Development and Application of Arabic Low -Verbal Early Speech Perception Test

Thesis Submitted in Partial Fulfillment of the Master Degree in

Audiology

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List of Abbreviations

AAMD: American Association of Mental Deficiency
ABR: Auditory Brainstem Response
ADHD: Attention Deficit/Hyperactivity Disorders
ASHA: American-Speech-Language-Hearing Association
BDMH: Brain Damaged Motory Handicapped child
BKB: Bench-Kowal-Bamford
BOA: Behavioral Observational Audiometry
CID: Central Institute for Deaf
CIS: Continuous-Interleaved-Sampler
CNC: Consonant-Nucleus-Consonant
CP: Common Phrase
CPA: Conditioned-Play-Audiometry
CUNY: City University of New-York
DAS: Developmental Apraxia of Speech
DSM: Diagnostic and Statistical Manual of Mental Disorders
ESP: Early Speech Perception
GAEL-P: Grammatical Analysis of Elicited-Language-Presentation Level
GFW: Goldman-Fristoe-Woodcock
HINT: Hearing in Noise Test
HYB: Hybrid
ID: Individual's Inter-disciplinary
LNT: Lexical Neighborhood Test
MLNT: Multi-Lexical Neighborhood Test
MMN: Mismatch Negativity
MPEAK: Multi-PEAK
MR: Mental Retardation

MTS: Monosyllabic-Trochee-Spondee
NU-CHIPS: Northwestern University-Children's Perception of Speech
OAEs: Otoacoustic Emissions
OSCAR: Optimal Speech Communication Assistance for Residual Abilities
PBK: Phonetically Balanced Kinder-garden
PDD: Pervasive Developmental Disorders
PDD-NOS: Pervasive Developmental Disorders Not Otherwise Specified
PPS: Paired Pulsatile Sampler
PSI: Pediatric Speech Intelligibility
QPS: Quadruple Pulsatile Sampler
SAS: Simultaneous Analog Stimulation
SCIPS: Screening Inventory of Perceptual Skills
SDT: Speech Detection Threshold
SERT: Sound Effect Recognition Test
SLI: Specific Language Impairment
SPAR: Sensitivity Prediction from Acoustic Reflex
SPIN: Speech Perception in Noise
SRT: Speech Reception Threshold
SSI: Synthetic Sentence Identification
TROCA: Tangible-Reinforcement Operant-conditioning Audiometry
VRA: Visual-Reinforcement Audiometry
WDRC: Wide Dynamic Range Compression
WIPI: Word Intelligibility by Picture Identification

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Introduction and Rationale

The ability to communicate meaningfully is one of the most important vital features of human life. All communication disorders carry the potential to isolate individuals from their social and educational surroundings **(ASHA, 2000).**

The first four years of a child's life are critical in terms of developing speech and language skills that will last a life time **(Amie and Gordon, 2001).** Hearing loss is the most frequently overlooked disorder affecting speech development. Any degree of hearing impairment can negatively impact acquisition and perception of speech and language, academic achievement, social, and emotional development **(Jennifer and Wang, 2000).**

Many hearing-impaired subjects can benefit from aural rehabilitation, the most popular rehabilitative procedure being hearing aids. Recently, cochlear implants can restore hearing and improve communication for children with severe to profound sensorineural hearing loss who gain little or no benefit from hearing aids **(Kara, 2001).**

Recent advances in hearing aids and other sensory aid technology have highlighted the need for development of age-appropriate sensory-level speech perception tests **(El Kholi, 2001)**. Speech audiometry, in conjunction with pure-tone

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Recent advances in hearing aids and other sensory aid technology have highlighted the need for development of age-appropriate sensory-level speech perception tests **(El Kholi, 2001)**. Speech audiometry, in conjunction with pure-tone

audiometry, can help in determining the degree and type of hearing loss, also provide information regarding discomfort or tolerance to speech stimuli and speech-discrimination abilities. In addition information gained by speech audiometry can help in determination of the proper gain and maximum output of hearing aids and other amplifying devices and facilitates audiological rehabilitation **(Walter, 2001).**

The Early Speech Perception (ESP) test is a test of speech perception for profoundly deaf children as young as 3 years of age who have enough linguistic abilities to perform the tasks required in the standard ESP test battery. The standard ESP battery consists of a pattern perception subtest and two word identification subtests including spondee and monosyllable identification subtests **(CID, 2000).**

Very youg children below this age are unable to perform the tasks required in the standard ESP battery because of their limited verbal abilities. As a consequence of the recent and effective aural rehablitative program and the expanded use of cochlear implant in children as young as 2 years of age, there is a need to develop an age appropriate speech perception test aiming to evaluate the level of speech processing of this age group **(Staller and Arcaroli, 2002)**. Accordingly, this work is designed to develop an Arabic version of a low-verbal ESP test and apply it on hearing impaired Egyptian children.

