

Traditional and Computer-Based evaluation of preschoolers' oral language in Greek - A review of the literature

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Abstract

The purpose of this study is to examine and present the procedures and the tools that are described in the literature for observing preschool children's communication competence. Informal and formal standardised testing activities are included and a distinction is made on traditional and Computer-Based Screening and Diagnosis.

The results of study illustrate the current trends of the literature and discuss the possibility of the computer-based screening and diagnosis to partially make up for the expert-personnel shortage..

1. Introduction

Technology is truly everywhere [1] and its widespread adoption in various applications influence almost every aspect of modern life. Amongst them, the society's prospect of the Information and Communication Technologies (ICT) role in education has also changed. Today learners seem to be more involved in the learning process, because they have the advantage of the technology special means to support their assignments [2]. ICT in education can make teaching and learning more effective and efficient [3], as they do not involve just learning about technology (obviously one needs to have certain abilities to use ICT), but learning with technology.

The early identification of speech and language disorders or delays is a crucial first step in the effective prevention of developmental and socioemotional problems [4], [5]. Children's early cognitive and language development has bearing on later development and readiness for learning and social competence [4].

In the field of language learning and assessment, computerized applications are limited, particularly for the Greek language. Most diagnosticians use qualitative means of assessment based on their personal experience [6]. According to Nelson et.al. "Computer capabilities, if used appropriately and responsibly, can expand the resources and improve the efficiency of language learning and assessment" [7].

The aim of this study is to examine and present the assessment procedures and available tools that are presented in the literature for early childhood oral language, focusing on the case of Greek language. Standardised and non standardised evaluation activities are discussed, highlighting on traditional and computer-based screening and diagnosis, following by a discussion of the results.

2. The assessment

There is no uniformly accepted screening and diagnostic technique in speech language for use in the primary care setting [5], [8]. Various tests and observation procedures can be used for measuring children's speech and language abilities. Instruments such as (i) Child Developmental Milestones for

speech and language, (ii) Parent questionnaires, (iii) Standardised Screening tests or (iv) Other Informal tests can be used. Milestones for speech and language development in young children are generally acknowledged [9]. Concerns for delay arise if there are no verbalizations by the age of 1, if speech is not clear, or if speech or language is different from that of other children of the same age. Parent questionnaires and parent concern are often used to detect delay. Many researchers support that the SLP needs to put together an assessment of his or her own, as speech and language skills can be revealed by using the three channels "testing - observing – questioning" [5], [10], [11]. The evaluation process usually requires a cooperation of speech therapists, educational professionals and parents [5], [10], [11].

The successful use of oral language means that the child is able to communicate using speech. Thus, the child can normally articulate, produce understandable speech and perceive speech. Articulation is described as the production of speech sounds [10][11]. Normal articulation involves a series of complex actions, such as exact placement, sequencing, timing, direction and force of the articulators, occurring simultaneously with precise airstream alteration, initiation or halting of phonation and velopharyngeal action [11].

Clinicians, when assessing speech, they examine the verbal production of language [10]. Articulation and phonology (the set of rules for sound production) are speech processes that must be examined [10].

The successful use of language involves the interaction of the three systems of language that Bloom and Lahey described in 1978 in order to show how the key language skills interrelate [12]. They refer to the form of language (grammar, shown in word order, word endings, verb tenses. This is the ability to put together a grammatical sentence), the content of language (picking the right words to get the message across, vocabulary, understand the meanings of words and be able to use these words to create what want to be said) and the use of language (making use of language in a variety of different ways, such as for greeting, describing, arguing and also involves body language, facial expression, tone of voice and non-literal language as well as knowing how to take turns in talking) and the connection between them. Clinicians, during language evaluation, assess abilities on form, content and use of language.

2.1 Assessment procedures

Speech and language assessment procedures include all the necessary activities to gather relevant information on speech and language abilities. Typically, in consistent with [10][11][12][13] such activities include:

- 1 A history of the child that provides background information.
- 2 Hearing and oral-facial examination, to thoroughly examine hearing anatomic and co-ordination parameters.
- 3 Use of standardized or non standardized articulation and phonological and other language tests or other observation methods.
- 4 Representative speech sample (fundamentally significant to accurately diagnose speech and sound disorders). Samples can be used to assess stimulability of misarticulated phonemes, error types, number of errors, prosody, speech rate, identifying dysarthria or apraxia. Furthermore, samples can be used to identify language disorders.
- 5 Normative data for phonemes and for other language aspects are used, to determine whether or not a child is developing within normal expectations. Although there are limitations (a norm is the

average age at which behaviour of a "hypothetical child" occurs), norms are practical for approximating how well a child's sounds are developing.

Finally, at the end a diagnostic report is produced containing the detailed conclusions of the assessment 1-5 procedures and possible treatment plans.

2.2 Assessment tools

A short description of reported in the literature standardized tools, that can be used for aspects of the evaluation of oral language in Greek, focusing on early childhood, follows in chronological order:

- (1983) The Denver Developmental Screening Test (D. D. S. T.), adapted for the Greek language by Ioannis Tsikoulas [14]:. It is a screening test for cognitive and behavioural problems in preschool children. Tasks are grouped into four categories: social contact, fine motor skill, language, and gross motor skill. It sorts those who probably have problems from those who probably don't, using a scale that reflects what percentage of a certain age group is able to perform a certain task. It is performed traditionally.

