

A STUDY OF PHONOLOGICAL DEFICITS IN CHILDREN WITH DOWN SYNDROME

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ABSTRACT

The aim of the study was to explore the phonological disabilities in children with down syndrome. It is about the syndrome influence on the phonological patterns with epi linguistic and meta linguistic transitions with large and small segments of sound structure. The potential negative effects and difficulties on learning reading of Urdu language vowels and consonant were observed. This study was qualitative in nature. The non-probability purposive sampling was used. There were two groups of population i.e. normal children and down syndrome children. The instruments included in this study were demographic information sheet, word elicitation list and reading comprehension notes. The written consent was taken from the participants for data collection. This study used CV phonology by Clements and Keyser (1983) as the theoretical framework. The findings show the substitution of consonants, vowels and consonant clusters by down syndrome children. The substitution process had been used with correct vowels and consonants in Urdu language. Further, this study also pointed out the position of phonemes on onset, nucleus and coda positions. It concluded that phonology of children with down syndrome was different from the normal children. The findings of the study may have implementation in clinical and educational fields.

Keywords: Phonological disabilities; Down syndrome; Phonological patterns; Epi linguistic; CV phonology

INTRODUCTION

Down syndrome is a disorder characterized by mental impairment and abnormal physical activity brought by an excess of chromosomes in the 21st pair. This study deals with the Mild Down syndrome children to test their phonological disabilities with their articulation. Proto conservation, vocal clashing and turn-taking exchange is the fundamental phenomenon of the Down syndrome children. Many studies show that Down syndrome children don't perform normal duties when contrasted with normal ones. The potential implications are limited in Down syndrome children (Wijayanti, 2015).

In recent years, it has become progressively evident that phonological knowledge creates a connection with figuring out how to read an alphabetic orthography (Kjeldsen, 2019). As indicated by Naess (2016) metalinguistic development comprises of a transition from implicit (epi) information to explicit (meta-) information. During epi-linguistic development, the child acquires implicit information of the segmental portrayals of verbally expressed words to differentiate between similar sounding words (e.g., pat-bat; coat-boat). While epi-linguistic development goes from sensitivity to large segments (onset, rhyme, nucleus, coda) to sensitivity to small

segments (phonemes), as indicated by various authors, metalinguistic knowledge of small segments emerges before that of larger segments (Bird, 2017). Language acquisition in individuals with mental retardation was once thought to address a slowed-down version of ordinary language development (Lenneberg, 1967). This viewpoint, however, has been shown to have two major flaws: first, language development patterns vary significantly across different types of mental impairment. Second, there is a lot of variation in linguistic abilities even within a single type of mental retardation, such as Down syndrome. This study objective is to provide an overview on phonological analysis in children with Down syndrome. It deals with the articulation of phonological sounds which are associated with Down syndrome children as compare to normal children. It is the first research up to my knowledge which deals with the Phonological Disabilities (PD) of Down syndrome children in Pakistani cultural context with the native Urdu Language. The scope of present research was limited to Mild Down syndrome children.

Down syndrome

Down syndrome is the most well-known reason for disorder in terms of physical and mental health in an infant. It happens due to presence of an extra chromosome. Down syndrome is one of the most well-known genetic disorders with reports of one infant child in each 600-800 live births (Mufson et al, 2021). There are recognizable neurocognitive deficits related with Down syndrome condition, for instance, correspondence, language, and memory impairments. It typically coexists with mild to severe intellectual disability, physical growth delays, and distinctive facial traits. Children with Down syndrome frequently suffer speech delays and need speech therapy to help them express themselves verbally. Additionally, fine motor abilities are delayed and frequently lag behind gross motor capabilities

Characteristics of Down syndrome

Characteristics of children who experience down syndrome can differentiate from one child to another child, ranging from not a visible point of view. The most visible characteristic identification of child with Down syndrome is the basic mental and physical development.

Physical conditions of Down syndrome include

1. Flat facial features
2. Little head and ears
3. Little nose and flat nasal bridge
4. Little mouth with a tongue that may stick out.
5. Short neck
6. Eyes that slant upwards and outwards
7. A flat back of the head
8. Wide hands with short fingers
9. Their palm may have only one crease across it.
10. Below average weight and length at birth.

Types of Down syndrome

There are the following four levels of Down syndrome in children:

i. Mild Down syndrome

At this level, a considerable number of the children with Mild Down syndrome used to already familiar to speaking but they often exhibit vocabulary deficit in speaking with normal children. At the age of sixteen years, usually the degree of ability and their intellect is same as that of the normal children with twelve years of age (Antonarakis et al, 2020).

ii. Moderate Down syndrome

At this level, a Down syndrome child can be prepared on a specific skill. Despite the fact that they frequently respond late to education and training, but if the appropriate educational opportunities are provided, they can be trained to acquire certain abilities. They lack language, conceptual, perceptual and creativity skills, so they need to be assigned more simple and brief tasks (Betancor Rodríguez et al, 2016). The children with Down syndrome usually cannot learn academic lessons. In general, they are trained to deal with themselves and their daily activities. When they are getting older the level of their intellect remains the same with the normal children of seven years old (Diamandopoulos, & Green, 2018).

iii. Severe Down syndrome

At this level, Down syndrome children show numerous issues and difficulties despite of the fact that they are educated in special schools. The children of severe Down syndrome during their phase of life, they constantly rely on others. They also experience speech disorders; they can only communicate vocally after concentrated training. Their intellectual ability is developed as high as normal children ranges between 3 to 4 years of age (Hüls., et al.2021).

iv. Profound Down syndrome

At this level, Down syndrome children have serious issues, like physic, intelligence and right education for them. They can't eat and walk alone, but the communication ability and their social interaction are exceptionally low. Mental Retardation makes the Down syndrome child experience flaws in variety of adaptive abilities i.e., communication, language, social, academic, self-care, self-manage and work abilities (Davidson and Neale, 1998). Down syndrome child becomes indefinitely and continuously dependent of the support from the family members and individuals around them (Phelan, et al, 2016).

Communication of Down syndrome

Communication is an obvious answer to painful divisions among self and other, private, public and internal thought and external world (Wenxiu, Peng, 2015).

