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The effects of alphabetic-reading competence on language representation in bilingual Chinese subjects

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Summary. The metaphonological abilities of two groups of bilingual Chinese adults residing in the Netherlands were examined. All subjects were able to read Chinese logograms, but those in the *alphabetic* group had, unlike those in the *non-alphabetic* group, also acquired some competence in reading Dutch. In Experiment 1, strong, significant differences between the two groups were obtained in the task of deleting the initial consonant of a Dutch spoken pseudo-word and also in a task consisting of segmenting a sentence into progressively smaller fragments, but there was no difference in a rhyme–nonrhyme classification task with pairs of Dutch words. In the latter task, the subjects in the two groups performed at a near-ceiling level. In Experiment 2, a significant difference was obtained again for the consonant-deletion task and no difference with an initial syllabic-vowel-deletion task, but the non-alphabetic subjects performed at a significantly lower level than the alphabetic subjects in the rhyme-judgement task. Taken together, these results are consistent with the earlier evidence that learning a non-alphabetic orthography does not promote awareness of the segmental structure of utterances. On the other hand, they confirm, for a population of Chinese readers, the conclusion drawn earlier from work with illiterate subjects that explicit instruction is more critical for the development of segmental representations of language than of representations of higher levels such as those of rhymes and syllables.

Introduction

A notion that plays a central role in current conceptions of the development of literacy is that the acquisition of reading and writing competence requires a form of explicit knowledge of those aspects of the phonology of the language that are relevant to the orthography at hand. Such *phonological awareness* would not be necessary for speech communication. Specific reading-acquisition difficulties would occur when the orthography represents aspects of the phonology that are not discovered spontaneously by the speaker/listener.

Empirical support for these notions has been obtained in the case of alphabetic orthographies that operate essentially at the level of phonemic segments (for recent discussions, see Morais, Alegria, & Content, 1987; Wagner & Torgesen, 1987; Bertelson & de Gelder, 1989, 1991; de Gelder, 1990; Morais, 1991; Bowey & Francis, 1991). On the one hand, arguments have been derived from the existence of correlations between various measures of phonological awareness and success in reading acquisition (Lundberg, Olofsson, & Wall, 1980; Bradley & Bryant, 1983; Stanovich, Cunningham, & Cramer, 1984; Bryant, MacLean, Bradley, & Crossman, 1990) and from the effectiveness of experimental training in phonological manipulations (Bradley & Bryant, 1983; Lundberg, Frost, & Petersen, 1988). On the other hand, it has been shown that some aspects at least of phonological awareness – those concerned with the segmental level of description – do not emerge spontaneously as results either of maturation of the linguistic machinery or of the practice of speech communication. The basic relevant finding was that the capacity to analyse utterances into phonemes is generally absent from individuals who, although competent speakers/listeners of the language, have not been submitted to specific training of the kind generally involved in alphabetic-reading instruction. Pre-reading children, for instance, have generally been found to perform poorly in tasks involving the explicit manipulation of phonemes (Rosner, 1971; Liberman, Shankweiler, Fisher, & Carter, 1974; Alegria & Morais, 1979). On the other hand, their performance improves rapidly after reading instruction has begun.

The evidence from pre-school children is, however, not completely conclusive, for there are also studies that report non-negligible performance on phonemic tasks in such subjects (Fox & Routh, 1975; Lundberg et al., 1980; Stanovich et al., 1984; Treiman, 1985). We have argued

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elsewhere (Bertelson & de Gelder, 1991) that informal tuition in speech analysis, or even in reading, received at home (a factor that is very difficult to control for) complicates the interpretation of data obtained from children of literate families. A similar point was made by Wagner and Torgesen (1987). Much stronger evidence for the non-spontaneity of explicit segmental analysis can be obtained by examination of adult subjects who have not learned alphabetic reading. It has been shown in several studies that adult illiterates perform at floor level in tasks that involve the manipulation of phonemes, such as detecting the presence of a consonant in an utterance, or deleting or adding a consonant (Morais, Cary, Alegria, & Bertelson, 1979; Morais, Bertelson, Cary, & Alegria, 1986; Bertelson, de Gelder, Tfouni, & Morais, 1989), while control subjects from the same populations, but who have the kind of alphabetic competence that results from attendance at literacy classes or from one or two years of primary schooling, performed considerably better. Low performance in phonemic analysis has also been reported for semi-literate subjects (Read & Ruyter, 1985).

