International Journal of English Linguistics, Literature, and Education (IJELLE)
Vol. 4, No. 1, June 2022, pp. 38-49
ISSN 2686-0120 (print), 2686-5106 (online)
http://journal.univetbantara.ac.id/index.php/ijelle/index

Consonant Production of an American-English Native Speaker from 3 to 6 Years Old: A Case Study on a Child named Brielle

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Received 10 June 2022; accepted 29 June 2022; published 30 June 2022

ABSTRACT

Children's phonological development is somewhat foreseeable, yet there are certain sounds that appear at different ages across children. Notwithstanding, there are a few overall principles which can be utilized to examine the phonological improvement of a kid. This study aims to look at the phonological improvement cycle of an American English local speaker named Brielle in delivering consonants from the age of three to six utilizing the discourse sound advancement achievements given by Sander (1972). The data are taken from Youtube videos of Brielle when appearing on an American talkshow called "The Ellen Show". A descriptive qualitative method is used in this study to elaborate the phonological development of Brielle. The result shows that Brielle completed her phonological development at the age of six. It can also be concluded from the study that some consonants appear earlier or later that the phonological development milestones set by Sander (1972). During the process of acquiring consonants, she replaced the consonant which she could not produce with another sound with similar features, such as replacing the liquid sound /l/ with the glide sound /j/.

KEYWORDS

Child
Phonological development
Speech sound

1. Introduction

The production of speech sounds initiates the development of language learning. Phonetics and phonology are two branches in the linguistics study which deal with speech sound production. Katamba (1989) stated that phonetics deal with the inventory of speech sounds produced by humans. Meanwhile, phonology deals with the systematic use of sounds in different languages in order to construct words and utterances.

Producing correct sounds is the first step of acquiring words and sentences. Partanen et al (2013) stated that humans begin the acquisition of first language phonology since they are in the womb. According to Vihman (1996), the production of complex sound sequences and words with more than one syllable in children normally happens when they are seven years old. From one to five years of age, it is easy to predict the phonological development in children since it is pretty much the same. For instance, the acquisition of bilabial and labiodental consonants occurs the earliest (before the age of four). Meanwhile the dental sounds /θ/ and /ð/ and other sounds which tend to be harder to produce normally appear much later, sometimes as late as the age of eight (Sander, 1972). Nevertheless, there are also considerable differences in the phonological development of children. For example, certain sounds could be produced by some children, while others in the same group of age take longer time to produce the same sound. However, in analyzing children's phonological development, some general guidelines could be used. Therefore, this research aims to elaborate a child's consonant acquisition and to compare it to the speech sounds development chart which was provided by Sander (1972).

An American child named Brielle who was born and raised in Salinas, California is chosen as the subject of this study. She appeared in a famous American talkshow called "The Ellen Show" after her mother, Carrie Milla, uploaded a video on Youtube of her reciting the periodic table at the age of

three. She has gained a worldwide recognition ever since. In her first appearance on "The Ellen Show", Brille, still aged 3, was considered to be more articulate than other children of her age. The author also noticed that she could already produce sounds which, according to the theories in first language acquisitions, are supposed to appear later in children. Therefore, the author is interested in analyzing the phonological development of Brielle.

There are two research problems in this study. The first is what consonants Brielle could and could not produce between the age of three to six years old. The second is whether Brielle's phonological development is in alligned with the milestones of consonant production according to Sander (1972).

Hence, this study has two objectives. The first is to elaborate the phonological development of an American child, Brielle, in producing consonants between the age of three to six using the distinctive features theory in generative phonology. The second objective is using the speech sound development chart provided by Sander (1972) to analyze the phonological development of Brielle between the age of three to six.