- (1999) Athena Test - Diagnosis of Learning Difficulties [14]: This test can be administered to children 5-9 years old and was built to be used by teachers (in preschool and in first classes of elementary school) or other specialist that deal with such matters. Athena Test gives a detail picture of the present situation of child in vital sectors of growth and locates concrete areas that are deficient and require particular teaching/therapy intervention. Its development was based on two other tests (i) Illinois Test of Psycholinguistic Abilities and (ii) Aston Index (a comprehensive, tried & tested battery of assessments for screening and diagnosing language difficulties). It is constituted by 14 tasks in a form of developmental psychometrics scales: (i) Intellectual ability (Linguistic proportions, Copying shapes, Vocabulary, (i) Memory of sequences (numbers - common sequences, pictures, forms), (iii) Completion of representations (Sentence Completion, Word Completion, (iv) Writing-phonological awareness (Discrimination of graphemes, Discrimination of sounds, Composition of sounds), (v) Neuropsychological maturity (Visual co-ordination, Perception of "right-left ", Dominant Hemisphere). It is performed traditionally.

- (2002) Test of early identification of dyslexia [16]: This test seeks to indicate the factors most probably included in an early detection of special developmental dyslexia at the preschool age. It offers the possibility of indentifying a child's various difficulties or particularities if any, however it does not classify the type or the form of difficulty. The test is divided in two sections: (i) Description of a subject's general intellectual development; (ii) Description of specific skills of development (psychomotoricity, visual perception, laterality, pre-writing ability and phonological awareness). It is performed traditionally.

- (2005) AnOmiLo 4 - Screening Test of Speech and Language Disorders: It is a Greek adaption of the French test ERTL 4, aiming for an early detection of speech and language problems of children age 3,9 - 4,6 years old. The test sorts those who probably have problems from those who probably don't. It is performed traditionally.

- (2007) Alpha test - Screening test for school readiness [18]: A very short screening test for children 5-6 years that examines the learning and emotional readiness of a child for elementary school, so as to prevent school failure, and serious social and mental disturbances. It is not an intelligence test. The evaluation is computer-based.

- (2007) Phonological screening Test of Dyslexic Behaviour for children 5-6 years old (FOTADYS 5-6) [19][20] : concerns the identification of preschool children that tend to appear dyslexic behaviour. It includes eight psychometrics tasks (repetition of pseudowords, phonemic synthesis, phonemic

composition, recognition of rhyme, elimination of initial part of word, rapid naming of nouns, colours, comparison of pseudowords, syllabic/ phonemic segmentation. It is performed traditionally.

- (2007) MetaFon Test : Aims for the evaluation of metaphonological abilities of preschool and first school age children for the detection of difficulties in the written language, that is to say the prevention of learning difficulties for children 3,10 - 6,6 years old. It interprets childrens' achievements via (i) Diagnostic Diagram of Phonological Awareness, (ii) Developmental profile of Phonological Awareness and (iii) Developmental milestones. It is performed traditionally.

- (2007). Screening tool for the detection of speech and language disorders for preschoolers [22]: It was created as a screening tool for detecting preschoolers (3 - 6 years old) that differ from the expected scale on expressive vocabulary, naming pictures, comprehension (pictures with different objects, animals, fruits and vegetables), vocabulary development. It is performed traditionally.

There are also other tests in this field, thus addressing to other target groups (only children older than six years) i.e. Wisc III (Wechsler Intelligence Scale for Children Wisc III) but they are not considered in this study as the emphasis is given on tests that include speech and language evaluation on preschoolers.

3. Discussion

The literature review reveals the following:

- No complete instrument for the evaluation of preschoolers' oral language exists in Greek in any form (traditional or computer-based). Most of the tools are either specified to evaluate one aspect of speech or language, or others only perform screening procedures, thus they do not conclude on evaluating the relevant skills.
- Oral language assessment is complex and requires skills and expert knowledge.

Preschoolers' oral language skills, can be revealed by using the three channels testing - observing - questioning and if this process requires a cooperation of speech therapists, educational professionals and parents, there is no such complete procedure available by now.

In terms of educational processes the literature review reveals the need for tools that can guide today's teachers in the educational procedures that require language assessment, particularly in the preschool setting. The teachers need intergraded and accurate tools for these evaluations so as to be able to design and improve their teaching strategies and ways that knowledge can be passed over to the today's active and communicational learners.

In the scientific area of computer science, for over 40 years, researchers are investigating on artificial intelligence applications to solve particular problems and support professionals in various tasks. Englemore and Feigenbaum state that artificial intelligence's scientific goal is to understand intelligence by building computer programs that reveal intelligent behaviour [23]. It is concerned with the concepts and methods of symbolic inference, or reasoning, by a computer, and how the knowledge used to make those inferences will be represented inside the machine [23]. Artificial intelligence programs that achieve expert-level competence in solving problems in task areas by bringing to bear a body of knowledge about specific tasks are called knowledge-based or expert systems [23]. An expert system can be used either by a non expert to provide solutions in problems replacing the expert and making decisions on behalf of the expert or as an advisory to the expert [24].

In this manner an answer to this shortage of tools could come with the use of new technologies. A computer-based system that embeds the expert's knowledge for the assessment of preschoolers' speech and language abilities can serve as assistance to a non expert such as the preschool teachers. The development of such a system has the potential to serve as a model demonstrating the

possibilities of expert systems and representing possible solutions on management of the parameters of such problem of diagnosis.

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