Dysprosody in Communication Disorders

Essay
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Abbreviations

ADHD	Attention-deficit hyperactivity disorder
AOS	Apraxia of speech
ASD	Autism spectrum disorder
CI	Cochlear Implant
dB	decibel
DS	Down's syndrome
DSM	Diagnostic and Statistical Manual of Mental Disorders
Fo	Fundamental frequency
FXS	Fragile X syndrome
HFA	High functioning autism
HI	Hearing impairment
Hz	Hertz
ICD	The International Classification of Diseases
IQ	Intelligence quotient
LHD	Left hemisphere damage
LSVT	Lee silverman voice therapy
MIT	Melodic intonation therapy
PD	Parkinson's disease
PDD	Pervasive Developmental Disorders
PEPS-C	The Profiling Elements of Prosodic Systems-Children
PPVT-III	The Peabody Picture Vocabulary Test-Third Edition
PROP	Prosody Profile of Crystal
PVSP	The Prosody-Voice Screening Profile
WCC	Weak central coherence

INTRODUCTION

Prosody can be defined as the acoustic material that is made up of fluctuations in pitch (or fundamental frequency), variations in loudness (or intensity), a number of durational features (e.g., phoneme, syllable, word, and phrase length; pausing, tempo, rhythm, and rate) and changing voice quality **(Sidtis and Van Lancker Siditis, 2003).**

Prosody is also referred to as the "suprasegmental" or "paralinguistic" channel of communication. It is the information that is added to the segmental, or phonemic elements of speech **(Wennerstrom, 2003)**.

A difficulty in understanding and using prosody may have many consequences for communication, affecting socialization. If children have monotonous prosody then they may sound disinterested in something because they don't know how to use prosody to express enthusiasm. Or, if they cannot hear the stress or emphasis on a word in a sentence, then they might miss the important point of what is being said to them. Despite these difficulties, prosody is rarely addressed in therapy or education **(Diehl et al., 2014)**

The nature and characterization of the prosodic system remain elusive, not because the acoustic qualities cannot be

measured, but because their correspondences in communication are rich and complex, interweaving linguistic, affective, attitudinal, psychological, pragmatic, and personal meanings **(Sidtis and Van Lancker Siditis, 2003).**

Prosody functions at several levels to enable speakers to construct discourse through expressive language which can be categorized in three subdomains **(Shriberg et al., 2001):-**

Grammatical prosody; includes suprasegmental cues that are used to signal syntactic information within sentences **(Warren, 1996).** Grammatical uses of prosody are generally obligatory aspects of the production of the surface structure that are an inherent part of the transformation from deep structure meanings **(Gerken, 1996; Gerken and McGregor, 1998)**.

Pragmatic prosody; is used to carry social information beyond that conveyed by the syntax of the sentence. It conveys the speaker's intentions, or the hierarchy of information within the utterance, and results in optional changes in the way an utterance is expressed **(Van Lancker et al., 1981)**.

Affective prosody; includes both the modal register of the individual's personal speech style, as well as the changes in register used for varying social functions also involved in conveying a speaker's general feeling state **(Hargrove, 1997).**

The development of the suprasegmental phonemic system occurs long before the development of the segmental phonemic

system which at this stage is still characteristically random **(Crystal, 1975)**. All children are able to produce a handful of intonation contours from the production of their first words **(Prieto et al., 2010).** Children have largely acquired the adult inventory of pitch accents and boundary tones before the age of two **(Chen and Fikkert, 2007; Frota and Vigario, 2008)**.

Blevins (1995), stated that the main prosodic features are generally taken to include length, accent and stress, pitch, intonation, and potentially a few others.

The length of speech sounds is highly variable; not only do different sounds differ in their length, but even what we take to be the 'same' sound may occupy very different amounts of time under different circumstances and in different contexts. There are many factors that may affect the length such as: the nature of the sound itself, the number and character of the surrounding sounds, the position of the sound in the word or syllable in which it occurs and the speed and style of utterance **(Fox, 2000).**

'Accent' is the linguistic phenomenon in which a particular element of the chain of speech is singled out in relation to surrounding elements, irrespective of the means by which this is achieved. It is considered one of the most controversial of the prosodic features, generating a considerable amount of theoretical debate. This mainly due to the disagreement about the phonetic nature of the phenomenon, its phonological role, and the

appropriate mode of its description, as well as its relationship to morphological and syntactic features in specific languages **(Fox, 2000).**