In ensuring the originality of this paper, the author gives 5 previous researches concerning phonological development in children. In (2003) Dodd et al. discussed how children's speech sound development is affected by socio-economic status, gender, and age, in their paper entitled "Phonological Development: A Normative Study of British English-speaking Children". A study which investigated the phonological development of bilingual children was conducted by Marecka et al. (2015) from University of Warsaw, Poland in the paper entitled "Phonological Development in the Home Language among Early Poilsh-English Bilinguals". The study elaborates the differences between phonological development of the bilingual children of Polish immigrants moving to UK and their peers who only speak one language. The third study is by Cohen and Anderson (2011) from Speech and Language Therapy Division, School of Psychological Sciences and Health, Faculty of Humanities and Social Sciences, University of Strathclyde, Glasgow, UK entitled "Identification of Phonological Processes in Preschool Children's Single-word Production". In this study, the authors examined the errors in speech production by 94 West of Scotland preschoolers. The next study is entitled "Speech Sound Acquisition and Phonological Error Patterns in Child Speakers of Syrian Arabic: A Normative Study" which was conducted by Husen Owaida in 2015 from City University London. The result shows that consonants and vowels acquisitions in Syrian Arabic was nearly completed by the age of 3 and 6,5 respectively, except for the fricative /ʒ/. The last study is entitled "Speech Errors in Early Child Language Production" which was conducted by Stemberger (1989) which compares the speech errors between children and adults. The way this study differs from others mentioned before lies on the more detailed patterns of speech sounds alternations using phonological rules and the elaboration of the sound characteristics using distinctive features in generative phonology in order to examine the phonetic environments influencing the production or the alternation of one speech sound to another.

In analyzing the data, the author requires a parameter to identify whether the phonological development of Brielle is similar, more advanced or later than the age of customary consonant production. Therefore, a chart developed by Sander (1972) which shows the consonant development of children from age 2 to 8 as follows:

ISSN 2686-0120 (print), 2686-5106 (online) Vol. 4., No. 1, June 2022, pp. 38-49

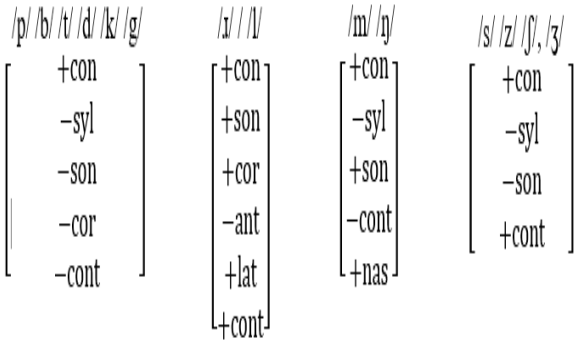
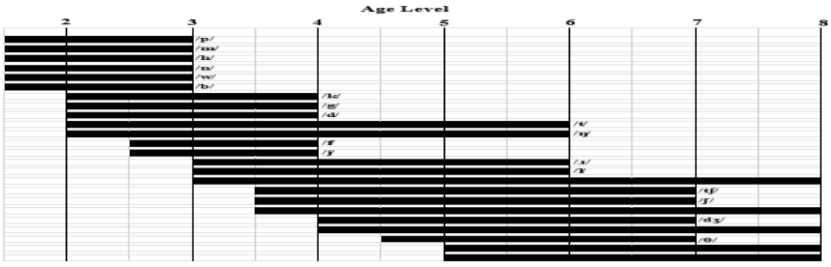


Fig. 1. Estimation of the cconsonant production age average (Sander, 1972)

The graph depicts the predicted average age and upper age limits for English consonant production. The solid bar that represents each consonant starts at the age when a kid normally begins to generate that consonant and ends at the age when nearly all children are able to create the sound. (Templin, 1957; Wellman et al., 1931).

Furthermore, in order to analyze the phonological environment of the changing of speech sounds, the author uses the distinctive features in generative phonology. Distinctive features are sound characteristics useful in differentiating a particular sound from the others (Carr, 1999). These features or characteristics are normally distinctive and unique that no sounds can posses those same features. Hayes (2009) classified the distinctive features into three big main classes. The first is major class features (describing and classifying sounds based on sonority and syllabic structure) which consists of ±consonantal, ±syllabic, and ± sonorant. The second is cavity features (classifying speech sounds based on the place production inside the place of articulation which consists of ± coronal and ± anterior. The last is manner features (classifying speech sounds according to the way and intensity of airstream that flows through the vocal tract while producing consonants) which consists of ± continuant, ± lateral, and ± nasal. Below are classification of English consonants according to distinctive features:



2. Method

Using a descriptive qualitative method and note-taking technique, this study intends to examine the phonological development of Brielle, an American English native speaker, in creating English consonants. Four videos of Brielle in a TV talkshow account named "The Ellen Show" and the official Youtube account of Ellen DeGeneres, the talkshow's host, called "Ellen Tube" were used as data sources. Each video taken as the source of the data represents Brielle's phonological development from the age of three to six. The very first video of Brielle entitled "*Adorable 3-Year-Old Periodic Table Expert Brielle*" in "*The Ellen Show*" channel was recorded when she was 3 years old. Following her first appearance on the show, she had her own segment called "*She's Brielle-iant*". She taped two episodes of this program when she was four and five years old, called "She's Brielle-iant, Anatomy" and "She's Brielle-iant, Vitamins, Minerals, and How to Stay Healthy." The most recent video in the series, "Astronaut Brielle Shares Fun Facts on Aliens and Space," was shot when she was six years old. To gather data, the author first listened intently to Brielle's speech in the video and took notes on the consonant sounds. The speech sound data are then evaluated using generative phonology's distinctive features theory to determine the sound's properties. The author

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related the phonological development of the Brielle to the age of conventional consonant production in the last section.

3. Findings and Discussion

After examining the data, it was discovered that when Brielle was three years old, she could appropriately make a number of sounds, including bilabial sounds. Other consonants took longer to emerge until they were six years old. Some are finished before or even after the average age estimations of usual consonant production listed on Sander's speech sound development chart (1972). Below are some additional explanations.

3.1. Consonants Acquired at the Age of 3

Brielle's labial consonants were the first sounds she produced correctly at the age of three, according to the statistics. The bilabial ([p], [b], [m], [w]) and labiodental ([f] and [v]) consonants are among them. This finding corresponds to Sander's (1972) speech sound development chart, which states that labial sounds arise the earliest, as early as the age of three. Brielle's labial consonant acquisition at three years old is illustrated in the table below:

Table 1. Bilabial consonants produced by Brielle at 3 years old

Manner of Articulation		Sound	Word	Word Transcription	Phonetic Data of Brielle
Stop	Voiced	[p]	Europe	[jʊɹə**p**]	[jʊwə**p**]
	Voiceless	[b]	Be	[**b**i:]	[**b**i:]
Nasal	Voiced	[m]	Make	[**m**eɪk]	[**m**eɪt]
Glide	Voiced	[w]	Why	[**w**aɪ]	[**w**aɪ]

Table 2. Labiodental consonants produced by Brielle at 3 years old

Manner of Articulation		Sound	Word	Word Transcription	Phonetic Data of Brielle
Fricative	Voiceless	[f]	Africa	[æ**f**ɪɪkə]	[æ**f**wɪtə]
	Voiced	[v]	Have	[hæ**v**]	[hæ**v**]

Brielle could also appropriately produce the voiced fricative dental consonant [ð] by the age of three. Meanwhile, according to Sander (1972), the sound [ð] usually appears around the age of five, and by the age of eight, most children can produce it appropriately. Brielle's acquisition of the sound [ð] at three years old is shown in the table below:

Table 3. The sound [ð] produced by Brielle at 3 years old

Manner of Articulation		Sound	Word	Word Transcription	Phonetic Data of Brielle
Fricative	Voiced	[ð]	The	[**ð**e]	[**ð**e]

Brielle was also able to appropriately pronounce the alveolar consonants [t], [d], [s], [z], [n], and [l] at the age of three. According to Sander (1972), alveolar consonants are acquired a little later than labials. Consonants [t] and [d] are typically acquired between the ages of two and six for the consonant [t] and six for the consonant [d]. The sound [s] and [z] are typically learned between the ages of three and a half and eight. Except for the palatal consonant [l], Brielle was able to pronounce

ISSN 2686-0120 (print), 2686-5106 (online) Vol. 4., No. 1, June 2022, pp. 38-49

those consonants correctly at the age of three. Brielle's acquisition of alveolar consonants at the age of three is seen in the table below.

