

## THE ROLE OF ARABIC ORTHOGRAPHIC LITERACY IN THE PHONOLOGICAL AWARENESS OF TUNISIAN CHILDREN

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### ABSTRACT

This article investigated the effect of Arabic orthography on the phonological awareness acquisition. A sample of Tunisian primary school and preliterate were asked to manipulate syllables and phonemes through segmentation, counting and deletion tasks. Results showed that manipulation of syllables is far easier than that of phonemes. Also, the deletion of phonemes was an easier task than phoneme segmentation and counting, in contrast to findings attendant to alphabetically written languages such as English and Hebrew. Data were interpreted by the nature of Arabic orthography and diglossia.

**Key Words:** Early childhood, Phonological awareness, Reading literacy, Arabic orthography, Diglossia.

### INTRODUCTION

Phonological awareness refers to the ability to hear and distinguish sounds (i.e., recognizing, adding, deleting, and moving sounds). It is crucial for learning to read in alphabetically written languages like Arabic and French. According to Gillon (2004), phonological awareness is a reliable predictor of more advanced reading ability, which makes it subject to substantial research not only from linguistics but also from educational psychology. Phonological awareness is one component of a larger phonological processing system which differs from other phonological sub-skills due its meta-linguistic character as it requires conscious awareness and reflection on the structure of language.

The role of phonological awareness in the reading acquisition in alphabetic scripts originates from systematic relationship between the letters in printed words (or graphemes) and the phoneme sequences underlying spoken language (Byrne, Freebody, and Gates, 1992). Phonological awareness has been empirically investigated in many alphabetically written languages such as English (e.g., Bradely and Bryant, 1983), French (Gillon, 2004) and Hebrew (Bentin, Hammer and Cahan, 1991; Oren, 2001). According to Morais et al. (1987), phonological awareness is a series of organized abilities, some of which are acquired long before learning to read, and others later. The earlier aspects of phonetic awareness (i.e., manipulation of syllables, rhymes and alliterations) constitute a prerequisite for learning to read. The later aspects correspond to a phonemic awareness and require a higher level of abstraction. The latter cannot appear before the acquisition of the reading skill in an alphabetical writing system.

## BACKGROUND OF THE STUDY

Gombert (1992) considers that the cognitive activities determine two sets of phonological behavior, epiphonological (i.e., intuitive) and meta-phonological. The first refers to linguistic knowledge that is more or less automatically applied spontaneously and intuitively whereas the meta-phonological behavior corresponds to the conscious and thoughtful activity on the components of speech. These two sets are more distinguished by the quality than by the degree of the processing in use. Meta-linguistic ability could appear in the manipulation of phonemes as well as for syllables. This conception (1992) differs in part from that of Morais et al. (1987) who confined the meta-phonological ability to phonemic units.

With regard to the Arabic orthography, it includes 28 letters, all consonants except three long vowels: /a:/, /u:/ and /i:/ and short vowels are represented by diacritical dots. Most Arabic consonants have more than one written form (e.g. /f/ = ف) depending on whether they occur in the beginning, middle, or end of a word. This specificity brings into existence two forms of spelling: with or without vocalisation. The vowels added through a consonantal skeleton by means of diacritical marks produce a shallow orthography whereas vocalisation is missing, orthography is deep and the word behaves as homograph that is semantically and phonologically ambiguous: the unvoiced word /k-t-b/, for example, supports several alternatives as /kataba/ (he wrote), /kutiba/ (it was written), /kutubun/ (books), etc. Voweled spelling is taught to novice readers, while unvoiced spelling constitutes the standard form and is gradually imposed at later reading literacy stages. These linguistic characteristics infer that phonological lexical representations developed by Arabic literate children operate on the basis of a clear distinction between consonants and vowels. Therefore, the position of consonants is more salient than that of vowels.

