Comprehensive Arabic Language test as a tool for assessing delayed language impaired Egyptian children

By

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Theories of language acquisition

- Imitation theory
- Reinforcement theory
- The active construction of a grammar theory
Language development

I- Phonological development:
- The phonation stage (birth- 1month)
- Gooing and cooing stage (2-3months)
- Expansion stage (4-6months): babbling and full resonant nuclei
- Babbling (6-13months): reduplicate babbling
- Vocables (11-14 months)
- First 15 words stage (1 year-1 ½ year)


Phonological processes

I- Syllable-structure processes

II- Substitution processes

III- Assimilation processes

Language development (cont.)

II- Prosodic development:

- Stage I: infant vocalization
- Stage II: discrimination of pitch and loudness
- Stage III: varied vocalization, with varying loudness and pitch range.
- Stage IV: appearance of tonicity and tonal contrastivity
- Stage V: appearance of tone units


Language development (cont.)

III- Syntactic and morphological development:

<table>
<thead>
<tr>
<th>Linguistic stage</th>
<th>Chronological age (m.)</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>12-26</td>
<td>Use of syntactic relations</td>
</tr>
<tr>
<td>II</td>
<td>27-30</td>
<td>Morphological development</td>
</tr>
<tr>
<td>III</td>
<td>31-34</td>
<td>Development of negative, imperative, interrogation</td>
</tr>
<tr>
<td>IV</td>
<td>35-40</td>
<td>Emergence of coordination, complementation</td>
</tr>
</tbody>
</table>
Language development (cont.)

IV- Semantic development:
- Overgeneralization of the new words to inappropriate contexts.
- Underextension of the words to label more finely and differentiate better among members of a class.


Language development (cont.)

V- Pragmatic development:
- Pragmatic development during the first 2 years
- Pragmatic development during the preschool age
- Pragmatic development during school age and adult years

Assessment

- The process of collecting, synthesizing and interpreting information.
- The initial step in providing clinical services.
- Purposes:
  - Identifying children with language disorders.
  - Designing appropriate language intervention programs
  - Monitoring changes resulting from intervention

Methods of assessment

- Obtaining information from parents.
- Direct observation of the child’s performance.
  - Standardized tests
  - Non-standardized procedures:
    - Spontaneous language samples
    - Elicited production procedures
    - Language comprehension
Test standardization

- Standardization requires a number of procedures:
  1. Determination of the major variables that affect the scores
  2. Determination the sample size
  3. The method of choosing the sample must involve a randomization process
  4. The test must be administered to all subjects within a few weeks or months
  5. Statistical analysis of the data.

Test standardization (cont.)

- Reliability:
  - Test-retest method

- Validity:
  - Judgment validity
  - Face validity
  - Construct validity
  - Criterion related validity

- Sensitivity

- Specificity
Criteria of reliable and valid preschool assessment:

- Not to make child anxious.
- Obtain information on the same content area from multiple and diverse sources.
- The length of the assessment.
- Appropriate sampling methods.
- Develop, construct a detailed comprehensive assessment battery for Arabic language
- Test the reliability and validity in order to use it in the early detection of subtle changes in the various components of language in cases of language impaired children.
540 children, the Unit of Phoniatics, ENT department, Faculty of Medicine.

- Age range (2-6 years).
- 2 groups:
  - Group I (320 normal children)
  - Group II (220 language impaired children)
- Pilot study (100 children)
I- Elementary Diagnostic Procedures.

A- History taking:
  - Personal data
  - Past history of feeding, illnesses and febrile attacks.
  - Perinatal, natal and postnatal history.

II- Clinical Diagnostic Aids.
  - Developmental milestones.

III- Test description

B- Examination:
  - General examination.
  - Ear, nose and throat examination.
  - Neurological examination.

II- Clinical Diagnostic Aids.

A- Psychometric evaluation:
  - Stanford Binet intelligence scale
  - Vineland social maturity scale
  - Progressive Matrices of Raven

III- Test description
  - Denver Developmental Screening test

B- Formal language assessment using the Arabic Language test (Kotby, 1995).

C- Audiological assessment.
The Comprehensive Arabic Language test is a test battery, composed of 5 subtests.