Types of communication

There are two types of communication which are mentioned below:

i. Verbal communication

Verbal communication indicates type of communication in which message is sent verbally. Communication is delivered through oral and in written forms. It serves as a vehicle for expressing desires, ideas and concepts and is essential tool for learning and teaching.

ii. Nonverbal communication

According to Tresnasari, (2020) nonverbal communication is an intricate code that is written nowhere, known to none but understood by all individuals. Nonverbal communication is the sending or obtaining wordless messages. Getting of silent messages. Nonverbal communication is not present in oral or in written form, which means it is understood by using gestures, body language, posture, tone of voice or with the help of facial expressions.

Potential impact of Communication in Down syndrome

The impact on communication is present in children who are suffering from Down syndrome. The intellectual factor which is present in Down syndrome will affect other development factors and language is one of the major factors, where the children faced difficulty to follow the guidelines and unable to express his/her needs verbally in order to be fulfilled. They used nonverbal communication to send their messages such as gestures.

Urdu phonology

The present study investigates the Urdu consonants and vowel system in relation with phonological theoretical framework. The purpose of this study is to explain and examine the phonological patterns/disabilities of the Urdu language used by the children with Down syndrome. Furthermore, a contrast between the Urdu consonant and vowel system with English is also presented, which aid in identification of phonological disabilities of children with Down syndrome.

Consonants

Consonant sounds are those phonemes in which there is a block of the air flow (Roach, 2009, p.10). In Urdu, consonants are partitioned into two essential positions: voiced and voiceless.

Urdu Consonants system

Urdu consists of 41 consonants sound, which includes stops, affricates, fricatives, nasals and liquids/glides. The stops and nasals articulated at different places which are categorizes as labial, dental, retroflex, palatal and velar. The palatal stops are regarded as affricates. According to (kahana,2021) every series of consonants consist of voice and voiceless sounds, as an aspirated and unaspirated. This contrast is special with Indo-Aryan with Indo-European languages.

		Labial		Dental		Retroflex		Palatal		Velar		Uvular	Glottal
Stops	Voiced	b	b ^h	ɖ	ɖ ^h	ɖ	ɖ ^h			g	g ^h		
	Voiceless	p	p ^h	ʈ	ʈ ^h	ʈ	ʈ ^h			k	k ^h	q	ʔ
Affricates	Voiced							ɟ	ɟ ^h				
	Voiceless							tʃ	tʃ ^h				
Fricatives	Voiced				z			ʃ		ʝ			
	Voiceless	f			S			ʃ		x			h

Nasals	m	n	ŋ	n ^h
Liquids		l r	ɽ ɽ ^h	
Glides	v			J

Fig. 1.1 Urdu Consonants

Vowels

Vowels are sounds which are created without any constriction of the vocal tract. They are almost voiced and are usually produced with airflow solely through the oral cavity. In contrast to consonants, vowels are created without constriction or obstruction to the flow of air. The airstream unhindered and without blockage during the articulation of vowels.

Urdu vowel system

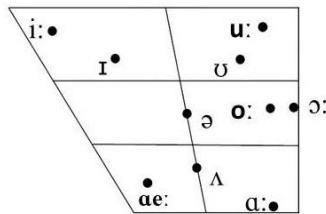


Fig. 1.2 Urdu Vowels

Research question

- How do phonological difficulties cause an inefficient verbal communication of children with Down syndrome.

Significance of the Research

The present study is the first in its nature investigating the phonological analysis being conducted in Pakistan with the down syndrome children. This study is significant to highlight whether or not native speakers of the Urdu language adhere to the universal principles of phonological development by examining how consonants and vowels are governed at segmental level. Further, this study is expected to give theoretical and practical contribution in relation to the teaching of different phonological disabilities of the Urdu learners in Pakistan.

Delimitations of the study

It is essential to recognize the limitations of the current study. The only province from which the data were gathered was Punjab. Due to time constraints and accessibility issues, a significant number of other private and public sector institutions and

Urdu language is consisting of 11 vowels in which three are lax vowels and eight are tense vowels. Lax vowels (ɪ, ʊ, ə) are considered as short and tense vowels (i, e, ε, u, o, ɔ, ɑ) are considered as long. The vowel sound [ɪ] is slightly lower and more centralized than [i], [ʊ] is slightly lower and more centralized than [u]. All have nasal forms. According to (Noor & Arif, 2018) states that oral and nasal vowels are different from one another.



organizations were not able to participate in this study. To obtain more representative data from which generalizations may be formed, volunteers from all provinces could have been employed. The comparison of phonological disabilities between children with down syndrome and normal children is aged between only twelve to sixteen years is investigated.

Literature Review

This study is about the linguistic disabilities and phonological disabilities of Down syndrome children.

Linguistic disabilities

A language disorder is the inability of a person to converse politely. Some disorders are brought on by genetic or developmental problems, while others are brought on by brain trauma. There is no distinction between the term speech and language disorders; they both refer to the same thing. Their issues can include difficulty articulating a specific letter or sound.

Language acquisition

Noam Chomsky first proposed the theory in the 1960s, that all children have an underlying ability that controls their language development. "He made a convincing case that behaviorist learning theories could not explain the quick development of an endlessly productive language capacity" (Gleason and Ratner, 1993, p.36).

Expressive vocabulary is related to word development and is measured by the quantity and complexity of its lexicon. As opposed to that, Receptive vocabulary relates to abilities preoccupied with perceiving or understanding words. (Deckers et al, 2019).

Phonological disabilities

Phonological disabilities are described as both speech and sound disorder. It is regarded as an inability to correctly speaking of the words. It also includes the problems related to fluency, articulation and uttering up the correct word. Sometimes a child with phonological disabilities drops sound at the end of the word such as book as boo, juice as joo and bed with beh.

Acquisition of consonants

There is a contrast between typical developmental speeches in children with Down syndrome; they produce confusing speech with various severity stages when they are getting older than 4 years of age (Kumin, 2006; Kumin et al., 1994; Pueschel and Hopmann, 1993).

Sokol and Fey (2013) states that the production of consonants is same as the children without Down syndrome. After 18 months the similar populations of Down syndrome were viewed as lagging behind children without Down syndrome on the basis of similar speech patterns. This shows the results of developmental delay of the process of acquisition and production of speech sounds.

Acquisition of Vowels

Children with Down syndrome between the ages of nine months and one year can produce back vowel sounds appropriately (Dodd, 1972; Oller and Eilers, 1988).