Arabic is characterized by diglossia that is the use of two language varieties: Modern Standard Arabic that is the official language taught at schools and colloquial Arabic that is the language of everyday communication outside official settings (Saiegh-Haddad, 2005). Diglossia gives rise to great phonological alteration during the shift from Modern Standard Arabic to colloquial Arabic. But the most important alteration have affected vowels and spared consonants (Abu-Rabia, 2001). For example, words like /qalam-/ (a pencil), /kita:b-/ (a book), and /tifl-/ (a child) in Modern Standard Arabic are pronounced respectively /qlam/, /kta:b/ and /tful/ in colloquial Arabic.

We assume that this phonological variability is determined by the morphologic structure of Arabic. Our hypothesis is that oral processing of Arabic words is different from that of English words. Acquisition of the meta-phonological ability in Arabic is closely determined by the consonantal part of the linguistic system. As we hoped to examine the meta-phonological abilities with children at different grades, we proposed tasks that could avoid as much as possible the risks of floor and ceiling effects. This might be approachable through considering the nature of the sound to be manipulated in light of the large number of tasks with various levels of difficulty exerted on both syllables and phonemes.

According to Gombert (1992), we retained three tasks which could influence one's meta-phonological ability with respect to syllables and phonemes. These included deletion, counting, and segmentation tasks. In the deletion task, the sound to be deleted was set at the beginning, in the middle or at the end of the given utterance. The phonemic deletion was exclusively applied to the consonants in order to get pronounceable sequences and also because of the prevalence of the consonantal structure in Arabic.

According to Gombert (1992), the cognitive demands should be different for each task. The order of success should proceed as follows: counting, segmentation, deletion. As suggested by MacDonald and Cornwall (1995), success in deletion depends on the position of the sound to be deleted within a given utterance. Syllable deletion at the beginning or at the end of the utterance should be easier than that in the middle. They claimed

that the deletion of middle-position sounds would require greater cognitive effort since children first proceed to the analysis of the word stimulus to locate the target syllable/phoneme and then to a synthesis in order to recompose the remaining syllabi. Such processing operations might be highly testing on short-term memory for capacity-limited children.

Like in other alphabetically written languages (e.g., French and Hebrew), it is expected in the present study that Arabic does not deflect from the rule that literacy of the alphabetic system would have strong bearing on children's phonological awareness, and so to their reading abilities. However, unlike the abovementioned languages, the comparatively complex nature of the Arabic morpho-syntactic character and the phenomenon of diglossia are hypothesized to overburden Tunisian children's reading processing abilities.

## METHODOLOGY

### Participants

Subjects were 110 Tunisian children enrolled in primary education schools and kindergartens, largely of low to middle class backgrounds. Girls and boys were evenly represented. There were 20 preliterate kindergarteners with a mean age of 5.6 years. Students of primary education were 30 in first grade (G1), 30 in second grade (G2), and 30 in third grade (G3). Their mean ages for each group were as follows: 6.8 years for Grade 1, 7.9 years for Grade 2, and 8.11 years for Grade 3. Each grade was represented by two sub-groups, with 15 informants each.

These groups were screened out of a larger sample that had participated in a collective test of word identification written in vowelized Arabic. The test was largely inspired by a test design developed in Khomsi (1993).<sup>1</sup> The preliminary sample was composed of 240 students, with 80 students corresponding to each grade. They were randomly chosen among four public schools. Two criteria were adopted for subject selection: (a) classification according to the student's global score in the collective test, and (b) the teacher's assessment of the student's reading mastery. In the event of disagreement between these two criteria, the subject was excluded from the sample. After the screening procedure, a sample of informants was selected for the subsequent experimental procedure. They were divided into two sub-groups under each grade category, except for the group of kindergarteners. They were respectively operationalized as Good Readers, Poor Readers, and Preliterate.<sup>2</sup>

### Instruments

In order to elicit data attendant to the phonemic and syllabic treatment of words in Arabic, two sets of measures of meta-phonological abilities composed of 72 items: 46 items for the syllabic set (Appendix 1) and 46 items for the phonemic set (Appendix 2). We suggested the vowelized script instead of the unvowelized one because it is usually used at Tunisian primary schools for learning to read. The items were made up of two or three syllables in the syllabic condition and of one or two syllables in the phonemic condition. Among each measure set, children were asked to manipulate 12 colloquial Arabic words, 12 Modern Standard Arabic words, and 12 pseudo-words. Manipulation of syllables and phonemes was carried out by means of three tasks: counting, segmentation and deletion.