Table 4. The alveolars produced by Brielle at 3 years old

Manner of Articulation		Sound	Word	Word Transcription	Phonetic Data of Brielle
Stop	Voiceless	[t]	Table	[teɪbl]	[teɪbl]
	Voiced	[d]	Periodic	[pɪrɪɑdɪk]	[pɪwɪɑdɪt]
Fricative	Voiceless	[s]	States	[steɪts]	[seɪts]
	Voiced	[z]	Crazy	[kɹeɪzi]	[tweɪzi]
Nasal	Voiced	[n]	No	[noʊ]	[noʊ]

Brielle had acquired almost all of the palatal sounds which are [tʃ], [ʒ], [dʒ] when she was three years old. In his speech sound development chart, Sander (1972) noted that the palatal consonants are not generally acquired before the age of three and a half for the consonants [dʒ] and [tʃ]. Meanwhile, the sound [ʒ] are not normally acquired before the age of six. However, three-year-old Brielle already acquired all of the consonants menstioned before. The following table elaborates the acquisition of the palatal consonants [tʃ], [ʒ], [dʒ] when Brielle was three years old.

Table 5. The palatal sounds produced by Brielle at 3 years old

Manner of Articulation		Sound	Word	Word Transcription	Phonetic Data of Brielle
Affricate	Voiced	[dʒ]	Geranium	[dʒəɹeɪmiəm]	[dʒəweɪmiəm]
	Voiceless	[tʃ]	Teacher	[ti:tʃəɹ]	[ti:tʃəw]
Fricative	Voiced	[ʒ]	Television	[tɛləvɪʒən]	[tɛləvɪʒən]

Last, the consonant that Brielle already acquired at the age of three was the glottal sound [h]. This is alligned with the theory stated by Sander (1972) in his speech sound development chart. Brielle's acquisition of the sound [h] is shown in the following table.

Table 6. The glottal sounds produced by Brielle at 3 years old

Manner of Articulation		Sound	Word	Word Transcription	Phonetic Data of Brielle
Fricative	Voiceless	[h]	Hi	[haɪ]	[haɪ]

3.2. Consonants Acquired after the Age of 3

3.2.1 Fricative Dental Consonants

Brielle had not yet acquired the voiceless fricative dental sound [θ] before she was five years old. This is in alligned with the theory stated by Sander in 1972 specifically in his speech sound development chart which shows that the sound [θ] is not usually acquired by children before they

are four and a half and is should be completed at seven years of age. Brielle's acquisition of the sound [θ] is shown in the table below.

Table 7. The Fricative Dental Consonants Acquisition Data of Brielle

Manner of Articulation		Sound	Word	Word Transcription	Phonetic Data of Brielle		
					Age 3	Age 4	Age 5
Fricative	Voiceless	[θ]	Three	[θɹiː]	[twiː]	[twiː]	[θɹiː]

Brielle exchanged the fricative voiceless dental [θ] with another consonant with almost similar qualities, the voiceless stop alveolar [t], when she was three to four years old, as seen in the table. The features of the sounds [θ] and [t], notably [+con], [+son], [+cor], [+ant], and [-voice], are relatively similar. The difference between the two sounds is that [θ] is a continuant consonant [+cont] because it is a fricative consonant that is produced by only halfway blocking the air stream through the vocal tract, whereas [t] is a non-continuant consonant [-cont] because it is produced by completely blocking the air stream. The following phonological rule can be used to explain this phenomenon:

$$/\theta/ \rightarrow [t] \;\; / \; \#\_\_$$

$$\begin{bmatrix} +con \\ +son \\ +cor \\ +ant \\ -voice \\ +cont \end{bmatrix} \begin{bmatrix} +con \\ +son \\ +cor \\ +ant \\ -voice \\ -cont \end{bmatrix}$$

3.2.2 Liquid Alveolar Consonant [l]

Brielle had already learned the consonant [l] at the age of six, according to the video. This is in line with Sander's (1972) consonant development chart, which claims that the liquid consonant [l] is typically acquired between the ages of three and six. Brielle increasingly substituted the sound [l] with other consonants with similar qualities when she was 3 to 5 years old. Brielle's progress in acquiring the alveolar consonant [l] from 3 to 5 years old is shown in the table below.

