

# Phonological awareness deficits in Arabic-speaking children with learning disabilities

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## Background

Phonological awareness refers to the language ability to perceive and manipulate the sounds of spoken words. It is an understanding of the structure of spoken language – that it is made up of words, and that words consist of syllables, rhymes, and sounds. The presence of a relationship between performance in phonological awareness tasks and reading ability is undisputed.

## Materials and methods

100 normal children together with 30 learning -disabled children were evaluated with the Arabic phonological awareness test to detect their performance on phonological awareness.

## Results

A large amount of evidence has been accumulated to show that the more knowledge children have about the constituent sounds of words, the better they tend to be at reading.

## Aim

Many studies have been conducted to detect phonological awareness deficits in English-speaking children, but very few studies have been conducted on Arabic-speaking children.

## Keywords:

learning disability, phonological awareness, reading

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## Introduction

Learning disability is a generic term that refers to a heterogeneous group of disorders that manifest in the form of significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical abilities [1]. Dyslexia is the most common type of learning disability. It is a language-based disability in which a person has trouble understanding written words. It may also be referred to as reading disability or reading disorder [2].

De Montfort [3] classified learning disability into two broad divisions of language:

- (a) Lower order processes, such as phonological awareness and sound production deficits; and
- (b) Higher order processes, such as vocabulary deficit (including word finding difficulty), semantic deficit and syntactic deficit.

Phonological awareness refers to the ability to perceive and manipulate the sounds of spoken words [4]. It encompasses awareness of the most basic speech units of a language, phonemes, as well as larger units such as rimes and syllables. The ‘awareness’ component of the term is as important to the definition as the ‘phonological’ component, for the skill is proposed to involve, not simply unconsciously discriminating speech sounds (such as in speech perception), but

explicitly and deliberately processing and acting upon them.

## Phonological units that predict reading acquisition

- (1) Word awareness and reading acquisition: It is the first level of language analysis. It must develop before all other smaller phonological units [5].
- (2) Syllabic awareness and reading acquisition: The syllable is a natural phonological unit. It would therefore seem likely that the ability to perceive and segment words into syllables might play an important role in the early stages of reading acquisition [6].
- (3) Rhyme awareness and reading acquisition: The awareness of onset and rime provides children with a strategy for linking spoken rime segments with printed rime units, which are the most consistent components of written words in English. These links can then be used to make inferences or analogies about new words through grouping words together by sounds, thereby reducing the number of words they have to learn to read by making generalizations of larger sound units [4].
- (4) Phonemic awareness and reading acquisition: Phonemic awareness is the highest level of phonological awareness, which is focused only on the manipulation of phonemes (sounds) [7]. Learning to read involves developing the understanding that letters (or graphemes) represent the most basic sounds in speech. Once this alphabetic principle is understood, a

child can then use it as a basis for sounding out words and ultimately for acquiring lexical knowledge [8].

All these studies have been conducted on English-speaking children. This study aimed to detect phonological awareness deficits in Arabic-speaking children with learning disability compared with normal children.

## Materials and methods

This study was conducted at the Unit of Phoniatrics, Ain Shams University Hospitals. It included two groups.

The first group included 100 normal children between the ages of 5 and 9 years 11 months; 20 children were included for each 1 year age range. The sample included 47 girls and 53 boys. The distribution of the sample based on the chronological age is shown in Table 1.

Children fulfilling the following criteria were included in the first group:

- (a) Normal language and speech development for age;
- (b) Normal hearing and vision abilities;
- (c) IQ of 90 or above;
- (d) Average scholastic achievement; and

- (e) Fair general health and neurologically free.

The second group included 30 learning-disabled children, who were exposed to the protocol of assessment applied in the Phoniatric Unit in Ain Shams University Hospitals to assure the diagnosis.

Both groups of children were evaluated with the Arabic phonological awareness test to detect their performance on phonological awareness.

## Results

The *t*-test was used for differences between normal and learning-disabled children, and mean scores were tabulated for each subtest, each section and for the total test (Table 2).

**Table 1 Distribution of the sample based on age**

Age	Number of children	Mean $\pm$ SD (years)
5 years 11 months	20	5.4 $\pm$ 0.34
6 years 11 months	20	6.3 $\pm$ 0.35
7 years 11 months	20	7.5 $\pm$ 0.29
8 years 11 months	20	8.5 $\pm$ 0.34
9 years 11 months	20	9.6 $\pm$ 0.28
Total	100	7.46 $\pm$ 0.31

**Table 2 t-test for differences between normal and learning-disabled children, mean scores for each subtest, each section and total test**

