LINGUISTIC ABILITIES AND SPELLING PROFICIENCY IN KINDERGARTENERS AND ADULT POOR SPELLERS*

Isabelle Y. Liberman,† Hyla Rubin,‡ Susan Duquèş,†† and Joanne Carlisle††††

The research effort over the past several years by the Haskins Laboratories reading research group has bolstered our conviction that the problem of most beginners who have difficulties in acquiring literacy is basically linguistic in nature. That is, in our view, the problem is not visual or auditory or motor, as many have proposed, but lies rather in the ineffective use of phonologic strategies. We have found this linguistic deficiency in regard to two major requirements of reading proficiency--lexical access and representation in short-term memory. We have recently also begun to look more closely at spelling from the standpoint of linguistic sophistication. In this paper we will describe two recent studies we have done that are concerned with linguistic abilities and spelling--one in a group of kindergarteners and the other in an adult literacy class. But, first, since the nature of the orthography is a central consideration in spelling, we should like to prepare the way by describing our assumptions about how the alphabetic orthography represents language, assumptions that are, in effect, the guiding principles of our research.

Some Guiding Principles

Everyone would agree, we believe, that an orthography represents a language, that languages are used to convey meaning, and that words are the basic

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*Paper presented at a Special Conference on the Biobehavioral Measures of Dyslexia sponsored by the National Institute of Child Health and Human Development, Bethesda, Maryland, September, 1984.
†Also University of Connecticut.
‡‡Now at University of Toronto.
†††University of Connecticut.
††††Now at American International College.

Acknowledgment. The introductory section of this paper ("Some Guiding Principles") is adapted from "A Language-Oriented View of Reading and its Disabilities" by Isabelle Y. Liberman, which appeared in H. Myklebust (Ed.), Progress in learning disabilities (Vol. 5). New York: Grune and Stratton, 1983. The research of the authors was supported by NICHD grant HD-01994 to Haskins Laboratories. Special thanks for their generous cooperation in the kindergarten experiment are due to Jerome Spears, Director of Pupil Personnel of the Mansfield, CT school system, and, in the Annie E. Vinton School, to James Chilleri, principal and Anita Sarriano, teacher of the kindergarten class and her pupils. For their thoughtful assistance in the adult literacy experiment, we are also indebted to Isobel Kaufman, Director, Adult and Community Education Services and to Thomas Rameaka, teacher and the students of the adult education class.
units by which languages do that. What is often forgotten, however, is that whether one receives language by eye or by ear, one must get to the word before one can get to its meaning and that a word exists apart from its typically various meanings. Moreover, a word has a uniquely linguistic, complex, phonological structure that must be somehow apprehended before one can deal with a message conveyed by language, whether written or spoken. In the primary language functions of speaking and listening, a special processor copes with that phonological structure in operations that normally function naturally, quite automatically, and below the level of awareness. One does not need to understand how it works in order to speak and listen. In contrast, both the reader and writer must have some fundamental understanding of the structure. Indeed, they must become, to some degree, linguists of sorts, sufficiently aware of the phonology to be able to divide the spoken language into the constituent segments that the orthography represents. How easy or how difficult that will be will largely depend on the nature of the linguistic segment that the orthography represents.

In the case of orthographies in which the segment represented is the word, as it is in the Chinese logography and the Japanese kanji, or the syllable, as it is in the Japanese kana,1 we contend that the beginner's task is relatively simple. If what they need to do is separate the word or syllable from the speech stream for purposes of pairing it with its appropriate orthographic unit, they will find it to be readily isolable. This has been found to be true both here and abroad in a number of experiments with young children (Alegría & Content, 1983; Fox & Routh, 1975; Holden & MacGinitie, 1972).

The problem faced by beginners in an alphabetic orthography is much more difficult. The essence of the problem can be put in this way: though it is often said that an alphabetic orthography represents speech or ought to, it is, in fact, an abstraction from speech. Although it does bear a fairly regular relation to speech, the nature of that relation will be hard for a child, or indeed any beginner, young or old, to apprehend. To understand why that is so, we would remark briefly, first, on why it is misleading to say that the alphabetic orthography represents the sounds of speech; second, why it is also misleading to say that it does or should represent speech phonetically; and, finally, what it means to say that it is an abstraction from speech. Let us consider these remarks one at a time.

