Commentary on "Segmental analysis and literacy" (Morais et al.)

MORPHOLOGICAL STRUCTURE AND SEGMENTAL AWARENESS

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Morais et al. are surely correct in arguing that segmental awareness is all but essential for the skilled reading of an alphabetic orthography, and that such awareness usually develops as part of the experience of learning to read (defined fairly broadly), rather than being a precondition for learning to read. The second point could be made in a slightly different way. Suppose that the goal were not to teach children to read, but to teach them to be phonologists. Surely, one of the teacher's first steps would be to introduce his pupils to phonological transcriptions. An adequate notation is a great help in mastering any abstract system, and most children would not become very advanced phonologists without some exposure to the notation, even if they were trained in segmental analysis tasks. The actual goal, of course, is to teach children to decode easily texts written in a quasi-phonological notation, and this requires that they be phonologists enough to have awareness of the segmental system that underlies this notation. Such awareness is certainly greatly enhanced merely through exposure to the notation itself.

But is such exposure absolutely essential for segmental awareness? For Morais et al., this "remains an open question." Surely, however, the answer must be, "No," if we are to understand the existence, in ancient India, of an oral tradition of morphological and phonological analysis of Sanskrit, only later codified and written down by Panini (Holender, in preparation); and unless we wish to believe that alphabetic writing was not invented by a segmentally-aware individual, but instead "evolved" (Gelb, 1963), a proposal whose various difficulties I have discussed elsewhere (Mattingly, 1985). Moreover, there are certainly a few children whose acquisition of reading is so rapid and effortless as to suggest that they are merely learning a set of graphic symbols to transcribe phonemic segments they are already cognitively aware of. It is perhaps more of an open question whether the cognitive states

of Panini's predecessors and the unknown genius who invented the alphabet, or of these exceptional children, are relevant to an understanding of the acquisition of reading in the general population. But I would argue that they are. If we wish to understand some cognitive process, it is at least as valuable to study those individuals in whom the process is exceptionally well-developed as to study those in whom it is normally developed or defective.

What factors might lead naturally to segmental awareness in an alphabetically naive but phonologically-curious person? As a native speaker, he has access to mental representations of spoken utterances in his language. These representations have many subtle properties resulting from modular linguistic processes that are themselves inaccessible (Fodor, 1983). What might lead the naive phonologist to notice the particular property of these representations that alphabetical orthography exploits: their segmental character? I would suggest that linguistic structure itself, in particular, certain morphological features found in some languages more than in others, may foster segmental awareness in the naive phonologist.

But let us first consider briefly how the naive phonologist might arrive at other forms of phonological awareness. (Morais et al. are certainly correct to emphasize that "several forms of phonological awareness must be distinguished.") Awareness of utterances as sequences of phonological words seems to be achieved by a compositional analysis that depends on the fact that most words can occur as meaningful utterances in isolation. Given the isolated utterances "John" and "runs," and the knowledge that the complex utterance "John runs" is about John and running, the naive phonologist realizes that "John runs" is *John* plus *runs*. Awareness of syllables is also compositional. It depends on the fact that syllables are pronounceable in isolation and in most languages serve as timing units. The naive phonologist readily realizes that "longer" utterances can be divided without remainder into two or more pronounceable units, and that the number of these units in an utterance is a measure of its apparent length. Thus many preliterate English-speaking children can count the syllables in a word (Liberman, Shankweiler, Fischer and Carter, 1974).

Compositional analysis, however, is not likely to lead to awareness of phonemic segments, for these segments are not consistently either pronounceable or meaningful in isolation. (Vowels, of course, may be either or both, but very few utterances are simply sequences of vowels.) Thus, there is no particular basis for analyzing English /bæg/ as composed of /b/, /æ/, and /g/. What seems rather to be required is a paradigmatic analysis. A comparison must be made between members of a set of utterances that have identical segments at some ordinal positions but different segments at others. Given the set

(1) bɪg, bɛg, bæg, bʌg, bɔg

one becomes aware of a systematic similarity at the beginnings and ends and a systematic difference at the middles, and in this way is led towards a segmental analysis.

