

ATYPICAL PHONOLOGICAL PROCESSES IN THE UTTERANCES OF NIGERIAN ENGLISH-SPEAKING CHILDREN WITH SPEECH IMPAIRMENT

Kofo Adedeji

&

Monsurah Badmus

Abstract

A crucial tool for self-expression and social interaction among humans is speech, making investigations focused on speech clarity and speech intelligibility germane in language research. This study assesses the articulation of selected speech-impaired children with cerebral palsy who are between the ages of seven and thirteen in order to identify the specific phonological processes observable in their speech in comparison with the speech of children who are neurotypical. The data was obtained by recording the speech of the children as they were engaged in a picture-naming task with flashcards of pictures representing target words, covering all the twenty-four English consonant sounds. Stampe and Donegan's theory of Natural Phonology (1979, 2004 & 2009), which explicates that phonological processes assume that both children and adults have a natural tendency to simplify articulation serves as the theoretical framework for the study. The analysis reveals that only 28.5% of the speech tokens produced by the speech impaired participants were correctly articulated in relation to 95% of correct tokens produced by the control participant, a child without speech impairment. Cluster reduction, initial consonant deletion, and final consonant deletion are a few of the phonological processes found in the speech of the children with the most prevalent being cluster reduction.

Keywords: phonological processes, cerebral palsy speech, speech intelligibility.

Introduction

This paper explores the phonological processes common in the speech of children with cerebral palsy through identification, analysis, and explanation of speech phenomena present in the speech of these selected children with cerebral palsy, and how those processes affect the intelligibility of their speech, while also investigating the speech processes they share with non-impaired children.

The research is necessary because language, especially verbal communication is undeniably an essential part of human existence, a tool for communication, social interaction, cultural transmission and other aspects of life. It allows us to easily express our ideas, feelings, thoughts and experiences and also build relationships. However, when children suffer cognitive impairments like Cerebral Palsy (CP), their ability to use language to communicate is affected and it becomes difficult for them to express themselves in a way will be easily understood by others. When children are unable to speak clearly and intelligibly like non-impaired children, it makes it challenging for them to express their needs, understand their peers, and engage in activities that other children engage in. This can lead to negative feelings of inferiority, low self-esteem, social exclusion, poor academic performance, frustration and poor mental health. This can also lead to closed doors of opportunities as they grow into adults. Therefore, there is a need to identify the processes in the speech of these children to ultimately improve on their communication skills.

Literature Review

Although previous studies have been conducted on the speech of children with cerebral palsy, there is a dearth of research that focuses on the specific phonological processes which affect their speech clarity and intelligibility. Phonological processes, as noted by Stampe and Donegan (1979), are the result of children's simplification of adult speech sound productions. These simplifications of adult sound productions are as a result of their phonetic or physiological limitations. Phonological processes are not mental rules, but they are phonological

patterns that occur because of the physiological limitations of children who are trying to master speech sounds. Phonological processes are natural and unlearned, and they also come to play subconsciously, whereas phonological rules are not natural but consciously learnt. An example of phonological processes common with children is cluster reduction, (as in *poon* instead of *spoon*) where one of the sounds in the consonant cluster is dropped because of constraints such as immaturity of speech organs. The table below explains various phonological processes that occur in children's speech and the expected age of disappearance of each process.

Table 1: Phonological Processes

S/N	Phonological process	Definition	Example	Expected age of disappearance
1	Cluster reduction	When one or more consonant clusters are deleted in a word	"tone" for "stone"	Without /s/ - Age 4 With /s/ - Age 5
2	Initial consonant deletion	Deletion of the initial consonant of a word.	"at" for "pat"	Age 3
3	Final consonant deletion	Deletion of the final consonant that occurs in a word	"foo" instead of "food"	Age 3
4	Weak syllable deletion	Deletion of one or more weak syllables in a word	"nana" for "banana"	3-4
5	Stopping	Substitution of fricatives or affricates with stops	"tun" instead of "sun"	/f/ /s/ age 3 /z/ /v/ - age 4 Sh, ch, j, th -age 5
6	Vowelization	Replacing a syllabic consonant with a vowel	"botu" for "bottle"	Age 6
7	Fronting	Replacing posterior consonants with anterior consonants	"tot" for "goat"	Age 4
8	Gliding	Substitution of liquids with glides	"wise" for "rise" "yeg" for "leg"	Age 6

9	Backing	Replacing anterior sounds with posterior sounds	“cop” for “top”	Age 4
10	Denasalisation	Replacing a nasal consonant with a non-nasal consonant	“fan” for “fa”	Age 3
11	Assimilation	When a consonant sound starts to sound like another sound in the target word	“kuck” for “duck”	Age 3
12	Deaffrication	Substitution of affricates with fricatives	“feə” for “chair”	Age 4
13	Voicing	Making a voiceless sound to become voiced	“tob” for “top”	Age 3-4
14	Devoicing	Rendering a voiced sound voiceless	“fan” for “van”	Age 3-4
15	Affrication	Replacing a non-affricate with an affricate	“chip” for “ship”	Age 4
16	Nasal substitution	Substituting a nasal consonant with another nasal consonant	“sin” for “siŋ”	Age 3-5

Culled from the American Speech-Language Hearing Association website

The occurrence of these phonological processes can impede speech clarity and intelligibility. Speech intelligibility, according to the American Psychological Association (2018), is the degree to which speech sounds can be correctly identified and understood by listeners in a particular environment.

