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The Representation of Vocoid [ə] in Indonesian Phonological Development of Preschool-Aged Children with Hearing Impairment

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***Abstract*— This study aims to describe the representation of vocoid [ə] phonological developments in the Indonesian language on deaf preschool-age children. Therefore, the collection of data is done longitudinally. A data source is a group of three deaf children TKLB-B (Nursery School of Students with Special Needs) who had the mild, moderate, and severe degrees of the deaf, and who did not have multiple impairments. The data is in the form of utterance that is capable of giving vocoid representation [ə] of deaf preschool-age children. The data collected by using observation, fishing, logging, and recording techniques. The collected data are then analyzed by sorting, reversals, and connections techniques. Based on the results of the study, there were four representations of vocoid [ə] phonological developments in the Indonesian language on deaf preschool-age children; (1) indeed, they used the word contain vocoid [ə], (2) they used it to replace the other vocoid, (3) along with vocoid [a] it formed a diphthong [aə], (4) they used it to replace the sound on syllable of the end of a word.**

Keywords*— *vocoid representation [ə], the development of deaf children

I. INTRODUCTION

In general, research on the phonological development of deaf children is focused on contoid and syllable developments, such as research on the change of contoid in children's lexical with hearing impairment [1], a research on the quantity and mistakes produced by the deaf children [2], and a research on the development of syllable structures [3]. Even though, for deaf children, the acquisition of vocoid of is very dominant. When the word cannot be stated completely, the deaf children inclined to declare vocoid, such as '*adik'* (little brother), '*bakso'* (meatball), and '*masuk'* (enter) are pronounced [ae], [pao], and [atu]. At these words, vocoid is used to represent syllables. in the words '*adik'*, the sound consists of two syllables i.e., [a-e] is intended to reveal the syllables [a-dI?]. Likewise, '*bakso'* and '*masuk'*, syllable [so] and [ma] pronounced [o] and [a]. The process is not without meaning. A child must shorten the vocabulary through a process of abbreviation. The input received by them certainly isn't possible to be in a complete form, but it must be assisted with the correlated syllables. In fact, the syllables of the children's products are not necessarily in complete form, i.e. it shouldn't consist of vocoid and contoid, but it could just be vocoid. It is because of the children's performance basically requires a process of psychological and cognitive ability [4]. Therefore, children's cognitive development can be seen from its language development.

A research on vocoids is mostly directed at minimal vocoids, namely [a], [i], and [u]. Jakobson stated that the acquisition order of the initial vocoid produced by the children are [a], [i] and [u] [5]. Darjowidjoyo stated that at the age of 1;0, children have already received a vocoid [a]. Furthermore, it also appeared some vocoid such as [u], [i], [o], and [e]. However, at the age of 1;1:3, the most widely appeared are [i] [u] [4]. Yulianto also found the same thing in a study conducted on the three subjects of research [10]. Though somewhat different, the order also stated by Steinberg, Nagata, and Aline that the development of vocoid can occur with the order from back to front, i.e. vocoid [a] and vocoid [o] precedes vocoid [i] and [u] [6].

In contrast to these researchers, this article discussed in another vocoid, vocoid [ə]. This kind of vocoid is rarely discussed individually, whereas in Indonesian language acquisition of deaf preschool-age children, vocoid [ə] also important to be discussed. Based on the results of the research on deaf children, vocoid [ə] is not only produced by the deaf children to proclaim the words but also to produce the sound of the others. The result of the use of vocoid [ə] event showed a change of sounds and sounds distortion.

The deviation is the common name of speech that does not comply with the norm. Norm is "pattern or characteristic which is considered the most common in the situation of the language" [7]. The deviation is not a mistake, but part of the

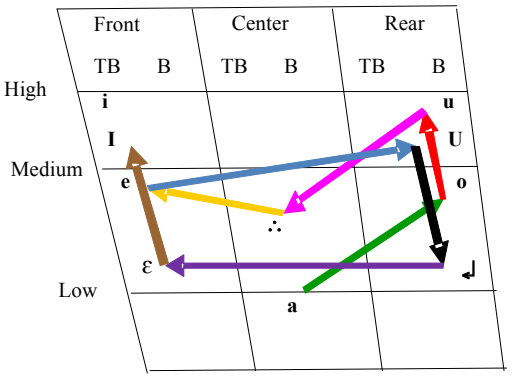
process of language acquisition. Every stage of the development of languages generated by the child is recognized because it is not a process of declining the inappropriate structure, but rather a systematic development on each of the phases of it. The child will continue to test a series of hypotheses in the conversation. The hypothesis would be revised, reformed, even abandoned [8]. Therefore, through the development of vocoid [ə] can be known a children's cognitive development with hearing impairment.

