# Construction of an Arabic reading test for assessment of dyslexic children

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## ABSTRACT

**Objectives:** Dyslexia is a specific language-based disorder of constitutional origin, characterized by difficulties in phonological processing. The Arabic language differs in many aspects from foreign languages and the few previously designed Arabic tests for assessment of dyslexia did not pay attention to phonological awareness problems. This necessitates the design of an Arabic test which could properly assign specific difficulties among Arabic reading dyslexic children, including phonological awareness as a major contributing factor for dyslexia.

**Methods:** The study was carried out in Assiut City, Egypt, during the period from September 1999 to the end of January 2001. The newly designed Arabic Reading Test (ART) in this work passed through many stages. Firstly, test construction by 11 Arabic teachers (specific judges). Secondly it was applied, in a pilot study, to 50 normal students (9-10 years old) to ascertain clarity of the test. Then test standardization was proven through application on a second sample (n=252 students), and third sample (n=58 dyslexics).

**Results:** The reliability of the ART was proven by the test-retest method (r=0.913, $p<0.01$). Validity was proven by judgment validity, internal consistency validity (ranged from 0.238 for auditory perception to 0.940 for phonological awareness and spelling), contrasted group validity, and criterion related validity (in relation to Schonell r=0.859, Awaad reading r=0.817, Awaad comprehension r=671, mid-term Arabic scores r=0.686).

**Conclusion:** The ART was thus proven to be highly reliable, and valid for assessment of dyslexia among Arabic reading children. It has great value in predicting dyslexia even among preschool age Arabic speaking children, through assessment of their phonological awareness skills, and thus, remediation programs can be properly and early directed.

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Learning disability is one of the most prevalent forms of developmental disabilities. Learning disabilities are diagnosed in approximately 5% of school-aged children.[1] Dyslexia is a type of learning disability. The recent working definition of dyslexia proposed by the International Dyslexia Society is that it is a specific language-based disorder of constitutional origin characterized by difficulties in single word decoding usually reflecting insufficient phonological processing.[2] It affects 3-9% of school-age children.[3] Dyslexic children fail to achieve an expected rate of scholastic achievement for their chronological age.[4] Dyslexia was found to be a multifactorial outcome of deficits in phonological,[5,6] neurological,[7,8] visual,[9,10] verbal short term memory[11] auditory perception,[12] or genetic factors[13,14] together with other aggravating factors such as psychological, educational or environmental factors.[15,16] Many tests were designed for assessment of dyslexics, and most of these are foreign non-Arabic tests.[17-20] Due to the different nature of the Arabic language (written from right to

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left, in blocks, with no mirror image letters) there is a great need for an Arabic test that could identify specific difficulties met by Arabic reading dyslexic children, to facilitate their early detection, and facilitate better planning for intervention strategies. Although there have been some attempts at making a standardized Arabic test for identifying dyslexia among Arabic reading children such as Ahmed and Faheim[21] and Awaad,[22] yet these tests are limited, and did not pay attention to phonological processing difficulties which are a major contributing factor for dyslexia. From the scientific and practical points of view, the new test should cover the following 6 essential functions. 1. Phonological awareness, namely, representation and processing of phonological information, and this includes: a) rhyme detection, b) blending of sounds to form a word and segmentation of a word into sounds, c) recognition of the first sound, and middle sound of the word, d) deletion of the first sound, middle or the last sound from the word and, e) addition of a sound to the word. 2. Auditory perception and discrimination. 3. Visual perception, which includes: recognition of a single letter, recognition of similar letters and, testing the ability of sequencing of letters into a word. 4. Short term memory. 5. Comprehension. 6. Spelling.

**Methods.** Subjects consisted of 3 samples of schoolchildren at the fourth grade who were selected randomly from 4 different schools in Assiut City, Egypt. The study was carried out from September 1999 until January 2001.

***First sample: For pilot study.*** This consisted of 50 normal children (38 males and 12 females), aged 9-10 years with the following inclusion criteria: 1. Normal intelligence (IQ $\geq$ 90) by Wechsler's Intelligence scale for children (WISC). 2. Normal attention (after application of school form of children's attention and adjustment survey).[23] 3. Not suffering from any reading problems (could read 50-60 words in about 40 seconds on Schonell test).[24]

***Second sample: For testing reliability of the Arabic Reading Test (ART).*** This consisted of 252 students who were chosen out of 300 pupils, randomly selected from 4 schools, with an age ranged from 9-10 years with the following inclusion criteria: 1. Normal intelligence (IQ $\geq$ 90) by WISC, 40 pupils were excluded as they had IQ below 90. 2. Normal attention (after application of school form of children's attention and adjustment survey.[23] After application of this test, 8 pupils were excluded as they had attention deficit hyperactivity disorder (ADHD). 3. Normal neuropsychiatric evaluation to exclude any handicapping neuropsychiatric illnesses. 4. Normal visual and hearing systems, by Snellen's chart and pure tone audiometry in suspected cases.

***Third sample: For testing validity of ART (contrasted group validity).*** This consisted of 58 dyslexic pupils. They were considered dyslexics according to their performance on: WISC (they had IQ $\geq$ 90) and children's attention and adjustment survey (school form).[23] They had normal attention, no sensory handicapping, and normal neuropsychiatric examination. On Schonell test:[24] they read 30 words or less/40 seconds. On Awaad test (reading and comprehension forms):[22] they scored less than 60% of the total score of each subtest.