Subtests	Normal children (mean $\pm$ SD)	Learning-disabled children (mean $\pm$ SD)	t-test	P value	Significance
Segmenting sentence into words	7.34 $\pm$ 1.86	6.90 $\pm$ 2.78	3.82	0.000	HS
Segmenting words into syllables	4.60 $\pm$ 1.89	3.87 $\pm$ 2.05	1.92	0.058	NS
Segmenting words into phonemes	5.07 $\pm$ 3.31	2.33 $\pm$ 1.67	4.35	0.000	HS
Total segmentation	17.35 $\pm$ 5.79	12.30 $\pm$ 4.54	4.38	0.000	HS
Isolating initial phoneme	8.83 $\pm$ 2.79	7.63 $\pm$ 3.75	1.89	0.060	NS
Isolating final phoneme	7.43 $\pm$ 3.84	5.73 $\pm$ 3.75	2.13	0.035	S
Isolating middle phoneme	6.91 $\pm$ 4.05	4.57 $\pm$ 3.61	2.85	0.005	HS
Total isolation	6.91 $\pm$ 4.05	4.57 $\pm$ 3.61	2.85	0.005	HS
Deleting compound words and syllables	23.17 $\pm$ 10.01	17.93 $\pm$ 10.38	2.49	0.014	S
Deleting phonemes	8.20 $\pm$ 2.45	6.27 $\pm$ 2.98	3.60	0.000	HS
Total deletion	6.08 $\pm$ 3.84	1.70 $\pm$ 2.72	5.82	0.000	HS
Substitution	14.39 $\pm$ 6.15	7.97 $\pm$ 4.90	5.24	0.000	HS
Blending syllables	9.25 $\pm$ 1.65	8.97 $\pm$ 1.40	0.85	0.395	NS
Blending phonemes	8.15 $\pm$ 2.71	6.50 $\pm$ 3.46	2.73	0.007	HS
Total blending	17.40 $\pm$ 4.16	15.47 $\pm$ 4.52	2.19	0.031	S
Rhyming discrimination	6.68 $\pm$ 2.57	5.17 $\pm$ 2.87	2.74	0.007	HS
Rhyming production	2.3 $\pm$ 0.37	0.53 $\pm$ 1.54	3.83	0.000	HS
Total rhyming	9.66 $\pm$ 5.45	5.70 $\pm$ 3.68	3.72	0.000	HS
Total phonological awareness	87.46 $\pm$ 30.78	59.70 $\pm$ 23.58	4.55	0.000	HS
Reading consonants	25.44 $\pm$ 6.00	22.67 $\pm$ 7.23	2.12	0.036	S
Reading vowels	7.18 $\pm$ 3.94	4.90 $\pm$ 3.59	2.84	0.005	HS
Reading consonant clusters	5.42 $\pm$ 4.27	1.43 $\pm$ 2.49	4.86	0.000	HS
Total grapheme	37.74 $\pm$ 13.04	29.07 $\pm$ 11.51	3.28	0.001	HS
Decoding	6.62 $\pm$ 4.36	4.37 $\pm$ 3.83	2.55	0.012	S
Total phoneme/grapheme	44.65 $\pm$ 16.59	33.43 $\pm$ 14.74	3.33	0.001	HS
Total test	132.11 $\pm$ 46.75	93.07 $\pm$ 37.15	4.19	0.000	HS

$P > 0.05$ , nonsignificant (NS),  $P < 0.05$ , significant (S),  $P < 0.01$ , highly significant (HS).

## Discussion

The results showed that children with learning disability had significantly poorer scores compared with normal children in most of the tasks of phonological awareness.

As regards word level tasks presented in segmenting sentences into words, there was a highly significant difference between normal and learning-disabled children.

As regards syllable level tasks presented in segmenting syllables and blending syllables, there was a nonsignificant difference between the two groups because the term syllable is not taught in Egyptian schools; hence, children were unaware of the term syllable and thus were unable to segment words into syllables. Therefore, even normal children performed poorly in that task. However, in the deleting syllable task, there was significant difference between the two groups. Overall, these nonconsistent results in syllable awareness level are consistent with the results of Badian [6], who examined syllabic segmentation skills in 238 preschool children. He found that performance on this task accounted for no independent variance in reading ability in first or second grade.

As regards rhyme level of awareness presented in rhyme discrimination and production, there was a highly significant difference between the two groups, and this is in agreement with the results of De Jong and Van der Leij [9], who found that rhyme awareness at the end of first grade predicted later on reading achievement.

As regards phoneme level presented in segmenting phoneme, isolating initial, middle and final phoneme,

deleting phoneme, substitution and blending phonemes, all showed highly significant differences between the two groups, and this is in agreement with the findings of Hulme *et al.* [10], who found that their combined measures of phonemic awareness were highly significant with concurrent and longitudinal predictors of reading skills when the effects of age were excluded.

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## Acknowledgements

### Conflicts of interest

None declared.

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