II. RESEARCH METHOD

The research was done on longitudinal because it relates to the development of the sound of the language, vocoid [ə]. The data source in this study is a group of three deaf children TKLB-B that have the degree of deaf mild, moderate, and severe and did not have multiple impairments both physically and mentally. The determination of these subjects based on the concept of Ingram that the number of three subjects is used as an absolute minimum figure to determine the general characteristics of the acquisition [5]. The research data is in the form of utterance that is capable of giving vocoid representation [ə] of deaf preschool-age children.

The data were collected by using observation, fishing, recording, and recording techniques. When the data were collected, the subjects were given a word formation to produce a word that had a vocoid [ə]. Fishing is done by using verbal, visual, and reliable media.

The collected data is then analyzed by sorting, reversals, and connections techniques. It was used for instrument data analysis in the form of a table. To take advantage of the instruments and techniques, it was carried out the data analysis by using the reduction to present, interpret, infer, and validate the data findings.



PICTURE I THE DEVELOPMENT OF VOCOID

III. RESULTS AND DISCUSSION

Vocoid [ə] is vocoid medium center unrounded. In the development of the Indonesian vocoid deaf children TKLB-B, vocoid [ə] is obtained after vocoid [a], [o], and [u].

Phonological developments in Indonesian language on deaf preschool-age children found four representations of vocoid [ə]; (1) indeed, they used the word contain vocoid [ə], (2) they used it to replace the other vocoid, (3) along with vocoid [a] it formed a diphthong [aə], (4) they used it to replace the sound on syllable of the end of a word.

A. Vocoid [ə] Used in Words Containing Vocoid [ə]

On phonological acquisition of deaf children, the word they produced were contained vocoid [ə]. The produced syllables of vocoid [ə] on the given instrument are in the middle, the beginning, and the end of the word. The detail is in the following table:

TABLE I THE USE OF A VOCOID [ə] AND ITS DISTRIBUTION

Distribution	Vocabulary	The Resulting Sound
End of word	Tante	[ay.∴]
The middle of the word	apel, telur, besar, wortel, wafer, perut, renang, celana, sepatu	[ap.∴], [t.∴yo], [b.∴ta], [wot.∴t], [wap.∴], [p.∴yUt], [y.∴la], [t.∴tata], [t.∴patu]
Beginning of word	empat, enam	[∴.pat], [∴.yap]

The table shows that vocoid [ə] had acquired by the subject with a complete distribution, although the distribution is at the end of the word only in the words '*tante'* (aunt). In the language of Indonesia, not only words that use vocoid [ə] which can be known by children of preschool age are deaf.

B. Vocoid [ə] is Used to Replace Other Vocoid

Besides being used on words that do contain vocoid [ə], the subjects also used vocoid [ə] to replace another vocoid, such as vocoid [e] and [i]. It can be seen in the following table.

TABLE II VOCOID [ə] AS SUPPLIER OF OTHER VOCOID

The Replaced Vocoid	Vocabulary	The Resulting Sound
[ɛ]	meja, dompet, monyet	[p.∴ta], [ay.∴], [poy.∴t],
[i]	telinga, piring, hitam, pisang	[∴.ya], [p.∴t.∴], [∴.tap], [p.∴ta]

Vocoid [ɛ] and [i] pronounced [ə] for two reasons; (1) the subject understand the exposure and (2) the subject is retained the vocoid to replace with another vocoid that has been acquired.

The process that occurs in vocoid [ə] also occurs at another vocoid, such as vocoid [e] often used by the subject to change the vocoid [i] that has not been retrieved. For example, in the word *'kaki'* (foot), *'mi'* (noodle), *'Aldi'* (person's name), *'kucing'* (cat), '*lari'* (run), *'nasi'* (rice), and *'mandi'* (bath) are pronounced [ate], [pe], [ate], [ute], [aye], [late], and [pate].

C. Vocoid [ə] Together with Vocoid [a] formed a Diphthong [aə]

At the time the subject would like to say a word, but there is contoid that is not available yet, they usually tried to pronounce it in a certain way. This occurred at the end of the contoid syllables; [m], [n], [ŋ], and [t]. The examples are in the words *'hitam'* (black), *'salam'* (greetings), *'tangan'* (hand), *'makan'* (eat), *'renang'* (swim), and *'coklat'* (brown). The word *'hitam'* is pronounced [etaə] and [etaəp], whereas the word *'salam'* is pronounced [yaə] and [tayaəp]. The sound

[aə], produced in the form of a diphthong. It can be seen on the following data.

TABLE III THE USE OF A DIPHTHONG CONCENTRATES ON THE WORD *HITAM*

Period	The Development				
	h	*i*	*t*	*a*	*m*
4		e	t	aə	
10		e	t	aə	p

TABLE IV THE USE OF DIPHTHONGS CENTERS ON THE WORD *SALAM*

Period	The Development				
	s	*a*	*l*	*a*	*m*
5			y	aə	
15	t	a	y	aə	p

The data shows that in the early period of the generation of *'hitam'* and *'salam'*, the subjects used the diphthong [aə]. In fact, in the next period, although the subjects have received the final contoid [p], they replaced it by [m], but the diphthongs are still generated.

