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Prototype Prosody in Speech Disorder Children

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Abstract

In the science of language, the smallest units of sound that can be distinguished by humans are called phonemes. In principle, a greeting word or phrase can be seen as a sequence of phonemes. The set of phonemes that exists in a language is different. Each phoneme is symbolized by a unique symbol. Vocal speech signal has the form of quasi-periodic and each vowel has certain frequency components that distinguish one vowel phonemes with other vowel phonemes. Data processing is done using Speech Filing System software for every word spoken in order to obtain prosodic patterns. The research object is prosodic structure and the cavity on phonological dysfunction. This research problem is concerned with lingual unit and suprasegmental elements of any speech that marked phonological dysfunction. The stages of this study are: (1) the method of providing data, (2) data analysis methods, and (3) methods of presenting the results of data analysis. The Result of data analysis showed that there are some lingual units which mark the subject speech,

namely, supra-segmental elements are weak and there is a shift in the location of the sound production in the cavity.

Keywords: *prototype, prosody, speech disorder, phonological dysfunction, Speech Filing System.*

Introduction

Phonological disorder or phonological dysfunction refers to speech disorder models that can be measured by the development of the child's age and intelligence. Practically, the disorder can be called as a form of imprecision or delay aspects of speech in children. The form of the disorder that can be identified consisting of errors in sound production, substitution of one voice with another voice, and eliminate certain sounds such as final consonants. Certainly, the difficulty interferes with the academic skills and social communication for the child. Through the analysis of phonological prosody will be found speech flow arranged in a set of phonological unit. It refers to the theoretical interaction between phonological and the components of the grammar. Interaction in the form of mapping rules that build phonological structure is based on understanding morphology, syntax, and semantics, provides a set of phonological units are needed to characterize the application domain of the large number of phonological rules. In the case of severe phonological dysfunction sounds such as *b, m, t, d, n* and *h* are often mistakenly pronounced. The main function of intonation is to organize oral discourse into units understood, with punctuation, capitalization and paragraphs are properly written.

Signaling organization and the content information of the message indicates the grammatical meaning and attitude of the child to talk. The sentence intonation can be organized into a kind of spoken language intonation units called tone. For purposes of the research presented here, to analyze the speech signal we utilized the software Speech Filing System (SFS). This software can display speech signal wave in the form of spectrogram and pitch. It shows the pattern in the fundamental frequency changes. This helps us to describe prosody or intonation of the speech signal.

This study is intended to identify the prosodic structure through speech signal characteristics and location of the cavity in patients with phonological dysfunction.

Review of Literature

Prosodic phonology is proposed by Firth which includes characteristics beyond consonants and vowels, namely, syllables level, words, phrases, and sentences (Daniel, 1991). Prosody can be divided into several important components of prosody syllables. Prosody part of sentence includes lengthening, tone, stress, and tone relation between syllables, and also intonation in the prosody of a sentence. Prosodic analysis is used to demonstrate the phonologically explicit functions based on phonetic characteristics and their relation to the grammatical analysis.

Phonetics is divided into 3 types: articulatory, acoustic phonetics and auditory phonetics.

In Indonesia, the development of prosody analysis reveals that it has much interaction with other theoretical frameworks. Research developed by Zellig Harris shows that there are attributes of language as an important aspect of phonological structure such as prosody, whose scope is larger than a single segment.

As already stated, this study used the SFS software. It also considered the study of Hyunsong Chung of the Department of Phonetics and Linguistics (2000) which dealt with consonantal and prosodic influences on Korean vowel length. This study took into account the study of Khaila, namely, A Study of The So Speech Produced By two Long - Term tracheotomies Children. We also considered the study of Prica (2010) which examined the vowels in Recognition of Continuous Speech by Using Formants.

Research Methods

The data used in this study may be classified into two types: primary data and secondary data. Primary data were obtained from a number of people who have phonological dysfunction. Data from the subjects is taken directly through an integrated system of hardware with software. Secondary data is derived from the analysis using software filing system in the form of speech signal characteristics indicating prosodic features for each word

spoken. The secondary data is used for method development and testing algorithms of speech therapy. Five words were used as test words: /ayam/, / balon /, / bola /, / buku / and / lampu /. This study used the Dynamic Time Warping (DTW) method to calculate the distance between two time series data of the sound signal. Testing of these applications is done by finding the ratio error matching that state the probability of matching errors in the system. There are two types of matching error ratio: False Mate (FMR) and False Non-mismatch Error Ratio Mate Rate (FNMR). Comparison between FMR and FNMR is called threshold or threshold value (T), If the score << T, then both the signal sounds are increasingly similar,

Discussion

Based on primary data collected, the following stages of language acquisition in children who performed with a variety of things were identified: (1) The child will choose a combination of short beeps of sounds heard to express a pattern of action. (2) If the combination of short sounds is understood, then the child uses the same series of sounds, but with a phonetic form that is closer to the phonetic forms of adults, to convey the patterns of the same action performed by others. Originally these action patterns always have a relationship with the child and in the pattern of action there are always interwoven elements, namely, agents, actions, and people.