According to Smith and Oller (1980) children with Down syndrome formed vowel characteristics at the age of 8 months and 4 days, just like typically developing children do at that age. Children with Down syndrome pronounced vowels more accurately (Kumin, 2012; Stoel-Gammon, 1997; Van

Bysterveldt et al., 2010; Stoel-Gammon, 1980). For instance, Stoel-Gammon (1980) conducted phonological analysis on samples of four Down syndrome children ranging in age from 3 to 6 years old. The findings show that the populations have no problems articulating vowel sounds.

Research Methodology

This research is based on qualitative approach. Morrison (1989), states that qualitative approach is an interpretative approach heading towards its data, which cannot be measured using numerical data. The data comprise of behavior, language, emotions and culture etc.

Research Design

The present study was based on phonological analysis, which aimed to investigate the comparison between two groups regarding speech phonology in children with Down syndrome and normal children. Qualitative research is multifactor approach, using this qualitative approach, researchers attempt to comprehend, describe, interpret and develop unique ideas about a particular context. Because of the phenomena of irregular language, this study had adopted qualitative research. Due to the complexity of language, the researcher uses relevant tools. (Alasuutari, 2010).

Sampling Technique

The present study used purposive sampling technique. A non-probability sampling technique called "purposive sampling" relies on the researcher's judgement in selecting the population to be studied. The target population for this study were children with Down syndrome and normal children. There were both male and female respondents.

Data Collection Method

The researcher first seeks the approval from the heads of the organizations and institutions. Responses from participants had been gathered. The collection of data had conducted by keeping research ethics into consideration. The *Informed Consent Sheet* had been given to each participant. The Urdu language had been used during the discussion for data administration.

Pilot study

A pilot study was conducted with 2 participants, in order to estimate the time required for tool administration and comprehension level of participation to eliminate any ambiguity and fatigue

factor. Pilot study was executed in order to implement and discover the type of word elicitation list and reading comprehension that should be in accordance with the intellectual abilities of children with down syndrome in contrast with normal children. Pilot study was completed with the aid of registered psychologist and speech therapist.

Instrumentations

The tools which were used in present study for data collection are demographic questionnaire, word elicitation list, comprehension reading and tape recordings.

Demographic information sheet

A Demographic information sheet was available in the institute. The demographic information sheet was used to determine the level of down syndrome children whether the child was mild down syndrome or not. The demographic information sheet had been used by the researcher to obtain personal information of participants such as age, education, stage of down syndrome, birth order, siblings etc.

Word elicitation list

It was the first phase of collecting data from children with down syndrome. The word elicitation list was being created with the aid of a psychologist to determine the level of down syndrome children. The children of down syndrome offended very quickly, so the psychologist was best source person to sort out vocabulary words. This list is used to examine the all sorts of Urdu words and taking maximum exposure from these words, due to restricted intellectual abilities of children with down syndrome.

Comprehension reading

It was regarded as most difficult phase of data collection. It was time consuming task. Children with down syndrome consume a lot of time to read one phrase of comprehension reading. They face various difficulties due to many intellectual and physical disabilities.

Tape recordings

The whole session was being recorded during the word elicitation list and comprehension reading with their natural settings, along with note taking.

Main study

All the measures had been administered individually.

Data Analysis Method

This research investigated the phonological changes in the Urdu language which were made by the speakers of children with down syndrome. This study investigated the phonological structural alterations in children with down syndrome.

Theoretical framework

The theoretical framework which was used to observe changes in phonological structure of children with down syndrome through CV phonology, proposed by Clements and Keyser (1983).

CV phonology

To demonstrate syllable structure, Clements and Keyser (1983) introduced the concept of CV phonology. Syllables are seen to be hierarchical units in this theory, with CV tiers acting as their basic constituents.

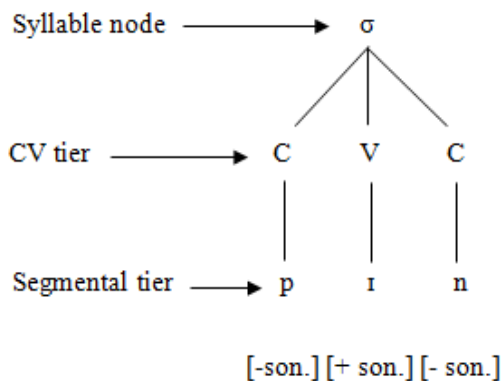


Fig. 3.1 Hierarchical structure of Syllable

The V tier works as the syllable's nucleus, as seen by this Fig. and the syllable structure. The most sonorous sound, the vowel, serves as the syllable peak. Additionally, Clements and Keyser (1983) provided a phonological sonority chart that assigned the segments to various spots based on their sonority.

This chart illustrates that since vowels are the most sonorous sounds that are always the peaks in the syllables.

Consonants and vowels make up the segmental tier of the syllable, but they have a different purpose as shown in the figure:

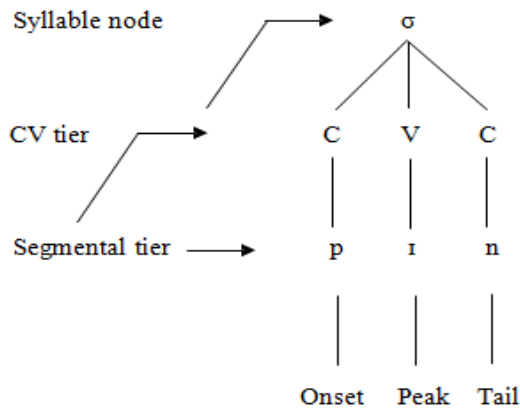


Fig. 3.2 Constituents of a Syllable

According to this figure, any segment that is influenced by the V segmental tier serves as a syllable peak [+sonorant]. Syllabicity is the term used by theorists to describe how C and V segments

function when discussing CV elements. It leads to the primary principle, which states that a segment is syllabic when a V-element dominates it rather than non-syllabic when a C-element of the CV tier does.