But the problem for the alphabetically naive phonologist is to discover the right paradigms in the first place. Useful as a paradigm such as (1) may be for a linguist training an informant or for a teacher instructing a beginning reader, it is not one that is apt to occur independently to the naive phonologist, for, except for their monosyllabicity, the words in the paradigm have nothing in common but the segmental structure that he has yet to discover. But consider a paradigm such as

$$(2) \ \text{læg+}, \ \text{læg+z}, \ \text{læg+d}, \ \text{læg+ɪŋ}$$

This paradigm, like (1), commutes phoneme-sized units (except for /ɪŋ/), but it has the advantage of being natural, because it consists of various inflected forms of one regular English verb, *lag*. (I am not suggesting that the naive phonologist regards these forms as a formal grammatical paradigm, as would a linguist, or that he has awareness of their morphological structure, but simply that he is likely to observe that they are closely related semantically.) This paradigm would lead to the naive phonologist to isolate /z/ and /d/, while /læg/ and /ɪŋ/ would require further analysis. Of even more value is the paradigm for *sing*:

$$(3) \ \text{s+ɪ+ŋ}, \ \text{s+æ+ŋ}, \ \text{s+ʌ+ŋ}, \ \text{s+ɔ+ŋ}$$

in which, because the base morpheme is discontinuous, there are two word-internal boundaries rather than one, so that the segments /s/, /ŋ/, /ɪ/, /æ/, /ʌ/, /ɔ/ could be isolated.

Natural paradigms (2) and (3) exemplify a property of morphological structure found in other languages as well as English, but by no means in all languages: morphological boundaries need not coincide with syllable boundaries. Such paradigms may enable the naive phonologist to notice phonemic segments in particular words. He will then be in a position to extend his analysis to other words. Thus he could use the analysis of /s+ɪ+ŋ/ to segment /ɪŋ/.

Paradigmatic analysis in English, however, would probably not be sufficient in itself to lead the naive phonologist to segmental awareness, simply because English inflectional morphology is very limited. A further compositional analysis, difficult because it would be unsupported by meaningfulness or pronounceability, would be needed, even to segment a simple CVC syllable like /bæg/. The naive phonologist would have to be quite persistent to get as far as this. Thus Liberman et al.'s subjects performed worse on a phoneme-counting task than on the syllable-counting task, even though the stimuli were limited to V, CV, VC and CVC patterns.

More complex syllable structures obviously compound the problem. French has a richer inflectional morphology than English, but, like English, it has many consonant clusters that are never divided by morpheme boundaries. French-speaking children find segmental analysis of these clusters a difficult task, even *after* some exposure to the alphabet (Morais, Cluytens & Alegria, 1984).

The Chinese language family puts the alphabetically naive phonologist in an even more unfavorable situation than do English and French. In Chinese, there is no inflectional morphology, and morpheme boundaries almost always coincide with syllable boundaries (in fact, most of the morphemes are monosyllables). Thus, it is not merely the word-syllabic writing system, but the language itself that fails to provide any encouragement for segmental awareness. Although traditional Chinese linguistics, influenced by the Indic phonological tradition, analyzed syllables into onset, rhyme, and tone, it never achieved a true segmental analysis (Wieger, 1927: 18-21). Read, Zhang, Nie and Ding's (1986) finding that literate Chinese speakers not exposed to the modern *pinyin* transcription system lack segmental awareness is just what we should expect, on linguistic as well as on orthographic grounds.