The ART, needed for assessment of dyslexia among Arabic reading children passed through the following stages:

***Stage 1: Test construction.*** Based on the previous studies,[18-22] our test was constructed cautiously by 11 well experienced Arabic teachers to cover the identified suspected areas of difficulties among Arabic reading children at the age of 9-10 years. Special consideration was taken for the phonetic alphabet groups, according to the manner of articulation for example, plosives, nasal, guttural, to be presented over all the items of the test especially in the phonological awareness subtest. This is the preliminary form of the test.

***Stage 2: Pilot study.*** By application of the preliminary form of ART to the first sample (50 normal students). The aim of this pilot study was to ascertain clarity of the items of the test and to determine the pattern and order of presentation of the test items used so as to be presented from easier to more difficult items. As a result of the pilot study, remodification of the test was made. The resulting test is shown in **Appendix 1**.

***Stage 3: Test evaluation and testing reliability of ART.*** The second sample (252 students) were subjected to: a) Schonell test (Arabic translation form).[24] b) Awaad test[22] with its 2 subtest forms: subtest for assessment of reading disability and subtest for diagnosis of difficulty in comprehension. c) Arabic reading test (**Appendix 1**). After 5 weeks, ART (**Appendix 1**) was re-applied on the same sample (second sample n=252). This test-retest method was used to evaluate the reliability of ART. After testing children of this group, difficulty coefficient was calculated for each item of the ART. Items, which had a difficulty coefficient below 20% (very easy) or above 80% (very difficult), were excluded. Therefore, the total original test items were 213 (**Appendix 1**). After calculation of difficulty coefficient, 116 items were eliminated to reach 97 items in the final form. The resulting final form of the test is shown in **Appendix 2**.

***Stage 4: Testing validity of ART.*** The final form of ART (**Appendix 2**) was applied to students of the third sample (n=58) who were known to be dyslexic according to their performance on Schonell test,[24]

Awaad test,[22] taking in consideration their mid-term Arabic scores (having the lowest scores).

***Stage 5: Statistical distribution of the sample of the research.*** Students of the second sample (n=252), and third sample (n=58), (total n=310) were divided according to: 1. Their performance on Schonell test[24] into 3 groups: Group 1 (dyslexic group): Children who read ≤ 30 words/40 seconds (n=159/310, 51.3%). Group 2 (border line group): Children who read 31-49 words/40 seconds (n=110/310, 35.5%). Group 3 (normal group): Children who read ≥ 50 words/40 seconds (n=41/310, 13.2%). 2. According to their performance on Awaad test,[22] they were divided into 2 groups: Group 1 (dyslexics): Children who scored less than 60% of the total score (n=86/310, 27.7% according to reading subtest), (n=163, 52.6% according to comprehension subtest). Group 2 (normal): Children who scored 60% of the total score or more, (n=224/310, 72.3% according to reading subtest), (n=147, 47.4% according to comprehension subtest). 3. According to their mid-term scores of Arabic exam, they were divided into 4 quarters, according to the median (32.5). First quarter (potentially dyslexic): Children with lowest scores in the mid-term Arabic exam (81/310 pupils; 26.1%). Second and third quarters: Children with average scores (82 pupils, 26.5% and 79 pupils, 25.5%). Fourth quarter (potentially normal): Children with the highest scores (68/310, 21.9%).

**Results.** **Table 1** shows comparison of performance on ART between dyslexic and normal children according to Schonell test, Awaad test, and Arabic mid-term scores. It was apparent that there was a highly significant difference ($p<0.001$) between normal and dyslexic students, on all items of ART except auditory perception, where the difference between the 2 groups was either slightly significant ($p<0.05$) (as according to mid term scores, and Awaad comprehension subtest), or the difference was insignificant when the students were divided according to Schonell, or Awaad reading subtest.

***Results of test standardization.*** a) Reliability. The test-retest method of sample II (n=252 pupils) revealed that all test items showed highly significant reliability (r=0.913, $p<0.01$). Thus, the test is highly reliable. b) Internal consistency validity. It is a measure of homogenicity of the test itself. This is measured by making a correlation between the subtest scores and the total test score. It was found that all subtest scores were highly significantly correlated ($p<0.01$) to the total score. Thus, all the test items are proven to be valid (**Table 2**). c) Criterion related validity. The performance on the test was checked against a criterion, namely, a direct and independent measure of that which the test is designed to predict. A correlation was made between total score of ART, Schonell test,[24] Awaad test[22] (reading and comprehension) and mid-term scores as illustrated by **Table 3**. It shows a significant correlation between ART, Schonell test, Awaad test (reading and comprehension) and mid-term scores. d) Contrasted group validity (**Table 4**). According to performance on ART, the second sample (n=252) was divided into 4 quarters according to the median (the median was 54.00). First quarter: students with lowest scores (0-40) on ART (n=67, 26.6%). Second quarter: students with low average scores on ART (>40-54) (n=65, 25.8%). Third quarter: students with high average scores (>54-64) on ART (n=59, 23.4%). Fourth quarter: students with highest scores (>64-97) on ART. This group was composed of 61 pupils (n= 61, 24.2%).

Comparison was carried out between the test scores of sample III (dyslexic group n = 58) and those of the fourth quarter of second sample (pupils with the highest total scores on ART, n=61), as well as those of the first quarter (pupils with the lowest total scores on ART, n= 67). The results of this comparison are shown in **Table 4**. It was found that students of the fourth quarter recorded significantly higher scores ($p<0.001$) than dyslexic students on all test items. Alternately, there was insignificant differences between dyslexic group and students of the first quarter of sample II on most sub items of the ART.