Another type of comparison relevant to the effect of alphabetic-reading competence can be provided by readers of a non-alphabetic script who have also learned to read an alphabetic orthography. Read, Zhang, Nie, and Ding (1986) have taken opportunity of the existence in mainland China of an alphabetic notation of the Mandarin language, the Hanyu Pinyin, introduced in to school programs in the 1950s shortly after the establishment of the People's Republic. They applied the consonant deletion and addition tasks of Morais et al. (1979) to two groups of Chinese adults in Beijing. The subjects of the alphabetic group, who had been to school in the early years of the communist regime, had learned to read both Pinyin and simplified Chinese characters. Those of the non-alphabetic group, whose schooling had taken place before the communist take-over, had learned only the traditional Hanji characters. The latter subjects' performance was about 20% correct, a level comparable to that reported by Morais et al. (1979) for both Portuguese illiterate adults and Belgian preschoolers, while the alphabetic subjects on average reached the level (about 80% correct) typical of other alphabetized subjects.

The result of Read et al. (1986) is potentially important for at least two reasons. First, it supports the hypothesis that the metaphonological consequences of literacy depend on the phonological level at which the orthography operates: learning a logographic representation has apparently no effect on access to segments. On the other hand, the evidence it provides escapes some of the criticisms that have been addressed to the conclusions drawn from illiterate data (see Koopmans, 1987, and the reply of Bertelson, Morais, Alegria, & Cary, 1987). The additional educational experience of the alphabetic subjects was the result of an external administrative decision, which presumably affected all children in the areas in which it was applied, and was less likely than attendance at literacy classes to select particularly motivated or intelligent individuals. On the other hand, the non-alphabetic subjects had presumably benefited from a form of schooling not very different, except for the absence of Pinyin instruction, from that enjoyed by the alphabetic subjects. Hence, their low performance in the speech-segmentation tasks can presumably not be due to lack of some of the general cognitive skills promoted by school education.

Thus, the evidence based on readers of non-alphabetic orthographies can offer a useful check on that coming from studies of illiterates. It should be used more extensively. The Read et al. (1986) study was in fact rather limited in scope. Each subject was administered only 20 experimental trials, 10 with words and 10 with non-words, and performed only either the phoneme-addition or the phoneme-deletion task. Only results pooled over the two tasks are provided in the paper. Another problem is that the non-alphabetic subjects were on average older (49 as against 33) than the alphabetic subjects.

In many Western countries there are groups of Chinese people, most of whom can read Chinese characters and some, but not all, have also learned to read the local alphabetic script. This provides a form of comparison similar, but not identical, to the one explored by Read and his colleagues in Beijing. The present study was run with Chinese adults living in the Netherlands. All had learned to read Chinese writing in China or Hong Kong. Some of them had, since their arrival in Holland, learned to read Dutch alphabetic text, while others had not. The population thus offered an opportunity of examining the metaphonological effects of competence in a foreign alphabetic orthography.

Two main questions were asked. First, would the difference in performance on consonant deletion, found repeatedly between illiterate and alphabetized subjects and replicated by alphabetic and non-alphabetic Chinese subjects by Read et al. (1986), hold in this new population? The second question concerned the heterogeneity of metaphonological competence.

Starting with Liberman et al.'s (1974) classical study with the fragment-counting task, it has been shown repeatedly that pre-reading children find tasks based on segments more difficult than tasks based on higher-level phonological units such as syllables (Alegria & Morais, 1979; Lundberg, Olofsson, & Wall, 1980; Stanovich, Cunningham, & Cramer, 1984) or rhymes (Lenel & Cantor, 1981; Kirtley, Bryant, MacLean, & Bradley, 1989; Bowey & Francis, 1991). In the comparison between illiterate and alphabetized adults, Morais et al. (1986) found that in a rhyme-judgement task, illiterates performed at a much higher level (about 65% correct) than in consonant deletion (19%), but still significantly[1] lower than alphabetized subjects (about 92%). In the Bertelson et al. (1989) study, a small difference between illiterate and alphabetized subjects in performance on a rhyme-judgement task failed to reach significance. In both studies, illiterates performed initial-segment deletion better when the target was a syllabic vowel than when it was a consonant. In the Morais et al. (1986) study, the alphabetized subjects still exceeded the illiterates in vowel deletion, while the two groups were both at ceiling level in the Bertelson et al. (1989) study.