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<sup>1</sup> The Khomsi Test was specifically designed to French-speaking dyslexic children. The test is composed of two main rubrics: word identification and word reading comprehension. The present study focused on the main part and the chief change was to opt for words in Arabic instead of French.

<sup>2</sup> Mention of these terms in capitalized font accounts for their use as between-subjects variables and not simplistic measures of judgment. Also, the term *Preliterate* was preferred to *Kindergartners* because the latter may include subjects who might have received some instruction in alphabetic literacy.

The tasks were administered to both preliterate and literate children in small groups that did not exceed fifteen subjects. The instructions were given to the informants in colloquial Arabic. We used "large sound" and "small sound" terms to refer to syllable and phoneme, respectively. In the counting and the segmentation tasks, the utterance was pronounced and the child was asked to repeat it and to count by his fingers the number of syllables or phonemes it involved. Then he (or she) was asked to articulate the sounds s/he had just counted, separately and in order. In the deletion tasks, the child was asked to say what remained when one sound was removed from the utterance.

Each subject was tested individually in a relatively quiet room at the school and the test required between five to ten minutes for each subject. Prior to the administration of each data elicitation task, every child had to perform three practice items. S/he was then asked to repeat the demonstration trial. Upon completion of the trial, the test items were presented. Each correct response was followed by confirmation. We corrected any incorrect responses and demonstrated the correct response. Each child's score consisted of the number of correct responses.

## RESULTS

The results reported in the present study were presented across two main conditions: the syllabic condition and the phonemic condition. As far as the syllabic condition is concerned, descriptive statistics of the data gleaned by the aforementioned tasks suggested that the literacy level of children did not yield substantial differential effect across the three experimental activities of segmentation, counting, and deletion. Accordingly, Table 1 shows that the Preliterate group scored even better than the literate children with respect to the counting activities. Similarly, results related to Grade 1 children within the Poor Readers' group outsourced their counterparts of Grades 1 and 2 within the Good Readers group.

Table 1: Mean scores for the syllabic tasks

	<i>Good Readers</i>			<i>Poor Readers</i>			<i>Preliterate</i>
	G1	G2	G3	G1	G2	G3	
Counting	12.20	13.87	15.87	15.20	12.20	11.33	16.80
Segmentation	13.60	13.60	16	14.80	13.27	11.20	15.65
Deletion	13.73	15.80	15.07	6	10	12.87	8.15

Note: G = grade.

Equally, analysis of variance (ANOVA) using the variables grade (Preliterate, G1, G2, and G3), reading status (Good/Poor Reader) and task type (counting, segmentation and deletion) showed no significant effect for reader's grade (i.e., [ $F(2,267) = 1.81, P = 0.164$ ]), contrary to the significant effect for reading status [i.e.,  $F(2,327) = 13.69; P < 0.001$ ]. *Post-hoc* comparisons showed that Good Readers obtained scores in the deletion task that were markedly higher than those of Poor Readers [i.e.,  $F(1, 88) = 37.87, P < 0.001$ ] and those of the Preliterate group [i.e.,  $F(1, 63) = 56.56, P < 0.001$ ]. Also, scores of the Preliterate group in the counting task were considerably higher than those of Good Readers [i.e.,  $F(1, 63) = 14.29, p < 0.001$ ] and those of Poor Readers in Grade 1 [i.e.,  $F(1, 63) = 22.55, P < 0.001$ ].

As for the deletion task, we examined the effect of the syllable location on accuracy scores. Data were calculated using the number of items for each syllable location, that is the frequency and the number of subjects across each category of subjects as the maximum score. Results presented in Figure 1 attested to the assumption that the manipulation of the medial syllable was the most difficult task for all tested groups.