But in certain other languages, the situation is far more favorable for the naive phonologist. The Afro-asiatic family of languages, including Egyptian and the Semitic subfamily, have rich inflectional systems. In these languages, words are regularly formed from biconsonantal and triconsonantal roots, not only by affixation, but also by the insertion of different vowels between the root consonants, so that root morphemes become discontinuous. Thus, in Hebrew, the root /k t b/, 'write' yields (spacing between syllables):

		k+$\bar{a}$+	t+a+b	3p. masc. sing. perfect
	yı+k	k+$\bar{a}$+	t+$\bar{e}$+b	3p. masc. sing. imperfect passive
		k+$\bar{a}$+	t+o+b	infinitive absolute
		k+$\bar{a}$+	t+u+b	passive participle
(4)		k+$\bar{o}$+	t+$\bar{e}$+b	active participle
		k+ı+t	b+i	fem. sing. imperative
		k+ɔ+t	b+i	1p. sing. infinitive construct
	yı+k		t+$\bar{o}$+b	3p. masc. sing. imperfect

and a great many other inflected and derived forms. Almost every native word in these languages is phonemically segmented by the morphology. A large number of useful natural paradigms are available to the naive phonologist, and it would seem that he could hardly avoid segmental awareness. It is thus not surprising that of the ancient writing traditions, Egyptian and Semitic are alphabetic, while the others are essentially syllabary (Mattingly, 1986).[1]

Japanese is also a good language from the point of view of the alphabetically naive phonologist.[2] Its timing unit is the mora, not the syllable, and we assume that it is not difficult to become aware of moras; they are the basis of Japanese versification. Moras are restricted to the patterns CV, CyV, C, and V. Thus, except for Cy, there are no clusters internal to moras; the problem is essentially to resolve the CV moras into C and V. Because only a few of the phonemic consonants can occur as whole moras, a compositional analysis would not be sufficient; a paradigmatic analysis is needed. But any verb whose root ends with a consonant[3] provides a useful paradigm,[4] for example, /matu/, 'wait' (spacing between moras):

ma	t+a	na	i	negative
ma	t+a	se	ru	causative
ma	t+i			continuative
ma	t+u			nonpast
ma	t+u	na		negative imperative
ma	t+u	ma	i	negative volitional
ma	t+e	ba		conditional
ma	t+e	ru		potential
ma	t+e			imperative
ma	t+o	o		volitional
ma	t+	ta		past

(5)

Japanese is of special interest because its writing system, having been borrowed from the Chinese, is not alphabetic. But in contrast with traditional Chinese linguistics, traditional Japanese linguistics, also under Indic influence (Miller, 1967: 128), arrived at what is tantamount to a segmental analysis. The kana characters of the writing, which correspond to moras (and have no counterpart in Chinese orthography) are customarily presented in a table in which the columns correspond to consonants and the rows to vowels. Verbs like /matu/ are fittingly called *godan* ("five-row") verbs, because, in the paradigm of such a verb, as can be seen in (5), vowels from all five rows of the table occur at the same ordinal position (Vance, 1987: 179). Moreover, Mann (1986) reports segmental awareness in fourth-grade Japanese children, a surprising finding if exposure to alphabetic orthography is taken to be essential for such awareness.

As Morais et al. point out, certain features of the kana characters may partly explain the children's awareness, and of course, as Mann points out, the kana table is part of the Japanese elementary-school curriculum. But for Japanese, and also for other languages that have favorable morphological properties, the possibility that naive phonologizing plays an important role in the development of segmental awareness must not be overlooked. It would be interesting to know whether signs of segmental awareness can be found in illiterate speakers of Japanese, or of Afro-asiatic languages in which the basic triconsonantal root structure has not been obscured by foreign borrowings.

Notes

1. Both the Egyptian and Semitic alphabets were consonantal; vowels were not regularly transcribed. But this does not indicate an imperfect awareness of segments, for, when necessary, as with proper names or with forms that would otherwise be intolerably ambiguous, the vowels were transcribed, using the letters for phonetically similar consonants. Presumably, the vowels were normally omitted in the writing because, being purely inflectional, they did not carry much information.

2. For a different view of segmental awareness in Japanese speakers, see Holender (in preparation).

3. According to Western analyses; the traditional Japanese analysis regards these verbs as having six different allomorphic stems (Vance, 1987). This issue does not affect the present argument, for a useful paradigm is available either way.

4. Daniel Holender called my attention to the possible relevance of these verbs to segmental awareness in Japanese speakers.

Acknowledgments

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