[1] No significance level was given in the paper. With 39 *df*, $t = 2.73$, $p < .005$.

Table 1. Experiment 1: Performance on reading tests (ranges in parentheses)

	Non-Alphabetic	Alphabetic
N	14	12
Age	40; 6 (25–52)	28; 7 (18–49)
% correct on reading tests		
Chinese words	100	98 (75–100)
Dutch words	12.5 (0–60)	87.9 (65–100)
Dutch pseudo-words	0.0	69.1 (50–100)

Table 2. Experiment 1: Mean percentage of correct responses on experimental tasks (range in parentheses)

Task	Non-Alphabetic	Alphabetic	Significance
Rhyme Judgement	77.5 (35–90)	81.6 (65–90)	NS*
Progressive Fragmentation	0.0	40.0 (0–100)	.005+
Consonant Deletion	14.2 (0–65)	58.3 (10–90)	.001*

+ Fisher's exact-probability test (Siegel, 1956)
* *t* test

What these findings, taken together, suggest is that whereas the acquisition of explicit phonemic analysis requires specific tuition, the ability to deal with higher-level units such as syllables and rhymes may develop more spontaneously. We also wanted to know whether evidence of heterogeneity could be obtained in the comparison between Chinese readers who had and did not have alphabetic-reading competence.

Experiment 1

Chinese subjects living in Holland, who since their arrival either had or had not developed competence in Dutch reading, were submitted to a small battery of metaphonological tests involving rhyme judgement, progressive phonological fragmentation, and initial-consonant deletion, all run with Dutch or Dutch-like material.

Method

Subjects. The subjects were employees in Chinese restaurants in Tilburg, or their relatives. They came mostly from Hong Kong, with a minority from Beijing, Wencheng, and Chekiang. All were native speakers of Chinese and could speak some Dutch. All had learned to read Chinese characters in China. Sixteen had had some instruction in reading Dutch at literacy classes in Holland. Upon interrogation, they all denied any familiarity with Hanyu Pinyin. This was to be expected of the subjects coming from Hong Kong, where Pinyin is not normally taught, but somewhat surprising for those from the mainland, where it figures in all first-grade programmes. Knowledge of Pinyin is apparently not as universal in mainland China as has been assumed in the literature.

All subjects were administered three tests consisting of reading aloud (a) 20 common Dutch words, half monosyllabic and half disyllabic; (b) 20 Dutch pseudo-words, i.e., non-words conforming to Dutch orthographic and phonotactic rules (10 monosyllabic and 10 disyllabic); and (c) 20 common Chinese characters. They were divided into two groups according to performance on pseudo-word reading: those whose score was 50% or more formed the *alphabetic* group ($N = 12$, 6 female, 6 male) and those who scored zero formed the *non-alphabetic* group ($N = 14$, 8 female, 6 male). Five subjects whose score fell between these limits were excluded from the analysis. The criterion of admission into the alphabetic group, which is rather lax, is admittedly arbitrary. The reading performance of the subjects in the two groups is presented in Table 1. The non-zero mean score for the non-alphabetic subjects for Dutch words is due essentially to three subjects who were able to read 13, 12, and 10 of the 20 items respectively.

As is shown in Table 1, the non-alphabetic subjects tend to be somewhat older than the alphabetic ones. The possibility that this difference would have influenced performance on the metaphonological tests will be considered in the Results section. All alphabetic subjects had followed literacy training in Dutch for between a few months and one year.

Tasks. Three experimental tasks were administered in the following order.

(1) *Rhyme judgement.* Subjects had to say whether the words in a pair uttered by the experimenter rhymed or not. Twenty pairs of common monosyllabic Dutch words, 10 of which rhymed (e.g., DAK–LAK) and 10 of which did not (e.g., KAT–BAL), were presented. The nature of the task was conveyed by the provision of two examples of rhyming pairs and two examples of non-rhyming ones.

(2) *Progressive speech fragmentation.* The experimenter uttered a sentence, and the subject was asked to say only part of it, then part of the produced part, and so on, until he or she could go no further. This task has previously been used by Morais et al. (1986). It was applied to five sentences 4–6 words long. The performance was scored by counting the number of final responses that consisted of one single phonemic segment.