**Discussion.** This study presented a design of an ART that could be used for diagnosis of dyslexia among Arabic-speaking children aged from 9-10 years. The ART identifies areas of relative weakness that cause dyslexia, with special emphasis on difficulties in phonological awareness as a major contributing factor for dyslexia, besides defects in auditory perception and discrimination, short-term memory, comprehension and spelling so that remediation of these defects can be logically intervened with. The theory of phonologically – based reading disabilities is the most coherent and most completely developed current theory.[5,6] As none of the previously constructed Arabic tests in the field of evaluation of reading disability are concerned with deficits in phonological awareness, so, the ART presented in this study is a pioneer in this field.

The present study showed that, the dyslexic group performed worse than the control group in all subtests of phonological awareness, and the difference between both groups was statistically significant ($p<0.001$), (**Table 2**). This is in accordance with other studies which suggest that less skilled readers are delayed in the acquisition of phonological analysis and phonological decoding skills (assessed by pseudo-word reading accuracy) that may be essential in the development of efficient

**Table 1 -** Comparison of performance on ART between dyslexic and normal children according to Schonell test, Awaad test, and mid-term scores.

| Items of ART | Schonell test | | Mid-term scores | | Awaad reading test | | Awaad comprehension test | |
|---|---|---|---|---|---|---|---|---|
| | Dyslexic N=159 Mean±SD | Normal N=41 Mean±SD | Dyslexic N=81 Mean±SD | Normal N=68 Mean±SD | Dyslexic N=86 Mean±SD | Normal N=224 Mean±SD | Dyslexic N=163 Mean±SD | Normal N=147 Mean±SD |
| Rhyme | 3.2±2.5 | 7.5±2.3 | 2.5±2.4 | 5.6±3 | 2.5±2.2 | 5.6±2.9 | 3.4±2.6 | 5.7±2.9 |
| Blending | 0.6±0.5 | 0.9±0.3 | 0.5±0.5 | 0.9±0.3 | 0.4±0.5 | 0.8±0.4 | 0.6±0.5 | 0.8±0.4 |
| Segmentation | 0.8±0.9 | 1.8±1 | 0.7±0.8 | 1.3±1.1 | 0.7±0.8 | 1.2±1 | 0.9±0.9 | 1.3±1.1 |
| Recognition of first sound | 1.2±0.7 | 1.7±0.5 | 1.1±0.7 | 1.5±0.6 | 1.1±0.7 | 1.5±0.6 | 1.3±0.7 | 1.5±0.6 |
| Recognition of middle sound | 2.8±1.9 | 5.2±1.2 | 2.4±1.9 | 4.6±1.6 | 2.3±1.9 | 4.1±1.8 | 2.9±1.5 | 4.3±1.7 |
| Deletion of first sound | 0.6±0.5 | 0.9±0.2 | 0.5±0.5 | 0.9±0.3 | 0.5±0.5 | 0.8±0.4 | 0.6±0.5 | 0.9±0.3 |
| Deletion of middle sound | 1.9±1.7 | 5.8±1.4 | 1.7±1.8 | 4.4±2.2 | 1.1±1.1 | 3.9±2.1 | 2.1±1.9 | 4.3±2.1 |
| Deletion of last sound | 1.4±1 | 2.9±0.2 | 1.2±1.1 | 2.5±0.7 | 0.9±0.9 | 2.4±0.8 | 1.6±1.1 | 2.5±0.8 |
| Addition of sound | 2.1±1.3 | 4.3±0.8 | 1.9±1.3 | 3.7±1.1 | 1.5±1.1 | 3.5±1.2 | 2.3±1.5 | 3.7±1.1 |
| Phonological awareness | 14.5±6.7 | 31.1±4.4 | 12.4±7.1 | 25.5±6.8 | 11±5.3 | 23.6±6.9 | 15.8±7.6 | 24.9±6.9 |
| Auditory perception | 1.8±0.9 | 2±0.9NS | 1.6±0.9 | 1.9±0.9* | 1.7±0.8 | 1.9±0.9NS | 1.7±0.9 | 1.9±0.9* |
| Comprehension | 4.7±1.9 | 7.9±1.5 | 4.3±1.9 | 6.5±2 | 4.3±1.9 | 6.1±2 | 4.7±1.9 | 6.6±1.9 |
| Spelling | 12.1±6.2 | 28.1±4 | 9.7±6.1 | 23.1±6.6 | 8.8±5.1 | 20.6±6.7 | 13.3±7.1 | 21.8±6.8 |
| Memory | 4.3±1.3 | 5.3±1.4 | 4.1±1.4 | 5±1.2 | 4±1.4 | 4.9±1.2 | 4.3±1.43 | 4.9±1.1 |
| **Total score** | **36.4±13.1** | **73.1±8.6** | **31.3±13.9** | **60.9±14.1** | **28.9±10.5** | **55.9±13.9** | **38.8+15.2** | **59.1±14** |

$p<0.001$ for all differences between dyslexic and normal students, except auditory perception where * indicates that $p<0.05$ or NS - not significant
ART - Arabic reading test

**Table 2 -** Correlation between the subtest scores and the total scores of ART (internal consistency validity).

| Items of ART | Correlation coefficient between the item and the total score of ART | Level of significance |
|---|---|---|
| Rhyme | 0.700 | 0.01 |
| Blending | 0.385 | 0.01 |
| Segmentation | 0.426 | 0.01 |
| Recognition of first sound | 0.352 | 0.01 |
| Recognition of middle sound | 0.660 | 0.01 |
| Deletion of first sound | 0.472 | 0.01 |
| Deletion of middle sound | 0.810 | 0.01 |
| Deletion of last sound | 0.694 | 0.01 |
| Addition of sound | 0.730 | 0.01 |
| Phonological awareness | 0.940 | 0.01 |
| Auditory perception | 0.238 | 0.01 |
| Comprehension | 0.697 | 0.01 |
| Spelling | 0.940 | 0.01 |
| Memory | 0.412 | 0.01 |