Theoretical Background: Natural Phonology (NP)

Natural Phonology was first propounded by David Stampe in 1973 and further expounded on in Donegan and Stampe (1979 and 2009). The theory belongs to the functionalist school of phonology, and it treats phonology as a psycholinguistic system of innate, substantive processes that shape both speech production and perception. The

theory views speech processes as being prompted by the physical limitations of the human vocal system as well as the perceptual constraints of the human auditory system.

Centred on child language acquisition, Stampe's view is that children are born with a general set of phonological processes which include cluster simplification, consonant lenition, assimilation and vowel harmony. These speech processes are "natural" because they demonstrate ease of articulation, clarity in perception, and auditory restrictions. Thus, phonological acquisition involves repressing redundant processes while maintaining those that are obligatory. Simplification of articulation is the core essence of Natural phonology and this is captured in the description of phonological processes as being, "a mental operation that applies in speech to substitute for a class of sounds and sound sequences presenting a specific common difficulty to the speech capacity of the individual, an alternative class, identical but lacking the difficult property" (Stampe 1973:1).

The Theory of Natural Phonology and Second Language Acquisition

Beyond first language acquisition, the main concept of simplification of difficult speech segments is also observable in second language learning situations where learner errors are perceived as being the result of the operation of universal phonological processes rather than purely phonological interference errors emanating from the mother tongue or first language. Donegan & Stampe (1979) argue that learners are born with an innate set of processes – cluster simplification, assimilation, fortition and lenition. In second language acquisition children suppress some of these processes which are not needed in the target language while some processes remain available in the learner's mental inventory and can re-surface as replacements when certain L2 forms are difficult to produce.

A related principle of Natural phonology is the Principle of Closest Phonetic Value which was developed from the application of the theory of natural phonology to second language acquisition (James 1997; Nathan 1982; Hayes-Harb & Barrios 2021). It posits that in

instances where a second language learner cannot accurately articulate a target sound, universal fortition and lenition processes are applied to select the L2 sound that is phonetically closest to the target sound. The principle states that “when a target L2 segment cannot be produced, learners will substitute the segment in their interlanguage that is phonetically closest to the target, given the set of processes they have suppressed and the segmental inventory available to them” (James 1997:248).

The argument is that the selection is not random or arbitrary and must fulfill the twin conditions of: (i) identity: a phonetically similar segment or the segment with the closest phonetic value must be selected (ii) simplicity: the choice must lack any inherent difficult property. This view rejects the traditional view of interference as being the sole determinant of L2 deviations.

Participants and Collection of Data

Segmental and suprasegmental sounds constitute the phonological considerations with which a phonological analysis is done. This study focuses on the segmental sounds, specifically the consonant sounds in English. 10 children with cerebral palsy between ages 7-13 from the Lagos University Teaching Hospital, Idi-Araba and an 8-year-old neurotypical child were selected for this study. The participants were chosen based on age range and ability to speak. Their speech was assessed, transcribed and analysed for errors, focusing on phonological processes found in their speech. The subjects were given a picture-naming task, and not a reading task, because many cerebral palsy children struggle with reading, but they can understand and correctly interpret visuals. The instrument used for the picture-naming tasks were flashcards of pictures representing a group of target words covering all the twenty-four (24) English consonant sounds. Each participant was asked to name the picture on each of the flash cards. Auditory perception followed by manual transcription of the responses was done as the participants were asked to pronounce each word at least three (3) times, in order to ensure the accuracy of the transcriptions.

After transcribing the speech of the CP participants, collection of the speech samples of th 8-year old was done. The child was asked to also do the picture naming task and the production was recorded, followed by the transcription of the speech.

The next stage was the identification and statistical representaation of the phonological processes found in the utterances of the participants. The phonological processes in the CP participants’ realisations were treated differently apart from the processes found in the speech of the child without CP. Moreover, the researcher proceeded to represent the frequency and distribution of each of the phonological processes on tables and bar charts.

Data Analysis and Results

The frequency and distribution of the phonological processes in the speech of the cerebral-palsied respondents and neurotypical child are presented below in tables.