The Alphabet Does Not Represent the Sounds of Speech

The alphabetic orthography does not transcribe the sounds of speech. In the first place, the letters obviously do not portray acoustic events, as they might if they were bits of oscillograms or spectrograms. So in that rather trivial sense, the alphabet certainly does not represent the sounds of speech. However, there is a more significant sense in which the alphabet does not transcribe sounds. The point that needs to be made, and which is not trivial, is that the segmentation of the sound does not correspond to the segmentation of the letters. To take a simple example—it would be impossible to divide a recording of the spoken word, "big," into three parts, such that when played back, one part would be "buh," a second part "ih," and the last part "guh." That is because in the spoken syllable, "big," there is only one piece of sound and the three phonological segments we write with the letters B, I, and G are nearly simultaneously encoded into it.
Encoding several segments of the phonology into one segment of sound provides an important gain in efficiency for the listener, who, as we have said, has a built-in processor nicely equipped to deal with it automatically. But it has quite adverse consequences for the beginner dealing with the written language. One unfortunate consequence of the very odd relation between phonological structure and sound is that the phoneme, which is the segment represented by the alphabetic orthography, unlike the word and the syllable, is not easily separable from the speech stream. If we had not found this to be so in our research with children (Liberman, Shankweiler, Fischer, & Carter, 1974), we should have suspected it from the history of writing systems—the system using an alphabetic unit was the last to be developed, long after logographies and syllabarries. Moreover, unlike those others, the basic unit of the alphabetic orthography, the phoneme, was apparently discovered only once and all other alphabets were later adapted from that original, brilliant discovery (Diringer, 1948).

If readers and writers must be able to appreciate the relationship between the orthographic character and the linguistic unit it represents, as we believe they must, then, beginning learners of an alphabetic system are put at a disadvantage initially. They will find it difficult to see the relation between spelling and sound. And it will even be difficult for teachers to demonstrate that relationship to them. If teachers wish to do this with even a simple word like "big," they will try to isolate three sounds and in the process will unavoidably produce, not three phonemes, but three syllables: "buh," "ih," and "guh." Put together, these form a nonsense trisyllable "buhiguh" and not the monosyllable "big" that comprises the three phonological segments we spell as B-I-G (see Liberman, 1983, for a more complete discussion of this point and of the two sections that follow).

The Alphabet Does Not Represent the Phonetic Surface of Speech

If it is now evident that the alphabet is not a transcription of the sounds of speech, what about the alphabetic orthography as a phonetic transcription? It is, of course, possible to use an alphabet phonetically. Linguists do just that when they use a phonetic transcription to represent as precisely as possible what they perceive when they listen to speech. Unfortunately, the wealth of phonetic information that our natural speech-perceiving mechanisms can use creates serious problems when, as in reading and writing, we try to put all that information through the eye.

A phonetic transcription, such as the linguist uses, preserves much surface information that is not represented in any alphabetic orthography. It includes all the context-conditioned variations of speech both within words and across syllable and word boundaries. For example, in a phonetic transcription, the plural s in cats would be transcribed as s but its counterpart in "dogs" would be z to reflect its pronunciation in that context. To take another example, the final consonant in the word, "sit," would be transcribed as t, but what we ordinarily consider to be the same consonant in the related word, "sitter," would have to be changed from t to d to reflect accurately that manner change in our pronunciation. Similarly, in American English, the contraction "what's" would be transcribed differently in the context of "What's he saying?" from its rendition in the context of "What's your idea?", where, because of context-conditioned effects, it would be coarticulated with "your" to produce "Wuuhchur (idea)"

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In view of these confusing context-conditioned variations, one would suppose that it should be extremely difficult to apprehend messages conveyed by means of a strictly phonetic transcription. And so it is, in fact. To be sure, any literate adult can learn to decode a phonetic transcription more easily than s/he can decode the visual display of acoustic events in a spectrogram, but even highly trained phoneticians cannot read an unfamiliar text written phonetically as fluently as they would the same passage written in our English orthography. The representation of context-driven articulatory distinctions, to say nothing about differences in linguistic stress, emphasis, idiolect, and dialect, seriously detracts from the broader requirements of language representation. This is certainly a case in which, except for very specialized purposes, more is definitely not better.