(3) *Consonant deletion.* Subjects had to produce what was left of 10 monosyllabic CVC pseudo-words and of 10 disyllabic CVCVC ones read by the experimenter after the deletion of the initial consonant. For each set of trials, the instruction was conveyed by two examples, such as "When I say KUR, you say UR."

Procedure. Subjects were tested in the restaurant where they worked, or, in a few cases, at home. All testing was carried out in Dutch, but the assistance of an interpreter was sometimes resorted to for translating the instructions into Chinese. The need for such translation occurred for both alphabetic and non-alphabetic subjects.

Results

The mean percentages of correct responses in the experimental tasks are given in Table 2. The differences between the two groups were submitted to one-tailed *t* tests and the significance levels appear in the table.

In rhyme judgement, there was only a very small difference in performance between the two groups, which was non-significant. In both progressive fragmentation and consonant deletion there were substantial and highly significant differences.

No non-alphabetic subject produced a single segmental response in free fragmentation. The subjects of this group

also performed poorly in consonant deletion, except for three who produced respectively 8, 9, and 13 correct responses out of 20. Examination of the other data concerning these three subjects afforded no explanation of their high performance. The mean performance of the alphabetic subjects in consonant deletion is somewhat inferior to that obtained in other studies with alphabetized subjects, but is strongly influenced by the data from one subject who scored only 10%. When this subject was removed from the analysis, the mean percentage correct rose to 69.5%, which is closer to the usual result.

Since the two groups were not matched exactly in age, the results were examined for a possible influence of this variable on performance. In the consonant-deletion task, the product–moment correlation between percentage of correct responses and age was for the alphabetic subjects exactly .01. For the non-alphabetic subjects, there was not enough variation in the performance score to allow a meaningful use of correlation. In the rhyme-judgement task, the correlation between percentage of correct responses and age was .11 (NS). Thus, there is no indication that the age factor may have influenced the profile of differences between the present two groups of subjects.

Discussion

Just like the readers of Pinyin studied by Read et al. (1986), the present alphabetically trained Chinese subjects were much superior to the non-alphabetically trained subjects in segment-manipulation ability. Their superiority was demonstrated in both the initial-consonant-deletion task and the progressive-fragmentation task. On the other hand, no difference between the two groups was apparent in the rhyme-judgement task, in which the two groups were equally successful. The interaction between the kind of phonological unit involved in the task and the orthographic experience of the subjects obtained in previous studies with alphabetic literates and illiterates (Morais et al., 1966; Bertelson et al., 1989) would also seem to hold in the case of Chinese readers, with or without alphabetic experience respectively.

One limitation of the present study is that the main inter-task comparison was the one between initial-consonant deletion (a production task) and rhyme judgement (a same–different-decision task). In other studies in the same series (Morais et al., 1986; Bertelson et al., 1989) consonant deletion was compared to another production task, syllabic-vowel deletion, which involves exactly the same cognitive operations and produces a directly comparable performance measure, while involving a target unit of different linguistic status. In both studies the effect of literacy was much stronger for the consonant than for the vowel task. In Experiment 2, vowel deletion will be used together with consonant deletion on the same subjects.

Experiment 2

This new experiment was carried out with two new groups of subjects from the same general population. It involved two of the tasks in Experiment 1, rhyme judgement and consonant deletion, and added vowel deletion.

Table 3. Experiment 2: Description of the groups of subjects and performance on reading tests (ranges in parentheses)

	Non-Alphabetic	Alphabetic
N	9	12
Age	31;5 (17–36)	30;7 (16–41)
% correct on reading tests		
Chinese words	94.4 (50–100)	98.7 (90–100)
Dutch words	16.1 (0–45)	96.6 (85–100)
Dutch pseudo-words	0.0	80.4 (55–100)

Another difference from the procedure of Experiment 1 was the use of continuous corrective feedback. Content, Kolinsky, Morais, & Bertelson (1988) found that preschool children, who originally could not perform consonant deletion, improved significantly within a single session when provided with knowledge of results on every trial. On the basis of this finding, Bertelson et al. (1989) proposed that the procedure used in the previous experiments in the series (and in Experiment 1), of having the subjects perform experimental trials without knowledge of results, prefaced by an arbitrary number of demonstration trials with feedback, provided an ambiguous measure of segmentation ability, and that a more satisfactory procedure for comparing different populations consisted of measuring performance progress during a series of trials with continuous corrective feedback. They applied the new procedure in their Brazilian study, and found that in consonant deletion illiterates did not profit from feedback, but that readers, who started at the same low level of performance as illiterates, improved rapidly. Rapid improvement in consonant-deletion-performance with continuous feedback was obtained in illiterate adults by Morais, Content, Bertelson, Cary, & Kolinsky (1988), but with instructions that provided some elementary tuition in phonemic segmentation, which makes comparisons with the other results difficult.