ART -Arabic reading test

**Table 3 -** Correlation among total score of ART, Schonell test, Awaad test, and mid-term scores (criterion related validity).

| Items | ART | Schonell | Awaad reading test | Awaad comprehension test | Mid-term scores |
|---|---|---|---|---|---|
| ART | 1.000 | 0.859* | 0.817* | 0.671* | 0.686* |

* $p<0.01$, ART - Arabic reading test

**Table 4 -** Comparison between the test scores of dyslexic group and those with highest, and lowest, total scores on ART (fourth and first quarters) (contrasted group validity).

| Items | Dyslexic group N=159 Mean±SD | Fourth quarter N=61 Mean±SD | First quarter N=67 Mean±SD |
|---|---|---|---|
| Rhyme | 2.9±2.7 | 7.6±1.9 HS | 2.5±2.1 NS |
| Blending | 0.3±0.5 | 0.9±0.4 HS | 0.7±0.5 HS |
| Segmentation | 0.7±0.9 | 1.7±1.1 HS | 0.5±0.8 NS |
| Recognition of first sound | 1.1±0.7 | 1.7±0.5 HS | 1.2±0.7 NS |
| Recognition of middle sound | 2.9±1.9 | 5.4±0.9 HS | 1.9±1.5 MS |
| Deletion of first sound | 0.6±0.5 | 0.9±0.2 HS | 0.5±0.5 NS |
| Deletion of middle sound | 1.1±1.2 | 5.8±1.3 HS | 1.6±1.1 S |
| Deletion of last sound | 1.2±0.9 | 2.9±0.4 HS | 1.4±1.1 NS |
| Addition of sound | 1.5±1.2 | 4.3±0.9 HS | 1.9±1.1 S |
| Phonological awareness | 12.2±6.2 | 31.2±3.4 HS | 12.4±4.9 NS |
| Auditory perception | 1.8±0.9 | 2.1±0.9 S | 1.5±0.9 NS |
| Comprehension | 4.2±1.7 | 7.8±1.5 HS | 4.2±1.9 NS |
| Spelling | 9.7±5.3 | 28.1±3.3 HS | 9.9±4.3 NS |
| Memory | 4.2±1.2 | 5.3±1.2 HS | 4.2±1.5 NS |
| Schonell test | 16.4±9.2 | 50.2±9.2 HS | 20.1±9.3 S |
| Awaad reading test | 66.6±40.6 | 170±9.2 HS | 107.7±43.8 HS |
| Awaad comprehension test | 7.3±3.9 | 14.6±2.7 HS | 9.9±3.9 HS |
| Intelligence quotient | 102.7±10.2 | 132.3±14.6 HS | 106.4±11.4 NS |

HS - highly significant ($p<0.001$), MS - mildly significant ($p<0.01$),
S - significant ($p<0.05$), NS - not significant, ART - Arabic reading test

word reading.[25,26] Lundberg[27] linked the poor reading problems to poor phonemic awareness. Scarborough[28] confirmed that weakness in phonological awareness is a precursor to reading disability, when he found that children with poor letter-sound knowledge and who later became poor readers were also deficient in phonological awareness. He thus considered rhyme detection as a pre-literacy skill, which predicts later reading disabilities. This result is consistent with the present study, which showed that the dyslexic group perform significantly worse than the control group in rhyme detection.

The significant difference obtained between the dyslexic group and the control group in phonemic segmentation task, phoneme deletion task, and phoneme manipulation denotes that these tasks are quite successful items in distinguishing dyslexics from non-disabled readers. Similar results were obtained by Das et al[29] concerning phoneme segmentation, Datta et al[30] concerning phoneme deletion task; Olson et al[31] and Plaza[32] concerning rhyming processing, phoneme segmentation and manipulation. Thus, phonological awareness tests are quite reliable and sensitive in the detection of poor reading abilities and may be sensitive predictors of development of reading abilities if they are tested in younger ages even before the reading skills are acquired (preschool age).

The insignificant difference between the dyslexic and control group regarding their performance on auditory perception and discrimination may indicate that the auditory perception and discrimination are poor differentiators between dyslexics and non-dyslexics. This is consistent with the results of previous studies.[33-35] More recently, Samuelsson et al[36] found that dyslexic subjects displayed no significant difference compared to controls in auditory recognition and recall tasks suggesting that dyslexics perform like normal readers on tasks requiring auditory perception skills. Alternately, Reed[37] and Masterson et al,[38] found that dyslexic children were less able than normal readers to discriminate words that differed only in their initial phonemes. These conflicting results regarding auditory perception could reflect a real difference in auditory perception between dyslexics and non-dyslexics, which is small enough and therefore hard to detect, or that auditory perception deficits are found in some but not all dyslexics.[39] These explanations may also clarify the reason for the discrepancy of the results of auditory perception in the present study. So, deficits in auditory perception as one of the contributing factors to reading disability needs further exploration and introduction of more comprehensive tests for its assessment.

The poorer performance of the dyslexic group than the control group in the short-term memory task of the ART may indicate the importance of short-term memory deficits in the etiology of dyslexia. These results are consistent with many previous results, which showed that disabled children have a short-term memory deficit.[40-42]

The difficulty coefficient for each item of visual perception subtest was calculated, it was less than 20% (very easy). This means that this subtest could not differentiate between dyslexics and non-dyslexics. So, this subtest was completely excluded in **Appendix 2** of the test. This is in accordance with Samuelsson et al[36] who, in their study demonstrated that there were no differences in visio-spatial, visual recognition and visual recall between dyslexic and control subjects.