The Alphabet Represents Phonological Structures

Given that reading the sounds of speech is hard and reading a phonetic transcription is only slightly less so, what is it that an alphabet should represent if reading is to be made as easy as possible? Presumably, in the ideal case, the representation should match the way words are organized in our heads, in what linguists refer to as our lexicons. It stands to reason that our lexicons must be organized in terms of phonological or morphophonological segments that are sufficiently abstract to stand above the many variations at the auditory and phonetic surfaces. We have described the difficulties we get into when, in trying to put language in by eye, we begin with the variable auditory and phonetic forms. To get around these problems, we would want ideally to have words spelled in a way that matches the abstract (morpho)phonological structures as they must be stored in the speaker's lexicon. But that is an ideal that is not easily achieved.

The problem is that there are undoubtedly great differences among speakers of the language in the way in which their lexicons are organized and in exactly how abstractly the items are entered. To take one example, for the would-be reader who understands that such pairs as heal/health, steal/stealth, and even weal/wealth are related, the individual members of those pairs might well be entered quite differently than they would be for the reader who has never noted those relationships. The entries of the former reader would in this instance be closer to the way English spelling deals with the language.

For better or worse, English spelling happens to be quite far out on the abstractness dimension, rising considerably above the phonetic surface variations to preserve the identities of lexical cognates. The spelling is, in this sense, morphophonological in nature. As such, it necessarily must strain the linguistic sophistication of many would-be readers and spellers. The young child is especially likely to lack even the tacit knowledge, what we have elsewhere called "phonological maturity" (Liberman, Liberman, Mattingly, & Shankweiler, 1980), that is needed to rationalize so much of the spelling. For example, the use of the same alphabetic characters for phonological segments that are phonetically quite different, as in such pairs as muscle/muscular and magic/magician, preserves the morphemic relations of the words and thus may increase fluency and efficient comprehension for a mature reader but would serve only as a roadblock to the young child who is trying to figure out how the system works.
In summary, the point that should be emphasized here is that no matter how abstract it may often be and how far or how close to a given reader's lexicon, the alphabetic orthography does represent the (morpho)phonological structure of the spoken word, not its sounds or its phonetic surface. Now we can consider how this characteristic of the orthography relates to the attainment of literacy.

Linguistic Awareness and Reading

It has been our contention that in addition to the obvious need to have some command of the spoken language and the ability to discriminate the graphic symbols, the first requirement for beginning readers is to acquire a certain degree of linguistic sophistication, beyond that required for speaking and listening. One important aspect of linguistic sophistication is what Mattingly (1972) of the Haskins research group has dubbed "linguistic awareness." Though it could be taken to have a more general connotation, this term has been defined in a rather special way in the context of initial reading acquisition—to refer to the awareness of the units of speech that are represented by the orthography. In the alphabetic orthography, the phoneme, the unit of which the learner must become aware, is a constituent part of larger units, the word and the syllable, both of which have considerably more salience, as we have said. Awareness that these larger units have parts and the ability to identify those parts does not come easily and does not happen all at once. The ability to segment speech into its constituent units, of whatever size, has been found to show improvement from ages four to six or seven (Calfee, Chapman, & Venezky, 1970; Liberman, 1973; Treiman & Baron, 1981). But in this developmental sequence, awareness of the phonemic unit is always harder, develops later, and is generally found to be a more sensitive predictor of reading skills in kindergarteners and first graders than awareness of the syllable or word. There is by now a long list of studies, originating both here and abroad, which have been strongly supportive of phoneme segmentation skill as a predictor of reading ability. Among the studies that come to mind (and there are surely others as well) are Blachman (1983), Helfgott (1976), Mann and Liberman (1984), Zificak (1981) from our research group, Bradley and Bryant (1983) in England, Lundberg and associates (1980) in Sweden, Fox and Routh (1975) in the States, and Bertelson's laboratory (Alegria & Content, 1983) in Belgium.