Method

Subjects. The testing involved 9 non-alphabetic and 12 alphabetic subjects, defined by the same criteria as in Experiment 1. As can be seen in Table 3, the matching by age between the two groups was better than in Experiment 1. All the subjects came from Hong Kong and had received primary-school education there. All the subjects in the alphabetic group had attended literacy classes in the Netherlands. Three subjects in this group admitted to some knowledge of Pinyin. Recourse to an interpreter was needed for three subjects in the non-alphabetic group and for four in the alphabetic group, or one third of the population of each group.

Tasks. Each subject was administered the *rhyme-judgement* task and the *initial-consonant-deletion* task with the same material as in Experiment 1, and in addition an *initial-vowel-deletion* task, in which he or she had to delete the initial syllabic vowel of 10 disyllabic (ALEM–>LEM) pseudo-words. A corrective-feedback procedure was applied throughout

Table 4. Experiment 2: Mean percentage of correct responses on experimental tasks. In parentheses: range or significance level

Task	Non-alphabetic	Alphabetic	*t* test
Rhyme Judgement	63.7 (40–95)	92.9 (85–90)	5.07 (p <.001)
Vowel Deletion	50.0 (0–90)	69.1 (10–100)	1.46 (p >.10)
Consonant Deletion	2.7 (0–10)	47.0 (5–85)	4.69 (p <.001)

for each task. For rhyme judgement, the experimenter explained that on each trial she would enunciate two words that would sometimes rhyme and sometimes would not, and gave two examples of each category. She then presented the 20 experimental pairs, half of which rhymed and half of which did not. On each trial, the subject first repeated the items, and then said "rhyme" or "don't rhyme." The experimenter then provided corrective feedback by saying either "very well" or "no, you should have said ...." For vowel deletion, the experimenter explained that on each trial she would enunciate something, and that the subject had to repeat it without the beginning sound, and gave two examples of the target and of the correct response ("When I say 'ALEM,' you should answer 'LEM'"). She then enunciated the 10 items, and provided corrective feedback by saying either "Very well" or "No, you should have said ...." For consonant deletion, the procedure similarly consisted of giving two examples of item and correct response, followed by presentation of the 20 experimental items, with corrective feedback on each trial.

Results and discussion

For each task, performance was first examined in sucessive blocks of five trials each. No improvement was apparent in any task. It was thus decided to limit the analysis of the data to mean performance per task in the two groups of subjects, which appear in Table 4.

For the deletion tasks, there is a strong and significant difference between the two groups in the consonant task, and a small non-significant difference in the vowel task. The main task-related difference is observed in the non-alphabetic subjects who were all at floor level in consonant deletion, but among whom six out of nine gave 50% or more correct responses in vowel deletion. Among the alphabetic subjects, four were below 30% correct in consonant deletion, and one in vowel deletion. For rhyme judgement, the present alphabetic subjects were significantly superior to the non-alphabetic ones. A similar effect of alphabetic literacy on rhyme judgement was previously reported by Morais et al. (1986), albeit with a somewhat different rhyme-classification task.

There are a number of possible explanations for the fact that the sort of corrective feedback that was effective with the pre-schoolers of Content et al. (1986), was not effective with the present non-alphabetic subjects. Candidate factors are age and the correlated closeness to school-like situations, and the fact that in the present study testing occurred in a foreign language. The available evidence affords no reasonable choice among these possibilities. On the other hand, it should be clear that the present results should not be taken as putting into question the interest of the corrective procedure.