Table 8. The Liquid Alveolar Consonant [l] Acquisition Data of Brielle

Manner of Articulation		Sound	Word	Word Transcription	Phonetic Data of Brielle		
					Age 3	Age 4	Age 5
Liquid	Voiced	[l]	Loud	[l̠aʊd]	[ad]		
			All	[ɔːl̠]	[ɔː]		
Liquid	Voiced	[l]	Learn	[l̠ɜːɹn]		[j̠ɔːn]	[w̠ɜːɹn]
			Float	[fl̠oʊt]		[fj̠oʊt]	
			Milk	[mɪl̠k]			[mɪl̠k]

ISSN 2686-0120 (print), 2686-5106 (online) Vol. 4., No. 1, June 2022, pp. 38-49

Brielle had not acquired the alveolar [l] at the front or end of a syllable when she was three, as evidenced by the table, and she did not alternate or substitute the sound with another consonant. As a result, she mispronounces loud [lad] as lad [ad] and all [ɔ:l] as a [ɔ:].

It can be drawn from the table that when Brielle was 4, she already acquired the the sound [l] when it appeared at the end of words, but she could not produce the consonant when it is at the beginning or if the sound was preceded by another consonant. As a result, she substituted the sound [l] with the sound [j], which has nearly identical characteristics. Touching the tip of the tongue to the alveolar ridge produces the lateral sound [l], which has the [+ant]. Rather than placing her tongue on the alveolar ridge, she placed it on the palatal area, which produces the sound [j]. Because it is produced beyond the alveolar ridge, the sound [j] has a [-ant] characteristic. The phonological rule that follows elaborates on this phenomonen:

$$/l/ \rightarrow [j] \;/\; \#\_\_ \qquad \begin{bmatrix} +con \\ +ant \\ +lat \end{bmatrix} \begin{bmatrix} -con \\ -ant \\ -lat \end{bmatrix}$$

$$/l/ \rightarrow [j] \;/\; C\_\_ \qquad \begin{bmatrix} +con \\ +ant \\ +lat \end{bmatrix} \begin{bmatrix} -con \\ -ant \\ -lat \end{bmatrix}$$

At the age of five, her acquisition had developed because she replaced the lateral sound [l] with the bilabial or semivowel [w] is is located at the beginning of the word. This replacement is formulated in the following phonological rule:

$$/l/ \rightarrow [w] \;/\; \#\_\_ \qquad \begin{bmatrix} +con \\ +ant \\ +lat \\ -cont \end{bmatrix} \begin{bmatrix} -con \\ +ant \\ -lat \\ +cont \end{bmatrix}$$

3.2.3 Approximant Alveolar Consonant [ɹ]

In his speech sound development chart, Sander (1972) stated that by the age of five and a half, normally children should already completed the acquisition of the approximant alveolar sound [ɹ]. This remark is supported by the findings of this study, which show that Brielle was able to create the sound at the age of five. She always replaced the semivowel [w] for the approximant [ɹ] when she was younger, notably between the ages of three and four. The following table depicts Brielle's progress in learning the sound [ɹ].

Table 9. The Approximant Alveolar Consonant [ɹ] Acquisition Data of Brielle

Manner of Articulation		Sound	Word	Word Transcription	Phonetic Data of Brielle		
					Age 3	Age 4	Age 5
Liquid	Voiced	[ɹ]	Three	[θɹiː]	[tw̲iː]	[tw̲iː]	[θr̲iː]
			Water	[bɔːɹn]	[bɔːw̲n]		
			Ribs	[ɹ̲ɪbz]		[w̲ɪbz]	
			Learn	[lɜːɹn]		[jɔw̲n]	[wɜːɹn]
			Your	[jʊɹ̲]			[jʊɹ̲]
			Right	[ɹ̲aɪt]			[ɹ̲aɪt]