Most of the previous research on linguistic awareness and the acquisition of literacy has been concerned with the attainment of reading skills. Recently, we have begun to look more closely at spelling from this vantage point. We should like to report on two of these investigations in this paper, one in which we examined the invented spellings of kindergarteners and the other in which we explored the virtually uncharted territory of linguistic factors in adult illiteracy.

Linguistic Abilities and the Invented Spellings of Kindergarteners

The first study we will describe looked into the linguistic abilities of kindergarteners in relation to their skill in invented spelling. Before reporting on our findings, we should take a moment to say what we mean by invented spellings. When spelling words in their spontaneous writings, preschoolers are, of course, limited by their meager orthographic knowledge, which in the beginning may include only the knowledge of names of letters ("bee" and "dee," for example). In his seminal work in the early seventies,
Charles Reed (1971) demonstrated that the invented spellings of preschoolers display a predictable pattern in their choice of the letter symbols used to represent the spoken language. Relying on their apparently quite acute perception of the phonetic, surfacy features of both the utterance to be recorded and the letter names they know, young children begin by devising what amounts to a primitive phonetic transcription, rather than the phonological representation of our spelling system.

To the extent that English is written abstractly, it assumes, as we said earlier, a user who has, to a considerable degree, what we have called "phonological maturity" (Liberman et al., 1980). These younger children clearly do not have the requisite degree that our orthography demands. Given a word like "train," to borrow one of Read's examples, a preschooler might produce an H as the first letter of the word in an attempt to represent the first phone in their own spoken version of the word ("e'htrain") by its closest counterpart in a letter name they know ("a'itch"). As the children begin to develop more sophisticated apprehensions of the phonology, the purely phonetic transcription becomes less prevalent in their spellings. They begin to assimilate the rules according to which our abstract spelling makes sense.

This growing awareness of the (morpho)phonological rule structure of words is implicit in their invented spelling productions. Therefore, if one is interested, as we are, in evaluating the level of linguistic sophistication in children's spellings, it is possible to do so by constructing a scoring system that is fashioned to reflect that awareness, rather than being limited to a consideration simply of right/wrong judgments. Louisa Cook Moats (1983), using an analytic scoring system of this kind, did a pioneering study in which she found the misspellings of dyslexic fourth through eighth graders to be quite similar linguistically to those of nondyslexic second graders.

We were curious to learn whether we could find possible precursors of linguistic deficiencies in the spelling of much younger children--those in a public school kindergarten class. Accordingly, we chose to examine the relationship between kindergarteners' proficiency in invented spelling and in their other linguistic abilities.

All the children in the kindergarten class were given a dictated, real word spelling test. A given word could receive a score from 0 (for simply random letters) to 6 (for a correct English spelling). In this scoring system, we measured the children's spelling proficiency along two dimensions--the number of phonemes that the child included in spelling the word and also the level of the orthographic representation. Thus, for the target word, "sick," increasing scores would be awarded for the following sequences of responses: one phoneme with conventional letters (s, c); more than one phoneme but not all (sk, ck); all phonemes with phonetically related letters (sec, sek); all phonemes with conventional letters (sic, sik); all with correct spelling (sick).

In addition to the spelling test, eight language-based tasks were administered to the class. We found that four of these made a difference in a multiple regression analysis, accounting for 94% of the variance in invented spelling proficiency. Of these, a phoneme segmentation task patterned after Elkonin (1973) accounted for 67% of the variance in invented spelling performance and one that measured phoneme dictation accounted for an additional 20%. A phoneme deletion task ("Say meat without the 'm'"), adapted from Rosner's
Test of Auditory Analysis Skills (Rosner, 1975), added another 6%; and a measure of expressive vocabulary, the Boston Naming Test (Kaplan, Goodglass, & Weintraub, 1976), 1%.