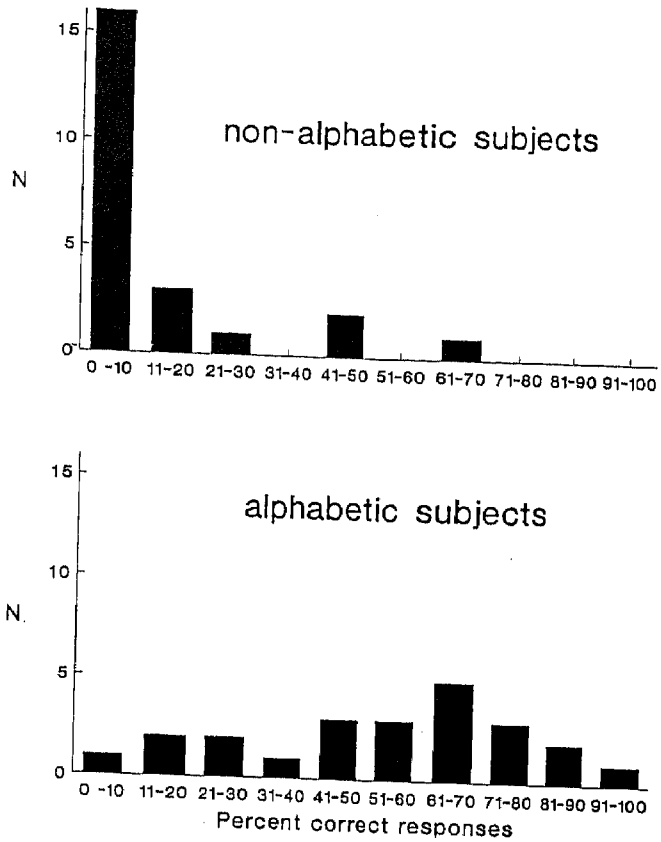

Fig. 1. Experiments 1 and 2: Initial-consonant deletion. Individual percentages of correct responses in the two groups of subjects. Above: non-alphabetic; below: alphabetic

Given the absence of any learning effect in Experiment 2, the data from the two experiments for consonant deletion and for rhyme judgement have been pooled. Figure 1 shows the individual scores in consonant deletion, separately for the two types of subjects. Non-alphabetic subjects have an inverted J distribution, with the majority scoring 0%. Alphabetic subjects show a more symmetrical distribution, centred on the mean of 52%. Figure 2 shows the scores for rhyme judgement. In the alphabetic group, nearly half the subjects performed at ceiling level, which was not the case in the non-alphabetic group. The difference between the two groups in mean rhyme-judgement performance is significant, $t = 4.41$; $df = 42$; $p > .001$.

General discussion

Since the corrective-feedback procedure introduced in Experiment 2 had no effect on mean performance, the results of the two experiments can be discussed together. The general profile of differences that emerges for our two populations of bilingual Chinese subjects is very similar to the one obtained in the previous studies comparing either alphabetic illiterate and literate subjects (Morais et al., 1979; Morais et al., 1986; Bertelson et al., 1989) or readers of Chinese who had or did not have training in the alphabetic Pinyin system (Read et al., 1986). The inability of

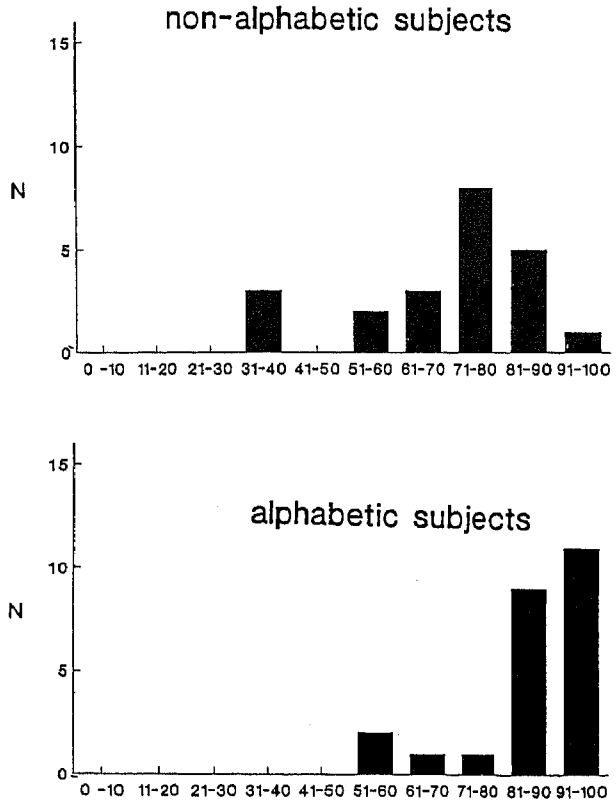

Fig. 2. Experiments 1 and 2: Rhyme judgement. Individual percentages of correct responses in the two groups of subjects. Above: non-alphabetic; below: alphabetic

subjects who had no alphabetic training to manipulate consonants, and the strong superiority of subjects who have benefited from such training, are replicated.