The unique properties of the sound [ɹ] include [+cons], [+son], [+ant], and [+cont], as it is classified as a voiced approximant alveolar. When Brielle couldn't make the sound, she used the bilabial or semivowel [w], which has nearly the same characteristics as the sound [ɹ], except for the [-consonantal] feature. This happened because she did not raise her tongue to the alveolar ridge when producing the alveolar [ɹ]. The following phonological rule formulates this alternation:

/ɹ/ → [w]

$$\begin{bmatrix} +con \\ +son \\ +ant \\ +cont \end{bmatrix} \begin{bmatrix} -con \\ +son \\ +ant \\ +cont \end{bmatrix}$$

3.2.4 The Postalveolar Fricative Consonant [ʃ]

According to the speech sound development stated by Sander in 1972, the acquisition of the voiceless postalveolar fricative [ʃ] is normally completed when children reach the age of three and a half until seven. From the video, it can be drawn that Brielle already acquired this sound at the age of five. Brielle acquisition of the sound [ʃ] is represented in the following table.

Table 10. The Postalveolar Fricative Consonant [ʃ] Acquisition Data of Brielle

Manner of Articulation		Sound	Word	Word Transcription	Phonetic Data of Brielle		
					Age 3	Age 4	Age 5
Fricative	Voiceless	[ʃ]	Show	[ʃoʊ]	[s̲oʊ]		
			Function	[fʌŋkʃn]	[fʌns̲n]	[fʌŋs̲n]	[fʌŋkʃn]

Brielle replaced the sound [ʃ] with the voiceless fricative alveolar [s] when she was 3 to 4 years old, according to the table. [+cons], [-son], [+cor], and [+cont] are all traits shared by the sounds [ʃ] and [s]. The sound [ʃ] is formed at the postalveolar area [-anterior], but the sound [s] has the feature of [+anterior] because it is produced by placing the tip of the tongue against the alveolar ridge. This alternation is represented by the phonological rule below:

ISSN 2686-0120 (print), 2686-5106 (online) Vol. 4., No. 1, June 2022, pp. 38-49

/ʃ/ → [s]

$$\begin{bmatrix} +con \\ -son \\ +cor \\ -ant \\ +cont \end{bmatrix} \begin{bmatrix} +con \\ -son \\ +cor \\ +ant \\ +cont \end{bmatrix}$$

3.2.5 Voiceless Velar Consonants [k]

The velar consonant [k] is normally acquired when children are at the age of two until four, according to speech sound acquisition milestones provided by Sander (1972). Brielle, however, acquired this sound correctly in all phonetic environments a little late, which is at the age of five. The following table shows Brielle's development in acquiring the sound [k].

Table 11. The Voiceless Velar Consonant [k] Acquisition Data of Brielle

Manner of Articulation		Sound	Word	Word Transcription	Phonetic Data of Brielle		
					Age 3	Age 4	Age 5
Stop	Voiceless	[k]	Kills	[**k**ɪls]	[**t**ɪ:s]		
			Dark	[dɑ:ɹ**k**]	[dɑw**t**]		
			Speak	[spi:k]		[spi:k]	
			Okay	[oʊ**k**eɪ]		[o**t**eɪ]	
			Called	[**k**ɔ:ld]		[**t**ɔ:ld]	
			Can	[**k**æn]			[**k**æn]
			Milk	[mɪl**k**]			[mɪl**k**]

It can be seen from the table that Brielle consistently replaced the sound [k] with [t] when she was 3. Both of those sounds have the same distinctive features which are [+con], [-son], [-cont], [-cor], and [-voice]. The sound [k] is [-ant] because it is created by placing the ridge of the tongue on the velum, whereas the sound [t] is [+ant] because it is generated by placing the tip of the tongue against the alveolar ridge. The phonological rule below expresses this alternation:

/k/ → [t]

$$\begin{bmatrix} +con \\ -son \\ -cont \\ -ant \\ -cor \\ -voice \end{bmatrix} \begin{bmatrix} \mp con \\ -son \\ -cont \\ +ant \\ -cor \\ -voicee \end{bmatrix}$$

However, the table shows that Brielle accurately pronounced the word [spi:k], which means she already acquired the sound [k] when preceeded by a high vowel before the age of four. This phenomenon is formulated in the following phonological rule :