The four other language-based tasks in our study did not contribute significantly to the variance of the invented spelling performance. They included a test of receptive vocabulary (the Peabody Picture Vocabulary Test, Dunn & Dunn, 1981); a syllable deletion task ("Say cowboy without the 'cow'"); also adapted from Rosner's TAAS (1975); word repetition (correctly repeating words spoken by the examiner); naming letters and writing letters to dictation. Analysis of the children's performance on word repetition, letter naming, and letter writing revealed only developmentally appropriate errors such as slight infantilisms in articulation and occasional confusions of visually similar letters in writing. In regard to the latter type of error, it is of interest to note that letter reversals, though present in some protocols, were not found to be related to invented spelling ability. That is, children could be good invented spellers at the kindergarten level without having fully mastered the correct orientation of the reversible letters.

This study suggests that spelling skill develops systematically as young children master the ability to analyze words into their constituent phonemes. That conclusion is supported by the strength of phoneme segmentation ability, writing phonemes to dictation, and the deletion of phonemes as predictors of invented spelling ability. These three tasks all require a degree of explicit awareness of internal phonological word structure that is not tapped by the other language tasks. The other tasks all reflect certain aspects of language development but either do not include the analytic component at all (Peabody Picture Vocabulary, letter naming, letter writing, and word repetition) or tap it at a less abstract level, closer to the basic unit of articulation (syllable deletion).

Linguistic Abilities and Adult Poor Spellers

Among kindergarteners, then, we had found that the children who were the better spellers in the class exhibited better skills as well in analyzing the phonemic constituents of words. Recently, we examined a group of adults enrolled in a community literacy class with a view toward finding out whether their profiles would be similar to those of younger learners. The subjects in this study were nine men whose occupations ranged from lower-level management to semi-skilled labor, all of whom reported serious difficulties with spelling. Five of the men had repeated a grade in school, but only one had received remedial assistance.

Once again, as we had with the kindergarteners, we administered a number of tests of language ability as well as measures of spelling proficiency. To determine the kinds of spelling problems characteristic of adult illiterates, we used two dictated lists of spelling words. One list was taken from the spelling subtest of the Gallistel-Ellis Test of Coding Skills (1974), which includes real words of both regular and irregular orthographic construction. The other was a list of pseudowords taken from the reading subtest of the Gallistel-Ellis Test. In order to provide a comparison with their spelling proficiency in spontaneous writing, we also collected writing samples, using the stimulus pictures of the Test of Written Language (Hammill & Larsen, 1978).
Four tests of language ability were included in the adult study. As a check on the possibility that gross problems in speech perception might be at the root of their difficulties, we examined the performance of the adults on the Sound Mimicry subtest of the Goldman-Fristoe-Woodcock Auditory Skills Test Battery (1974). In this subtest subjects are required to repeat taped nonsense words, one to three syllables in length.

In view of previous findings with children that have suggested that poor readers and spellers may have difficulty analyzing other aspects of internal structure of words (Carlisle, 1984; Rubin, 1984), we wished to measure the analytic abilities of the adults at both the phonemic and morphemic levels of language. The test used for phonemic analysis was the Sound Analysis subtest of the Goldman-Fristoe-Woodcock Auditory Skills Test Battery (1974). Here, monosyllabic nonsense words are presented on tape and the subject is required to identify the first, middle, or last phoneme in the word. To determine the subjects' ability to apply basic inflectional and derivational rules of morphology, they were also given the Berry-Talbott Test of Language (1966). Normal children have been found to develop the morphological abilities tapped by this test in a systematic progression from the easier items at the beginning to the more difficult ones at the end, with mastery expected by age seven or eight.

Finally, in addition to testing them on spelling and language tasks, we also measured the oral reading ability of our adult subjects. For this purpose, both single word and passage reading measures were used. The reading subtest of the Gallistel-Ellis Test of Coding Skills was chosen to assess reading of single words. This subtest includes real words of two types—those of irregular (unpredictable by the more common orthographic rules) construction, and those of regular construction that are presented in order of increasing difficulty by syllable type. The test also includes nonsense words that are arranged by syllable type as well. The Spache Diagnostic Reading Scales (1972) were used to assess oral passage reading.