Language Disorders in Children

Definition and Terminology:

The American Speech-Language-Hearing Association (ASHA) has proposed defining language disorders as impairment in "comprehension and/or use of spoken, written, and/or other symbol system. The disorder may involve (a) the form of language (phonologic, morphologic and syntactic systems), (b) the content of language (semantic system), and/or (c) the function of language in communication (pragmatic system), in any Combination" **(1993).**

According to the Diagnostic and Statistical Manual of Mental Disorders **(DSM-IV; American Psychiatric Association, 1994)**, language impairment is impairment of expressive and/or receptive language development. The most common feature associated with an expressive language disorder in younger children is a phonological disorder. The linguistic features of expressive language disorder include a limited amount of speech, a limited vocabulary range, difficulty in acquiring new words, vocabulary errors, shortened sentences, simplified grammatical structures, limited varieties of grammatical structures, limited varieties of sentence structures, the omission of critical parts of sentences, and the use of unusual word orders. Receptive language impairment is characterized by difficulty in understanding words, sentences, or specific types of words. The linguistic features of a mixed receptive–expressive language disorder include receptive

language impairment in combination with phonological and expressive language problems **(Willinger, 2003).**

The change over the years in how language disorders are conceptualized have influenced the terms used to label them. A variety of names have been given to the problem including language impairment, language disability, language disorder, language delay, language deviance and childhood aphasia or dysphasia. The world health organization has defined three terms we can make good use of in describing the child's language. The term impairment is the most neutral as it simply states that there is some difference between the child with impairment and other children **(Wood, 1980, Paul, 2001).** The term disability has additional aspect to its meaning. It refers to the child's needs for functioning in real world environment, particularly in school **(Nelson, 1998).** The term handicap should be used only in special circumstances to address the opportunities available to the child to participate in important situations, such as the classroom **(Paul, 2001).**

Etiology of language disorders in children

Several models were used to discuss language disorders in children, of which is the categorical model. This approach to classification organizes language disorders on the basis of the syndromes of behavior they accompany. In this model, language disorders would be defined as those associated with mental retardation, sensory deprivation (hearing and visual impairment), environmental disorders, psychiatric disorders,

known neurological damage and those with no known concomitant, which are referred to as specific language impairment **(Paul, 2001).**

Mental retardation (MR):

The American Association of Mental Deficiency (AAMD) defined MR as a significantly subaverage general intellectual functioning resulting in or associated with concurrent impairment in adaptive behavior and manifested during the developmental period, that is before the age of 18 years **(Kaplan et al., 1994).**

Coulter (1996) classified the causative factors of MR into:

1) Pre conceptual disorders as single gene abnormalities (e.g., inborn errors of metabolism, chromosomal abnormalities e.g., x- linked disorders and fragile x syndrome).

2) Early embryonic disruptions as infections (e.g., cytomegalo virus, rubella, toxoplasmosis and human immune deficiency virus), teratogenes (e.g., alcohol, radiation and placental dysfunction).

3) Peri-natal difficulties as extreme prematurity, hypoxic ischemic injury, intra-cranial hemorrhage and metabolic disorders.

4) Post-natal insults as infections by meningitis or encephalitis, trauma, asphyxia and malnutrition.

Mental retardation is the most common cause of language delay, accounting for more than 50 percent of cases **(Rosman, 2000).** Limitation in communication skills is often one of the first symptoms of MR. The sequence of language skills in MR, in general, follows that of normal children, although some difference can be identified. For many children with MR, communicative skills are less mature than would be expected, based on their non-verbal mental age **(Paul, 2001). Miller and Chapman (1984)** reported that about one half of individuals with various kinds of retardation have language skills on par with cognitive levels. In the rest of children with MR, two patterns of language disorders were identified: 25% diagnosed with MR had comprehension skills on par with mental age, but production skills were poorer. The other 25% had deficits in both production and comprehension relative to mental age.

Sensory deprivation: including hearing and visual impairment

Hearing impairment

Hearing loss is the most frequently overlooked disorder affecting speech and language development. Some studies showed the prevalence of hearing loss in the children with language impairment to be as low as 0% to as much as 50%. The lower the criterion for hearing impairment (16 dB HL versus 26 dB HL), the older the subjects in the study, and the lower the cognitive functioning of the individuals in the study, the greater the prevalence of hearing impairment **(Ray, 2002).**

Multiple handicaps are common in the hearing-impaired child, with 13% to 33% of children with hearing loss suffering from some other handicap **(Shepard et al., 1981 and Levitt et al., 1998). Kirk, (2004)** reported that approximately one third of American children with hearing loss has additional disabilities. Although the cause of hearing loss had a relatively small influence on language development, the presence of other handicaps tend to slow aspects of speech and language development that employ higher level speech processing abilities **(Pyman et al., 2000).**

Quigley and Krestchmer (1982) found that a variety of factors influence communication development in children with hearing loss. These factors include not only the degree of hearing loss but also the age at onset, the audiometric slope of loss, the age of identification and amplification and the amount and type of habilitation. In spite of that, intensive special education of children with hearing impairment makes slow but steady progress in communication skills **(Levitt and McGarr, 1998).**

Children with hearing impairment have been found to use at least partially rule-governed phonological system. They use phonological processes as young children with normal hearing, although more processes are used **(Kretschmer, 2001).** Consonant delusions are common, distorted vowels and affected prosody, in addition to, delayed and slower rate of semantic, syntactic and pragmatic development **(Radziewicz and Antoellis, 1997).**