Table 2: Frequency and Distribution of Phonological Processes in the Speech of the Impaired Participants

S/N	Phonolo gical Process	Instances of Occurrence	Frequency of Occurrence in the Participants’ Speech Samples	Correct Pronunciation
1	Cluster reduction	i. [toun] for stone ii. [vet], [fes], [es] for vest iii. [zeba], [seba] zebra iv. [bu:m], [bu:] for broom v. [fawa] for flower vi. [bed] for bread vii. [fes] for vest viii. [kɒt], [kɒ] for cloth	30	i. /stəʊn/ ii. /vest/ iii. /'zeb.rə/ iv. /bru:m/ v. /'flaʊə/ vi. /bred/ vii. /vest/ viii. /klɒθ/
2	Devoicin g	i. [taɪka] for tiger ii. [telɪfɪʃoh], [elɪvɪʃun], [elɪvɪʃun], [tefɪʃon], [efɪʃon], [tejɪfɪʃon], [tefɪʃo] for television iii. [aʊs], [haʊs] for house	27	i. /'taɪ gə/ ii. /'teləvɪʒən/ iii. /haʊz/ iv. /vest/ v. /'dʒɪndʒə/ vi. /'zeb.rə/

		iv. [fes] for vest v. [tʃɪtʃa], [ɪntʃa], [tʃɪntʃa] for ginger vi. [seba] for zebra vii. [tɒg] for dog viii. [wɪntɔ] for window		vii. /dɒg/ viii. /'wɪn.dəʊ/
3	Initial consonant deletion	i. [aʊs] for house ii. [elɪvɪʃən], [efɪʃən] for television iii. [aɪgə] for tiger iv. [tɒʊ] for stone v. [ɪŋ] for king vi. /eə/ for chair vii. [ɪp] for lip viii. [ɪndʒə], [ɪntʃə] for ginger ix. [i:p] for sheep x. [æm] for yam xi. [awa] for flower xii. [est] [es] for vest xiii. [efɪʃən] [elɪvɪʃən] for television	29	i. /haʊz/ ii. /'teləvɪʒən/ iii. /'taɪ gə/ iv. /stəʊn/ v. /kɪŋ/ vi. /tʃeə/ vii. /lɪp/ viii. /'dʒɪndʒə/ ix. /ʃi:p/ x. /jæm/ xi. /'flaʊə/ xii. /vest/ xiii. /'teləvɪʒən/
4	Final consonant deletion	i. [ki:] for king ii. [dɒ] [dɒh] for dog iii. [ʃi:] for sheep iv. [stɒl] [stɒh] for stone v. [fɪ] for fish vi. [ja:] for yam vii. [bu:] for broom viii. [telɪvɪʃən] [tefɪʃən] for television ix. [li:] for lip x. [kɒ] for cloth xi. [bre] for bread	22	i. /kɪŋ/ ii. /dɒg/ iii. /ʃi:p/ iv. /stəʊn/ v. /fɪʃ/ vi. /jæm/ vii. /bru:m/ viii. /'teləvɪʒən/ ix. /lɪp/ x. /kɒθ/ xi. /bred/
5	Stopping	i. [pɪʃ] for fish ii. [klɒt], [kɒt], [tɒt], for cloth	11	i. /fɪʃ/ ii. /kɒθ/
6	Denasalization	i. [dʒɪndʒə], [tʃɪtʃə] [gɪgə] for ginger ii. [wɪdɔ] for window	6	i. /'dʒɪndʒə/ ii. /'wɪn.dəʊ/

7	Affrication	[tʃi:p] for sheep	1	/ʃi:p/
8	Deaffrication	i. [ʃe], [ke] for chair ii. [giga] for ginger	7	i. /tʃeə/ ii. /'dʒɪndʒə/
9	Voicing	i. [bɔ:bɔ:] for pawpaw ii. [gm] for king iii. [daiga] for tiger	6	i. /'pɔ:pɔ:/ ii. /kɪŋ/ iii. /'taɪ gə/
10	Devoicing	i [taika] for tiger ii. [aʊs], [haʊs] for house iii. [fes] for vest iv. [tɒg], [dok] for dog v. [telɪfɪʃoh] for television vi [seba], [sebja] for zebra	26	i. /'taɪ gə/ ii. /haʊz/ iii. /vest/ iv. /dɒg/ v. /'teləvɪʒən/ vi. /'zeb.rə/
11	Fronting	[tɒt] for cloth	1	/klɒθ/
12	Backing	[gaiga] for tiger	1	/'taɪ gə/
13	Gliding	i. [flawa], [fawa], [awa] for flower ii. [jɪp] for lip iii. [bjed] for bread iv. [sebja] for zebra v. [tewɪʃun], [telɪwɪʃoh], [telɪwɪʃon], [tejɪfɪʃon] for television	19	i. /'flaʊə/ ii. /lɪp/ iii. /bred/ iv. /'zeb.rə/
14	Assimilation	i. [gɒg] for dog ii. [fɪʃ] for fish	3	i. /dɒg/ ii. /fɪʃ/
15	Weak syllable deletion	i. [tewɪʃun], [teftɪʃo], [teftɪʃon] for television	3	i. /'teləvɪʒən/ ii. /'teləvɪʒən/
16	Nasal substitution	[km] for king	2	/kɪŋ/
17	Glottal substitution	[hɪʃ] for fish	2	/fɪʃ/

Table 3: Frequency and Distribution of Phonological Processes in the speech of the non-impaired participant

