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Phonological Rules and Processes: An Introduction

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Abstract: The aim of this paper is to examine phonological rules and processes. This it does in order to investigate such rules and processes with a view to justifying their place in phonology and appreciate their relevance in the production of speech sounds. The database derives from a number of illustrative texts and the method of analysis is mainly descriptive consequent upon the available data. The work looks into the provided data to different degrees for sound pattern of various languages through phonological rules and processes. Findings reveal that many current write-ups on phonological rules and processes are therefore, not particularly new but keep on changing and improving. Studies show that phonological processes are formalizing the knowledge of the phonological rules. This paper has four sections. Section one is the introduction, section two is literature review, section three is on the analysis of phonological rules and processes and finally section four is the summary of findings and conclusion. The study recommends that more researches be carried out on phonological rules and processes in order to be touch with the current changes and improvements on the study of phonology and phonological rules and processes.

Keywords: Phonology, Phonological processes, phonological rules, sound patterns, speech sounds.

Introduction

Phonology is derived from Ancient Greek words: phone, meaning "voice, sound" and logos meaning "word, speech, subject of discussion". Broadly speaking, phonology is a subsdiscipline of linguistics concerned with the function, behaviour and organization of sounds as linguistic items (Wikipedia, the free encyclopedia). A close look at the study of phonology since the inceptions of its study has revealed some significant variations. Phonology as a field of study has moved from classical phonology (also known as phonemics) to generative phonology, which Goldsmith (1976) later called classical generative phonology then, from classical generative era to more current ones like auto-segmental phonology, metrical phonology, lexical phonology and prosodic phonology. So, classical phonology and classical generative phonology stand to be the two important approaches to the study of phonology around 1920s and 1960s. The first approach seeks to provide answers to questions like the following:

a. What speech sounds are distinctive in a given language?

b. What features of given speech sounds are capable of bringing about meaning distinction between utterances in a natural language? (Okorji, 1998; Asadu, 2016)

These approaches were the basic orientation of phonology between 1920s and 1960s. The quest to answer the above questions resulted in what is generally known as classical **phonology or phonemics**. The leading proponents of this Prague school of phonology are Trubetzkoy and Jackobson. They are the founders of this classical orientation.

The second approach on the other hand, concerned itself with the task of providing answers to the questions, which Sommerstein raised in (1977) thus: "What are the principles determining the pronunciation of words, phrases and sentences of a language and to what extent are these principles derivable from more general principles determining the organization in this respect of human languages? (Okorji, 1998). This kind of orientation is known as **generative phonology**. The major proponents of this orientation are Chomsky and Halle. Generative phonology is otherwise known as **modern phonology**. Generative phonology is a component of generative grammar that assigns the correct phonetic representations to utterances in such a way as to reflect a native speaker's internalised grammar.

The difference between classical phonology and generative phonology lies on their bases of study. That is, where each bases it's study. While classical phonology bases its study on a given language, generative phonology covers all the languages of the world to know their peculiarities and universalities. The interest of classical phonology is on identifying the phonic elements or properties that may qualify speech sounds as distinctive in a given language. Conversely, in generative phonology, attention is on describing those phonic elements that may be used distinctively across languages.

Worthy of note about generative phonology is that it posits two levels of phonological representation. They are:

1. The underlying level or the systematic phonemic level and
2. The surface level or the systematic phonetic level.

An underlying representation refers to the most basic form of a word before any phonological rules have taken place or have applied to it. It shows what a native speaker knows about the abstract underlying phonology of the language. A phonetic representation on the other hand, is the form of a word that is spoken and heard (Kenstowiez and Kisseberth, 1979). This study was motivated by the quest to justify the place of phonological rules and processes and appreciate their relevance in the production of speech sounds in the study of phonology.

This paper is divided into four sections: The first section is the introduction, which provides the background to the study. The second section is the literature review, which embodies the theories we opt to use. Section three comprises the analysis of phonological rules and processes, highlighting how they operate in languages of the world. Section four deals with the summary of the findings and conclusion, whose sections provide the findings made as well as recommendations and conclusion. However, our focus of study is on phonological rules and processes.

Literature Review

This section reviews the view of scholars about phonological rules and processes and points out the differences between them.

Phonological Rules

Langacker (1992:11) asserts that phonological rules are "… regularities that hold not just for individual lexical items, but for all the lexical items of the language or at least for a whole class of items - not all phonological rules occur sequentially." phonological rules specify the relationship between the surface structures and phonetic representations (Omachonu, 2001). In the words of Finch (2000:64), phonological rules are "a system of writing, using formal notation, which allows linguists to express how to pronounce speech sounds phonetically. Phonological rules are part of every speaker's linguistic competence. These rules operate unconsciously." This means that speakers don't actually realise that they are following phonological rules when they speak and no one teaches them these rules.

Fromkin and Rodman (1993), emphasize that when we speak, we undo (open) phonetic information required to pronounce utterances. That is, these rules allow us to produce the correct allophones for all the phonemes in a word, thus, allowing us to determine the relationship between words and sentences

and the pronunciation of these words and sentences (Fromkin and Rodman, 1993). Finegan and Besinger (1998:73) aver that "these are rules that are similar and are applied to the same classes of sounds across languages". For instance, in order for a child to learn a new word, the child needs to learn the number of phonemes in the word, what those phonemes are and in what order they occur.

Continuing, Mbah and Mbah (2010) states that phonological rules are the conversion of the changes, which segments undergo into more formal descriptions. In line with the above view, Schane (1973). After studying these changes, generalised them in the form of rules. Therefore, phonological rules stand to mean formalising our phonological knowledge hence; phonological rules can also be called **rule formalization** in phonology.

Kenstowiez and Kisseberth (1979) in **SIL International** assert that "phonological rules map underlying representations onto phonological representations. They delete, insert, or change segments, or change the features of segments". Phonological rules are very important in the study of generative phonology, considering the above definitions. This is because, phonol,ogical rules specify the relationship between surface structures and phonetic representations. These rules usually apply in a particular order, that is, phonological rules occur sequentially.

Phonological rule takes an underlying form as input, operates on it, and derives a surface form as output. The operation of the rule, however, is subject to a main restriction: it has to occur in a certain phonological environment (Williamson, 2009). Phonological rules are used in phonology to show the following:

a. Changes that segments undergo, and

b. Capturing important generalisation in phonology.

There exist certain phonological rule notations while constructing phonological rules.

Such notations include:

1. The arrow (⟶) the arrow is interpreted as "re-write". In other words, the item(s) at left of the arrow are to be re-written as specified to the right of the arrow.

Below is the use of arrow as "re-write" illustrated thus:

$$\begin{bmatrix} +\text{cons} \\ +\text{back} \\ +\text{high} \\ +\text{voice} \\ \begin{bmatrix} K \end{bmatrix} \end{bmatrix} \dashrightarrow [\,+\text{front}\,] \,/\, \begin{bmatrix} k \\ + \end{bmatrix} - \begin{bmatrix} +\text{syll} \\ +\text{high} \\ +\text{back} \\ +\text{voice} \\ \begin{bmatrix} [i/l] \end{bmatrix} \end{bmatrix}$$

Interpretation: A voiceless back consonant /k/ becomes $\begin{bmatrix} k \\ + \end{bmatrix}$ in the environment before a front high vowel(s) [i/I] (Okorji, 1998).

2. Again, a phonological rule takes an underlying form as input, operate on it, and derives a surface form as output. The operation of the rule is subject to a main restriction: It has to occur in a certain phonological environment. We can represent this in the following notation thus:

X ⟶ Y/ Z—— Z

The " ⟶ " here means "changes to"; the slash "/" means "in the environment of"; and

the "—" positions the input in the environment (that is before or after the relevant segments that determine the phonological changes).

What this rule simply says is that an input X is changed to Y when it occurs before Z. But where X changes to Y after (rather than before) Z, it will get us the following result thus:

X ⟶ Y/Z —— Z (Williamson, 2009).

At this juncture, we will explicate notation thus: Notation means a system of signs or symbols used to represent information.

3. A diagonal slash (/): This is used to separate the environment where the change(s) occurs from the remaining part of the rules.

4. The domain/environment (-): This refers to the actual place where the change take place. If the environment is not specified, the rules are said to be context free. However, recent researches have shown that most rules in languages apply within given a environments. That is to say that most rules are context bound.

5. Word boundary /=/: This indicates the beginning or end of a word.

English example: i). # cane #

ii). // goat //, etc.

6. Phrase boundary //: This refers to the beginning and end of a phrase. Below are examples in Igbo:
i. /Ịgba egwu/
ii. /Ịrị nrị/
iii. /Ịtị akị/, etc.

7. Null symbol (Ɵ): This notation is often used in insertion or deletion rule to represent the segment that is deleted or inserted.

8. Braces [ ]: This notation is used when we have more than one context for the application of a rule. Braces are often used to refer to alternative/alternate environment

Example: X→ Y/ [ ]

Interpretation: The above rule simply means that "X changes to Y either before Z or at word boundary".

Types of Phonological Rules
Schane (1973) categorizes phonological rules into three. They are:
a. Feature changing rule
b. Insertion rule
c. Deletion rule

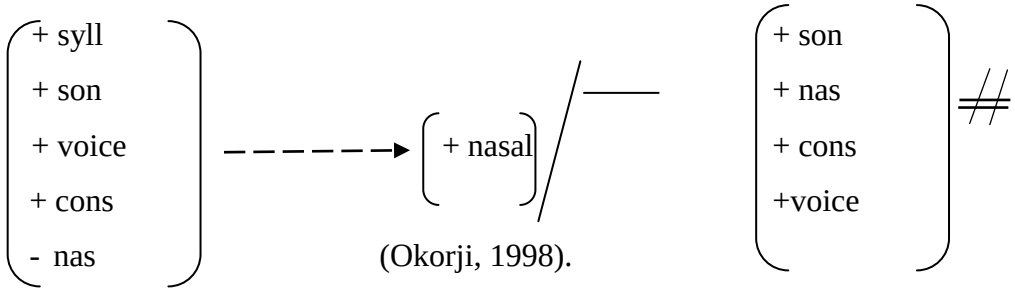
The Feature Changing Rule

This rule takes care of change(s) that is associated with a segment or a class of segments as a result of co-occurrence with other segments. The segment or class of segments that changes is connected/linked to what it changes into by an arrow which points progressively to what it changes into.

Illustration

Example: 'A' is a good example of a feature changing rule.

2.)



(Okorji, 1998).

Explanation:

A vowel becomes nasalized in the environment, before a nasal consonant at word boundary. This rule may be simply re-written thus:

b.) V ⟶ [+ nasal] / (C, + nasal) ##

This rule is also referred to as nasalisation rule. It is applicable to a language like French where a vowel that occurs before a nasal consonant that ends a word is nasalized as in

'an' ⟶ ãn

As a matter of fact, we can have a rule that takes care of nasalisation of vowel that occurs before a nasal consonant after which there is an ordinary consonant. That is

V [+nasal] / (C, + nasal) C.

Interpretation:

A vowel becomes nasalized before a nasal consonant that is followed by another consonant. This rule is reflected in French German and English phonology,

Example:

3. French

a) /sêt/ = saint
/garsɔ̃/ = boy

b) /kænt/ = can't
/pænt/ = pant

c) um = around
launt = sound

Here, /u/ is nasalized in the environment because of is now written as /ụ̃/.

Braces [{}] can be used to fuse rules or merge rules. In the rules examined so far, rule

'1' and '2' can be fused together, using bracing as in:

4. V ⟶ [+ nasal] / (C, + nasal) { C, ## }

So, a vowel becomes nasalized when the vowel is followed by either a nasal consonant or another consonant at word boundary or word final position.

The Insertion Rule

This rule is applied in a language, which does not permit consonant cluster. To maintain this rule, a vowel is normally inserted in between the two consonants that clustered together in order to conform with the morphology of the language. This rule is observed in many Nigerian languages like: Igbo, Yoruba and many other Nigerian languages. Consonant cluster is normally seen in borrowed words of English. When the cluster is observed, the insertion rule has to take place in order to break the cluster. Null symbol (Ø) is used in the insertion rule, and it occurs on the left side of the arrow, while the inserted item occurs on the right side of the arrow.

Illustration

The English words 'true', 'break', 'fruit' and 'bread' are pronounced in the following ways in Igbo

5a. turu = 'true'
b. bureki = 'break'
c. furutu = 'fruit'

a vowel 'u' has been inserted in the above three examples to break the clusters: 'tr', 'br' and 'fr'

The rule is V

d. ø ⟶ ——— (+ syll, + voice, - son, - con) / [+ cons] – [+ cons]

The Deletion Rule

This specifies the deletion of a consonant either before another consonant or at the end of a word. In language like French where the rule is very operative, the final consonats are not pronounced. The word 'petit' is pronounced as [peti]. Also, in Tiv language, one Nigerian language, word final consonants are also deleted except when they are syllabic.

Example: 'Var' 'come' is pronounced as [Vá).

The rule is: $\begin{bmatrix} + \text{cons} \\ - \text{syll} \end{bmatrix} \longrightarrow Ø \; / \; \_\_ \; \left\{ \begin{bmatrix} + \text{cons} \\ - \text{syll} \end{bmatrix} \right\}$

The braces here {} show 'either/or'

Here, a consonant is deleted in the environment before another consonant or at the end of a word. The rule for the deletion of 'n' in 'an' French is:

$$\begin{bmatrix} C \\ + \text{nasal} \end{bmatrix} \longrightarrow Ø \; / \; \begin{bmatrix} V \\ + \text{nasal} \end{bmatrix}$$

That is, a nasal consonant is deleted after a nasalized vowel. The symbol signifying the deleted segment is Ø. It usually appears to the right of the arrow while the deleted segment appears to the left side. Some segments are deleted in certain environment.

Rule Ordering

This rule ordering comes into play when there is more than one phonological rule in operation. In such a situation, there may be need for the rules in question to be ordered. This gives room for the effective phonetic form to be achieved. This results in adequate pronunciation of the utterance involved. This is evident in French language where nasalization and final consonant deletion can co-occur. In this context, it is mandatory that the nasalization rule applies first before the deletion rule. This is because, if the final consonant is deleted first, there will no longer be any room for nasalization to take place. For example, the word 'an', which is pronounce as [a], the nasalization rule should apply first before the final consonant deletion in order to nasalize [a] for if 'n' in 'an' is deleted first, the vowel nasalization will no longer be possible. So, phonological rule can be ordered.

Phonological Processes

Phonological processes are otherwise known as phonological derivations. According to *www.speech-therapy-information-and...*, "phonological processes simplify the production of complex words. They are not random but predictable…".

Also phonological processes are "a normal part of language development and are to be expected in children just starting to speak" (www.speech-language-development.com..., 2002). According to Mbah and Mbah (2010), phonological processes tend to modify on change the nature of speech sounds involved during speech.

Phonological processes have to do with a series of natural developments or events or activities in the course of speech, which tend to alter the nature of speech sounds. For Mbah and Mbah (2010), it does happen especially in fast or rapid speech caused by psychological or physiological demands that some phonemes lose their strength (weakened), or have themselves entirely eliminated within the context of the speech. These processes in which the nature of the speech sounds are changed in certain exigencies or demands of speech are known as the phonological processes. They are phonological because the phonological forms of speech are affected in one way or the other:

There are four outstanding types of such processes for our consideration here:

a. Secondary articulation

b. Assimilation

d. Vowel harmony

Secondary Articulation

Secondary articulation, in a way of definition, is a super imposed articulation with a lesser degree of closure, which occurs at the same time (simultaneously) with the first grade (primary) articulations. Describing it as extra vowel-like articulations is not out of place (Ladefoged, 2006). Also, it is a process in which speech sounds change their articulation in order to take a lot of the features of the sounds that are neighbouring to them. The fact about them, is that they may bring about changes in meaning in the languages they occur.

Palatalization

Palatalization is said to have taken place when there is a raising of the front of the tongue towards the hard palate as a superimposed activity on the primary articulation. There is a noticeable lip rounding which signifies the palatalization (Ladefoged, 2006) and (Mbah and Mbah, 2010). One example in English is the /k/ in "key" /ki:/, in which attention is not on the kind of velar contact that takes place, but on the place of articulation in "key", which has shifted nearer to the hard palate area. Another example is said to take place at the moment the alveoelar fricative [z] in "is" gets transformed to palata-alveolar fricative as in "is she..." [Iz͡ʃi] (Laolefoged, 2006). It occur also in Igbo. For example, in Igbo (adopted and adapted from Mbah and Mbah, 2010:95).

7 a. /pjaá/ - flog

/h;á/-twist

/rjá/ - wail/suffer from

b. Others (not from Mbah and Mbah)

/tja/- stretch oneself

/dʲ/
/kʲ/ } Plant for germination

c. Contrast involving palatalization in Russian (adapted from Ladefoged, 2006:229)

Formə	“form”	fjərmə	“farm”
Vltʲ	“to howl”	Vʲitʲ	“to weave”
Sok	“juice”	sʲok	“he lashed”
Zof	“call”	pʲatʲ	“five”
Pakt	“pact		

Velarization

Velarization has to do with the raising of the back of the tongue. It takes the form of putting an extra (u]-` like tongue position, but with the absence of the hp rounding that also takes place in the production of the [u].

The English syllable final /l/, called the dark "L, written as (ɬ), is velarized (ladefoged, 2006).

Other English examples from Mba and Mbah (2010:96)

8. [ml ɬ k] - milk

[kl ɬ t]- kilt

(gl ɬ t)- guilt

Pharyngealization

Pharyngealization involves a super-imposition of a narrowing of the pharynx. In pharyngealization, the tongue root is moved back towards the pharynx. It exists in Igbo language. The IPA diacritic mark for pharyngealization is [ɬ], which is not different from velarization. It may not be out of place to consider pharnygealization as the superimposition of the vowel quality of [a], the cardinal vowel [ɜ], seen as the "lowest, most back possible vowel without generating pharyngeal friction" (Ladefoged, 2006:230).

The following are pharyngealized vowels:

Igbo examples (adapted from Mbah & Mbah, 2010:31)

9. /ádʒÍ/

/ázĪzà/ - broom

/Σwɔ̄rɔ̄/- shedded skin

àfɛ́ – shirt

Úzo - way, entrance

Údʒɔ̄ - fright

Úŋàrà - noise movement.

Labialization

In labialization as a phonological system, lip rounding is imposed on the place of the primary articulation. Liabialization can combine with palatalization, valarization, pharyngealization, especially as they take varying tongue shapes that may not take place at the same time (Ladefoged, 2006). Labialization is denoted by a raised [ʷ]. Labialization exists not only in Igbo, but in Twi and other Akan languages in Chana

10. a. Igbo example

/áhʷɔ̄/ - stomack (umuchu dialect)

/ádʷɔ/ - struggle

/ àgʷà/ - bean

/ɛ̀lʷó/-swallow (umuchu dialect)

/abʷa/ - two

b. Tiv examples (adapted from Mbah (2010:94)

/pwar/ -to borrow

/tʷar/- question

c. English examples

/kʷiəri/- query

/kʷən/ - when

Nasalization

Here, what is super imposed on the primary articulation is the lowering of the velum. Once the velum is lowered, it makes the airstream to pass through the oral and nasal cavities. It exists in Igbo, Yoruba and French.

a. Igbo examples:

11 a /Irẽ/- to burn.

/ara/˜- breast

/Iro/˜ { Taking vengeance / Doing something bad to people }

b. Yoruba examples:

/fũ/- give

/ogu/ - good of iron

loğu/-good of iron

Summary of Secondary Articulation

(culled from Ladefoged, 2006:231)

Phonetic Term	Brief Description	Symbols
Palatalization	Raising of the front of the tongue	s^j l^j d^j
Velarization	Raising of the back of the tongue	S^y 7 b^y
Pharyngealization	Retracting of the tongue root	S^y7 b^a
Labialization	Rounding of the lips	s^w l^w d^w

Assimilation

Gleason (1961:82) says that "assimilation is a label for the situation, where some phoneme, is more nearly like its environment than is the phoneme sound in the base form". He sees assimilation as one of the commonest types of morphophonemic. In this study, assimilation is seen as a phonological process in accelerated speech, whereby some phonemes undergo some changes in which they may lose their original characteristics and assume new features, especially those of the adjacent sounds that influenced them.

Three major types of assimilation are discussed in this study. They are:

a. Progressive Assimilation

b. Regressive Assimilation

c. Coalescent assimilation.

Progressive Assimilation

When a speech sounds exerts some control or influence on the one following it such that the one (following it) becomes like itself, it is called progressive assimilation. That is, the sound has in a forward-looking posture (manner) taken up the one infront to make it take its shape (Macgregor, 2009)

Igbo example:

12. i. כ bỤ̌ = ככ = is it

ii. Ego gị = go I = your money

iii ịsị ya = ịsị ye = his/her head

What has happened here is that in (i), the back mid vowel /כ/ has in a forward-looking

manner taken up the back high vowel, /Ụ̌/. It looks like a deletion of the bilabial plosive

(b) facilitated this progressive assimilation.

Then, in (ii) and (iii), the originally pharyngealized pronouns turned out to lose its pharyngealization simply for the fact that the vowels that precede them are not generated by the movement of the root of the tongue towards the hard palate (Mbah and Mbah, 2010).

English examples

13. /WDt IZ/= WDts what is

Here, /I/ is elided so that the occurrence of /Z/ to /S/ will occur.

Regressive Assimilation

If in progressive assimilation there is a forward-looking influence, then in a regressive assimilation, what obtains is a backward-looking influence. That is to say, one speech sound exerts some influence on the one preceding it. English and Igbo have many examples of this, like:

Igbo examples:

14. /Ựlɔakwựkwɔ/ = (Ựaakwựkwɔ) = school

/Ựka ego/= (Ựke ego) = Discussion about money

/Igo ala/ = (Iga ala) = to buy land

/Isi okwỰ/ = /Iso okwỰ/= subject matter

15. English examples:

/ten ʌbsIZ/ = /tem ʌbsIZ/ = ten buses

/gUd mʌnIŋy/ = /gʷuugwa/ = good morning.

Igala example:

16. Odo ≠ abia - [odo abjra] = dog's liver

Oje ≠ una – [ɔdzuuna] = hot food

gwa ≠ ugwa – gwuugwa = to greet

Coalescent Assimilation

In coalescent assimilation there seems to be a mutual agreement between the two contigiuous sounds not to influence each other, but to generate new sound in accelerated speech (Mbah & Mbah 2010).

Igbo example

17. /ịsị ewu/ - ịsị jewu = goat head

/Ùdịrị úló/ =/udịrị j ulọ/= type of house.

Elision or Deletion

The loss of a segment in faster speech is known as Elision (Davenport as Hannahs, 2015). Butto Finch (2000: 45) asserts that "elision is the omission of a phonome in Speech. Elision is common in casual speech styles, particularly at word boundaries"

For example, the words handsome" and "mostly" are often seen to be pronounced leaving out /d/ in handsome and /t/ in mostly" in a way of omission

Another example:

19. Last year = (1 a: s j ɪə)

Thousand points = [ɵaƯzn pɔ ints]

Most of the time, the elided segments tum out to be either a consonant or a vowel and this is noticed when the words that have the segments are pronounced slowly and in isolation (Mbah and Mbah, 2010)

Consonant Elision

This is the case in ịgbo where consonants fall victim of the elision in accelerated speech. For examples:

20. /ákpúkpↄ/= -áúkpↄ = leather

/ádʒúdʒú/ = áúdʒú = question

anını = àíní = quarter of penny

According to Mbah and Mbah (2010:99),"In Igbo, because vowels form the peak of prominence of syllables and bear tone, vowel elision is rare".

Igala examples (adapted from Amachonu:2000:53)

In Igala according to Amachonu (2000), it is possible for an initial morpheme to give away its final vowel together with its tone simultaneously. The effect of this is that the final vowel of the first morphome vanishes entirely without a trace, thus

21. Jè ⇏ òjè -[dʒↄdʒɛ́] = eat food

ne⇏ ùmà –[ʌùmà]= buy tree(s)

la ⇏ ólí – [ólí] = buy tree(s)

Consonant deletion in Igala

This occurs, especially in last speech, thus:

Odudu -[òùdù] = (morning)

Me wa -[mɛ́á] = (form of greeting)

Babami -[baámi] (my father)

Other English examples

22. /last tʃans/ = /las tʃans/

/kauld ʌlntʃ/ = /kəuı ʌlntʃ/

In the above examples, it is obvious that what is elided are the dental plosives /t d/, and this happens in associated speech.

Vowel Harmony

In the opinion of Williamson (1984:22-23), vowel harmony is "The systems whereby in many languages the vowels are divided into two sets: "wide" and "narrow" in such a way that vowels from the same sets normally go together in the same simple word".

Vowel harmony in this study is taken as a phonological process, which is contrived for convenience by allotting the vowels into two co-occurrence family groups. Languages like Turkish, Igbo and Yoruba have the vowel harmony system. Mbah and Mbah (2010:101) write that:

Vowel harmony is based on pharyngealization.

Pharyngealization divides the vowels into two sets.