/k/ → [k] / vowel __

$$\begin{bmatrix} +con \\ -son \\ -cont \\ -ant \\ -cor \\ -voice \end{bmatrix} \begin{bmatrix} +con \\ -son \\ -cont \\ -ant \\ -cor \\ -voice \end{bmatrix} \begin{bmatrix} +syl \\ +high \end{bmatrix}$$

3.2.6 Voiced Velar Consonant [g]

The velar consonant [g] is normally acquired when children are at the age of four, according speech sound acquisition milestones provided by Sander (1972). Brielle, however, acquired this sound correctly in all phonetic environments at the age of five. Brielle's progress in learning the sound [g] is shown in the table below.

Table 12. The Voiced Velar Consonant [g] Acquisition Data of Brielle

Manner of Articulation		Sound	Word	Word Transcription	Phonetic Data of Brielle		
					Age 3	Age 4	Age 5
Stop	Voiced	[g]	Argon	[ɑːɹ**g**ɑːn]	[ɑw**d**ɑːn]		
			Guys	[**g**aɪz]		[**d**aɪz]	
			Gums	[**g**ʌms]			[**g**ʌms]

Brielle replaced the consonant [g] with [d] in all phonetic environments when she was three to four years old, according to the table. Both sounds share the same distinctive features namely [+con], [-son], [-cont], [-cor], and [+voice]. The distinction between the two sounds is that [t] is with the tip of the tongue touching the alveolar ridge [+ant], whereas the sound [g] is formed with the tongue touching the velum [-ant]. The following phonological rule expresses this alternation:

/g/ → [d]

$$\begin{bmatrix} +con \\ -son \\ -cont \\ -ant \\ -cor \\ +voice \end{bmatrix} \begin{bmatrix} +con \\ -son \\ -cont \\ +ant \\ -cor \\ +voice \end{bmatrix}$$

3.2.7 Nasal Velar Consonant [ŋ]

The nasal velar consonant [ŋ] is normally acquired when children are between two and six years old, according speech sound acquisition milestones provided by Sander (1972). Brielle, however, acquired this sound correctly in all phonetic environments at the age of four. Brielle's progress in learning the sound [ŋ] is shown in the table below.

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Table 13. The Nasal Velar Consonant [ŋ] Acquisition Data of Brielle

Manner of Articulation		Sound	Word	Word Transcription	Phonetic Data of Brielle	
					Age 3	Age 4
Nasal	Voiced	[ŋ]	Function	fʌŋkʃn	fʌnsn	fʌŋksn

The table shows that when she Brielle was at the age of three, she replaced the nasal velar consonant [ŋ] with nasal alveolar consonant [n]. Both sounds have similar distinctive features such as [+nasal] and [+coronal]. However, they differ on their place of articulation. The sound [n] is an alveolar consonant that is generated with the tip of the tongue raised touching the alveolar ridge [+ant], while the sound [] is a nasal consonant that is created further beyond the alveolar ridge with the tongue raised at the velum [-ant]. This alternation is represented by the phonological rule below:

/ŋ/ → [n]

$$\begin{bmatrix} +nas \\ -ant \\ +cor \end{bmatrix} \quad \begin{bmatrix} +nas \\ +ant \\ +cor \end{bmatrix}$$

4. Conclusion

It can be concluded from the results of the study that Brielle's phonological development progressed rapidly since she was three until five years old. At six years of age, Brielle completed her consonant acquisition and was able to produce all sounds correctly. Before turning six, Brielle replaced the consonants she was not yet able to produce with another consonant with similar characteristics according to distinctive feature theory. She replaced the voiceless and voiced velar pair [k] and [g] with the voiceless and voiced alveolar pair [t] and [d] accordingly between the ages of 3 and 4. Her consonant acquisition development was also in accordance to the speech sound development chart stated by Sander in 1972, despite the fact that some consonants were produced earlier or later than the age milestone represented in the chart. Brielle learned the dental sound [ð] and the majority of the fricative palatal consonants earlier than expected for her age, whereas the velar consonants [k] and [g] came later..

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