The highly significant reduced scores obtained by dyslexics in the comprehension subtest of ART, denotes that failure to use good comprehension strategies, can contribute to poor reading.[43] Similarly, the reduced scores in spelling, indicates that poor spelling performance is a natural outcome of all previous deficiencies in phonological awareness and short-term memory. These results were in support of many previous studies, which all agreed that comprehension and spelling are deficient in children with reading problems.[40,41,44]

As far as the results of ART standardization are concerned, the present findings indicate a high degree of reliability and validity, which thus prove the high sensitivity and objectivity of the test. Reliability of the ART proved to be high by only one method; the test-retest technique. The test-retest reliability of ART was 0.913. The test-retest stability of Test of Phonological Awareness (TOPA)[45] varies from 0.94-0.77 and in Lindamood Auditory Conceptualization Test,[46] the test-retest reliability over a 4 week period was 0.96.

Validity was proven by 5 methods, namely, judgment validity, face validity, internal consistency validity, contrasted group validity and criterion related validity. Internal consistency validity is a measure of homogenicity of the test itself. The internal consistency validity of ART items ranged from 0.238 (for auditory perception) to 0.940 (for phonological awareness and spelling). Thus, all items are significantly correlated to the total score of ART. This means that all test items are proven to be valid (**Table 2**). Contrasted group validity: from the results illustrated in **Table 4**, it was obvious that there was a highly significant difference in all items of ART between the 2 groups (dyslexics and pupils with the highest total scores [suspected normal] on ART). This means that the ART can differentiate between dyslexics and non-dyslexics and is considered to be valid. Criterion related validity (empirical validity) by the use of Schonell test[24] was 0.859, and by Awaad test (reading and comprehension subtests): was 0.817 and 0.671. By mid-term scores of an Arabic exam, the validity was 0.686 (**Table 3**). Similarly, validity of Awaad

reading test was proven by judgment validity, face validity, criterion related validity, self-validity and discriminative validity. Also, test of reading comprehension of Al-Moghazy[47] used criterion related validity, internal consistency validity and contrasted group validity. However, test of TOPA[45] used internal consistency validity only, and the Peabody Picture Vocabulary test[17] reported validity by using only the correlation with the WISC as a criterion related validity.

***Future applications of ART.*** The ART is considered to be reliable and valid for testing reading ability of Arabic speaking children at the age of 9-10 years. Thus, a child who totally scores 40 or less from a total score of ART which is 97 is considered dyslexic. This was reached as the sample was divided according to the median, which was 54 into 4 quarters: The score range of the first quarter was 0-40 (dyslexic). The score range of the second quarter was >40-54 (low average). The score range of the third quarter was >54–64 (high average). The score range of the fourth quarter was >64–97 (normal).

As phonological awareness is the most important subtest for prediction of dyslexia, so a child who scores 16 or less from a total score of phonological awareness, which is 38, is considered dyslexic. This was reached as the sample was divided according to the median, which was 23, into 4 quarters: The score range of the first quarter was 0-16 (dyslexic). The score range of the second quarter was >16-23 (low average). The score range of the third quarter was >23–28 (high average). The score range of the fourth quarter was >28–38 (normal). This part of the test has special importance in predicting dyslexia among preschool children, with poor phonological skills.

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**Appendix 1**

## اختبار القراءة العربى
## (الصورة الأولية)
## (Form I)

أ- اختبار الإدراك الصوتى

١- التعرف على القافية :

نقرأ للطفل كلمات ونطلب منه أن يأتى بكلمة مشابهة فى الأصوات ، وعلى نفس الوزن :

مثال: دار ، فار ، طار

الأسئلة : ١- هات ، فات ، ..... ٢- ثـــور ، نور ، ..... ٣- عـــلم ، قـــام : .....

٤- تاب ، كاب ، ..... ٥- فوز ، لوز ، ..... ٦- خطير ، قطير ، .....

٧- قريب : مريب ، ..... ٨- جمل ، بمل ، ..... ٩- فارس ، حارس ، .....

١٠- أشرار ، أبرار ، .....

٢- تجميع الأصوات لتكوين كلمة :

نقرأ للطفل أصوات ونطلب منه أن يكون منها كلمات :-

مثال : س م ك = سمك

الأسئلة : ١- ق ل م = ..... ٢- ز ر ع = ..... ٣- د ر س = .....

٤- ب ا ب = ..... ٥- ك و ب = ..... ٦- ج ى ن = .....

٧- ح ص أ ن = ..... ٨- ز هـــــــــــ و ر = ..... ٩- ط ر ى ق = .....

١٠- م ك ت ب = .....

٣- تجزئة الكلمة إلى أصوات :

نطلب من الطفل أن ينطق الأصوات التى تكون الكلمة

مثال : بلح = ب ل ح

الأسئلة : ١- علم ٢- ورق ٣- جرس ٤- يسر ٥- ثوب

٦- فيل ٧- عدو ٨- بطيخ ٩- بلدان ١٠- اسكندرية

٤- التعرف على أول صوت فى الكلمة :

نطلب من الطفل أن يتعرف على الصوت الذى يقع فى بداية الكلمة

مثال : ثريا .... ث

الأسئلة : ١- طلب ..... ٢- ظرف ..... ٣- ريش ..... ٤- كلب .....

٥- مسجد ..... ٦- ضباب ..... ٧- لامع ..... ٨- ثلمين .....