I- Test of phonology:

III- Test description

- 71 words
- Each Arabic phoneme is assessed in different position
- Correct articulation of the corresponding picture.
- Scoring of the test

III- Test description:
Test of phonology

Video sample

Record form

<table>
<thead>
<tr>
<th>Word correct?</th>
<th>Consonant inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected</td>
<td>Circle the i or m or f to indicate an error on an initial or medial or final consonant</td>
</tr>
</tbody>
</table>

Notes
II- Test of semantics:

- 214 items
- Recognize and name:
  - Different semantic groups e.g. body parts, clothes, vegetables, animals….
  - Other concepts e.g. direction, quantity, time, matching.
- Total semantics score

III- Test description

Test of semantics (Record form)
III- Test description
Test of semantics

Part II

Part I

III- Test description

III- Test of the morphology:

- 56 questions
- Different morphological structures e.g. personal pronouns,
  plurals, verb tense, negation, derivation...
- Score of the test is the sum of the correct answers.
Test of expressive morphology

(Record form)

<table>
<thead>
<tr>
<th>Test of expressive morphology</th>
</tr>
</thead>
<tbody>
<tr>
<td>III- Test description</td>
</tr>
<tr>
<td>(Record form)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test description (Record form)</th>
</tr>
</thead>
<tbody>
<tr>
<td>III- Test description</td>
</tr>
<tr>
<td>Test of expressive morphology</td>
</tr>
</tbody>
</table>

Methods
III- Test description

IV- Test of the syntax:

- The receptive syntactic ability (repeating 10 sentences, following 8 directives and answering 7 questions.
- The expressive syntactic ability (describing 10 actions, sequencing 4 events).
- Score of the test

III- Test description

Test of syntax
(Record form)

<table>
<thead>
<tr>
<th>النموذج</th>
<th>الدرجة</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ورني مكعبين لونهم أزرق</td>
<td></td>
</tr>
<tr>
<td>2. حدد كل المكعبات التي لونهم أبيض مش أزرق</td>
<td></td>
</tr>
<tr>
<td>3. ورني مكعب مش أزرق</td>
<td></td>
</tr>
<tr>
<td>4. حط مكعب أسفر فوق مكعب أسود</td>
<td></td>
</tr>
<tr>
<td>5. د. ورقة تحت أزرق و مكعبين فوق الورقة</td>
<td></td>
</tr>
<tr>
<td>6. حط 3 مكعبات لونهم أسفر فوق بعض هنا (ناحية الطفل) و 3 مكعبات لونهم أبيض فوق بعض</td>
<td></td>
</tr>
<tr>
<td>7. وضع المكعبات بناياك بعد ما توقع بتوعي</td>
<td></td>
</tr>
<tr>
<td>8. حط مكعب لونه أسفر بين مكعب أزرق و مكعب أبيض</td>
<td></td>
</tr>
<tr>
<td>المجموع</td>
<td></td>
</tr>
</tbody>
</table>
III- Test description

Test of syntax

V- Test of pragmatics:

- Answer 42 questions denoting different speech acts e.g. requesting, regulating, informing, expressing and organizing devices.
- The score of the test is the sum of the correct answers.
### III- Test description

**Test of pragmatics**

*(Record form)*

<table>
<thead>
<tr>
<th>Score</th>
<th>Key of answers</th>
<th>Question</th>
<th>Speech act</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Organizing devices (politeness markers)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Requesting (asking)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Regulating (warning)</td>
</tr>
</tbody>
</table>

#### Score

- **1**: ايتيني ناس عربت ولد و هو
- **2**: عرضي رضعت ولد و هو
- **3**: ايتيني ناس عربت ولد و هو

#### Key of answers

- ممكن استخد جواب؟ ممكنل
- نسوت كتب ناس؟
- هل حاس ولد؟
- هل حاس مطلب من ولد؟

#### Question

- هل حاس مطلب من ولد؟
- هل حاس مطلب من ولد؟
- هل حاس مطلب من ولد؟

#### Speech act

- حاس ولد
- حاس ولد
- حاس ولد

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**Methods**

### III- Test description

**Test of pragmatics**

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**Methods**
**III- Test description**

The test materials:
1- Cards of white glossy colored pictures
2- Twelve cubes colored with white, black, yellow and blue.

The final language score is the sum of the total scores of:

- Test of semantics
- Test of expressive morphology
- Test of syntax
- Test of pragmatics
The result of this study is divided into:

I- Demographic data

II- Reliability

III- Validity

IV- Sensitivity and specificity

V- Correlation between the demographic data and the responses of all test items

VI- Diagnostic profile
I- Demographic data

Control

Cases

RESULTS

Residence

32.30%

19.70%

48%

12.70% 7.20% 80.10%

Urban Rural Slum
I- Demographic data

The result of this study is divided into:

II- Reliability
I- Demographic data

II- Reliability

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VI- Diagnostic profile

III- Validity

C- Correlation between the final language score and each test score

<table>
<thead>
<tr>
<th>Subtest</th>
<th>Final language score (correlation coefficient)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test of phonology</td>
<td>-0.92**</td>
</tr>
<tr>
<td>Test of semantics</td>
<td>0.99**</td>
</tr>
<tr>
<td>Test of expressive morphology</td>
<td>0.92**</td>
</tr>
<tr>
<td>Test of syntax</td>
<td>0.96**</td>
</tr>
<tr>
<td>Test of pragmatics</td>
<td>0.94**</td>
</tr>
</tbody>
</table>
III- Validity

3- Criterion related validity:
- Highly significant Mann-Whitney test and area under the curve
- The greater ability to differentiate between the normal and delayed language children
- The cut-off values.