S/N	Phonological Process	Instances of Occurrence	Frequency of Occurrence in the Participant's Speech Samples	Correct Pronunciation
1	Cluster reduction	None	0	-
2	Devoicing	[haʊs] for house	1	/haʊz/
3	Initial consonant deletion	None	0	-
4	Final consonant deletion	None	0	-
5	Stopping	None	0	-
6	Denasalization	None	0	-
7	Affrication	None	0	-
8	Deaffrication	None	0	-
9	Voicing	None	0	-
10	Devoicing	None	0	-
11	Fronting	None	0	-
12	Backing	None	0	-
13	Gliding	None	0	-
14	Assimilation	None	0	-
15	Weak syllable deletion	None	0	-
16	Nasal substitution	None	0	-
17	Glottal substitution	None	0	-

Discussion of Findings

These results reveal the different types of phonological processes which affected the speech clarity and intelligibility of the CP respondents, which include: Cluster reduction, Devoicing, Initial Consonant Deletion, Final Consonant Deletion, Stopping, Denasalization, Affrication, Deaffrication, Voicing, Devoicing, Fronting, Backing, Gliding, Assimilation, Weak Syllable Deletion, Nasal substitution, and Glottal substitution. The occurrence of these processes made their speech unclear, such that many of their articulations had no similarity to the target words they were required to name. The most prevalent phonological process with the highest frequency of occurrence among the CP participants include: (i) Cluster Reduction (ii) Initial consonant deletion (iii) Devoicing.

While the CP participants encountered a lot of difficulty in the production of fricatives, the participants without cerebral palsy shared almost no phonological process in common with the CP participants, except just a single occurrence of devoicing found in the speech of the non-CP participant, where the voiceless alveolar fricative /s/ in “house” was pronounced as [haʊz] instead of [haʊs]. A careful analysis of this realisation showed that the non-CP participant mispronounced the word not because of any speech disability, but as a result of the phonological peculiarities of Nigerian speakers of English, as many Nigerian speakers are known to substitute voiced sounds like /z/ with their voiceless counterparts, especially if the sound is not present in their phonological inventory of their native language.

Findings of the Study: Phonological Processes in the Utterances of the Speech-Impaired Participants

1. Cluster reduction: A careful analysis of the data has shown that this phonological process occurred thirty (30) times, which is the highest number of times a phonological process occurs in the speech of the CP respondents, as indicated in table 4.4.1. This phonological process occurs when a child finds it difficult to produce a consonant cluster due

to immaturity of his or speech organs. The child therefore simplifies the cluster by reducing it to a single consonant sound. This process is not expected in the speech of children from age 5 and above, because they ought to have outgrown them, according to the American Speech-Language Hearing Association (ASHA 2025). The respondents have not yet outgrown it because of their speech disability, which is as a result of their cerebral palsy condition. The instances of this phonological process in the data include:

- i. stone: [toʊn]
- ii. vest: [vet], [ves]
- iii. zebra: [seba], [zeba]
- iv. window: [wino]
- v. broom: [bu:m], [bu:]
- vi. flower: [fawa]
- vii. bread: [bed]
- viii. cloth: [kɒt]

Explanation:

The pronunciation errors made by the participants in the words “stone”, “vest”, “zebra”, “broom”, “bread”, and “cloth” are as a result of the participants’ inability to articulate consonant clusters, due to their CP condition which makes it difficult for their vocal organs to produce consonant clusters. They therefore reduce the clusters to a single consonant sound, in order to make the pronunciations of the words easier. In the pronunciation of the word “stone”, some participants pronounced it as [toʊn], thereby deleting the alveolar fricative /s/ in the cluster. The correct pronunciation of the word should be /stəʊn/ as in stone. Also, while pronouncing the word “vest”, some participants articulated it as [ves] and [vet], thereby deleting /t/ or /s/, in order to reduce the cluster and make the word easier for them to pronounce. The correct pronunciation of “vest” is /vest/.

Similarly, in the articulation of the word “zebra”, some CP participants pronounced it as [zeba], while some pronounced it as [zeba], thereby deleting the post-alveolar liquid /r/ in the word. The

word is meant to be pronounced as /'zeb.rə/. Also, in the pronunciation of the words “broom” and “bread”, some CP participants deleted the /r/ in the cluster, as a way of simplifying the pronunciation of the word. The correct pronunciations of “broom” and “bread” are /bru:m/ and /bred/ respectively. Lastly, while some participants pronounced the word “cloth”, the alveolar lateral /l/ in the cluster /kl/ was deleted, thereby realising it as /[kɒt]/, instead of /klɒθ/.

2. Devoicing: a detailed analysis of the realizations of the CP participants indicate that devoicing occurred twenty seven (27) times in their speech. Devoicing happens when a voiced sound is pronounced as voiceless in a word. The instances of this phonological process in the data include:

- i. tiger: [taɪkə]
- ii. television: [elɪvɪʃun]
- iii. house: [haʊs]
- iv. vest: [fes]
- v. dog: [tɒg]

Explanation:

The errors in the realizations of the words “television”, “tiger”, “stone”, “king”, and “lip” by the participants are due to the participants’ omission of the initial consonants in the words, which is a phonological pattern that makes the word shorter and easy for them to pronounce. This phonological process ought to have been outgrown by the participants, as it is expected to disappear at age 4, based on the phonological process chart by ASHA (2025). The voiced velar plosive /g/ in tiger was substituted with the voiceless velar plosive /k/ sound, as in [taɪkə], instead of /'taɪgə/. Also, the voiced palatal fricative /ʒ/ in television was substituted with the voiceless palatal fricative /ʃ/, by some participants. The correct pronunciation of the word should be /'teləvɪʒən/.