Conversely, it was easier for them to delete the initial or the final syllable, and there were no considerable differences between accuracy scores of the initial and the final syllable, as exemplified by scores under Grades 1 and 2.

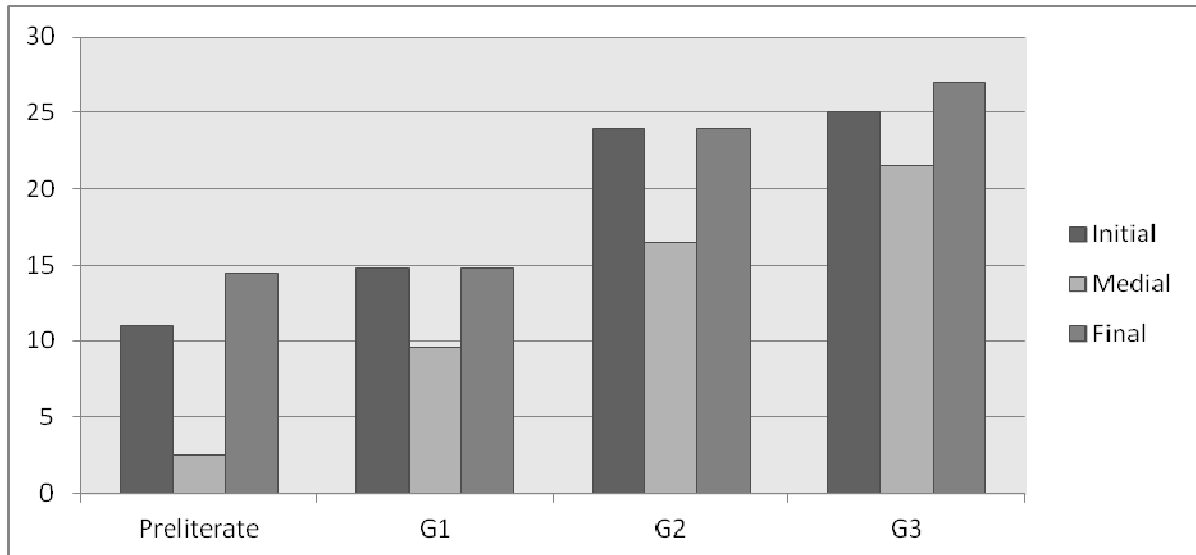


Figure 1: Distribution of accurate responses across groups in the syllabic condition

For the phonemic condition, Table 2 displays mean scores for the correct responses across the groups of informants. Descriptive results presented in the table reveal that phonemic awareness was most associated with the level of reading literacy regardless of the task type. The scores under the Good Readers category were the highest and the ones collected from the Preliterate subjects were the lowest. Findings related to the Deletion task were by far high the highest among the Good Readers whereas the Preliterate informants scored poorly. In the same vein, the mean scores within each group level increased as we move up in the grade scale, which further corroborates the influence of reading literacy on the meta-phonetic manipulation.

Table 2: Mean scores for the phonemic tasks

	<i>Good Readers</i>			<i>Poor Readers</i>			<i>Preliterate</i>
	G1	G2	G3	G1	G2	G3	
Counting	2.93	4.47	8.87	1.07	2.53	4.07	0.15
Segmentation	0.80	0.47	6.60	0.13	0.40	1.20	0
Deletion	9.87	10.87	14.07	2.80	5.87	9.53	4.40

Note: G = grade.

Inferential statistics of the data bear out the effect patterns in the phonemic condition. In order to examine the effect of the phoneme location on accuracy scores in the deletion task, data were calculated using the number of items for each phoneme location, that is the frequency and the number of subjects across each category of subjects (i.e., 45 for the Good Readers group, 45 for the Poor Readers group, and 20 for the Preliterate group as the maximum score). ANOVA showed no significant effect of the phoneme location [i.e.,  $F(2, 51) = 0.10, P = 0.904$ ]. The effect of subject's category was significant [i.e.,  $F(2, 51) = 42.17, P < 0.001$ ], indicating that the Good Readers group could delete phonemes more accurately than the Poor Readers group or the Preliterate group, and that the latter group were the least accurate.

