SPOKEN WORD SEGMENTATION IN ARABIC LITERATE AND ILLITERATE SUBJECTS: A PSYCHOLINGUISTIC APPROACH

Mohamed FARID
Laboratoire de Phonétique, U. F. R de Linguistique, Université Paris 7, 10, rue Charles V, 75004, Paris, France

ABSTRACT

An experiment was conducted to study the effect of alphabetic literacy on developing the ability of speech segmentation. Both Arabic literate and illiterate subjects were asked to segment progressively spoken Moroccan Arabic sentences.

The results showed that literates were able to reach the level of phonemes in their segmentation, whereas illiterates reflected a syllabic procedure of speech segmentation and were unable to segment phonemically.

We conclude that the level of phonological awareness, that is the ability to consciously recognize the internal phonemic structure of spoken words, is higher in Moroccan Arabic literates than in illiterates. This result speaks in favour of literacy having a crucial role in determining the level of processing which a listener can reach.

INTRODUCTION

The cognitive processes underlying speech segmentation make up a central topic in psycholinguistic studies. In the last decade, cognitive psychologists have been interested in studying the ability to segment speech signal into its component units. Some psycholinguists proposed the notion of phonological awareness [1]. Phonological awareness refers to a special kind of phonological representations. It is a type of phonological knowledge which differs from the phonology used in language production and comprehension. In other words, phonological awareness refers to conscious representations of the phonological properties and constituents of speech. Some studies claimed that phonological awareness is logically related to reading and spelling acquisition in an alphabetic system [2]. More recently, some researchers [3] have considered this ability to be a crucial component of reading and spelling. Its development is dependent on the learning of reading and spelling.

There are three levels of phonological awareness: word awareness, syllable awareness and awareness of phones (sub-syllabic units like onset and rime). The phonological awareness hypothesis is supported by some psycholinguistic studies showing that preschool children like illiterates were unable to manipulate speech segments at a sub-morphemic components level [4 and 5].

Subjects

The experiment was run in Paris. Two groups of subjects participated in it: illiterate adults and literate adults. The illiterates were eight subjects (2 females and 6 males aged 30 to 65). They were Moroccan immigrants having lived in Paris for many years. They were all of peasant origin and none had received any reading instruction at any time. They speak poor French. The literate subjects administered a reading test at the end of the experiment. It consisted in reading as fast and as accurately as possible 120 Arabic words, most of them verbs and nouns (65), the majority of which were bisyllabic (52) or trisyllabic (42). The results showed a clearly discontinuous distribution, suggesting the presence of two types of subjects who will be called better and poorer readers. Better readers read over 60 words/min and did not make errors. Poorer readers read less than 60 words/min and made errors. Ten better readers (2 females and 8 males) aged 22 to 31 were selected. They were students in a Paris university and had received, at least, bilingual instruction in reading and writing both Arabic and French.

The poorer readers were eight subjects (3 females and 5 males) aged 21 to 51. All were workers and had stopped their
schooling in primary school. They read and wrote poorly in Arabic and French.

Task and Procedure
The subjects listened to recorded sentences and were asked to say only part of a sentence, then only a subpart of the part, and so on, until they could not go any further: each subject segmented progressively all the sentences that served as trials.

Results
Mean percents of segmentation types are presented in Table 1. These were based on the number of responses produced by each subject on each sentence. Five types of isolated linguistic units were selected for the analysis: (1) phones (consonants), (2) syllables, (3) one word, (4) two words, and (5) sequences of words (more than two words).

Illiterate subjects had a higher performance in units "one word" (32.54%). This isolated linguistic unit is very significant in the process of segmentation in illiterates. Performance with "phones" significantly differed from "syllables" (t(9)= 1.48, p<.005). Also performances on phone and "one word" were significantly different (t(9)= 6.20, p<.001).

Nevertheless, poorer readers showed a similar performance in segmenting sentences in relevant linguistic units. But, one notices that this group of subjects had a higher performance in isolating "more than two words" (35.17%). No difference was revealed between isolating "one phone" and "one syllable" (t(9)= 0.77), but the difference was significant between "one phone" and "one word" (t(9) = 2.16, p<.05). Poorer readers performed well progressive segmentation from "one word" to "more than two words".

Better readers reached, without difficulty, the phone and the syllable levels. This gives further support to the hypothesis that better readers have the ability to reach the phonemic and syllabic units in a progressive segmentation task. Analysis of variance (ANOVA) performed on subject's responses yielded a significant effect of alphabetic literacy (F(4,25) = 10.84, p<0.005).

<table>
<thead>
<tr>
<th>Isolated units</th>
<th>Illiterate</th>
<th>Poorer readers</th>
<th>Better readers</th>
</tr>
</thead>
<tbody>
<tr>
<td>One phone</td>
<td>23, 12</td>
<td>26, 63</td>
<td>50, 25</td>
</tr>
<tr>
<td>One syllable</td>
<td>25, 08</td>
<td>26, 76</td>
<td>48, 16</td>
</tr>
<tr>
<td>One word</td>
<td>32, 54</td>
<td>33, 90</td>
<td>33, 56</td>
</tr>
<tr>
<td>Two words</td>
<td>27, 40</td>
<td>31, 51</td>
<td>41, 10</td>
</tr>
<tr>
<td>more than two words</td>
<td>20, 91</td>
<td>35, 17</td>
<td>43, 92</td>
</tr>
</tbody>
</table>

DISCUSSION
In the Arabic alphabet, it is difficult to segment a syllable into a consonant and a vowel because vowels are represented by diacritics in the writing system. The diacritics do not have an independent status as consonants do. For example the syllable [ka] is written in Arabic as a consonant plus a diacritic mark. This concerns the written syllable in Arabic. For the spoken syllable, the problem of analysis is not similar.

The results obtained in the present experiment showed that better readers have a more developed phonemic awareness than poorer readers and illiterates. They were able to isolate correctly the small sub-lexical units (phonemes and syllables) which are components of the phonemic structure of words and sentences. The development of this awareness is explained by their reading and spelling practice in an alphabetic system. Thus, cognitive capacities can help the speaker-hearer manipulate speech units. These manipulation of the segmental structure of words is a result of a conscious and intentional processing of speech elements. Moreover, both reading and spelling imply, in addition to the ability to perceive minimal phonetic distinctions, an explicit knowledge of the phonetic structure of speech. Furthermore, to segment progressively spoken sentences requires that subjects develop a special strategy in the segmentation process. First, they must memorize the whole sentence and then make a time according to their metalinguistic and linguistic knowledge. Illiterates and poorer readers do not have sufficient metalinguistic knowledge to reach such sub-lexical units. The fact that illiterates are not aware of the phonetic structure of speech does not imply, of course, that they do not use segmenting routines at this level when they listen to speech [4].

The hypothesis that reading and spelling knowledge may develop the capacity to segment speech into its small components is confirmed. This study is a comparison of performances between illiterates and literates in speech segmentation. It deals with the effect of alphabetic literacy on spoken word recognition and segmentation. It is a contribution to understand cognitive processes and the mechanisms of language processing in general, and speech segmentation in particular.

REFERENCES