However, …. Green and Igwe (1963) call the non-

pharyngealized and even, Emenanjo (1978) undotted and

dotted, Okonkwo (1974) light and heavy, Schacter (1961) wide and

narrow, Lindau (1975) retracted and retracted and

Carell (1970), tense and lax vowels.

Mbah and Mbah (2010) adopts the terminology of non-pharyngealized and Pharyngealized on

ground of descriptive adequacy.

The pharyngealized group is made up of e /ɛ/, i [I], ọ [ɔ], ʉ /Ư/ a /a/, whereas the non-

pharyngealised consist of e /e/, i /i/, o /o/, u /u/.

The common feature of the non-pharyngealised is that the root of the tongue never retracts towards the wall of the pharynx unlike the phyaryngealized set. Each group co-occurs with its set of members e.g.

23. a. élú - (up) b. /akị/ (palm kernel)

/égbè/ (gun) (ukwa) (oil bean fruit)

/ógè/ (time) ɔkɔ (itch)

/ìkó/ (akpụ) (cassava)

A careful observation will show that the (a) group are members of the non- pharyngealized and the (b) group members are the pharygealized. That is how they co-occur in simple words.

Borrowing, compounded words, word forms derived through language planning and natural violators seem not to obey the vowel harmony rule.

For examples:

24. (a) Borrowing (b) compounded words

/akamụ/ (pap) omenaala (culture)

/osikapa/ (rice) aŋiŋaigwe (bicycle)

/àgìdí/ (type of food made from maize)

(c) Language Planning Words

"Meela" as against "meele" (has done)

"Siela" as against "siele" (has cooked)

(d) Natural Violators

These are words who by their nature have never conformed to the vowel harmony principle, e.g.

/àjàdù/- (widow)

/árò/-(suggestion)

/àkpó/- (hard palate) (Umuchu dialect)

In the view of Amachonu (2000), Igala shows partial or uncomplete harmony, which he maintains could be blamed on the few vowels in Igala language. They have ten vowels.

Igala examples of conformity:

25. Verb Noun

dó (well settle) òdó (settlement)

gbò èbgò (weakling)

je (eat) òjè (food)

mé ómè (debt)

(f) Igala examples of Partial Harmony

Verb Noun

ro (be fruitful) èro (fruit)

mọ (drink)	ónu (water)
dẹ (frog)	édé (frying)
kọ (write)	ekọ (writing)

It should be noted that the vowel groups in Igala fall into undotted (wide) and dotted (narrow) vowels. The members of the dotted group are d e ị u, whereas the members if the undotted group are a, e, I, o, u, (Amachonu: 2010).

The discomformities notwithstanding, the vowel harmony system is of immense relevance to all the languages that use it, because it is a sort of guide as to what is odd and what is standard.

Summary of Findings and Conclusion

Finding

1. Findings of this study revealed that the major function of phonological rule is that it changes the value of a segment. This it does through the various ways as assimiliation, deletion, insertion, phonological change, and so on. Phonological rule also account for the different ways in which a sound is produced in different context.
2. Also, the result of this study has shown that Phonological process has made it known that some phonemes lose their strength or weakened, or have themselves entirely eliminated within the context of the speech through the secondary articulation, assimilation, elision and vowel harmony.
3. Again, it has been discovered that a phonological rule takes an underlying form as input, operates on it, and derives a surface form as output. However, the operation of the rule is subject to a main restriction. That is, it has to occur in a certain phonological environment. In fact, phonological rule is formalising our phonological knowledge.
4. Most importantly, it is a credit to this research work and the entire linguists to come face to face with proof that what have easily passed as mere normal expressions in speech can now be accorded scientific and realistic explanations as phonological rules and processes.
5. This shows that there is hardly any speech activity that escapes the observatory eyes of linguists
6. It has been discovered that many current issues in phonological rules and processes are therefore not particularly new but keep on changing and improving.

Conclusion

We have dealt with phonological rules and processes, which have enormous influence on the study of phonology right from time. While phonological rules are a system of writing, using formal notation, which allows linguistics to express how to pronounce speech phonetically, phonological processes have to do with a series of natural developments or events or activities in the course of speech which tend to alter the nature of speech sounds.

Sound patterns of languages of the world are viewed through phonological processes and rules. The study of sound pattern of English (S.P.E) is the first systematic exposition of generative phonology. It's key figure was to take seriously the notation in terms of which sounds are represented and rules are formulated.

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