## DISCUSSION

The present study sought to explore the development of meta-phonological awareness of Tunisian children through the implementation of deletion, segmentation, and counting tasks. It followed that the subjects had better scores in the syllabic condition than in the phonemic condition. These results are in agreement with those reported in other alphabetically written languages. The best performances of Good Readers confirm the idea supported by many researchers (e.g. Byrne et al., 1992; Gombert, 1992) that reading failure may manifest itself through a lack of phonemic awareness. The lowest results of the Preliterate children suggest that phonemic awareness does not develop spontaneously, but only in the specific context of learning to read an alphabetic script at school. This phenomenon was observed in many alphabetically written languages, such as English French (Gillon, 2004; Morais et al., 1987), and Hebrew (Bentin et al., 1991; Oren, 2001).

In the syllabic condition, the majority of children were able to attend to this type of sounds. Nevertheless, only the Poor Readers and the Preliterate groups were negatively affected by the deletion tasks and they were better in the segmentation and counting tasks. The relative ease of the segmentation and counting tasks did not seem to be linked on a high abstract and elaborate phonological knowledge, but to intuitive behavior. In fact, Gombert (1992) has emphasized the epi-phonological character of the syllabic segmentation tasks since they require only simple sound repetition. Accordingly, scores of the Preliterate group in the counting task were far above those of Good Readers and Poor Readers. These findings are in concordance with the observations of Liberman Shankweiler, Fisher, and Carter (1974) with respect to English, showing that preliterate children could succeed in some syllabic tasks.

The poor performance of literate children indicates their tendency to resort to some representations that are closely linked to the alphabetic code. This strategy is not efficient enough to manipulate syllables in spoken words. Furthermore, the failure of the Preliterate and the Poor Readers groups in the syllabic deletion task was considerable. Not only their accuracy scores, but their performances in the other tasks were far behind those of Good Readers. Comparison of the syllabic tasks with the other tasks showed that the degree of difficulty depended not only on the sound to be deleted (i.e. syllables or phonemes) but also on the task to be performed. Data were congruent with Gombert's (1992) claim that the meta-phonological ability is likely to appear in the manipulation of syllables as well as phonemes.

Success in the syllabic deletion task was relative to the position of the syllable to be deleted. All groups had better scores when the syllable to be deleted was at the end or at the beginning than when it was in the middle (c.f., Gillon, 2004; Kurtz, 2010). Scores on the medial syllable deletion task were markedly lower than those of the final or the initial one. This seems to agree with Gombert's (1992) assumption that deletion of the medial syllable is the most difficult because it requires a high level of conscious control. It involves a greater degree of cognitive complexity since the child must first proceed to an analysis of the spoken word stimulus in order to extract the target syllable, then to a synthesis in order to recompose the remaining syllables. Execution of this variety of operations would be high loading on short-term memory. It would need a well-developed capacity of control and consciousness while manipulating the verbal stimuli.

In the phonemic condition, scores were very low and floor effects were notable among the Poor Readers and Preliterate groups. The order of success was so as follows: deletion, counting, segmentation. Contrary to the findings in other alphabetically written languages, phonemic segmentation task was the most difficult. For instance, Vandervelden and Siegel (1995) have shown that presentation of a phonemic segmentation task to English-speaking children in the first grade results in substantially correct responses. Likewise, Bentin et al. (1991) found that success rate of Hebrew-speaking children in the same school grade for the same kind of task was equally high. Nevertheless, the phonemic segmentation task of the present study showed less correct responses for Good Readers in the first grade and the highest accuracy rate was among Good Readers of the

third grade. The Arabic-speaking children experienced difficulties in accomplishing this sort of tasks. Such difficulties stem from the constraints of diglossia as evidenced by Saiegh-Haddad (2005). Phonological changes with which children were usually confronted had posed an additional burdening factor in the explicit phonemic identification.