Another instance of devoicing was found in some participants' pronunciation of the word "house", whereas the voiced alveolar fricative /z/ in the word "house" was pronounced as the /s/, which is a voiceless alveolar fricative. This may not be just because of their cerebral palsy condition, but may be as a result of the phonological peculiarities of Nigerian users of English, as some of them find it difficult to pronounce the /z/ probably because the sound is not in their native language. They therefore substitute /z/ with /s/.

Similarly, the /v/ in "vest" was articulated as a voiceless sound /f/. This is also peculiar to Nigerian speakers of English, as they tend to substitute the /v/ sound with /f/ while speaking, as the /v/ is not found in some Nigerian languages like Yoruba. The correct pronunciation of the word is /vest/.

Lastly, the voiced alveolar plosive /d/ in "dog" was reduced from being a voiced consonant to the voiceless alveolar plosive /t/. Devoicing in this instance is expected to stop between age 3 and 4 according to the American Speech-Language Hearing Association, but it is still present in the speech of some of the participants due to their disability. The correct pronunciation of the word is /dɒg/.

3. Initial consonant deletion: Analysis of the data shows that this phonological process occurred twenty-seven (27) times. This process occurs when the first consonant in a word is omitted or deleted when pronouncing the word. This happens in children's speech when they are below the age of three, and usually because the consonant sound is difficult for them to pronounce. This process ought to have disappeared by the age of 3, according to the phonological process chart by ASHA (2025), but majority of the participants still exhibit it in their speech. The instances of this phonological process in the data include:

- i. house: [aʊs]
- ii. television: [elɪvɪʃun]
- iii. tiger: [aɪgə]
- iv. stone: [tʊʊ]
- v. king: [ɪŋ]

vi. chair: [e]

vii. lip: [ɪp]

Explanation:

The pronunciation errors made some the participants in the words “yam”, “broom”, and “lip” occurred due to their dropping of the final consonants in the words, which may be due to the immaturity of their vocal organs. This phonological process has the second highest frequency in the speech of the CP participants.

In the pronunciation of the word “house”, some participants pronounced it as [aus], thereby deleting the consonant sound /h/. This is more likely to be as a result of the phonological peculiarities of the speech of typical Nigerian speakers of English, rather than as a result of their palsy, as Nigerian speakers of English are known to delete the /h/ sound in words that have them; while they insert /h/ in words that do not have them, which is called the h-factor. The correct pronunciation of “house” is /haʊz/.

While articulating the word “television”, some participants realised it as [elɪvɪʃun], thereby omitting or deleting the initial consonant sound /t/, which is as a result of the participants’ CP condition. The correct pronunciation is /ˈteləvɪʒən/.

Another wrong articulation was in the articulation of the word “tiger”, as some participants deleted the initial consonant /t/ in the word, which is as a result of their disability. The correct pronunciation of “tiger” is /ˈtaɪɡə/. Similarly, the initial consonant sound /s/ is deleted in the pronunciation of “stone”, as in [tʊ] instead of /stəʊn/. The same phonological process is observed in the articulations of the word “king” as [ɪŋ], “chair” as [e], and “lip” as [ɪp], whereas their initial consonant sounds were deleted. The correct pronunciations of the words are /kɪŋ/ as in “king”, /tʃeə/ as in “chair”, and /lɪp/ as in “lip”.

4. Final consonant deletion: A careful analysis of the data reveals that this phonological process occurred twenty-two (22) times in the speech of the participants. This process happens when the last consonant in a

word is omitted while pronouncing the word. This process is not expected to be in the speech of normal-growing children, as they ought to have outgrown it by age 3 according to the American Speech-Language Hearing Association (2025), but it still manifests in the speech of the CP participants because of their condition. The instances of this phonological process in the data include:

- i. yam: [ja:]
- ii. broom: [bu:]
- iii. lip: [li]

Explanation:

The pronunciation errors made some the participants in the words “yam”, “broom”, and “lip” occurred due to their dropping of the final consonants in the words, which may be due to the immaturity of their vocal organs. “Yam” was realised by some participants as [ja:], thereby omitting the final consonant /m/ in the word. The correct pronunciation of the word “yam” is /jæm/. Also, the final consonant /m/ was deleted by some participants during the articulation of the word “broom” by some participants, thereby realizing it as [bu:] instead of /bru:m/.

Similarly, the final consonant sound /p/ in the word “lip” was deleted in the realisations of some participants, as they pronounced it as [li] instead of /lip/.