٩- سيارة ..... ١٠- زمارة .....

٥- التعرف على الصوت الذى يقع فى منتصف الكلمة :

نطلب من الطفل أن يتعرف على الصوت الذى يقع فى منتصف الكلمة :

مثال : خلف .... ل

الأسئلة : ١- مشى ..... ٢- عدو ..... ٣- عام ..... ٤- زين .....

٥- عود ..... ٦- وزن ..... ٧- مشرقة ..... ٨- عصفور .....

٩- مكتوب ..... ١٠- مسمار .....

٦- حذف الصوت الأول من الكلمة :

نطلب من الطفل أن يحذف أول صوت وبعد ذلك ينطق باقى الكلمة :

**Appendix 1 cont'd**

مثال : مصحف : صحف

الأسئلة : ١- ظرف .... ٢- غزال .... ٣- بنور .... ٤- ثمبـــــن ....

٥- كتاب .... ٦- وزيـــر .... ٧- نمـــور .... ٨- رشـــاش ....

٩- ممزور .... ١٠- فطائر ....

٧- حذف الصوت الذى يقع فى منتصف الكلمة :

تطلب من الطفل أن يحذف الصوت الذى يقع فى منتصف الكلمة ، وبعد ذلك ينطق باقى الكلمة:

مثال : ١- مشى : مى ٢- فطيرة : فطرة

الأسئلة : ١- شبك .... ٢- فول .... ٣- عين .... ٤- سحر ....

٥- بذر .... ٦- أقلام .... ٧- لشجر .... ٨- شماعة ....

٩- مسمار .... ١٠- محسنه ....

٨- حذف الصوت الذى يقع فى نهاية الكلمة :

تطلب من الطفل أن يحذف الصوت الذى يقع فى نهاية الكلمة ، وبعد ذلك ينطق باقى الكلمة :

مثال : ١- بلح : بل ٢- زراعة : زراع

الأسئلة : ١- كلب .... ٢- بنت .... ٣- عنو .... ٤- بذرى ....

٥- عليم .... ٦- عائل .... ٧- طريق .... ٨- زهور ....

٩- كراسة .... ١٠- زخرف ....

٩- إضافة الصوت إلى بداية الكلمة :

تطلب من الطفل إضافة صوت إلى بداية الكلمة ، وينطق الكلمة بعد الإضافة :

مثال : ١- م .... كتب = مكتب ٢- ح .... صان =

الأسئلة : ١- ل .... بن = ٢- ق .... لم = ٣- و .... رق =

٤- ن .... سر = ٥- ج .... مال = ٦- س .... كال =

٧- ت .... مثل = ٨- خ .... روف= ٩- غ .... بـــــــوم =

١٠- م .... درجات =

ب- الإدراك السمعى:

تطلب من الطفل أن يحدد الكلمات المتشابهة فى الأصوات :

مثال : سار – ثار شراب – شراب

الأسئلة : ١- بطة ، قطة ٢- سمع ، شمع ٣- فداء ، فداء ٤- قراءة ، براءة

٥- شقاء ، شراء ٦- سعود ، صعود ٧- زهرة ، ظهر ٨- عاش ، عائل

٩- فرض ، فرد ١٠- طارق ، تارك

جـ- الإدراك البصرى

١- التعرف على مسميات الحروف :

تطلب من الطفل قراءة الحروف الآتية :

ف – ش – خ – ك – ز – غ – ب – ذ – ط – ل

٢- التعرف على الحروف المكتوبة المتشابهة داخل الكلمة :

تطلب من الطفل أن قراءة الكلمات الآتية :

مثال : بط ،لط ٢-حروف ، خروف

الأسئلة : ١- جبر ،حبر ٢- نخل ، بخل ٣- عائم ،غائم ٤-فول ،هول

٥- أسرار ، أشرار ٦-نحل ،نخل ٧- طريف ،ظريف ٨- ذهب ،دهب

**Appendix 1 cont'd**

٩- هضار ،حصار ١٠- زيزى ،عزيزى ١١- بذرى ،جذرى ١٢- تمرة ،شجرة

٣- اختبار ترتيب الحروف داخل الكلمة :

نطلب من الطفل قراءة الكلمات الآتية :

مثال : ٠- علم ،عصل ٠- مسك ،سمك

الأسئلة : ١- حلم ،لحم ٢- علب ،لعب ٣- قمح ،محمق ٤- فرقة ،قرفة

٥- عامل ،عالم ٦- عبور ،زوبع ٧-كتل ،كمال ٨- قرأ ،أقر

٩-كحة ،حكة ١٠- مهتم ،متهم

د- اختبار الذاكرة قصيرة المدى :

نطلب من الطفل أن يقرأ الكلمات التالية لمدة ١٠ ثوانى ثم نطلب منه أن يتذكر أكبر عدد ممكن من هذه الكلمات :

أحمد – قلم – عنب – مدرسة – طفل – أرض – طيارة – كتاب – قمر – طبق

هـ- اختبار الفهم

أقرأ القطعة الآتية ثم أجب على الأسئلة التى بعدها :

تهتم الدولة بالزراعة والصناعة ، فهما الدعامتان الأساسيتان فى بناء اقتصاد الأمم ، فقد اتسعت رقعة الأرض الزراعية بفضل غزو الصحراء ، لإصلاح وزراعة بعض أجزائها ، وزاد الإنتاج بفضل العناية باختيار البذور ، وتوفير السماد ، وتنظيم وسائل الرى والصرف ، وانتشرت المصانع فى ربوع الوادى ، تعلن مداخنها عن نهضة صناعية كبرى ، وتحمل مصنوعاتها شعار (صنع فى مصر) ، فتعامل بها بلدى مع العالمين ، وشجع مصنوعات بلدك ، بهذا يعم الرخاء ، وتنهض البلاد ، ويسود الأمن فى هذا الوطن العزيز .