As shown above, the phonemic deletion task was the easiest for our sample of Arabic-speaking children. If we take into account that the phonemes concerned by deletion were exclusively consonants, our findings testify to more developed analysis abilities of the consonantal phonemes than of vocalic ones. Arabic phonological awareness may be related to the language structure that is principally morphological. As a rule, Arabic words are formed by mounting a word pattern of vowels on a root that is a skeleton of consonants. The importance of consonants in the inflectional system explains the better performances in manipulating the consonantal phonemes. Moreover, consonants have conserved their privileged status within diglossia. Phonological variations between Modern Standard Arabic and colloquial Arabic have affected vowels while preserving consonants. Exceptional phonologic invariability of consonants in the two Arabic spoken languages may allow children to develop fixed representations about the consonantal segments (see Abu-Rabia, 2001).

Gombert (1992) supported that success in the phonemic deletion tasks depended greatly on the phoneme location. In the same vein, Ziegler and Goswami (2005) found that deletion task scores were better for the initial or the final phoneme than for the medial one. However, our findings showed that the phoneme location is not significant. Divergence between the performances of Arabic-speaking and English-speaking children confirms that the representations about the consonantal segments were not the same.

## CONCLUSION

The study reported in this paper had the merit of replicating in part the findings on the development of phonological awareness among children across alphabetically written languages. It nonetheless accentuated an extent of variation with respect to the uniqueness of Arabic orthography system and diglossia. Other research attempts involving direct comparisons between meta-phonological acquisition of consonants and vowels should permit an in-depth examination of the specific effect of the consonantal prominence in the Arabic orthography system. Also, it would be interesting to investigate the type of reading strategies children should develop to enhance the reading ability with respect to this linguistic constraint. Cross-cultural studies, following the research line of Ziegler and Goswami (2005), might well contribute substantial validity to the results reported here and across other languages.

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#### Appendix 1: Sample items of the syllabic tasks

	Segmentation and counting	Deletion
Colloquial Arabic words	/ka`ba:t/	/kri:(ma)/
	/kugi:na/	/(mun)ga:la/
	/stiluwa:t/	/nwa:(mir)/
	/jitfa:hmu/	/jit`(a:)rik/
	/mtarqa/	/man(di):la/
Modern Standard Arabic words	/jizrib/	/(bar)ða/
	/manzilun/	/«aj(na)/
	/jamði:/	/(haqlun/
	/qittun/	/ja«(ti:)/
	/masaku:/	/«as(wa)dun/
Pseudo-words	/da`a:/	/(mi)`tafun/
	/jarsumu/	/jar(fa)`u/
	/bani`a/	/hi(mu)run/
	/lafnu:/	/fur(ki:)/
	/rihkadun/	/saqra:(bin)/
	/kranga/	/(hi)lsun/
	/barni:fa/	/(bran)ku:/
	/rizfun/	/rah(wa)da/

Note: Syllables to be deleted between parentheses.

#### Appendix 2: Sample items of the phonemic tasks

	Segmentation and counting	Deletion
Colloquial Arabic words	/:am/	/fa(k)/
	/hufra/	/(b)la:jis/
	/jurqid/	/ma(r)qa/
	/hðim/	/(n)sa:/
	/jðu:f/	/j(d)iz/
Modern Standard Arabic words	/mra:/	/flu:(s)/
	/ud/	/di:ku(n)/
	/«abi:/	/(l)am/
	/sa:ra/	/ja(k)fi:/
	/hal/	/(n)a:ma/
Pseudo-words	/i:dun/	/qu(l)/
	/min/	/ka(j)fa/
	/riz/	/ra:ðu(n)/
	/maku:/	/ba(l)ku:/
	/wal/	/h(r)u:/
	/hi:saf/	/(k)uð/
	/snu:fi/	/(f)a:bu/
	/rfan/	/sma(q)/

Note: Phonemes to be deleted between parentheses.