We can turn now to the results of our study of adults and look first at their spelling performance. On the dictated spelling of real words, they did somewhat better on the irregular than on the regular words—63% as against 57% correct, reflecting, perhaps, the tendency to rely on the memory of the global appearance of words often found clinically in poor readers. This possibility is supported by the large drop to 38% correct in their performance on nonsense words often found clinically in poor readers. In order to appreciate the seriousness of the drop, it should be noted that whereas there is, of course, only one correct response for real words, whether of regular or irregular construction, there can be several acceptable spellings of each nonsense word. Consider the pseudoword "lete," for example. Four spellings—lete, leet, leat, let—would all be scored correct.

To be sure, even with this apparent advantage for the nonsense words, one might still expect some discrepancy in performance between the spelling of nonsense and real words, in favor of the real words. However, it was evident from the pattern of their results that our adult subjects had not mastered the basic phoneme-grapheme spelling patterns that would allow them consistently to produce even phonetically reasonable renditions of words they had not seen before. One striking example that occurred during the reading test comes to mind. When presented with the written word, peg, one of the adult subjects puzzled over the word for some time and finally said: "Pig? Well, I know
it's not pig, because there's a e in the middle, but I guess I'll go with pig." (Letter discrimination was obviously not his problem.) It is relevant to remark at this point that our adults had little difficulty in the spoken repetition of the auditorily presented nonsense words, performing there with 92% success. This suggests that the problems they are having with spelling cannot be attributed to gross difficulties in speech perception (nor in articulation, for that matter, or some bias against using nonsense words.

Thus far we have reported only on spelling performances on dictated single words. The spelling of the adults on the spontaneous writing samples was somewhat better than on the dictated words--78% of the words were spelled correctly. But it was apparent that whatever improvement occurred here could probably be attributed to the tendency of the subjects to limit their productions to words that they thought they could spell correctly. A large proportion of one subject's output even included his copying of the wording of the printed test directions, for example.

An informal qualitative analysis of the errors made by the adults on the writing samples showed clearly that they had serious linguistic problems over and above their poor spelling. Approximately a third of the errors reflected grammatical weaknesses--difficulties with function words accounted for 12% of the errors, and omissions or substitutions of inflectional endings accounted for another 21%.

In the light of these findings, it is of interest to note that our adults passed only 63% of the items on the Berry-Talbott test, which measures inflectional and derivational knowledge. In contrast, in a study recently completed by one of us (Rubin, 1984), a group of 60 first graders was able to pass 57% of the same items. Moreover, the young children did well on the lower level items and less well on the higher, thus showing a systematic development of morphemic understanding. The adults, on the other hand, often performed poorly on even the simplest categories like plural and past tense inflections, though they were able to use them correctly in their spontaneous speech. It would seem that when they have to do even a moderate degree of analysis of their language, whether written or spoken, their linguistic abilities are strained to the point of breakdown.

In view of their performance on the morphemic analysis task, it was not surprising to find that language analysis at the phonemic level was especially trying for these adults. On our very simple phoneme analysis task, which is similar to those used in training kindergarteners and first graders in phonemic segmentation, only 58% of their responses were correct. Moreover, they found the task frustrating and unpleasant.

This inability of adults with literacy problems to perform well in a task requiring explicit understanding of the internal structure of words has also been found by other investigators (Byrne & Ledes, 1983; Marcel, 1980; Morais, Cary, Alegria, & Bertelson, 1979; Charles Read, personal communication, 1984). Particularly convincing in this connection is the finding by Morais and associates (1979) that the performance of first graders in the third month of school was slightly better in both phoneme deletion and addition tasks than that of the adult illiterates in their study.
We now turn to a comparison of the reading and spelling of our adult subjects. We found that their reading of single real words was better than their spelling, as would be expected in any comparison of recognition and production measures. But the pattern of performance was quite similar. Real words were read with greater accuracy than nonsense words, just as had been the case with spelling. But perhaps the most telling result was found in a direct comparison of reading and spelling as a function of word type. Whereas the reading of real words, as we have said, was generally better than the spelling, the situation was quite different in regard to the nonsense words. On nonsense words, for which a structural analytical approach is obligatory rather than optional as it may be in dealing with real words, the performance of the adults on both reading and spelling was virtually identical in quality and quite poor.