5. Stopping: this phonological process occurred eleven (11) times in the realisations of the participants. This happens when a fricative sound is substituted with a stop. This is common in children below 4, as they find it difficult to pronounce fricative sounds due to the immaturity of their vocal organs. However, this process is expected to disappear from the speech of children above age 5, according to the American Speech-Language Hearing Association. The instances of this phonological process in the data include:

- i. fish: [pɪʃ]
- ii. cloth: [klɒt]

Explanation:

The words “fish” and “cloth” were mispronounced by some participants as a result of their inability to articulate the fricative sounds /f/ and /θ/. While pronouncing the word “fish”, the bilabial fricative sound /f/ was substituted with a stop sound /p/ as in [pɪʃ], instead of /fɪʃ/. Also, in the realisation of the word “cloth” by some participants, the dental fricative /θ/ was replaced with the alveolar stop /t/. This substitution is likely as a result of one of the phonological features of Nigerian English, whereas the fricative sound /θ/ is often substituted with /t/ or /d/, rather than as a result of their disability. The correct pronunciation of the word “cloth” is /klɒθ/.

6. Denasalization: an analysis of the data shows that this process occurred six (6) times. This phonological process involves the deletion or omission of a nasal sound in a word, while pronouncing the word. Denasalization is a phonological process that is quite common in the speech of toddlers as they tend to delete the nasal sound in words for ease of pronunciation. This process is expected to disappear from the speech of children by the age of 4, according to the American Speech-Language and Hearing Association, but a critical analysis of the data shows that this process is still present in the speech of the CP participants, which is as a result of their neurological condition which has affected their speech. The instances of this phonological process in the data include:

- i. ginger: [dʒɪdʒə], [tʃɪtʃə]
- ii. window: [wɪdɒ]

Explanation:

The pronunciation errors in the above words are as a result of some participants' inability to articulate the nasal sound /n/. So, in order to be able to pronounce the words more easily, they simply omit the nasal sound /n/ in the words. The nasal sound /n/ in “ginger” and “window” was found to have been deleted by some participants. The

correct pronunciations of the words should be /dʒɪndʒə/ as in ginger, and /wɪndəʊ/ as in window.

7. Affrication: table 4.4.1 shows that this phonological process occurs only once. This happens when a non-affricate sound in a word is produced as an affricate sound. This phonological process sometimes occurs in the speech of children below 4 years, but they are meant to outgrow them by age 4 based on the claims of the American Speech-Language Hearing Association. None of the CP participants are below 7 years, yet, this phonological process is still present in their speech due to their disability. An instance of this process in the participants' speech samples includes the following:

i. sheep: [tʃi:p]

Explanation:

The words “sheep” was mispronounced by one of the participants as the participant substituted the fricative sound /tʃ/ with /ʃ/, probably because they find it difficult to articulate the /ʃ/ sound. The correct pronunciation of the word should be /tʃi:p/ as in sheep.

8. Deaffrication: an analysis of the data indicates that this phonological process occurred seven (7) times. This happens when a child replaces an affricate sound in a word with a non-affricate sound. Deaffrication is quite common in the speech of children between age 2 and 4, but it is expected to disappear at age 4, according to ASHA. However, despite their ages, they have not been able to outgrow this phonological process due to their disability. The instances of this phonological process in the participants' speech samples include:

i. chair: [ʃe]

ii. ginger: [gɪga]

Explanation:

The pronunciation errors in the above words are due to some participants' inability to articulate the affricate sounds /tʃ/ and /dʒ/.

So, to be able to pronounce the words “chair” and “ginger”, they substituted the affricates with non-affricate sounds /ʃ/ and /g/ respectively, which are quite easier to pronounce. The affricate /tʃ/ in “chair” was substituted with the alveolar fricative /ʃ/ (non-affricate), thereby articulating the word as [ʃe]. Also, in the realisation of the word “ginger”, some participants substituted the affricate /dʒ/ with the voiced velar stop /g/, thereby pronouncing “ginger” as [gɪga]. The correct pronunciation of the word “chair” is /tʃeə/, while “ginger” is correctly pronounced as /dʒɪndʒə/.

9. Voicing: this phonological process occurred six (6) times, based on the data analysed. This process occurs when a voiceless sound is pronounced as a voiced sound in a word. It is common in children below age 4, and children of 4 years of age and above are expected to have outgrown this phonological process according to ASHA (2025). The instances of this phonological process from the data include:

- i. pawpaw: [bɔ:bɔ:]
- ii. king: [gɪn]
- iii. tiger: [daɪga]

Explanation:

The words “pawpaw”, “king” and “tiger” were mispronounced by some participants as they pronounced the voiceless consonant sounds in the words with their voiced counterparts. The voiceless bilabial stop /p/ in “pawpaw” was substituted with the voiced bilabial stop /b/, thereby pronouncing the word as [bɔ:bɔ:], instead of /pɔ:pɔ:/.

Similarly, the voiceless velar stop /k/ in “king” was substituted with the voiced velar stop /g/, thereby pronouncing the word as [gɪn], instead of /kɪŋ/. Also, the voiceless alveolar stop /t/ in “tiger” was substituted with the voiced alveolar stop /d/, thereby pronouncing the word as [daɪga], instead of /'taɪgə/.