On the other hand, the study extends the pattern resulting from previous studies. There are two important points. First, the study by Read et al. (1986) showed that segmental-analysis ability was promoted in Chinese readers by the fact of learning an alphabetic notation for their own native language. In the present study, the effect was shown to hold for the case of learning to read the alphabetic representation of a foreign language.

The second point is that the interaction between alphabetic training and the kind of unit to be manipulated, obtained previously in comparisons between illiterate and literate populations (Morais et al., 1986; Bertelson et al., 1989), is replicated in a comparison involving logographic readers who had or had not received additional alphabetic training. The clearest results are obtained with the deletion tasks: significant inter-group difference in consonant deletion, and not in syllabic-vowel deletion, just as in Morais et al. (1986) and in Bertelson et al. (1989). With the rhyme-judgement task, the result is at first sight more ambivalent – no difference in Experiment 1, but a significant difference in Experiment 2. The ambivalence, however, is not peculiar to the present study, for the first result replicates that of Bertelson et al. (1989), while the second is like that of Morais et al. (1986). As a matter of fact, the discrepancy results from the fact that in Experiment 1, the non-alphabetic subjects are, like the alphabetic ones, close to ceiling, while they perform at a lower level in Experiment 2. Although we have no explanation to offer for the difference, the two results are still compatible with the conclusion from earlier studies that sensitivity to rhyme, unlike sensitivity to segments, develops to some extent spontaneously, and independently of school experience, but can still be promoted by reading instruction.

As in other studies in the series, the results of some individual subjects deviated from the general trends. As appears in Figure 1, five alphabetic subjects performed unusually poorly (25% correct or less) in consonant deletion. This kind of failure, which can be due to lack of attention or understanding, is not really embarrassing for the notion of the role of alphabetic training in promoting phonological awareness. More serious are the cases of the three non-alphabetic subjects in Experiment 1 who had substantial success (40% correct or more) in the same task. Isolated cases of success in phonemic segmentation have been observed in previous studies with alphabetic illiterates (Morais et al., 1979; Morais et al., 1986; Read et al., 1986). In future studies, such subjects should obviously be examined in more detail than has been the case so far. In the meantime, the observations call for some caution in pronouncements regarding the conditions under which segmental representations can be developed.

In the line of research to which the present study belongs, attention has generally been focused on two main levels of phonological description: that of segments (or phonemes) and that of syllables. When rhyme-judgment tasks were included, it was under the more or less implicit assumption that the relevant phonological fragments were themselves syllables[2]. Several authors have recently drawn attention to the possible role of *syllabic constituents*, such as the demisyllables onset and rime, in the development of language representations. It has been proposed that representations of onsets and rimes might occupy a place in development intermediate between those of syllables and of segments. They would become available later than representations of full syllables, but earlier, and more spontaneously, than representations of individual segments (Treiman, 1985, 1987, 1991; Kirtley et al., 1987). The hierarchical theory of the syllable (Clements & Keyser, 1983; Goldsmith, 1990) is based on convincing linguistic evidence and it is certainly important to examine its implications for the development of metalinguistic representations. However, the particular developmental hypothesis proposed by Treiman does not follow necessarily from the theory, and it needs specific empirical support. Although this is not the place for an extensive review of the existing evidence, we would suggest that it fails short of being fully convincing. For instance, the better capacity of pre-readers to deal with initial consonants when they function as onsets than when they are only part of a cluster onset is suggested by data from Treiman (1985, 1991) and from Kirtley et al., (1987), but Kirtley et al.'s critical findings were not replicated by Bowey and Francis (1991).

[2] In most cases, rhyming involves identity of the rime of the final syllable, a fragment that could be a syllable by itself. There are also cases – e. g., in Portuguese poetry – of rhymes involving the rime of the penultimate stressed syllable plus the last unstressed syllable (jan*ela*, cand*ela*). This fragment could form two syllables.

More fundamentally, it is not clear how the effect of demisyllable status per se (e.g., onset vs. coda) could be isolated from those of necessarily correlated features, such as location in the syllable. But whatever the case, the hypothesis is fully consistent with the notion of the developmental heterogeneity of metaphonological competence, so that its demonstration would imply no reconsideration of the present evidence based on the contrast between syllables and segments.

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