In short, the adult subjects, like the poorest invented spellers in the kindergarten study, appeared to have only the dimmest understanding of the phonemic structure of words. Qualitative analysis of their successes in reading suggested that memorizing words as global entities was a favored strategy. The analysis revealed, for example, that they often did well on words they had seen frequently before, even when the words were polysyllabic or irregular in construction. They might, for example, read correctly a ten-letter, trisyllabic word with uncommon spelling like photograph, but be at a loss to deal with a simple trigram like peg that they had never encountered before. The same kind of contrast between performance on complex practiced words and unknown but relatively simple words was also apparent in their spelling.

Their oral reading of connected text on the Spache test (1972) was clearly superior to their reading of single words, suggesting, as has been found in other studies of poor readers (Perfetti & Hogaboam, 1975), that our adult subjects were relying heavily on context to assist them in apprehending familiar words. At all events, reading, like spelling, was patently a struggle for these men, generating once more grammatical errors not present in their everyday speech. Examination of their errors in oral passage reading revealed a pattern of incorrect use of inflectional morphemes and function much like that noted in their spontaneous writing samples.

Educational Implications

In our introductory remarks, we have advanced our reasons for expecting that the acquisition of literacy would be related to a certain degree of linguistic sophistication, that is, to the ability to deal with the structure of language in an analytic manner. In the first study reported here we found that among kindergarteners, the better spellers, like the better readers among older children in previous investigations, have developed this ability to a higher degree than those who spell more poorly. In the other study, a group of adults in a community literacy class, who showed no serious deficiencies in everyday speaking and listening, were extremely poor spellers and at the same time were also deficient in various tasks requiring analytic linguistic skills. They found phonological segmentation tasks particularly troublesome.

The ability to stand back from one's language and analyze its structure apparently does not develop naturally as a result of cognitive maturation. It must be learned or taught. But there are several ways in which it can be learned or taught. Many children, as we have pointed out elsewhere (Liberman & Shankweiler, 1977), will develop linguistic insights as a consequence of
their experiences in learning to read an alphabetic orthography. But even for those children, the process might have been made easier and faster by giving them explicit instruction. For other children, including especially those who for whatever reason are at risk linguistically, more explicit instruction will be required if they are ever to attain true literacy— to be able, that is, to deal effectively with unknown or previously unlearned words, which is what an alphabetic orthography is all about. The adults in our community literacy class can still profit from explicit instruction in all aspects of the structure of language (phonological, syntactic, and morphological). But they would have been spared much grief and embarrassment if their deficits had been discovered and addressed in kindergarten instead.

Several investigations have now demonstrated that linguistic awareness can be trained (Bradley & Bryant, 1983; Olofsson & Lundberg, 1983; Vellutino, this volume, 1983) and will make a difference in reading acquisition. Recent studies make it clear that phonological (Fischer, Shankweiler, & Liber- man, in press) and morphological (Carlisle, 1984; Fischer et al., in press; Rubin, 1984) knowledge make a difference in spelling proficiency. At all events, it now seems reasonable to suggest, in view of the present findings and in light of the characteristics of the alphabetic orthography and how it relates to language, that more and earlier training in all aspects of linguistic sensitivity may promote better spelling and should be encouraged. Kindergarten is not too soon to start.

References


Footnotes

1The ways in which the individual characters in these orthographies represent their respective languages are more complex than can be described here. It should be noted that the segments represented by the characters in the Chinese logography and the Japanese kanji are more correctly defined as morphemes rather than words; similarly, the segments in the Japanese kana are better described as moras than syllables. However, it is sufficient for our purposes, and sufficiently accurate, to speak of the word in the first case and the syllable in the second.

2The representation in the ideal speaker-hearer's lexicon is often morphophonological, that is, the word is represented as a sequence of systematic phonemes divided into its constituent morphemes. For example, the words heal, health, healthful, have the morphophonological representations /hel/, /hel+θ/, /hel+θ+ful/, respectively (see Liberman et al., 1980, for a more complete discussion of the morphophonological nature of orthographies).