10. Devoicing: a thorough analysis of the data reveals that this phonological process occurred twenty-six (26) times. This process happens when a voiced sound is pronounced voiceless in a word. Devoicing is quite common in the speech of children below age 4, and it is expected to fade out from the speech of normal-developing children when they get to age 4, according to the American Speech-Language Hearing Association. The instances of this phonological process in the participants' speech samples include:

- i. house: [aʊs]
- ii. vest: [fes]
- iii. tiger [taika]
- iv. dog: [tɒg], [dɒk]
- v. window: [winto]
- vi. zebra: [seba], [sebjə]

Explanation:

The following words were misarticulated due to voicing and some other phonological processes like gliding. Some participants replaced the voiced velar stop /g/ in “tiger”, voiced alveolar fricative /z/ in “house”, voiced labio-dental fricative /v/ in “vest”, and voiced alveolar stop /d/ in “dog” with their voiceless counterparts; voiceless velar stop /k/, voiceless alveolar fricative /s/, and voiceless labio-dental fricative /f/, respectively which probably means that they find it difficult to pronounce the voiced sounds above. The correct pronunciations of the words are /'taɪgə/ as in tiger, /haʊz/ as in house, /vest/ as in vest, and /dɒg/ as in dog.

Likewise, some participants substituted the voiced alveolar stop /d/ in the word “window” with its voiceless counterpart /t/, thereby realising the word as [winto] instead of /'wɪn.dəʊ/. Also, the voiced alveolar fricative /z/ in the word “zebra” was substituted with the voiceless alveolar fricative /s/ by some participants, thereby realising the word as [seba], while some realised it as [sebjə].

11. Fronting: table 4.4.1 shows that this phonological process occurred only once (1). It happens when a posterior consonant is substituted with an anterior consonant in a word. An instance of this phonological process from the data includes:

i. cloth: [tɒt]

Explanation:

The word “cloth” was mispronounced by a participant as the participant substituted the initial velar consonant sound /k/ which is a posterior sound, with the alveolar stop /t/ which is anterior consonant. Hence, the posterior consonant is replaced with anterior consonant, which brings about the fronting process. This as a result of the participant’s disability, because a normal-developing child of 7 years and above should be able to produce posterior sounds as well as anterior sounds, without substituting an anterior sound for a posterior sound and vice versa, according to the American Speech-Language and Hearing Association. The correct pronunciation of the word “cloth” is /klɒθ/.

12. Backing: a careful analysis of the data shows that this process occurred once (1). It happens when an anterior consonant sound is replaced with a posterior sound. Below is an instance of this phonological process from the data collected:

i. tiger: [gaɪga]

Explanation:

One of the participants substituted the anterior consonant /t/ in the word “tiger” with the posterior sound /g/. This is due to the participant’s disability; because this process is not expected to feature in the speech of a child above age 4, according to the phonological process chart by the American Speech-language and Hearing Association. The correct pronunciation of the word “tiger” is /ˈtaɪgə/.

13. Gliding: this process occurred nineteen (19) times. It happens when a non-glide is substituted with a glide. Instances of this phonological process from the data include:

- i. flower: [flawa]
- ii. lip: [jɪp]
- iii. bread: [bjed]
- iv. zebra: [sebjə]

Explanation:

The words above were mispronounced by some participants as they substituted non-glides contained in the consonant clusters with glides, as a way of simplifying the clusters in the words “bread” and “zebra”. Therefore, the liquid /r/ in “bread” and “zebra” was replaced with the glide /j/. This is a common feature of the speech of children below age 6. Children of 6 years and above are not expected to exhibit this phonological process anymore, because it ought to resolve by age 6, according to the American Speech-Language and Hearing Association. The correct pronunciation of “bread” is /bred/, and “zebra” is meant to be pronounced as /'zeb.rə/.

Likewise, gliding was found in some participants' articulation of the words “flower” and “lip”. While articulating the word “lip”, the participants substituted the liquid /l/ with the glide /j/, thereby pronouncing it as [jɪp], instead of /lɪp/.

Also, some participants, while pronouncing the word “flower”, substituted the triphthong /aʊə/ with the glide /j/, thereby articulating it as [flawa], instead of /flaʊə/. This instance of gliding is common among Nigerian speakers of English, as they often substitute triphthong sound /aʊə/ and /əʊə/ with the glide /w/, while they substitute triphthong /aɪə/ and /eɪə/ with the glide /j/. Therefore, the participants' realisation of “flower” as [flawa] is more likely to be as a result of the phonological peculiarities of Nigerian speakers of English, rather than as a result of their disability.

14. Assimilation: this process occurred three (3) times. It is the process in which a sound takes on the qualities of its neighbouring sound in a word. This phonological process is common in the speech of children below age 3. Children from age 3 above are not expected to exhibit this phonological process in their speech. Instances of this phonological process in the participants' speech samples include:

- i. dog: [gɒg]
- ii. fish: [ʃɪʃ]

Explanation:

While articulating the word “dog”, some participants transferred the phonetic quality of the voiced velar stop /g/ onto the initial consonant /d/, such that they become phonetically similar, as a way of making the word easier to pronounce, thereby pronouncing the word as [gɒg] instead of /dɒg/.

The same phonological process is repeated in the pronunciation of the word “fish”, as the phonetic quality of the alveolar fricative /ʃ/ was transferred onto the labiodental fricative /f/, which is the initial consonant of the word, thereby realising the word as [ʃɪʃ] instead of /fɪʃ/.