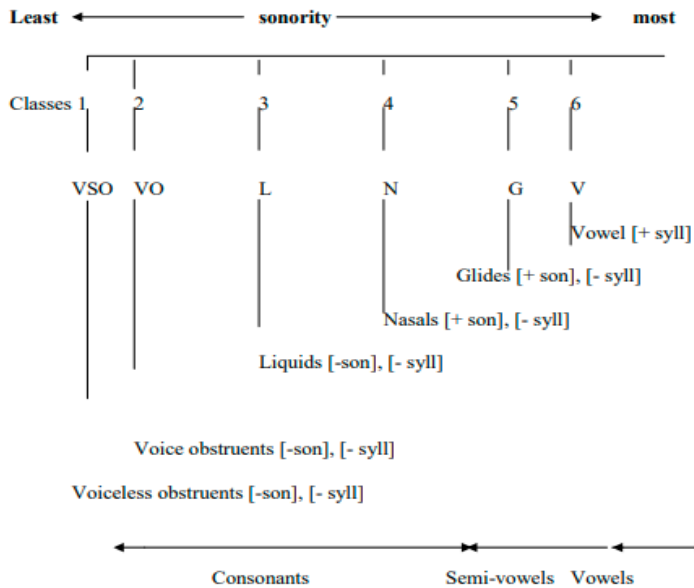


Fig. 3.3 Sonority Strength Hierarchy

The phonetic link between propensity and openness for voicing, in the class category from 1-6, is shown in the above figure. It demonstrates that a sound's sonorancy affects how audible it is. According to Hooper (1976), sonority is a term used to describe how loud a sound is, and liquids, nasals, and obstruents are considered to be less sonorous than

vowels and glides. Vowel syllabicity is determined in a CV tier by their position in the sonority hierarchy. The most sonorant element fulfills a V function and transforms into nucleus. The onset is the less sonorant sound, or the C-element, that comes before the nucleus.

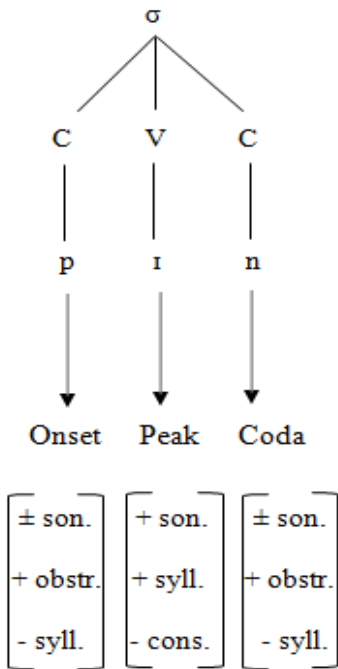


Fig. 3.4 Onset, Peak and Coda Algorithm

The Fig 3.5 demonstrates that onsets and codas may or may not be sonorant but must not be syllabic, while nucleus are represented by the [+son] and [+syll] elements.

Syllable Description

According to the syllable typology, languages typically have two different types of syllables

(Kaisse, 1985). Both of these are referred to as open and closed syllables.

Open Syllable

Typically, the rightmost element in each open syllable is the V-element. The structure of this syllable is +- C +V.

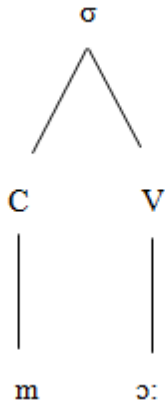


Fig. 3.5 Open syllable

Even though the C-element does occur in this kind of syllable, it does so in the initial position, or onset, rather than on the coda. As a result, V-element is made to move to the rightmost position in the syllable.

Closed Syllable

The [+V+C] syllable pattern is used in this kind of syllable. It indicates that there is an additional C-element to the right of the V-element.

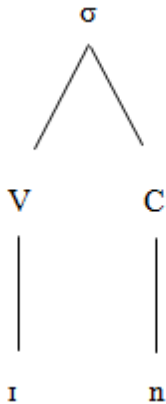


Fig. 3.6 Closed Syllable

Contrary to an open syllable, a closed syllable has a C-element in the rightmost position, defining it as the coda or tail.

Light Syllable

Light syllables are those that contains no branching rhyme, It does not have diphthong, triphthong or long vowel. It indicated as light syllable.



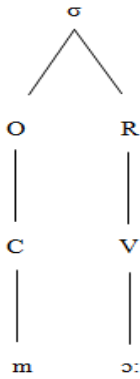


Fig. 3.7 Light syllable
Heavy Syllable

Heavy syllables are those that fall into the category of branching rhymes. It indicates that the coda location of the heavy syllable has a diphthong or C-element.

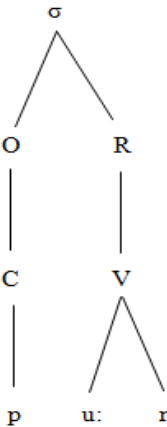


Fig. 3.8 Heavy Syllable along Rhyme

The CV-phonology makes it clear that there are two groups of syllables: CV and CVC.

DATA ANALYSIS

This segment contains the analysis and phonological structures of consonants and vowels. The current study grabs the attention of substitution process along with epenthesis which is based on CV phonology. The data was selected and analyzed according to the assortment of Urdu consonants, consonant cluster and Urdu monophthongs. Firstly, the data was taken from analysis of s, z, r, l, s, ʃ, ʧ, ʤ, ɖ, r, ʈ respectively. Secondly, for consonant cluster the data was taken from /xʈ/, /p/, nɖ, /m /, /bʃ/, /sʈ/, /ʃ/, /r/, /ʈ/, /rʈ/, /ʈ/ respectively. Thirdly, the data was selected and analyzed according to Urdu monophthongs system I, u, ə, ʌ, a: ɔ:, o:, e:, i:

Consonant Substitution

Substitution is a distinctive feature of many neutral dialects; where a sound is substituted as a result of

inaccessibility of a specific sound in the donor language Hussain et al. (2011).

Stops

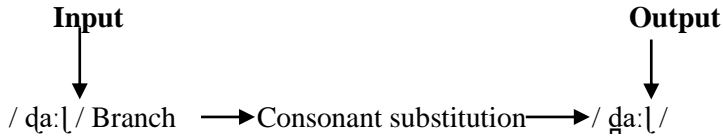
The consonants which are delivered by making a short stricture (closure stage) by compacting the air in the mouth (hold phase) for a short tenure than later holding (release phase) the air for a short time, the compressed air is delivered with the plosion (post release phase) are called stops or plosives. There are three sorts of plosives; bilabial plosives (/p/,/b/) palato alveolar plosives (/t/and/d/) and velar plosives (/k/and/g/) in English (Roach, 1998; Skandera and Burleigh, 2005). A stop consonant includes a complete closure of the articulators and thus complete blockage of air flow. There are six plosives in English language There are eighteen stops in Urdu language.

The data analysis shows voiced and voiceless pair of dental ɖ, ʈ are presented here. The data shows the consonant at initial, medial and final positions.



Substitution of /d/ with/d̪/

Retroflex sounds are produced created with the curling of the tongue tip towards the hard palate (Skandera and Burleigh, 2005).

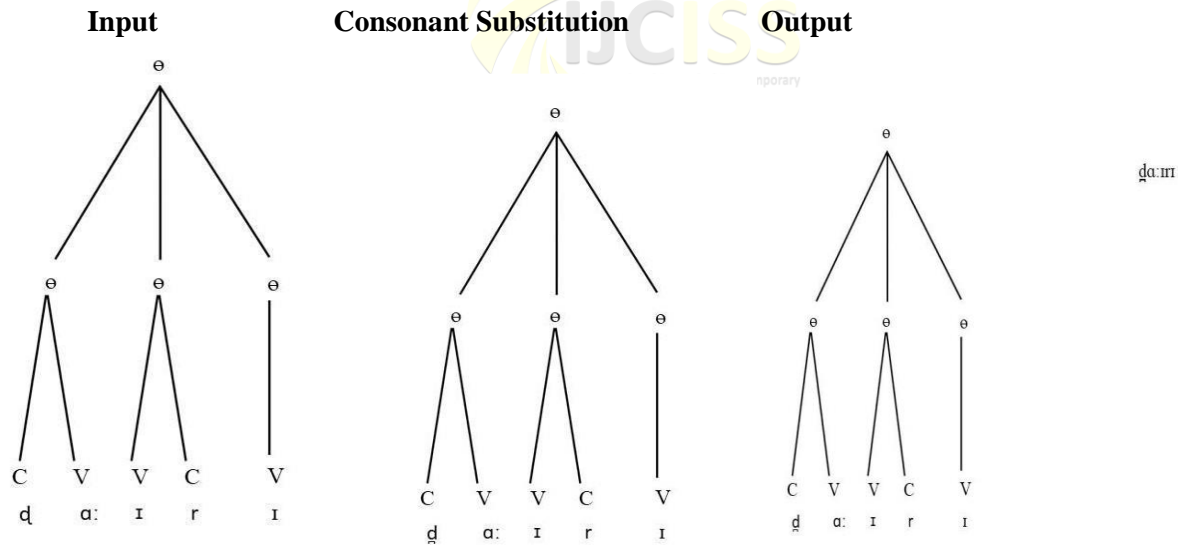


A dental consonant /d̪/ is consonant which is articulated enunciated with the tongue against the upper teeth. It is voiced sound. The sound /d/ and /d̪/ are stop pairs. The native speakers of Urdu language down syndrome children substitute dental voiceless sound /d/ with voiced /d̪/ sound while pronounce a specific word. They share the same distinctive features with one another.

Table 4.1 Substitution of /d/ with/d̪/

Gloss	Transcription in Urdu	Perceived word.
Card	kɑ:raɖ	kɑ:raɖ̪
Diary	d̪ɑ:ɪrɪ	d̪ɑ:ɪrɪ
Egg	əɳd̪ɑ:	əɳd̪ɑ:
Box	d̪əbə	d̪əbə
Powder	pɑ:d̪ər	pɑ:d̪ər
Bed	bɛɖ	bɛɖ̪
Calendar	kɛɭʌɳd̪ʌr	kɛɭʌɳd̪ʌr

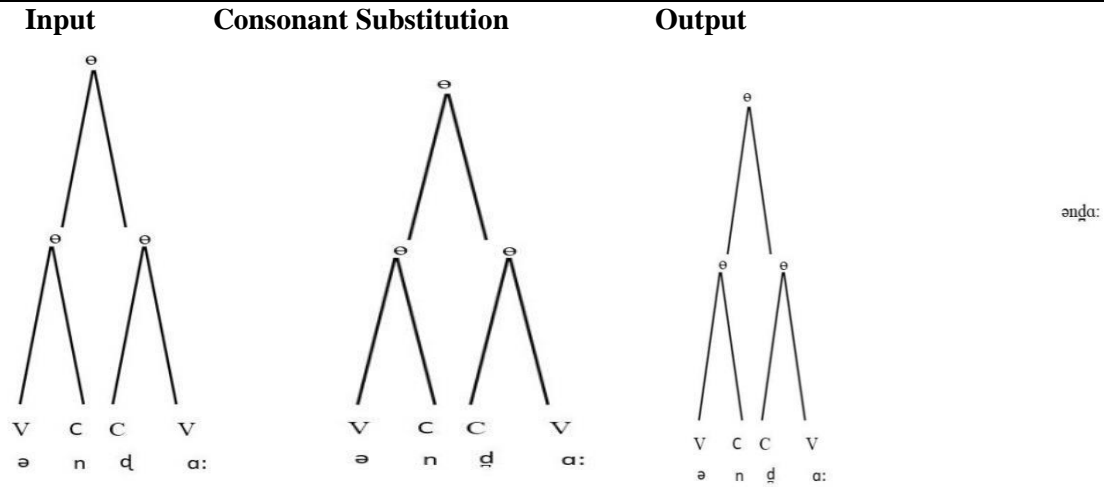
It presents initial, medial and final positions.



Substitution of d̪ into d̪

Fig. 4.1 Initial Substitution of /d/ into /d̪/

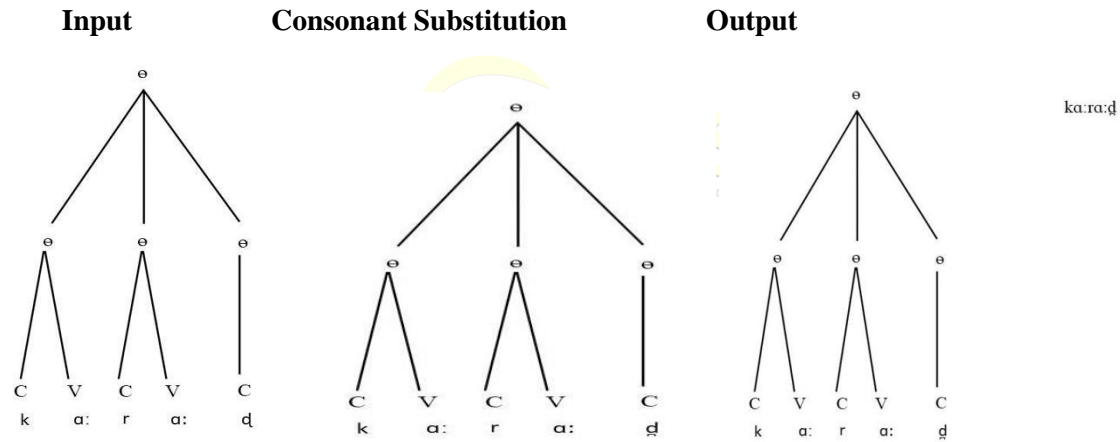
The above Fig.4.1 shows substitution of d̪ into d̪. The substitution takes place at onset position. As a result, the word [d̪ɑ:ɪrɪ] perceived as[d̪ɑ:ɪrɪ] by Down syndrome children.



Substitution of d into \mathcal{d}

Fig. 4.2 Medial Substitution of /d/ into /ɖ/

The above Fig.4.2 shows substitution of d into \mathcal{d} . The substitution takes place at onset position. As a result, the word [ənɖɑ:] perceived as [ənɖɑ:] by Down syndrome children.



Substitution of d into \mathcal{d}

Fig. 4.3 Final Substitution of /d/ into /ɖ/

The above Fig.4.3 shows substitution of d into \mathcal{d} . The substitution takes place at coda position. As a result, the word [ka:ra: d] perceived as [ka:ra: ɖ] by Down syndrome children.

Table 4.2 Initial, Medial and Final positions of /d/ into /ɖ/

Initial	Medial	Final
		ka:ra:ɖ
ɖɑ:ɾɾɪ	ənɖɑ:	
ɖəbə	po:ɖər	
	keɾɒndɑr	beɖ

Substitution of /z/ with /s/

There are nine Fricatives in Standard English, the fricatives are produced with the release of air by a narrow passage with hissing sound and are also called continuants because one can keep produce a fricative consonant without any interference as long as one can support breath (Roach,1998, pp. 47). Just like English, Urdu consonant also include the alveolar fricatives /z/ as aspirated and /s/ as unaspirated. These are also called groove fricatives by forming a groove along the tongue. The alveolar fricative is substitute with /z/ with /s/ in Urdu native speakers of Down syndrome children

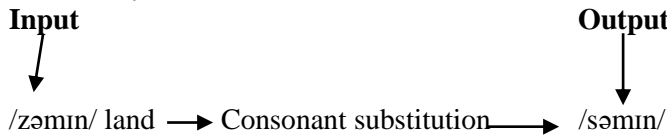
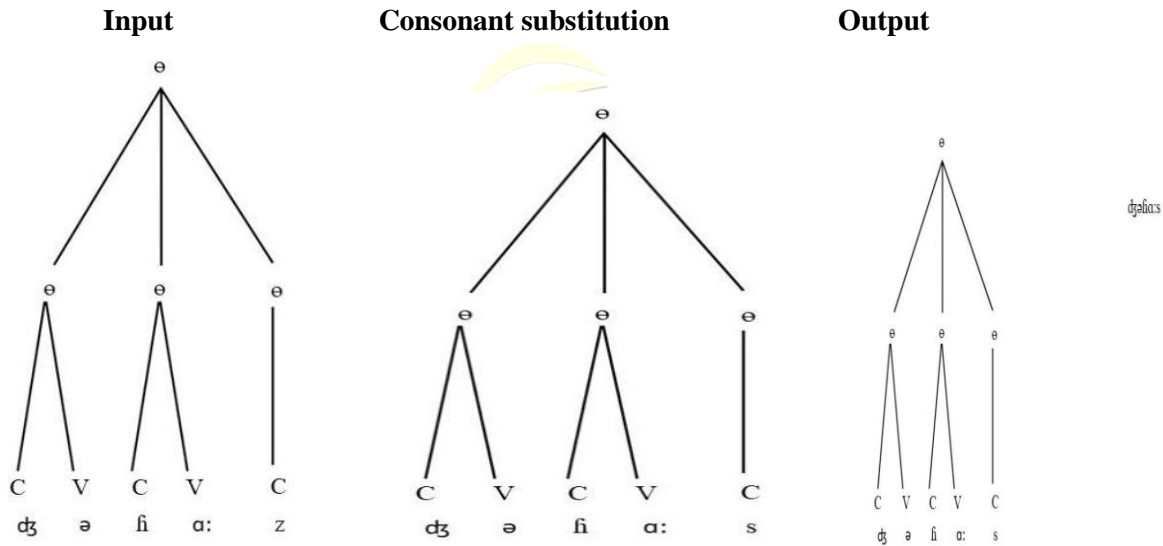


Table 4.3 Substitution of /z/ with /s/

Gloss	Transcription in Urdu	Perceived word
Aero plane	ɖʒəɦɑ:z	ɖʒəɦɑ:s
Drawer	ɖʒərə:z	ɖʒərə:s
Prayer	nəmə:z	nəmə:s
Onion	pɪɑ:z	pɪɑ:s

It presents final position



Substitution of z into s

Fig. 4.4 Final Substitution of /z/ into /s/

The above Fig.4.7shows substitution of Urdu consonants /z/ into /s/. The substitution takes place at coda position. As a result the word [ɖʒəɦɑ:z] perceived as [ɖʒəɦɑ:s] by Down Syndrome children.

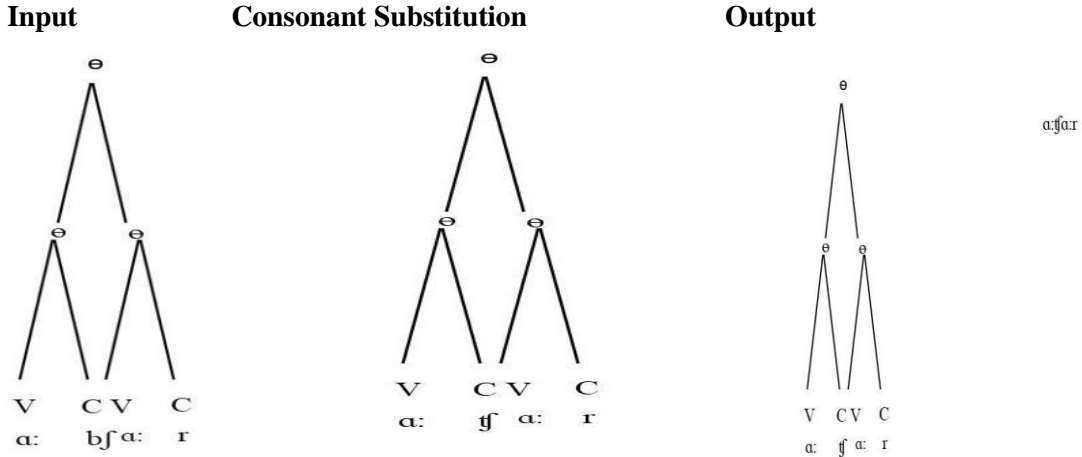
Table 4.4 Initial, Medial and Final positions of /z/ into /s/

Initial	Medial	Final
		ɖʒəɦɑ:s
		ɖʒərə:s
		nəmə:s
		pɪɑ:s

Consonant Cluster Substitution

“A consonant cluster is characterized collectively or succession of consonants that appear together in a syllable without a vowel between them”. The incoming section contains substitution of consonant cluster.

Substitution of /bʃ/ into /tʃ/



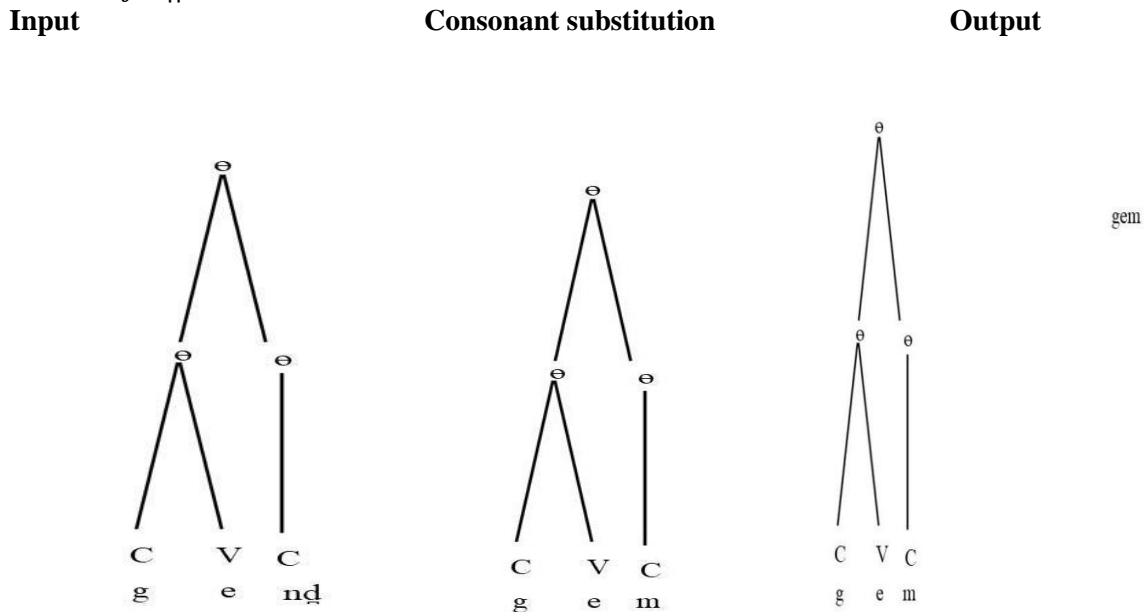
Substitution of consonant cluster bʃ into tʃ

Fig. 4.5 Substitution of /bʃ/ into /tʃ/

Urdu medial consonant cluster /bʃ/ pair includes stop labial /b/ and palatal fricative /ʃ/. The Urdu consonant stop labial /b/ is voiced which means the vocal folds vibrate with each other when it is produced while palatal fricative /ʃ/ is voiceless sound which means the vocal folds do not vibrate with each other when it is produced. The Urdu consonant /tʃ/ is palatal affricate. It is a voiceless sound.

The example in the above Fig.4.4 displays substitution of consonant cluster /bʃ/ into /tʃ/. The substitution takes place on coda position. As an outcome the word [ɑ:bʃɑ:r] perceived as [ɑ:tʃɑ:r] by Down Syndrome children.

Substitution of /nɔ̃/ into /m/



Substitution of consonant cluster nɔ̃ into m

Fig. 4.6 Substitution of /nɔ̃/ into /m/

Urdu final consonant cluster /nɔ̃/ pair consist of nasal /n/ and Urdu stop dental ɔ̃. The Urdu consonant stop dental ɔ̃ is voiced which means it is produced when the vocal folds vibrate with each other. Urdu consonant /m/ is nasal sound.

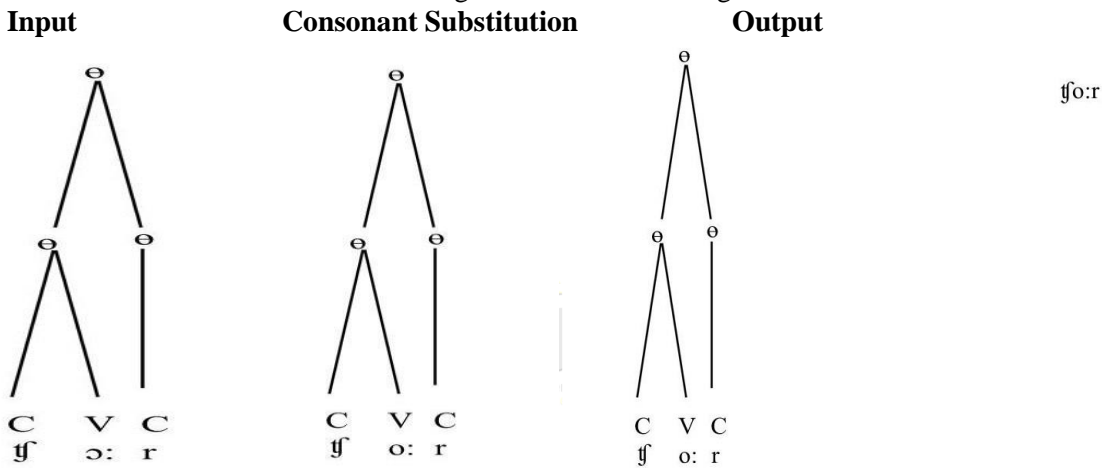
The example in the above Fig.4.6 displays the substitution of Urdu consonant cluster /nɔ̃/nasal-stop dental cluster into nasal /m/. The substitution takes place on coda position. As an outcome the word [genɔ̃] perceived as [gem] by Down Syndrome children.