Similarly, the word *'tangan'* pronounced [yaə] and [tayaə] as well as the spoken word *'makan'* [ataə] and [pataə]. It can be seen on the following data.

TABLE V USE Of DIPHTHONGS CENTERS ON THE WORD *TANGAN*

Period	The Development				
	t	*a*	*/*	*a*	*n*
2			y	aə	
8	t	a	y	aə	

TABLE VI USE Of DIPHTHONGS CENTERS ON THE WORD *MAKAN*

Period	The Development				
	m	*a*	*k*	*a*	*n*
3			y	aə	
7	p	a	t	aə	

At these words, vocoid [ə] together with vocoid [a] formed a diphthong [aə] because alteration of the syllables occurred without disconnection from low vocoid [a] to the center vocoid [ə]. As stated by Jones that the sound [aə] are called diphthongs [9]. Thus, deaf children are difficult to produce a nasal contoid syllables. It can be seen on the words ended by [m], [n] and [ŋ] syllables that they changed it with a diphthong concentrates.

In the Indonesian language, the vocabulary that used a vocoid [ə] in final position are very rare. On the three examined subjects, only one that was able to produce (the subject of the sentence combinations as well as the stage of simple and complex sentences) the vocoid [ə] in the final position. It happens when the subject uttered *'tante'*, whereas the subject of the sentence has not been a single word stage duration [10].

The use of a diphthong [aə] on the development of the vocoid language on Indonesian deaf preschool-age children is very attractive, because in the Indonesian language is only known four kinds diphthongs, they are [ai], [au], [oi] and [ei], whereas the diphthong [aə] is a diphthong concentrates. In other languages, such as English, diphthong concentrates is found, as in the word *'more'* [mɔə] and *'floor'* [flɔə].

D. Vocoid [ə] Replacing the Sound at The End of a Syllables

It also found that the deaf pre-school children used the vocoid [ə] to replace the sound at the end of syllables, i.e. the word *'coklat'* (chocolate) is pronounced [yoət]. At the beginning, the word *'coklat'* is pronounced by using the diphthong [aə], i.e., [yoə], but in its development, it changed to [yo-ət]. The word *'coklat'* was basically pronounced in two syllables [cɔ-klat] and it changed into [yo-ət]. In the words *'coklat'*, the syllables [cɔ] becomes [yo] because the subject has not received the contoid [c], so they replaced it with the contoid [y], and the syllables [klat] becomes [ət] due to the removal of the contoid cluster [kl] and the vocoid [a] became [ə].

TABLE VII USE OF DIPHTHONGS CENTERS ON THE WORD *COKLAT*

Period	The Development				
	c	*o*	*kl*	*a*	*t*
5			y	aə	
10	y	o		ə	t
14	y	ɔ	t	A	t

The changes of the sound are the impact of phonotactic pattern syllables. The pronunciation of the word *'coklat'* [cɔ-klat] is the evidence of patterned CV (onset) and CCVC (onset of double closed coda), or CV (onset) and VC (coda) to [yo-ət].

The presence of vocoid [ə] or diphthong [aə] showed that deaf children were able to produce words that have initial syllables patterned V (nucleus). In contrast, Burroughs that examined the English-speaking syllables pronounced by the children who experience loss hearing disorder found that from 500 words they produced, 15% was patterned CV, 38% was patterned VC, while the other left was patterned CVC (onset closed coda) and CCV (complex onset). This implied that the given information couldn't generate syllables patterned V [11].

Moskowitz stated children can produce the words in the form of the first unit syllable; CV then followed by the other patterns, CVC, VC, and CVCV [13]. Jakobson stated that the early children's syllables produced are in the CV pattern [5]. Darjowidjoyo stated that the first syllable patterns generated by the Echa were CV. The pattern is then often followed by another consonant so that patterned a CVC [4]. Kavitskaya, Babyonyshev, Walls, and Grigorenko that examined the 15 children with specific language impairment (SLI) ages 4;0 — 8;0 stated that the first syllables produced was in the form of

CV. This pattern is followed by a complex onset through the acquisition of CCV and later CVC [3].

On the other hand, Yulianto found that the subjects were able to produce the first syllable structure; the V then followed by VC, CV, CVC, CCV, and CCVC [10]. The syllables acquisition pattern in this research was due to the subject that has not be able to state a complete of vocals pronunciation in the question word. The vowel selection was due to the fact that the subject was easier to produce the vowels than the consonants.

IV. CONCLUSION

The representation of vocoid [ə] phonological developments in the Indonesian language on deaf preschool-age children were showed well on their language communication. They used it to replace the representation of the other vocoid and also the sound at the end of a certain word. In addition, their production of the vocoid [ə] with [a] was formed a diphthong [aə].

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