<table>
<thead>
<tr>
<th></th>
<th>Test of phonology</th>
<th>Test of semantics</th>
<th>Test of expressive morphology</th>
<th>Test of syntax</th>
<th>Test of pragmatics</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT</td>
<td>-0.91***</td>
<td>0.89***</td>
<td>0.85***</td>
<td>0.88***</td>
<td>0.26</td>
</tr>
<tr>
<td>VSMS</td>
<td>0.21</td>
<td>0.04</td>
<td>0.11</td>
<td>0.12</td>
<td>0.10</td>
</tr>
<tr>
<td>PMR</td>
<td>0.12</td>
<td>0.02</td>
<td>0.21</td>
<td>0.11</td>
<td>0.22</td>
</tr>
<tr>
<td>DDST (personal-social)</td>
<td>0.04</td>
<td>0.10</td>
<td>0.11</td>
<td>0.02</td>
<td>0.18</td>
</tr>
</tbody>
</table>

4- Convergent and divergent validity:
The result of this study is divided into:

I. Sensitivity and specificity
   - Demographic data

II. Reliability
   - All tests of the *Comprehensive Arabic Language test* showed high sensitivity and specificity ranged from 87.5 to 100.

III. Validity
   - Responses of all test items.

IV. Sensitivity and specificity

V. Correlation between the demographic data and the responses of all test items

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Range</th>
<th>Girls</th>
<th>Range</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test of phonology</td>
<td>95</td>
<td>(0)</td>
<td>91</td>
<td>(0-234)</td>
<td>0.81</td>
</tr>
<tr>
<td>Test of semantics</td>
<td>93</td>
<td>(24-207)</td>
<td>19</td>
<td>(1-50)</td>
<td>0.36</td>
</tr>
<tr>
<td>Test of exp. Morphology</td>
<td>19</td>
<td>(1-50)</td>
<td>17</td>
<td>(5-45)</td>
<td>0.24</td>
</tr>
<tr>
<td>Test of syntax</td>
<td>17</td>
<td>(5-47)</td>
<td>17</td>
<td>(5-45)</td>
<td>0.23</td>
</tr>
<tr>
<td>Test of pragmatics</td>
<td>12</td>
<td>(0-42)</td>
<td>15</td>
<td>(0-40)</td>
<td>0.12</td>
</tr>
<tr>
<td>Final language scores</td>
<td>0</td>
<td>(33-347)</td>
<td>0</td>
<td>(33-343)</td>
<td>0.22</td>
</tr>
</tbody>
</table>
**V- Correlation between the demographic data and the responses of all test items**

<table>
<thead>
<tr>
<th></th>
<th>Residence</th>
<th>F.education</th>
<th>M.education</th>
<th>Socio.class</th>
<th>Sch.adm.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P value</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test of phonology</td>
<td>0.05**</td>
<td>0.00**</td>
<td>0.00**</td>
<td>-0.05**</td>
<td>0.00**</td>
</tr>
<tr>
<td>Test of semantics</td>
<td>0.02**</td>
<td>0.00**</td>
<td>0.00**</td>
<td>0.32</td>
<td>0.00**</td>
</tr>
<tr>
<td>Test of exp. Morphology</td>
<td>0.00**</td>
<td>0.00**</td>
<td>0.00**</td>
<td>0.00**</td>
<td>0.00**</td>
</tr>
<tr>
<td>Test of syntax</td>
<td>0.19</td>
<td>0.00**</td>
<td>0.00**</td>
<td>0.14</td>
<td>0.00**</td>
</tr>
<tr>
<td>Test of pragmatics</td>
<td>0.18</td>
<td>0.00**</td>
<td>0.00**</td>
<td>0.89</td>
<td>0.00**</td>
</tr>
<tr>
<td>Final language scores</td>
<td>0.03**</td>
<td>0.00**</td>
<td>0.00**</td>
<td>0.21</td>
<td>0.00**</td>
</tr>
</tbody>
</table>

**VI- Diagnostic profile**

The result of this study is divided into:

I- Demographic data

II- Reliability

III- Validity

IV- Sensitivity and specificity

V- Correlation between the demographic data and the responses of all test items

VI- Diagnostic profile
VI- Diagnostic profile

Test of semantics

- Recognition of direction
- Recognition of quantity
- Recognition of matching
- Expression of direction
- Expression of quantity
- Expression of matching

Test of expressive morphology

- Pronoun
- Broken plural
- Imperative verb
- Superrelative
VI- Diagnostic profile

Test of syntax

- Repeating sentences: 100% (24 m.), 95% (53-56 m.), 85.60% (69-72 m.), 100% (75% - 85.70%)
- Following directives: 41.70% (24 m.), 33.30% (53-56 m.), 25% (69-72 m.), 8.30% (75% - 83.30%)
- Describing actions: 100% (24 m.), 83.30% (53-56 m.), 58.30% (69-72 m.), 25% (75% - 57.10%)
- Sequencing events: 100% (24 m.), 71.40% (53-56 m.), 57.10% (69-72 m.), 8.30% (75% - 53%)

Test of pragmatics

- Organizing: 100% (24 m.), 85.70% (53-56 m.), 50% (69-72 m.), 50% (75% - 58.30%)
- Requesting: 100% (24 m.), 85% (53-56 m.), 33.30% (69-72 m.), 25% (75% - 41.70%)
- Regulating: 100% (24 m.), 85% (53-56 m.), 41.70% (69-72 m.), 25% (75% - 58.30%)
- Expressing: 100% (24 m.), 83.30% (53-56 m.), 58.30% (69-72 m.), 25% (75% - 57.10%)
- Informing: 100% (24 m.), 71.40% (53-56 m.), 58.30% (69-72 m.), 25% (75% - 57.10%)
1- Age range

- The range was chosen to be representative to the preschool period:
  - The maximum language development occurs.
  - Most of the parents sought medical advice when they noticed a language problem.
  - For early detection of any deviation in language acquisition.
2- The choice of the number of sample for each age range

- The categorization was depended upon equalization of the sample number for all age categories.
- The four months age interval was chosen to detect the minor change in the development of each language component tested.

3- The time of administration

- 60 min for the five subtests application.
- Two sessions according to the response and the age of the child.
- This relative long period allowed testing of all the five components of the language and not only one component as in most of the language tests.
4- Results of the test standardization

A- Reliability:
- The Comprehensive Arabic Language test (CALT) was proved to be high by the test-retest technique and the internal consistency.
- The most commonly used methods as in the test of Auditory Comprehension of Language.
- The test-retest method was carried on the pilot study with 2 weeks interval so the performance of the child will not be influenced by learning or normal development of the language.

5- Results of the test standardization

B- Validity:
- The methods were chosen in order to prove validity of the test with greater number of methods to assume that the test is highly valid.
- The internal consistency coefficients were based on a single administration of the test and thus were easy to estimate.
C- Sensitivity and Specificity

- The Comprehensive Arabic Language test (CALT) proved to be highly sensitive and specific.
- Few language tests used sensitivity and specificity as a method of standardization as in the Language Screening Instrument (SNEL) and Parent Administered Language test (PAL).

D- Normative scores

- The normative scores are expressed in language ages, quotients, median, maximum and minimum.
- These results were consistent with that in the Utah test of Language Development which depended only on language age equivalent and quotients.
- The standard scores and percentile equivalents could not be established because of the small size of the standardization sample.
D- Normative scores (cont.)

- The Comprehensive Arabic Language test (CALT):
  - Norm-referenced test.
  - Standardized, formal procedures for administering, timing, and scoring.
  - Most of the language tests are norm-referenced tests as in Houston test of Language Development.

E- Diagnostic profile

- The percentages of the phonological processes decreased by the increasing of age.
- The findings of the test of semantics were similar to the results of Kotby, 1995 who noted that a child aged 2-3 years knew most of the semantic groups.
- The findings of the expressive morphology were similar to the results noted by El-Gabaly, 2003.
The Comprehensive Arabic Language test (CALT) is a valid, reliable, highly sensitive and specific test.

The Egyptian profile of language development is nearly the same as the western profiles except for minimal differences.

The first study to measure the normal development of Arabic language in the Egyptian children in details for each language component.
Recommendation

- Larger samples of children that might represent various areas in Egypt.
- Minimization of the age interval to 3 months.
- Giving some care to the age period below 2 years.
- Apply the test to delayed language development children in order to assess the effectiveness of the language therapy.
Recommendation

- The percentile rank and quotient for the test through administering the test on a larger number of normal children.
- Large sample of delayed language development children in order to identify the diagnostic linguistic criteria for each etiological category.
- Apply informal testing of pragmatics e.g. turn-taking and story telling.

THANK YOU