15. Weak syllable deletion: this occurred three (3) times. It happens when a weak syllable is dropped in a word. This phonological process is common children below 4 years, and it enables children to pronounce multi-syllabic words more easily. However, children of age 4 upwards, are not expected to delete weak syllables in words anymore, according to the American Speech-Language and Hearing Association. Therefore, the fact that this process still occurs in the speech of some participants shows that their disability is responsible. Instances of this phonological process in the participants' speech samples include:

- i. television: [tewɪʃun], [tefɪʃun]

Explanation:

Some weak syllables in the word “television” were deleted by some participants. Some participants deleted the unstressed syllable /lɪ/ in the word and substituted the voiced labio-dental fricative /v/ in the stressed syllable /vɪ/ with the glide /w/, thereby realising the word as [tewɪʃʊn], instead of /'teləvɪʒən/.

Similarly, one of the participants articulated the same word “television”, while deleting the unstressed syllable /lɪ/ in the word and replacing the voiced labio-dental fricative /v/ in the stressed syllable with the voiceless labio-dental fricative /f/. The correct pronunciation of the word is /'teləvɪʒən/.

16. Nasal substitution: this process occurred twice. It is the substitution of a nasal sound with another nasal sound. This sometimes happen when a child finds one nasal sound like /ŋ/ difficult to pronounce and therefore substitutes with another one that he or she finds easier to pronounce. Also, this may be as a result of the child mixing up the nasals, not knowing that each nasal sound is a distinct sound. An instance of this phonological process from the data collected includes:
i. [kɪn] for king

Explanation:

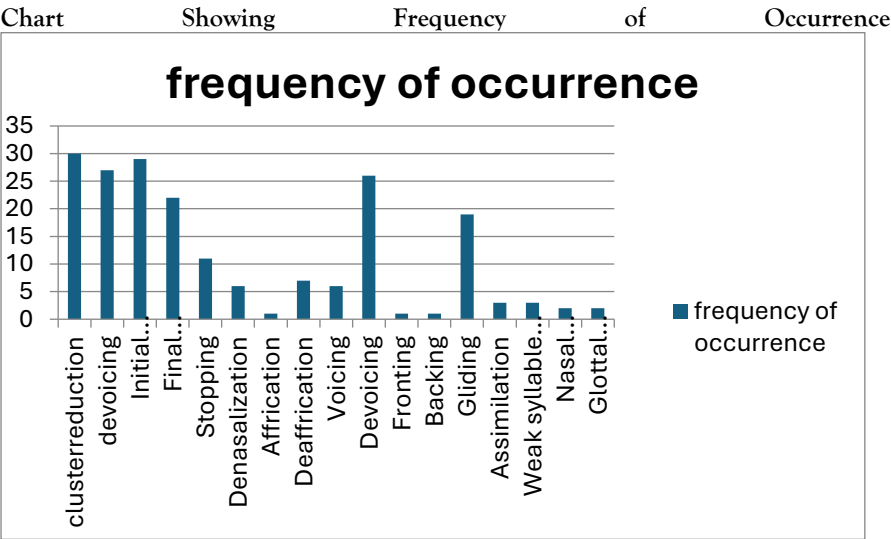
Two participants substituted the velar nasal /ŋ/ in the word “king” with the alveolar nasal /n/, thereby articulating the word as [kɪn]. The /ŋ/ consonant was probably difficult for the participants, and they had to substitute it with a nasal that is simpler to pronounce. The correct pronunciation of the word is /kɪŋ/.

17. Glottal substitution: this process occurred twice. It is the substitution of a non-glottal sound with a glottal sound. This phonological process is expected to resolve between ages 3-6, according to Bowen (2025), yet it occurred in the speech of two of the participants due to their disability. An instance of its occurrence in the data collected is indicated below:

i. fish: [hɪʃ]

Explanation:

The voiceless labio-dental fricative /f/ in the word “fish” was replaced with the glottal stop /h/ by two participants, thereby pronouncing the word as [hɪʃ]. This is likely because the participants find the labio-dental fricative quite difficult to articulate and therefore substitute it with /h/. The correct pronunciation of the word “fish” is /fɪʃ/.



Conclusions

The study focuses on the phonological processes that occur in the speech of children with cerebral palsy and how the condition affects the clarity and intelligibility of their speech. The speech samples got from the participants provided detailed insights into the various phonological processes that occur in their speech, the frequency and distribution, and how such processes impede intelligibility.

The adoption of quantitative and qualitative data analysis methods gave room for explanations of each phonological process, giving credence to the fact that these processes truly affect the speech

intelligibility of the participants. The analysis revealed that only 28.5% of the CP participants were able to articulate the sounds correctly while 71.5% could not. In contrast, 95% of the realizations of the participant without CP was appropriate, and only 5% of the realizations was not. Results from this study also reveal that the phonological processes in the realizations of the participants with this impairment made their pronunciations confusing and clearly different from the correct pronunciation of the target words, especially cluster reduction, which was the most prevalent.

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