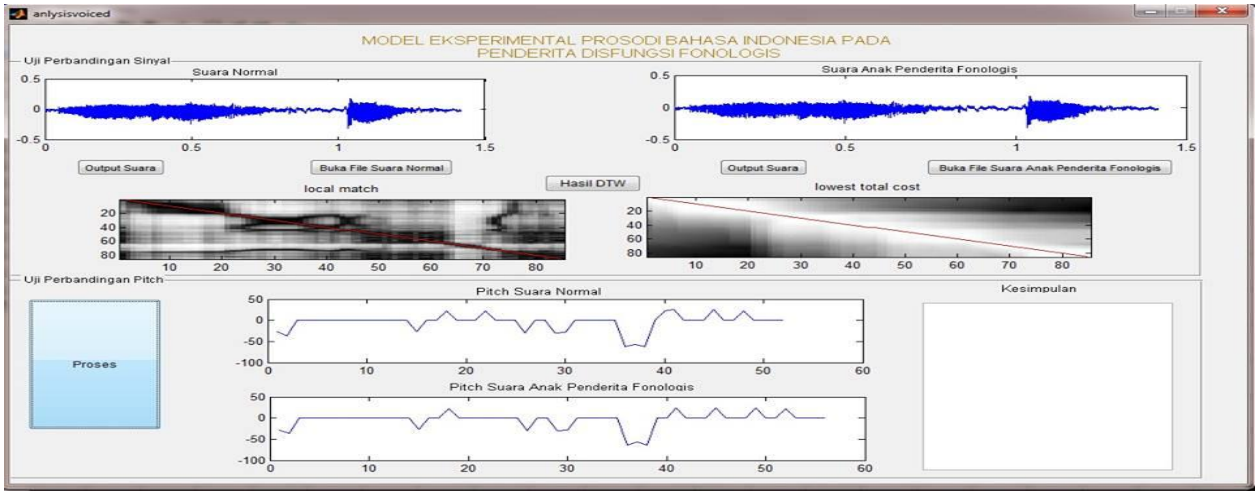
Waterson (1970) argues that language acquisition is a social process. Therefore the study is more precisely done at home in a social context in order to know more about the phonological acquisition.

In the science of language, the smallest units of sound that can be distinguished by humans are called phonemes. In principle, a greeting word or phrase can be seen as a sequence of phonemes. Each phoneme is symbolized by a unique symbol. Vocal speech signal has the form of quasi- periodic and each vowel has certain frequency components that distinguish one vowel phoneme from other vowel phonemes. Data processing is done using Speech Filing System software for every word spoken in order to obtain prosodic patterns.

Based on the prosodic signal results, the following points are observed: In the syllable pronunciation of consonants / b / and / l / there is no change in the fundamental frequency of

a particular duration of 0.1 s to 0.4 s and there is a disconnection signal for the time between 0.718 to 0.789 s when switching consonants / m / to / p / in the word / lampu /. It is also noticed that in the word / buku / there is disconnection signal contained at between 0.340 s to 0.528 s . This indicates difficulties in the presence of utterance tools in generating consonant / b / and / l /. As for the vowels, fundamental frequency variation noticed is appropriate. Conversion of text into phonemes is strongly influenced by the prevailing rules in a language. In principle, this process is the conversion of textual symbols into phonetic symbols that represent the smallest unit of sound in a language. Every language has specific rules for the reading and pronunciation of a text. This led to the implementation of a text converter unit to phoneme.

Prosody is highly specific for each language. So the model used should generate the specific prosody data for a language. Some models have been developed, but for use in a language models still need a lot of adjustments. The process of data analysis and experimental approach obtained the following result:



Application of experimental model of Indonesian prosody in patients with phonological dysfunction as shown in figure 1 above is an application in the form of a Graphical User Interface (GUI) in MATLAB programming language. This application can display the sound signal in the time domain , and the voice pitch analysis Dynamic Time Warping (DTW), which can measure between two specific sound signals between normal voice signal and sound signal phonological patients, as well as the conclusions in the form of text containing information about pronunciation mismatches that occur in

people with the said tool. This application also can display the sound by pressing the sound output to be analyzed so that the sound can be heard.

Based on the difference between the two signal sounds, cavity location of errors in children with phonological dysfunction can be identified. This error appears on the differences in the pattern pitch of each sound frequency of the basic unit for any duration uttered. For example, a short tongue sticking out leads to difficulty in pronouncing the letter " t " , " n " and " l " . The dental deformity results in noise sounds like " f " , " v " , " s " , " z " and " “th”. Analysis of the data showed that subjects tend to ring a [b] , [p] , [d] , and [t] rather than sound [f] and [s]. The study also refers to the results of the research done by Waterson (1971) who found no relationship between the forms of acoustic speech features of children with an adult form of greeting. Children simply recite the speech part time approximately 0.2 seconds, but the back part with vowel and consonant elements result in strong articulation.

Conclusion

From the testing and analysis conducted we come to the conclusion that there is no explanation for the consonant pronunciation and switching of consonant pronunciation to consonant or vowel. Some inhibitory bilabial sound, post-dental, and velar voiceless / p, t, k / cannot be sounded perfect and the location shifted from its cavity. Consonant syllabic in the form of nasal, lateral, or shakes also experiences a shift in the structure and cavity. Consonants [l, m, n] are usually louder than the sound preceding and subsequent pause and the culmination of the syllable. But the subject shows that the pattern is not stable.

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