Substitution of vowels

The incoming section contains substitution of vowels. The data was selected and analyzed according to Urdu monophthongs system.

Substitution of /ɔ:/ with /o:/

/ɔ:/ is a half close back vowel. The length of this vowel is long (Ladefoged & Johnson, 2014). The position of the tongue is backwards in the mouth and no constriction occurs at that point. The position of the lips is rounded when it is articulated. This vowel sound gets replaced by /o:/ vowel. It is half-close and back vowel. The position of the lips is rounded when it is articulated. The length of the vowel is long.



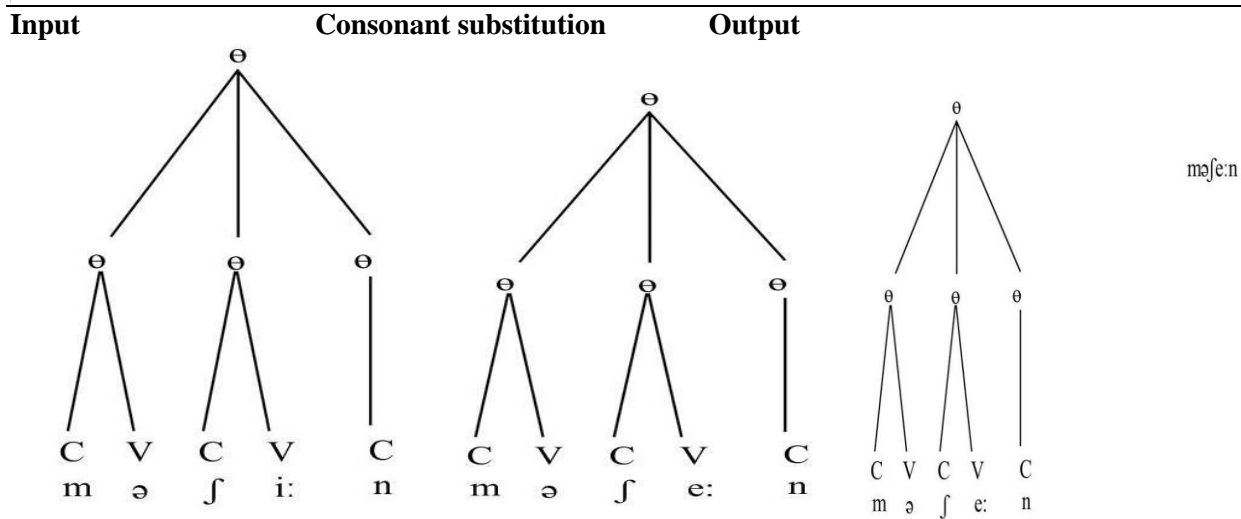
Substitution of /ɔ:/ with /o:/'

Fig. 4.7 Substitution of /ɔ:/ with /o:/'

The above instances shows the substitution of Urdu vowel sounds /ɔ:/ into /o:/.As an outcome the word [ʃɔ:r] perceived as [ʃo:r] by Down syndrome children.

Substitution of /i:/ into /e:/'

/i:/ is a close vowel which means the height tongue is close to the roof of the mouth. The position of the tongue is front which means it is produced when the front part of the tongue slightly raised towards the hard palate. The length of the vowel is long. The position of the lips is unrounded. The vowel sound /e:/ is close-mid vowel sound which means the height of the tongue is between the close and mid position of the tongue when it is articulated. It is also a front vowel, which means it is produced with front part of tongue slightly raised towards the hard palate. The length of the vowel is long.



Substitution of vowel /i:/ into /e:/

Fig. 4.8 Substitution of /i:/ into /e:/

The above instances shows the substitution of Urdu vowel /i:/ into /e:/. As an outcome the word [məʃi:n] perceived as [məʃe:n] by Down syndrome children.

CONCLUSION

This study dealt with the phonological disabilities of down syndrome children, who were native speakers of Urdu language. It deals with phonological changes which was brought by down syndrome children due to lack of their pronunciation errors. These phonological changes were observed with the aid of CV phonology, a theory introduced by Clements and Keyser (1983). First part was based on substitution of Urdu consonants, which was based on manner of articulation and palace of manner. These consonants include stops, fricatives, nasals and semivowels which are based on the manner of articulation. Second part was based on the substitution of Urdu Vowels system which included the pure vowels. These pure vowels were based on the phonological classification of height of tongue and position of tongue. It included substitution of Front, Central and Back vowels depending on the height of tongue. It also includes the substitution of High, mid and low vowels. Third part was based on the position of consonants and vowels on syllables structure. The position of the consonants takes place on onset and coda position. On the other hand, the position of vowels took place on nucleus position. The first type of changes occurred, which were noticed during the substitution of Urdu consonants

and their combinations with other alternative combinations of Urdu consonants.

- The sound /d/ and /d̪/ are stops pair. The sound /d/ is retroflex in Urdu language. The sound /d̪/ is dental sound in Urdu language. The dental voiceless sound is /d̪/. The retroflex voiced sound is /d/. /d/ changes into /d̪/.
- The consonant sound /z/ and /s/ belongs to fricatives pair. These sounds are also known as groove fricatives. The dental voiced fricative is /z/. The dental voiceless fricative is /s/. /z/ changes into /s/.

The data analysis of consonant cluster include:

- This pair /nd̪/ includes nasals /n/ and stops dental voiced /d̪/. The consonant /m/ is nasals sound. /nd̪/ pair changes into /m/.
- The pair /bʃ/ belongs to stops labial /b/ and palatal fricative /ʃ/. The sound /b/ is voiced. The sound /ʃ/ is voiceless. The consonant /tʃ/ is palatal affricates sound. /bʃ/ pair changes into /tʃ/.

The second change was taken from the substitution of vowels. The data was drawn from pure vowels sounds.

- /ɔ:/ is a half close back vowel. /o:/ is half-close and back vowel. /ɔ:/ changes into /o:/
- /i:/ is a close, front vowel. /e:/ is close-mid, front vowel. /i:/ changes into /e:/

The Diphthongs and triphthongs are not included in this study.

This study recorded description of all these sounds which were observed by given data, drawn for goal of this study.

The study has clinical, research and educational implications for the diagnosis, treatment, phonological acquisition of Children with Down Syndrome.

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