الأسئلة :

١- عكس كلمة تهتم ( تحفز – تهمل – تشجع)

٢- الدعامتان الأساسيتان فى بناء اقتصاد الأمم هما (الزراعة والصناعة – الزراعة والتجارة – الصناعة والتجارة)

٣- اتسعت مساحة الأرض الزراعية بسبب ( اختيار البذور – استصلاح الأراضى – تنظيم وسائل الرى والصرف)

٤- معنى كلمة "اتسعت" (انتشرت – زادت – نقصت)

٥- عكس كلمة بناء ( هدم – إعلاء – تشييد)

٦- زاد الإنتاج الزراعى بفضل (بناء المصانع – توفير السماد – النهضة الصناعية الكبرى)

٧- العناية باختيار البذور أدت إلى (نقص الإنتاج – زيادة الإنتاج – غزو الصحراء)

٨- من مظاهر اهتمام الدولة بالصناعة (تنظيم وسائل الرى والصرف – غزو الصحراء – بناء المصانع)

٩- مرادف كلمة "شعار" (علامة – دليل – شكل)

١٠- انتشرت المصانع فى (مصر كلها – الصحراء – الشوارع)

و- اختبار الهجاء

١- تشخيص صعوبة التفرقة بين الأصوات المتشابهة فى النطق :

**Appendix 1 cont'd**

ذئب – نورس – ثريا – طبق – صوت – تامر – ظرف – شكر – ضرب – زهرة – حاتم – شقاء – غراب – زحام – منة .

٢– اختبار تشخيص صعوبة التفرقة بين الهمزات ووضعها في اماكنها الصحيحة :

مؤمن – ملائكة – آداء – قرأ – رديء – كأس – مؤتمر – شراء – حدائق – جرئ

٣– اختبار تشخيص صعوبة هجاء الكلمات المطوية :

الإسكندرية – المستقبل – الديمقراطية – الادخار – مزدحمة – اعمالكم

٤– اختبار تشخيص الصعوبة في هجاء الكلمات التي بها حرف مد :

سلطان – مستحيل – بخور – دبابات – كبير – ملوك

٥– اختبار تشخيص صعوبة كتابة التنوين :

أكلت طعاماً شهياً  هذا ثوب نظيف  لعبت وقتاً طويلاً في حديقة واسعة

٦– اختبار تشخيص صعوبة كتابة الألف اللينة :

ليلى – لثوى – سلوى – مصطفى – نهى – موسيقى

٧– اختبار تشخيص صعوبة التفرقة بين الفعل المضارع المتصل الآخر بالواو ، واو الجماعة :

يأكلوا – يسمو – يلعبوا – يرجو

٨– اختبار تشخيص صعوبة هجاء كلمات بها أصوات تنطق ولا تكتب :

طه – لكن – ذلك – أولئك – هذا – هؤلاء

## اختبار القراءة العربي
## (الصورة النهائية)
## (From II)

أ– اختبار الإدراك الصوتي :  الدرجة الكلية =٣٨

١– التعرف على القافية :( ١٠ درجات )

نقرأ للطفل ونطلب منه أن يأتي بكلمة متشابهة في الأصوات، وعلى نفس الوزن:

مثال:  دار ، فار ، طار

الأسئلة : ١–هات، فات، .....  ٢– نور، دور ، .....

٣– عام ، قام، .....  ٤– ثاب ، كاب ، .....  ٥– فـوز ، لـوز، .....

٦– خطير ، فطير ، .....  ٧– قريب ، مريب ، ....  ٨– جلال ، بلال ، .....

٩– فارس ، حارس ، ....  ١٠– أشرار ، أبرار ، .....

٢– تجميع الأصوات لتكوين كلمة : (درجة واحدة)

نقرأ للطفل أصوات ونطلب منه أن يكون منها كلمات: –

مثال:  س م ك = سمك

الأسئلة : –  ١– ب ا ب = ———

٣– تجزئة الكلمة إلى أصوات : (ثلاث درجات)

نطلب من الطفل أن ينطق الأصوات التي تكون كلمة

مثال : بَحْ = ب ح

**Appendix 2**

الأمثلة : ١- بطيخ ٢- بلدان ٣- اسكندرية

٤- التعرف على أول صوت في الكلمة : (درجتان)

نطلب من الطفل أن يتعرف على الصوت الذي يقع في بداية الكلمة :

مثال : ثريا --- ث

الأمثلة : ١- فلرف ------ ٢- زمارة ---

٥- التعرف على الصوت الذي يقع في منتصف الكلمة : - (ست درجات)

نطلب من الطفل أن يتعرف على الصوت الذي يقع في منتصف الكلمة :

مثال : خلف --- ل

أمثلة : ١- عام --- ٢- زين ---- ٣- مشركة ---

٤- عصفور --- ٥- مكتوب --- ٦- مسمار ---

٦- حذف الصوت الأول من الكلمة : - (درجة واحدة)

نطلب من الطفل أن يحذف أول صوت ، وبعد ذلك ينطق باقي الكلمة :

مثال : مصحف : صحف

الأمثلة : ١- معزور

٧- حذف الصوت الذي يقع في منتصف الكلمة : - (سبع درجات)

نطلب من الطفل أن يحذف الصوت الذي يقع في منتصف الكلمة ، وبعد ذلك ينطق باقي الكلمة :

مثال : ١- مشى مى ٢- فطيرة فطرة

الأمثلة : ١- شبك --- ٢- بئر --- ٣- أقلام --- ٤- أشجار ---

٥- شجاعة --- ٦- مسمار --- ٧- محمية ---

٨- حذف الصوت الذي يقع في نهاية الكلمة : (ثلاث درجات)

نطلب من الطفل أن يحذف الصوت الذي يقع في نهاية الكلمة ، وبعد ذلك ينطق باقي الكلمة :

مثال: ١- بلح: بل ٢- زراعة: زراع

الأمثلة: ١- عليم --- ٢ زهور --- ٣- كراسة ---

٩- إضافة صوت إلى بداية الكلمة : (خمس درجات)

نطلب من الطفل إضافة صوت إلى بداية الكلمة ، وينطق الكلمة بعد الإضافة :

مثال: ١- م---كتب = مكتب ٢- ج---صان =

الأمثلة : ١- ل---ن = ٢- ن---سر = ٣- ج---مال =

٤- ن---كان = ٥- م---درجات =

ب- الإدراك السمعي: الدرجة الكلية=ثلاث درجات

نطلب من الطفل أن يحدد الكلمات المتشابهة في الأصوات

مثال: مار – نار شراب – شراب

الأمثلة : ١- سعود ، صعود ٢- زهر ، طهر ٣- فرض ، فرد

ج- اختبار الذاكرة قصير المدى : الدرجة الكلية=عشر درجات

يقرأ للطفل الكلمات الآتية خلال مدة عشرة ثواني ، ثم نطلب منه أن يتذكر أكبر عدد ممكن من هذه الكلمات : -

أحمد – قلم – عنب – مدرسة – طفل – أرض – طيارة – كتاب – قمر – طبق.

**Appendix 2 cont'd**

د- اختبار الفهم : الدرجة الكلية =عشر درجات

اقرأ القطعة التالية ثم أجب على الأسئلة التي بعدها :

تهتم الدولة بالزراعة والصناعة ، فهما الدعامتان الأساسيتان في بناء اقتصاد الأمم ، فقد اتسعت رقعة الأرض الزراعية بفضل غزو الصحراء ، لإصلاح وزراعة بعض أجزائها ، وزاد الإنتاج بفضل العناية باختيار البذور ، وتوفير السماد ، وتنظيم وسائل الري والصرف ، وانتشرت المصانع في ربوع الوادي تعلن مداخنها عن نهضة صناعية كبرى ، ونحمل مصنوعاتها شعار (صنع في مصر) ، فاعمل يا بني مع العاملين ، وشجع مصنوعات بلادك .

بهذا يعم الرخاء ، وتنهض البلاد ، ويسود الأمن في هذا الوطن العزيز .

الأسئلة :

١- عكس كلمة تهتم (تحفز – تهمل – تشجع)

٢- الدعامتان الاساسيتان في بناء اقتصاد الأمم هما

( الزراعة و الصناعة – الزراعة و التجارة – الصناعة و التجارة)

٣- اتسعت مساحة الأرض الزراعية بسبب

(اختيار البذور – استصلاح الأراضي – تنظيم وسائل الري الصرف)

٤- معنى كلمة " اتسعت" (انتشرت – زادت – نقصت)

٥- عكس كلمة بناء (هدم – إعلاء – تشييد)

٦- زاد الإنتاج الزراعي بفضل (بناء المصانع – توفير السماد – النهضة الصناعية الكبرى)

٧- العناية باختيار البذور أدت إلى (نقص الإنتاج – زيادة الإنتاج – غزو الصحراء)

٨- من مظاهر اهتمام الدولة بالصناعة

(تنظيم وسائل الري و الصرف – غزو الصحراء – بناء المصانع)

٩- مرادف كلمة شعار (علامة – دليل – شكل)

١٠- انتشرت المصانع في (مصر كلها – الصحراء – الشوارع)

هـ- اختبار الهجاء الدرجة الكلية=ست و ثلاثون درجة

١- تشخيص صعوبة التفرقة بين الأصوات المتشابهة في النطق :

يطلب من الطفل كتابة الكلمات الآتية: (درجة للحرف المظلل بكل كلمة )

ذئب – ثريا – ظرف

٢- اختبار تشخيص صعوبة التفرقة بين الهمزات ووضعها في أماكنها الصحيحة: (سبع درجات)

مؤمن – ملائكة – قرأ – رديء – كأس – مؤنس – جرئ .

٣- اختبار تشخيص صعوبة هجاء الكلمات المنونة : أربع درجات)

النيمقراطية – الانحار – مزدحمة – أعمالكم

٤- اختبار تشخيص الصعوبة في هجاء الكلمات التي بها حرف مد : درجة واحدة لكل كلمة

٥- اختبار تشخيص صعوبة كتابة التنوين : (ثماني درجات)

أكلت طعاما شهيا هذا ثوب نظيف لعبت وقتا طويلا في حديقة واسعة

٦- اختبار تشخيص صعوبة كتابة الألف اللينة : (أربع درجات)

تبقى – تقوى – سلوى – نهى

**Appendix 2 cont'd**

٧- اختبار تشخيص صعوبة التفرقة بين الفعل المضارع المعتل الآخر بالواو، واو الجماعة: (أربع درجات)

يكلوا - يسمو - يلعبوا - يرجو

٨- اختبار تشخيص صعوبة مجاه كلمات بها أصوات تنطق ولا تكتب: (خمس درجات)

طه - لكن - ذلك - أولئك - هؤلاء