Assessment of Prosody

Prosody assessment methods include variable checklists, rating scales or instrumental acoustic analysis. For example, **McGarr and Osberger (1978)** used a rating scale from 1-5 to describe pitch deviancies. **Stathopoulos, et al. (1986)** used acoustic analysis to measure fundamental frequencies to determine pitch appropriateness and Smith (1975) used a simple checklist (present/not present) system to monitor errors. The Profiling Elements of Prosodic Systems-Children **(PEPS-C; Peppé and McCann, 2003)**, Crystal's PROP (Prosody Profile; **Crystal, 1982**), yet, most of them had not been standardized yet.

The Prosody-Voice Screening Profile (PVSP) developed by **Shriberg, Kwiatkowski and Rasmussen (1990)** is a procedure that provides qualitative data and more detail on error patterns than a simple 1-10 rating scale. The PVSP is an assessment method intended for use with conversational speech samples; it allows the user to describe specific errors and provides percentage correct/incorrect scores along with a graphic representation of overall prosody-voice performance.

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In hearing impairment:-

Hearing impaired speakers tend to have a higher fundamental frequency and vary pitch less, producing problems in speech intelligibility **(Darrow and Starker, 1986).**

Irregularities of rhythm in the speech of deaf individuals "appear to have their origins in the difficulty controlling varying loudness, pitch and duration" **(Calvert and Silverman, 1983).**

Boone (1966), provided evidence of prolonged vowels and longer interword pauses in deaf speech. Each word appeared separate as opposed to the continuous. Normal hearing speakers demonstrated shorter pauses between sentences and paused more within sentences.

"Almost as if deaf speakers only produce stressed syllables". Deaf individuals tend to vary pitch less often resulting in excessive stress on all syllables or a flat monotone stress pattern throughout the utterance. Other stress patterns observed included monotonality or excessive, erratic pitch variation **(Nickerson, 1975**; **Maasen and Povel, 1984).**

On the other hand, in implanted children, there is a dramatic increase of suprasegmental features of the speech **(Liwo, 2011).**

After only one year of cochlear implant experience, speakers were better able to imitate prosodic features in their own

speech. However, it is not yet clear what prosodic differences are apparent in the speech of hearing aid or tactile device users versus the speech of multichannel cochlear implant users **(Tobey et al., 1991).**

In pervasive developmental disorders:

Monotonic or machine-like intonation, deficits in the use of pitch and control of volume, deficiencies in vocal quality, and use of aberrant stress patterns are speech and prosody characteristics of individuals with Pervasive Developmental Disorders. **(Rutter and Lockyer, 1967; Kanner, 1971; DeMyer et al., 1973; Simmons and Baltaxe, 1975).** Autistic children have problems with intonation and inflection causing their speech to be rigid and monotone **(Pronovost et al., 1966, Fine et al., 1991, Lord et al., 1997, Shriberg et al., 2001).**

Speakers with PDD have notable deficits in prosody which appear to be associated more with pragmatic and affective processes than with deficits in the grammatical functions of prosody **(Shriberg et al., 2001)**.

In Down's syndrome:

Low vocal pitch and hoarse, harsh, or raucous voice have frequently been ascribed to individuals with DS. Individuals with DS also have limitations in the perception, imitation, and

spontaneous production of prosodic features **(Kent and Vorperian, 2013).**

In Dysphasia

There is impaired speech timing in both fluent and non-fluent aphasia, but more often seen in non-fluent aphasia **,** Furthermore, non-fluent aphasia appears more likely to disrupt timing in any length units (including monosyllabic words), while disruptions in fluent aphasia appear to be more marked in longer speech units (multisyllabic words, phrases, and sentences **(Sidtis et al., 2010).**

In Fragile X syndrome (FXS):

Most boys with FXS tend to have a fast articulation rate during the initial part of a sentence and a perceptually fluctuating pattern at the end of a sentence **(Zajac et al., 2009).**

In Attention-deficit hyperactivity disorder (ADHD):

Although the database is sparse so far, ADHD is clearly associated with social cognition impairments involving emotional face and prosody perception **(Uekermann et al., 2010).**

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In Stuttering: