning difficulties or learning disabilities, the content is presented in a picture with the schema of a model of the sentence.

In the sentence model construction task, a child is asked to make a model of a sentence with small symbol plates on which a symbol figure is drawn. At the first stage, he or she is asked to make a sentence, saying aloud each word, taking the corresponding symbol plates one by one from the right side of a schema of the sentence with the help of a schema of the sentence. Then different tasks are given stage by stage.
The first training experiment (Amano, 1982) was conducted with normal second-grade schoolchildren (four children each in the experimental and control groups) applying a six-step program. The steps of the training are illustrated in the flow chart shown in Figure 12.8.

In this program, training began with teaching the function of each syntactico-semantic category through the concrete pretending act of using toys in miniature garden situations. The program then moved to the model construction of sentences through learning the previously mentioned two kinds of operation. This method proved to be very effective in developing the sentence model constructive skill in children.

Figure 12.9 shows the effect of the training, comparing the mean percentages correct on model construction tasks before and after training.

Subsequently, we moved to a training program with lower-grade schoolchildren with learning difficulties. The program was administered to first-grade children who apparently could not learn to read and write due to a learning disability or slight mental retardation. For the time being, the program consists of two parts.

In the first part of the program, children composed declarative and interrogative sentences with different constructions in oral speech, such as constructing the model of a sentence on the basis of a schema of the model. The aim of training in this stage is to improve their sentence construction in oral speech and, at the same time, to develop syntactico-semantic categories and functions of each figurative symbol with the aid of the explanatory figure. Then they learn to compose declarative and interrogative sentences with the interrogative words who, what, and where in oral speech. In this step, pictures expressing the content of sentences are used as training materials. Each picture is drawn on a sheet; below it is a schema of the model of the sentence corresponding to it. The schema is usually covered by a small sheet of opaque paper, but it can be uncovered if needed.

The training in sentence composition is conducted in the following order.

1. Training in sentence composition without a schema of the model and model construction. First, the child is asked to compose a sentence, viewing a picture presented with the schema covered. If the child succeeds, the trainer gives praise and asks the child to construct a model of the sentence.

2. Sentence composition based on schema and model construction. If the child fails to compose the required sentence or makes mistakes in the use of postposition, the trainer points out the errors,
Figure 12.8. Flowchart of the experimental training program.
uncovers the schema, and asks the child to compose the sentence correctly, putting the corresponding symbol plates on the schema and constructing a model of it.

3. Composition of an interrogative sentence with interrogative sentences. After the child has constructed the model of a sentence, he or she is required to compose an interrogative sentence, asking for one component (agent, object, or place of the sentence) and constructing a model of the sentence with the aid of the supplementary figures for interrogative sentences. The trainer first demonstrates constructing the interrogative sentences once with each type of interrogative sentence.

4. Test of model construction. After exercises with 14 sentences, the trainer asks the child to make a model of each sentence correctly again in order to evaluate his or her learning. In steps 2–4, similar training is done with 10 different sentences with different syntactico-semantic components. But in each step, the child learns to compose different kinds of interrogative sentences.

In the second part of the program, written sentences are introduced and children learn to read and write sentences based on the model of sentences constructed by themselves. In step 5, written text and a miniature garden, small dolls (a mother, a boy, a girl, a cup, poles, a sheet of paper, a block of clay, etc.) are prepared. After the sentence is read aloud, the child is asked to make himself or herself or a toy doll perform the action.
described in the text and to construct a model of the sentence. By confirm­
ing the correspondence between syntactico-semantic categories and components of the concrete action performed, the child learns the func­
tion of each category.

In steps 6–9, the child learns to read and write in the following order, using the materials in steps 1–4, respectively:

1. **Reading sentences.** A written sentence on a small sheet of pa­
paper is put on the schema of the sentence under the picture. The child is required to read correctly. When he or she makes errors, the trainer points them out and asks the child to read the sen­
tence again correctly.

2. **Sentence composition based on model construction.** When the child reads the sentence correctly, he or she is required to con­
struct a model of it, putting symbols on the sheet of paper one by one, sequentially reading aloud the corresponding component of the sentence.

3. **Sentence composition based on model construction.** The writ­
ten sentence is covered, and the schema of the sentence is un­
covered. The child is asked to compose a sentence aloud while constructing a model of the sentence.

4. **Writing sentences.** After constructing a model of the sentence, the child is asked to write the sentence with a pencil in his or her notebook while looking at the syntactico-semantic model of the sentence that the child constructed.

We conducted experimental training of five first-grade boys with learn­
ing difficulties in reading and writing (four of the boys demonstrated what appeared to be learning disabilities; the fifth boy apparently had slight mental retardation) for 1.5 years using this syntax program in addition to the previously mentioned orthography program in syllabic letters and the lexico-semantic-cognitive program. The training was conducted in­
dividually with each boy two times a week in the speech clinic centers in Kawasaki City.

As a result of the training, all children successfully acquired the basic ability to construct the syntactico-semantic models of sentences, to read, and to write sentences with different kinds of constructions on the basis of the model construction of sentences. Table 12.1 shows the comparison of the results of tests on syllabic analysis of words (syllabic model con­
struction), sentence model construction, oral sentence construction, class inclusion, and revised Japanese Wechsler Intelligence Scale for Children
Table 12.1. Comparison of test results of children with learning disabilities before and after the training

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Before training</th>
<th>After training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>7:5</td>
<td>7:0</td>
</tr>
<tr>
<td>WISC-R* VIQ</td>
<td>84</td>
<td>107</td>
</tr>
<tr>
<td>PIQ</td>
<td>113</td>
<td>95</td>
</tr>
<tr>
<td>IQ</td>
<td>97</td>
<td>102</td>
</tr>
<tr>
<td>Syllabic models construction (20 words), %</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Sentence model construction task (29 items), %</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Oral sentence construction task (22 items), %</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Class inclusion task (6 items), %</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Age of the child when tested.
*The test was administered in 1983 and 1985. However, the scores of VIQ, PIQ, and IQ are modified on the basis of the score table of the WISC-R test revised in 1989 in Japan.
The task consisted of three items with concrete objects and three verbal items.

(WISC-R) tests before and after training. After the training, we also gave the children a sentence composition task using a certain model sentence and the task of writing an essay on a certain theme ("On a person whom I like best"). These results showed clearly that the children had acquired a linguistic awareness of syllabic word construction and sentence construction, as well as the basic skills required to write a sentence and an essay correctly through the training by our complex language teaching programs.

The very important and interesting result obtained by this experimental training is that the verbal IQs (VIQs) on WISC-R tests improved significantly for three boys (T.M., M.Y., and I.T.) of the five who underwent our complex training program. In contrast, one boy (N.T.), whose performance IQ (PIQ) on WISC-R tests had been lower than his VIQ before the training, did not improve in VIQ, although his awareness of
the syllabic structure of words, the syntactico-semantic structure of sentences, and his sentence composition abilities were significantly improved by the training. The fifth boy (N.D.), who had considerably lower scores in both VIQ and PIQ before the training, seemingly due to slight mental retardation, also showed improvement in VIQ, but the gain was smaller.

These results indicate that the training of children with learning disabilities by our complex teaching programs not only improved their reading and writing abilities but also contributed much to the development of general verbal abilities, especially in children whose VIQs were depressed. Our complex language teaching programs were more effective for children with verbal learning disabilities.

Conclusion

I have outlined a long series of studies that started nearly 30 years ago, stimulated by the ideas of Vygotsky and El'konin on reading acquisition by children. To conclude, I point out some of the problems concerning the relationship between the development of linguistic awareness and learning to read and write.

As I mentioned earlier, we observed a strong reciprocal relationship between the development of the act of analyzing the succession of syllabic components of words and reading and writing acquisition by children in Hiragana, particularly in the fundamental syllables (letters), which have a one-to-one correspondence between syllable and symbol. But a different pattern was observed in reading and writing words containing special syllables, especially those with long or long contracted ones. When we were able to form and develop linguistic awareness of special syllables in children before they learned to read and write words with them, we observed the appearance of a reciprocal relation between development of linguistic awareness of special syllables and reading and writing activity of children. However, when we did not teach them the linguistic features of special syllables, we did not observe this relation. That is, some children began to read and write words using their own strategy, with no linguistic awareness of special syllables. As a result, their awareness developed very slowly, and they repeated errors in reading and spelling words for a long time. A similar relationship was observed between the development of linguistic awareness of syntactico-semantic structures of sentences and learning to read and write sentences.

In our training studies, we observed that children's construction of models of the syntactico-semantic structures of sentences played a role
in facilitating learning to read and to write sentences in the following two ways: (1) the syntactico-semantic model of sentences constructed by children served as a schema of sentences when they constructed sentences orally and then in written speech; (2) the linguistic awareness of each syntactico-semantic category developed through model-constructing actions made children more conscious of the relations between the case of words and the form of words in sentences and facilitated their learning to read and write. In these cases children’s reading and writing activity also facilitated their development of linguistic awareness. But when we did not organize their formation of linguistic awareness, their reading and writing activity did not always facilitate the development of linguistic awareness of syntactico-semantic structures of sentences because, as mentioned earlier, they could hardly learn such linguistic knowledge spontaneously.

On the basis of our research, we may conclude that the optimal way of organizing the teaching of reading and writing in a phonological symbol system is to organize the learning so that development of linguistic awareness is interrelated with reading and writing activities in a reciprocal way. In other words, instruction that leads to linguistic awareness at the beginning of teaching literacy is one of the most effective ways to enlarge the zone of proximal development for children engaged in learning to read and write.

References


Improvement of children's reading and writing


