Chapter: Three

Strength relations and sound patterns: an analysis in the framework of Dependency phonology and Government phonology

3.0 Introduction:

There are two theories of phonology within whose frameworks the issue of phonological strength can be easily addressed. These are Dependency Phonology (Anderson 1987) and Government Phonology (Clements and Keyser, 1983). Both the theories are theories of phonological representation. Dependency Phonology basically, indicates the principles of head modifier relation. This genre of phonology shares with other modern theories of phonology the assumption that segments are exhaustibly decomposable in to features known as components belonging to a universal set. In the same fashion Government Phonology seeks to isolate universal principles governing the form of phonological representations. Its original aim was to unify the notions of syntax and phonology, to show that these are but two manifestations of the same thing, the human linguistic capacity. This branch of phonology, which originated in the early 1980s as an attempt to unify theoretical notions of syntactic and phonological structure, is based on the notion that all languages necessarily follow a small set of principles and vary according to their selection of certain binary parameters. That is, all languages' phonological structure is essentially the same, but there is restricted variation that accounts for differences in surface realizations. Principles are held to be inviolable, though parameters may sometimes come in to conflict.

This chapter is designed to address the issue of patterning of segmental speech sounds and the complexity involved in their representation in the framework of Government phonology, (henceforth GP) as proposed in Kaye, Lowenstamm & Vergnaud (henceforth KLV) (1990), Kaye (1990), Kaye (1995) and Charett (1991) and Dependency phonology (henceforth DP) as proposed in Anderson (1987). GP has deviated a lot from its earlier assumptions. Some frameworks of GP use neither branching constituents nor skeletal points (among many Yoshida, 1993; Lowenstamm, 1996; Sheer, 2004). GP in this chapter refers to the version of the theory as outlined during the 1990’s mainly by Kaye, Lowenstamm and their followers.
This chapter is divided into two main sections. In the first section I am going to outline a brief review of the theoretical constructs that define the domain of GP. Here the focus will be on various concepts pertaining to this model such as constituent structure in GP, constituent and interconstituent government, coda licensing principle, empty category principle, magic licensing, headedness, licensing constraint. In addition to these theoretical underpinning an attempt is also made here to investigate the application of the governing constraints in a set of data drawn from Assamese, an Indo Aryan language. The positional asymmetry exemplified in the organization of onset branching in Assamese is investigated taking in to consideration Element theory and Complexity condition involved in governing constraints. In the second section the segmental distribution is shown using DP module. The section begins with Dependency, structure and structural analogy which is followed by Principle of unarism and componentiality in DP model. Following Anderson (2002) a sketch is drawn here on the Assamese vowel inventory. Through the discussion of categorical gesture and consonantal representation in DP model I am trying to take in to consideration the notion of segmental asymmetry and prosody in a phonological domain. Here I would like to argue in the light of spirantization of Assamese that the process of lenition involves more notation in DP framework. The lenited segments involve more notational representation thereby making them functionally weaker in representation.

Section 1

3.1. Government Phonology: An overview

Government phonology seeks to isolate universal principles governing the form of phonological representations; it claims that phonological representations are built from a set of elements in accordance are similar to those of DP. Government phonology is very much influenced by the syntactic theories and adheres to the principle that just as constraints or governing relations in syntactic structures determine the well formedness of those structures, so do constraints in metrical and syllabic structures condition the well formedness of those structures. In other words, the principles of GP concern the place of segments in syllabic and metrical structure which follows from the syntactic slant on phonology adopted in the theory, thereby establishing the claim that syntax has bearing on the phonological principles and vice versa.
3.1.1 Constituent structure constituent government in GP:

GP is a non liner development in the framework of generative paradigm which seeks to represent the phonological phenomena following universal constraints on the organization of skeletal points. A skeletal point functions as intermediary point linking to a constituent above and elements below and the series of positions is called skeleton. The skeleton is a part of hierarchical structure known as constituent structure. A representation is given below to represent the constituent structure in GP:

\[
\begin{array}{c|c|c}
\text{Constituents} & \text{O} & \text{N} \\
\hline
\text{Skeletal points} & x & x \\
\hline
\text{Melody(segments/elements)} & A & A \\
\end{array}
\]

Figure No 3/A: Representation of constituent structure in GP

The three constituents that GP takes into consideration are: onset, rhyme and nucleus, all of which can be either branching or non branching. It is to be noted in this context that onset does not mean a syllabic initial consonant, it can be a syllable final position too although it does not occupy the final structural position. Nucleus refers to vowels. Nucleus and non branching rhymes are the same constituents. When rhymes branch, it is headed by a nucleus and followed by an onset which is occupied by a consonant. GVP recognizes three syllabic constituents: onset, rhyme and nucleus, but not coda. Segments in the coda position are described simply as rhymal complements (the position in a rhyme governed by the head of the rhyme i.e. the nucleus). In GP, phonological processes apply only when they are necessary and hence there is no order of application. This is a part of Minimalist Hypothesis (Kaye, 1995). This principle implies that processes apply wherever the conditions that trigger them are satisfied. Whether the constituents rhyme and nucleus and onset may branch or not are subject to parametric variation. These are subject to universal principles which are listed below:
a) Every nucleus can and must license a preceding onset.

b) Every onset must be licensed by a following nucleus.

c) Every constituent licensor must dominate a skeletal point.

From these principles what is evident is that a nucleus without a skeletal point is ill formed whereas an onset may or may not have a skeletal point. Some frameworks of GP use neither branching constituents nor skeletal points (among many Yoshida, 1993; Lowenstamm, 1996; Sheer, 2004). The onset slot is always present though it may have no skeletal point. For the sake of convenience consider the diagrammatic representation below:

(3/1)

\[
\begin{array}{ccc}
\text{a. } & \text{O} & \text{N} \\
\text{b. } & \text{O} & \text{N} \\
\text{c. } & \ast \text{O} & \text{N} \\
\end{array}
\]

\[
\begin{array}{cccc}
x & x \\
& x \\
& x \\
\end{array}
\]

In the above representation 3/1c. is ill formed as it shows a nucleus without a skeletal point. In GP the patterning of syllabic structure is organized by a series of governing relations that correlate between the skeletal points associated with the constituents. In the lexicon these relationships between the skeletal points are established and are not subject to phonological processes, stated formally as the Projection Principle (KLV, 1990) as cited below:

Governing relations are defined at the level of lexical representation, and remain constant throughout a phonological process.

This Projection Principle rules out the resyllabification process as GP adheres to the dictum that vowels and consonants occupy the constituent position they occupy. As, for instance, a consonant occupying an onset remains in an onset.

3.1.2 The principles of constituent government in GP model:

The motivation behind the government relations is to determine phonological structures and thereby adhering to the principle of well formedness. GP model talks about two types of government in constituents: constituent and interconstituent. When governing relations operate between syllabic constituents it is called constituent government. In constituent
government two units are sisters within a constituent such as onset, nucleus or rhyme. The government relation is head initial and the head of a nucleus is rhyme. Charett (1990) claims that in constituent government, governing relations are subject to the following principles:

a) Only the head of the constituent may govern and
b) Only the nuclear head may govern a constituent head.

In the same fashion Kaye (1990) also put forth two principles regulating governing relations as cited below:

i. Strict locality

No position may intervene between a governor and its governee.

ii. Strict Directionality

In a given governing domain, at the skeletal level, the direction of the government is universally invariable.

Strict locality coupled with Strict Directionality prohibits more than two branches. Below a representation is given showing skeletal points of branching onsets, rhymes and nuclei in constituent government relationship:

(3/2)

a) O
   x ———> x

b) N
   x ———> x

c) R
   x ———> x

In (3/2a) the governing relations are displayed at the branching onset as in tr cluster in train considered to be a branching onset in English. In (3/2b) the relationship is between i and l in English word milk can be cited as example. (3/2c) gives the representation of long vowels like [ u:] in food.
3.1.3 Interconstituent government in GP model:

When a governing relation occurs between two different constituents, the relationship is defined as interconstituent government which is universally head final. The relation between an onset and a preceding rhymal consonant constitutes interconstituent government. Consider the diagrammatic representation displaying interconstituent governing relations below:

![Diagram of interconstituent government](image)

Figure No 3/B: Representation of interconstituent government

It is possible to observe the representation of interconstituent governing relations with an example from English ‘silk’

![Diagram of interconstituent government in English word ‘silk’](image)

Figure No 3/C: Representation of interconstituent governing relation in English word ‘silk’.

In the above schematic representation, the onset following a branching rhyme is shown to govern the branch of the rhyme, which is called the coda licensing principle. k in the following onset governs l in the branch of a rhyme. In this example we also observe the constituent governing relation between the branches of the rhyme i and l. However, codas must also be governed by the following onset. All constituent governments operate from left to right. Thus within branching onsets and nucleus, the leftmost skeletal position governs the rightmost, and within branching rhymes, the rhymal complement is governed by the skeletal slot which is governed by the nucleus. In the context of coda licensing, Kaye (1990) points out that an onset licenses a preceding coda if the onset is less sonorous than the preceding
coda. As for example in the word ‘silk’ which is the representation as shown in 3/C k can
govern l as the former is more sonorous than the latter.

According to constituent government, the nuclear point which is the head of the rhyme must
govern a skeletal point of the rhymal complement. Hence the nuclear head and the rhymal
complement must be adjacent to each other. Kaye (1990) formalized this principle based on
the notion of Strict Locality and strict Directionality as Binarity Theorem, which implies that
syllabic constituents are maximally binary. In GP, phonological positions need to be licensed
in order to be present which Kaye (1990) termed as Licensing Principle.

3.1.4 Licensing Principle:

All phonological positions, save one, must be licensed within a domain. The unlicensed
position is the head of the domain. Kaye (1990) argues that coda is not a constituent in GP as
it cannot branch. Coda is not treated as independent category; it has to be governed by the
following onset.

3.1.5 Coda licensing Principle in GP:

Post nuclear rhymal positions must be licensed by the following onset. According to Kaye
(1990) a non nuclear point is syllabified within the rhyme if there is a governor in the
following onset. From this dictum what follows is that a word internal or word final
branching rhyme is possible only when there is a following consonant in the onset position.
Let illustrate with the English word ‘Mary’ where the rhyme does not branch because there is
no governor in the following onset. Consider the following diagram

(3/3)

\[
\begin{array}{cccc}
\text{a)} & O & R & O & R \\
\text{b)} & *O & R & O & R \\
N & N \\
x & x & x & x \\
m & e & r & i & m & e & r & i \\
\end{array}
\]

It provides an answer to the query as why an intervocalic consonant is always syllabified
within an onset and not within a rhyme followed by an empty onset and thereby providing an
account for the behavior of elements that are analyzed elsewhere as being in an extrametrical position.

The phenomena of vowel shortening in word final closed syllables can be explained in relation to coda licensing principle. Word final consonant occurs within an onset, which because of government constraints, is followed by a nucleus (Charett 1991). However this nucleus may or may not have phonetic content. The theory of government brings home the point that words ending phonetically with a consonant have a final nucleus in their lexical representation and they are underlyingly present despite the fact that they are not manifested in pre pausal position overtly. Charett (1991) shows that in French the words either end with a nucleus which has phonetic content or realized as zero. In French an underlying empty nucleus can be realized as zero because this language selects a parameter according to which a word final empty nucleus is licensed. Hence, word final empty nuclei in languages would have phonetic content or zero is determined by the licensing of word final empty nuclei. This parameter results in two types of languages: those which license word final empty nuclei and those which do not license them. Languages such as Brazilian Portuguese, Japanese, and Oriya do not license word final empty nuclei and thereby providing phonetic content to those nuclei. In these languages words always end phonetically with a vowel. Whereas the second genre of languages are those which license word final empty nuclei. In these languages word final empty nucleus is realized as zero even though it is not properly governed as a result of which words in these languages may end with a consonant. In other words, all words have a final nucleus in their representation, but this final nucleus can have no phonetic content. In accordance with this parameter words may end phonetically with a vowel or with a consonant. Therefore the principle of Coda licensing does provide a means of differentiating languages in which words must end with a vowel from those which allow words to end phonetically with a consonant. In addition, there is one more criteria to differentiate languages. On the one hand, there are languages like French and English where words can either phonetically end with a single consonant or a consonant cluster. On the other side, languages like Korean, Wolof and Pulaar where words can end phonetically with a vowel or a single consonant but never with a consonant cluster. It is because these languages selects the ‘No’ option of the parameter “a licensed word final empty nucleus is a government licensor.”
3.1.6 Empty Category Principle:

The parametric variation of languages can further be brought in to the penetrating light of scrutiny through the discussion of a concept known as Empty Category principle in GP. Sometimes there may not be one to one correspondence between melody and structure. The interpretation of silence of empty position does not occur randomly, but are controlled by application of universal principles (Kaye, 1990). Through this Empty Category Principle it is possible on the part of GP to unify all the processes such as metathesis, syncope, epentheses and vowel harmony in to a single universal principle (See Charette (1991) and Yoshida (1993) for a detailed discussion on existence of empty categories). Kaye (1995) has provided a detailed analysis of the definition, principles and parameters of the Empty Category Principle which are listed below:

3.1.7 The Phonological ECP

A prosodic (p) licensed empty category receives no phonetic interpretation.

P-licensing takes place when:

a) Domain final empty categories are p-licensed (parameterized) ON/OFF (e.g. ON English, Turkish; OFF Italian, Japanese).

b) Properly governed empty nuclei are p-licensed.

\[ \alpha \text{ governs } \beta \text{ if} \]

i) \( \alpha \) and \( \beta \) are adjacent on the relevant projection.

ii) \( \alpha \) is not itself licensed, and

iii) No governing domain separates \( \alpha \) from \( \beta \).

c) Empty nuclei within an inter onset domain are p-licensed.

d) Empty nuclei licensed by 'Magic licensing' are p-licensed.

Hence, from this definition what is evident is that there are four ways an empty nucleus can be p-licensed to remain silent, which will be explained below:
3.1.8. Parametric domain final p-licensing:

This parameter is based on the domain final empty nuclei which is the source of cross linguistic variations. In some languages like Italian, Oriya this parameter is switched OFF, which implies that domain final empty nuclei are not p-licensed in these languages and therefore words in these languages end with a vowel. However, in a language like Turkish, Assamese, Bengali, Hindi this parameter is switched ON, thereby implying that domain final empty nuclei are p-licensed in these languages and so words in these kinds of languages may end with a consonant. In GP all onsets must be licensed by a nucleus and all word final consonants must occupy an onset. If the onset is always followed by a nucleus but the word phonetically ends in a consonant, then the last nucleus must be silenced.

Consider a monosyllabic word in Assamese ‘xit’. Monosyllabic words have codas which are onsets followed by empty nuclei, as shown below

```
  O  N  O  N
  |  |  |  |
  x  i  t  φ
```

Figure No 3/D: Representation of the monosyllabic Assamese word ‘xit’

In this word the last nucleus following the onset ending with a consonant sound is silenced.

3.1.9 Proper Government:

For Proper Government to take place there are three conditions which have to be satisfied which are: a) only an interpreted nucleus can properly govern an empty nucleus, b) no intervening governing domain is allowed c) nuclei must be adjacent at a nuclear projection. The second means an empty nucleus can remain silent is by being p-licensed by an adjacent interpreted nucleus that properly governs it. If proper government fails to apply, the empty nucleus must be phonetically expressed. In GP the direction of proper government is assumed to be from right to left. Head initial, right to left, proper government is proposed by Gibb (1992) and Rowicka (1999).
(3/4) Consider the example from Moroccan Arabic (Kaye, 1990)

a) [ktib] ‘he wrote’  
b) [kitbu:] ‘they wrote’

![Diagram of Arabic words with proper government](image)

Figure No 3/E: Internal representation of Arabic words [ktib] and [kitbu:] in GP model

In (3/4a) p-licensing occurs in the domain final empty nuclei by virtue of the parameter being switched ON, so it is beyond interpretation. Being p-licensed itself, it cannot properly govern N₂, so N₂ is realized phonetically. As it is phonetically interpreted it can properly govern N₁. Therefore N₁ may not get phonetic manifestation. This governing relation occurs at the supra segmental level where nuclei are projected to be adjacent.

In (3/4b) the final nucleus that is branching containing a long vowel has the potentiality of properly governing N₂ as a result of which N₂ becomes silent. Properly governed N₂ cannot properly govern N₁ and therefore N₁ has got phonetic interpretation.

3.1.10 Inter onset Government:

Depending on the elemental composition of consonants in inter onset positions an empty nucleus may remain silent. When two consonants make a good inter onset governing domain, the empty nucleus is licensed to remain silent. This principle is known as Inter onset licensing by Gussmann and Kaye (1993) according to which Inter onset government p-licenses an intervening nucleus between the onsets.

Consider an example from Assamese, which shows an inter-onset government relationship between two word final consonants.
The above example is characterized by an inter onset governing relationship between $O_3$ and $O_2$ by virtue of the fact that $O_3$ is a good governor as it dominates a headed expression and $O_2$ is a good governee as it does not dominate a headed expression. Headedness of an element in the composition of a phonological expression is considered to be an essential characteristic of a good governor.

The existence of inter-onset governing relation prevents $N_2$ to acquire phonetic interpretation. Since $N_3$ is $p$-licensed it does not have the potentiality to properly govern $N_2$ as a result of which $N_1$ has got manifestation in phonetic terms.

3.1.11 Magic licensing

It is one kind of $p$-licensing which is applied to some languages, where a nucleus remains silent even though other three conditions are not met. Kaye (1992) claims that in $s + C$ sequence, $s$ as in stop occupies the branch of the rhyme followed by an onset which can be represented diagrammatically below:
In example (3/6a) \(N_2\) cannot properly govern \(N_1\) as there is a branching rhyme, whose branch has to be governed by the following onset. As there is a governing relation between branching rhyme and onset cluster proper government is blocked and as a result \(N_1\) is supposed to get phonetic manifestation. But \(N_1\) is empty despite the unavailability of the conditions which is termed Magic licensing (Kaye, 1992).

In example (3/6b) the onset cluster is not in a position to exhibit appropriate governing relationship. As far as the principle of constituent government is concerned it displays the direction from left to right cross linguistically and \(s\) is bound to govern the following stop \(t\). But this principle suffers as \(s\) cannot be a good governor of \(t\), as it displays the function of governe in English words such as mist and cost etc.

Here, I am going argue about the positional asymmetry exemplified in the organization of onset branching in Assamese, an Indo Aryan language. The theme of discussion revolves around certain issues:

The internal make up of the segment determines its position in a syllabic or word string. As, for example, in Assamese word initial onset position the stops and nasal precede liquids not vice versa and thereby implies the notion of asymmetry in the patterning of segments. Before dealing with this issue let us have a brief outline of Element theory and Complexity Condition popularized by GP model.


In GP model Element theory plays a pivotal role in the differentiation of consonants and vowels. Unlike distinctive features as used in SPE which are binary in nature, elements used in GP framework are monovalent, unary atomic units of phonological description and the use of elements is privative and asymmetric thereby implying that if an element is present in a
given expression, there is no minus property specified to that element. As, for instance, if the element L is used to represent nasality, there is no other element –L to represent the non-nasality of other consonants. Elemental composition of phonological expression has to take into account the linguistic properties of a language under consideration. Cobb (1997) argues that with this small number of primitive elements in all permitted combinations, all the sound of the world languages can be represented. Element theory has found a significant place in the discussion of many phonologists such as in Cobb (1997), Denwood (1997a, 1997b, 2002), Charette & Goskel (1996, 1998), Ploch (1996) and Kaye (2000) etc. However, for our convenience we can consider the following elements as useful in the representation of phonological representation:

\[(3/7)\]

- A represents openness in vowels, palatality in consonants.
- U represents roundness in vowels, labiality in consonants.
- L represents low tone, slack vocal cords, voice consonants, nasality.
- H represents high tone, stiff vocal cords, voicelessness in consonants, frication.
- J the glottal stop

However Jenson (1994) has argued about the authenticity of the last element, the glottal stop, which can be dispensed in the representation of phonological expressions. In GP, only the elements A, I, U are adequate to represent the nuclear expressions; but in the representation of consonants it involves the combination of all the elements to some extent. In this regard the representation of Elemental theory can be compared with that of DP framework (Durand, 1990) in which three elements i, u, and a corresponding to palatality, roundness and lowness were considered to be prime unary components.

An attempt is made here to represent the Assamese vowel system using the framework of Element theory:
From the above representation of Assamese vowel system in the framework of Elemental composition what is evident is that elements are assigned two functions: operator or head. When both the elements are equal they are termed as operators and when the elements display an asymmetric relation they are in headedness relation. In headedness, one of the constituents function as the head of the expression while other elements behave as operators. An element is assigned the status of head by taking into consideration the nature and behavior of phonological expressions it is embedded in. In the representation of Assamese vowel system headedness is shown by underlining. Kaye (2001) says that the combination of elements into phonological expressions are conditioned by universal constraints such as there can be one head per expression and no element can occur more than once in one expression. Balci Ercan() claims that headedness of a certain element is intended to function as good governors if complexity is not sufficient accounting for government relations, to account for different phonological processes and to use the same element with two different functions. As, for illustration, consider the element L which can be used as a head to represent voicing and as an operator representing nasality. Ploch (1996) uses L in the representation of n as operator, (A.?L), and as head in d (A.?L).

The ways elements are combined with each other are subject to licensing constraints. According to Kaye (2001), licensing constraints, which are defined at L-structure (lexically), are language specific laws on phonological expressions. In GP module all phonological expressions are considered to be grammatical unless they are ruled out by specifically a
licensing constraint. Licensing constraints govern the combinatorial properties of elements. In other words they impose restriction on the patterning of elements in the composition of phonological expressions. Licensing constraints cannot make reference to more than one element at a time.

3.1.13. Complexity Condition in GP model:

Complexity condition is one of the strategies which regulate the governing relations among the segments in terms of constituent and interconstituent governments. Kenstowicz (1994) claims that the construction of complex onsets and codas is guided by a sonority sequencing principle which requires onsets to rise in sonority toward the nucleus and codas to fall in sonority from the nucleus. The principles underlying sonority sequencing principle governing the organization of segments in a syllable or a word are taken in to account by elemental composition of consonants and the governing relations existing between them in GP which is addressed as Complexity Condition (KLV, 1990; Harris, 1990). Complexity Condition implies that the element which occupies the governed position cannot be more complex than the governor. Kaye (1990) claims that the reason behind the postulation of Complexity Condition was to provide an explicit explanation concerning the constituent and interconstituent governing relations, specifically for branching onsets and branching rhymes. The governor has to be more complex than the governee in terms of the number of elements composing the phonological expression. We can simply state the complexity condition in the following manner:

Let $\alpha$ and $\beta$ be segments occupying the positions A and B respectively. Then, if A governs B, $\beta$ must be no more complex than $\alpha$.

What is implied by the above statement is that the patternings of segments are motivated by Complexity Condition. The first instance we can draw from the branching onsets as evident in Assamese consonant cluster.

(3/9) Consider the following Assamese words:

/pr/ pran ‘life’

/prem prem ‘love’
From the above data it can be observed that word initial onset cluster in Assamese can be formed by combining either stop + liquid or nasal+liquid. But liquid does not have the potential to be the initial member of the onset cluster. As, for instance the following are not the onset cluster in Assamese permitted by the phonotactic constraints in Assamese:

\[*/rp/, */rt/, */lp/, */rk/, */rm/, */lm/*

The ungrammaticality associated with these above onset clusters can be addressed in the light of constituent government relationship. As we have already discussed, constituent government is characterized by Directionality and Strict Locality Condition. The syllabification of adjacent segments is determined by the governing relations and it is the constituent government which determines what constitutes a well formed branching constituent. In the examples stated above the stops and nasals are functioning as governors and the liquids as governees. As, for illustration consider the following onset branching:
It has been shown through this diagrammatic representation that in the former the approximant is governed by the stop and in the latter the liquid by the nasal. In these examples a downward complexity slope is enforced between a governor and a governee. The reasons as why p governs r can be answered from the internal make up of the two segments. Whereas the voiceless bilabial stop has two internal elements constituting its structure the approximant possess only one internal component, as is evident from the representation below:

In the same way, from the analysis of the onset branching in initial position in Assamese, it is observed that nasals can precede liquids but not vice versa. This distributional asymmetry is instrumental in providing explicitly the ability of the nasal to govern the liquid. This ability cannot be assigned to charm value as both segments are neutrally charmed. Charm is another property of government relations which determine the combinatorial possibilities of the elements in the organization of phonological expression.

The asymmetry here is motivated by the Complexity Condition: nasals containing three elements have priority over liquids, which contain two or sometimes only one element.
3.2. Government phonology and Disordered speech: a correlation:

Government phonology along with its use of phonetically interpretable unary primes, does have the potential to provide an elegant accounts of many aspects of disordered speech as compared to traditional feature based accounts. Following the works of Harris, Watson and Bates (1999), and Ball (2002), Harrison (1996), Ball (1997) it is possible to draw a correlation between commonly reported phonological patterns in disordered speech and GovP.

Bauman-Waengler (2003) has reported in clinical literature about difficulties with onset clusters and the simplifications of these clusters found in normal phonological development.

Another commonly occurring simplification in both developmental and disordered phonology is the deletion of the final consonants whereby cat is realized as [kÆt] and dog as [dn]. This phenomenon of final deletion can be accounted for by a constraint on onsets and empty nuclei in final position. The pattern exhibiting final consonant clusters requires the parameter setting allowing branching rimes to be turned off. Sometimes final consonants may be replaced by glottal stops. Final glottal replacement involves an interaction between constituency and melody. In that case the consonant slots have had an element material stripped from them except [?].

Ball (2007) has shown the instances of velar fronting as evident in the disordered phonological patterns at the melodic level. In traditional binary feature descriptions, a change from /k/, /g/, /n/ to [t], [d], [n] involves changing the values of the four features [high, back, anterior, coronal]. In GP this change can be represented in a much simpler fashion where the element [?] is substituted for [R] as shown below in the diagrammatic representation:

(3/11) k → t

```
  x   x
 /    /   
 h   h   
/    /   
?   ?   R
```

Figure No 3/G: Representation of the change of feature from k to t in GP module
Ball (2007) has also discussed the instances of lisp pattern which involve the realization of the target /s/ and /z/ as dental fricatives or alveolar lateral fricatives. Both of these patterns can be accounted for through simple change at the melodic level: dental fricative involves a change in the head whereas the lateral fricative involves the addition of the [?] element as shown below:

(3/12)

\[
\begin{align*}
&\text{s} \quad \longrightarrow \quad \Theta \quad / \quad \longrightarrow \quad i \\
&\begin{array}{c}
\text{x} \\
\text{h} \\
\text{R}
\end{array}
\begin{array}{c}
\text{x} \\
\text{h} \\
\text{R}
\end{array}
\begin{array}{c}
\text{x} \\
\text{h} \\
\text{R}
\end{array}
\begin{array}{c}
\text{?}
\end{array}
\end{align*}
\]

Although these lisp patterns reported in clinical literature (motoric rather than phonological) are easy to represent in GovP, fricative simplification is difficult to deal with. Ball (2007) claims that fricative simplification is a pattern whereby in English target dentals are realized as labiodentals, and target postalveolars as alveolars (e.g./θ,ð/ as [f,v], and as /ʃ,ʒ/ as [s, z]) as shown below:

(3/13)

\[
\begin{align*}
&\text{θ} \quad \longrightarrow \quad f \\
&\begin{array}{c}
\text{x} \\
\text{h} \\
\text{R}
\end{array}
\begin{array}{c}
\text{x} \\
\text{h} \\
\text{R}
\end{array}
\begin{array}{c}
\text{x} \\
\text{h}
\end{array}
\begin{array}{c}
\text{?}
\end{array}
\end{align*}
\]

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If we delete the [I] element post alveolar is represented as alveolar, but the realization of dental to labiodentals change requires a switch of elements and a change of head patterns.

Through the mechanics of GP it is possible to throw light on the works of vowel impairment reported in Ball (1996, 2002) and Harris, Watson, and Bates (1999). Many of the vowel disorders involve a move towards the corner vowels [i, a, u]. Such instances of vowel patterning can be captured in GP by a simplification of vowels to the three elements of [I,A,U]. In phonological literature other instances of reported patterns in disordered speech include context sensitive voicing, fricative stopping and liquid gliding that can be better represented in the framework of GovP with economy of descriptions as the use of unary primes can provide a detailed account of phonological regularities in comparison to binary features. As, for instance, Grunwell (1986) argues that a fully specified /r/ to [w] change requires at least six feature changes, while in GovP it can be represented through the removal of two elements and their replacement by one another.

3.3 Section II Dependency Phonology: an analysis

As already stated in the introduction, this section tries to give an outline of Dependency phonology along with its major constituent theories with regards to major phonological processes. This section shows as how the notion of strength in phonology can better be analysed in DP module along with its head dependent parameter. In this section I am trying to show as why certain vowels are considered prime and some are derived vowels. As, for instance, in Sanskrit some vowels are called mulaksar and some are known as Sandhyaksar. Mulaksar are called the main vowel sounds whereas sandhyaksar are based on the combination of the former vowel sounds. This issue is better interpreted in minimal sequential units through the combination of unary features as proposed in DP. Even Assamese vowel inventory is interpreted here by taking in to consideration the principle of unarism. This representation will justify as how different prime components, especially peripheral vowels responsible for the representation of vowel sounds combine together to produce the mid vowels in the language and thereby showing the head dependent asymmetry in the phonological representation of sound patterns in a language. Even through the device of categorical gesture as employed in DP model it is possible to show the internal representations involved in consonantal segments which differ from each other. In section 9.1. it will be observed that the preponderance of vowel components decreases in a scale ranging from liquids to voiceless stops.
3.3.1 Strength relations of segments and Dependency phonology

The notion of strength can be addressed within the framework of Dependency phonology (DP), which is a conjunction of assumptions concerning the representation of phonological phenomena. This branch of phonology relies on the assumption that fundamental to phonological structure is the dependency or head/dependent relation and thereby implying the notion that phonological structure involve constructions and secondly, each of these constructions has a determinate head. The head is atomic; it is a single segment or a minimal unit and is associated with some substantive property which distinguishes it from other constituents of the construction, which in phonology is known as perceptual salience (Anderson, 2002). The notion of constituency which is of prime concern in theoretical linguistics, is supposed to be derivable from the dependency relation coupled with linear precedence and rules of association.

Jacques Durand (1990) claims that like other modern theories of phonology DP assumes that segments are exhaustively decomposable in to features known as components belonging to a universal set and thus drives home the point that unary features provide more appropriate account of phonological regularities unlike Generative phonology which takes for granted that features are inherently binary. Some previous treatment of DP include Anderson and Ewen (1980), Lass (1984: ch. 11), Anderson and Durand (1986, 1987), Clark and Yallop (1990), Anderson and Ewen (1987), Durand (1990: ch.8), Carr (1993), Ewen (1995, 1996).

This chapter is devoted to the analysis of various perspectives within DP which can be correlated with the segmental representation of speech in a hierarchical fashion. Section 1 of this chapter deals with dependency, construction and structural analogy in the light of instances drawn from Assamese, an Indo Aryan language. The subject matter of section 2 comprise of unarism, segmental structure and componentiality in DP whereas the section 3 deals with the issue of infrasegmental representation in DP model which includes the categorial gesture and consonantal representation. In DP framework the categorical gestures C and V are shown to occur alone or in various dependency combinations as opposed to the binary feature proposed by Jakobson.
3.3.2 Dependency, Construction and Structural analogy:

The basic framework of DP is rooted in the concept of dependency or head modifier relation which finds its manifestation in syntactic, morphological and phonological domains. This dependency relation exhibits the pattern of linear precedence and rules of association gives rise to the notion of constituency which assumes a significant place in theoretical linguistics. Basic to the dependency grammar is the notion that every syntactic structure has a head; each construction is characterized by a non-symmetrical relation between its head and modifiers of their head, the dependency relation. This relation imposes certain restrictions on the head; a head or Governor is atomic (non phrasal) and obligatory. Even the phonological constructions do bear head modifier construction. A word like attendant contains three syllabics and thus three syllables.

The final two syllables constitute a foot. What characterizes a foot is the presence of a stressed syllabic, or ICTUS, which is atomic and obligatory. In *attendant* the final foot head is the head of the word or group head or TONIC. The syllable has a head – a vowel in many languages without which it does not exist as a constituent. That head is flanked by the margins and the segments are normally ranked in accordance with the sonority hierarchy.

(3/14)

Example

```
\[ \text{O} \quad \text{O} \quad \text{O} \quad \text{O} \]
```

```
\[ \text{f} \quad \text{i} \quad \text{n} \quad \text{t} \]
```

In this syllable flint /f/ and /n/ respectively govern the less sonorous /i/ and /t/.

The internal structure of the syllable can incorporate the various structural sub units by invoking both subjunction and adjunction. Consider the following example in English:
In this diagram, the onset is constituted of the left hand side dependent /l/ of the syllable node and its subordinate /b/. Both the nucleus /ai/ and the coda /nd/ are sub units of the rhyme. The coda comprising of the head /n/ and a less sonorous dependent /d/ is adjoined to the node corresponding to the rhyme. In the same way the nucleus, made up of the head /a/ and a right hand side dependent /i/ is expressed by a node which is subjoined to the rhyme node itself subjoined to the syllable node. The geometry of the graph is instrumental in providing a comprehensive picture of the constituents incorporated in the syllable /blaind/. Each node in the tree is associated with a categorical representation. This symmetric relation of association is represented by the discontinuous lines.

What is evident from the construction (i) is that there are no relational labels associated with dependency trees. Here the relative strength of some property attributed to various elements is not represented by the labelling, such as ‘strong’ vs., ‘weak’. The salience associated with the syllabic is directly represented relationally, by the dependency arcs.

This dependency relation popularised in the DP model was introduced as an analogy from the syntax where the notion had been familiar for sometime (cf. Anderson and Jones 1972/1974, Anderson and Ewen 1987). Such analogies have always been instrumental in the development of DP and of dependency morphology (Coleman 1985, 1994, 1996) and thereby enriching the Structural analogy assumption (SAA). Anderson (2002) claims that linguistic objects can be represented on different levels, where these different levels display distinct principles of organization or have different domains. However differences between levels are constrained by SAA which is stated below:
The same structural properties are to be associated with different levels of representation except for differences which can be attributed to the different character of the alphabet involved (as in the case of planes) or to the relationship between the two levels (as may be the case with any pair of levels), including their domains’ (Anderson, 2002, p-3).

The SAA recognises that the same structural properties recur throughout linguistic representations although there exists an asymmetrical relation holding between phonology and syntax. In this context mention must be made of transplanar analogy (Boomberger & Halle, 1989:69) according to which syntax and phonology are essentially different. Carr (2000) also holds the similar view. Nevertheless, as told by Anderson (2002), analogy works both transplanarly, and within planes, across levels. Phonology shares with syntax not only the dependency relation but also motivations for drawing a line of demarcation between dependency as adjunction and dependency as subjunction. Dependency relation is characterised by distinction in linear precedence, that is, the head is distinct in terms of precedence from its dependents which are adjoined to the former. This is representation involving adjunction. But when head and dependent coincide in position the dependency graph will involve subjunction in which an element is shown to be the head of two successively more inclusive constructions.

It may appear to be difficult to maintain the distinction of the head in terms of precedence. However, under the subcategorisation principle of dependency relation it is possible to show the ‘S’ (sentence) and ‘VP’ (verb phrase) as variants of the same construction type, with the same head. The same motivation underlying the pattern of subjunction under the rubric of dependency relation can be applied to phonological domain. Consider the Assamese word ‘kan’ (ear) and its internal syllabic representation with rhyme as a constituent.

(3/15)

In this example (3/15) the element a is both the head of the syllable and head of the rhyme, the nucleus. Thus DP is shown to exhibit the SAA principle as the structural properties shared here by the syntax and phonology go rather beyond simply sharing the dependency relation.
Carstairs- McCarthy (1999:143) argues for 'the syllable as a model for sentence structure' in evolutionary terms. Both the adjunction and subjunction distinction seem to be appropriate to both the planes of phonology as well as syntax.

3.3.3 Principle of Unarism and Componentiality in DP in the light of Assamese:

DP model assumes that unary features provide more appropriate accounts of phonological regularities and thereby going against the dominant trend of binarism which regard features as having two values (represented as [+/- F]). Anderson (2002) has shown that DP analyses minimal sequential units, segments, or units in to component properties, generally known as features. The features, better known as components are single-valued, unary and atomic which constitute the alphabet of the plane and their various combinations define categories. Since its inception, DP has maintained feature of unarism bearing close affinity with the representation of syntactic features adopted in the 'case grammar tradition' that leads to the recent work in the 'notional grammar' (Anderson, 1971). Indeed like other modern theories in phonology DP also believes in the conviction that segments can be decomposed in to features called components belonging to a universal set and thereby providing an explanation for relative degrees of salience among the components of a segment found in languages crosslinguistically. In opposition to the binary or multi valued representation of a segment as given in generative paradigm DP shows its adherence to the notion of unarism which can provide a more detailed and appropriate account of phonological regularities.

The DP framework seeks to represent the minimal sequential units through the combination of unary features. In other words, an attempt has been made under the rubric of DP to explore the infrasegmental representation of the segments in the backdrop of the underlying properties of the vowel components. Jacques Durand (1990) shows that there are three components which play a crucial role in the definition of the vowel space which are cited below:

(3/16)  
i    palatality  (or acuteness or sharpness)  
a    lowness  (or compactness)  
u    roundness  ( or gravity and flatness)
Donegan (1973) considers these above properties which are instrumental in the characterization of segments and double articulation as resonance components. Through the application of these resonance components it is possible to represent the simplest possible vowel system /i,a,u/ type in the following manner:

\[(3/17)\]

\[
\{ i \} /i/ \quad \{ u \} /u/ \\
\{ a \} /a/ 
\]

The symbols in the slanted brackets bear no systematic import but abbreviate the set descriptions of the left. Rennison (1986) claims that as resonance components structure the vowel system, they are often referred to as tridirectional feature systems, in contrast with classical binary system. According to Durand (1990) the issue of binarism and tridirectionality are independent. Unlike binary features, unary features are not omnipresent via the attribution of a positive or a negative value. In other words, segments are under consideration may simply be characterized by the presence as well as the absence of a given component. As, for instance, the segment /a/ in DP is not comprised of \([+a, -i, -u]\) but is simply \{a\}, with the features i and u absent. Thus the distinction between vowels in a language can be entailed by the presence vs. absence of the unary perceptually based features i, u and a (introduced in Anderson & Jones 1972/1974) which can roughly be correlated with a predominance of acoustic energy high in the spectrum, a predominance low in the spectrum and a concentration of energy centrally in the spectrum. i and u are distinguished as chromatic or tonality components as opposed to the sonority feature underlying a with which they combine in various configurations to denote different vowels, especially the mid vowels (Anderson and Ewen, 1987). The combination between the tonality components is not optimal from the functional point of view although it is not uncommon, giving \{i, u\}, a front round vowel [y].

This issue of unarism and the recognition of i, u, a as basic vowels is associated with a number of other approaches to phonology, such as radical CV phonology (e.g. van der Hulst 1989, 1994, 1995), particle phonology (e.g Schane 1985, 1994), government phonology (e.g. Kaye, Lowenstamm & Vergnaud 1985). However, a line of demarcation can be drawn between DP and these phonological approaches in the representation of segments in terms of how the components are combined as well as the identity of the components and other
aspects of their organization. As, for instance, in the representation of vowels particle phonology is the most distinctive in allowing only simple combination of particles but reiteration of aperture article a. All these phonological approaches including DP hold the view of asymmetric relation between components and thereby implying indirectly the strength asymmetries existing in the patterning of segments. DP recognises the fact that the components of a language can be combined in asymmetrical fashion; one component is more salient than the other. The theory of vocalic representations allows for the representation of three elements \{i\} \{u\} and \{a\} in distinct ways:

```
   v-tier
  /\   
 a-tier
 /\     
 i-tier
 /\       
 u-tier
```

Figure No 3/I: Representation of three elements \{i\} \{u\} and \{a\}

These tiers are often dependent on one another. vdH seeks to spell out the relationship between tiers in vowel systems using only elements, rather than binary valued features – the way the different vocalic tiers relate to each other in terms of government relations and how they are interpreted phonetically. The elements have component parts. For the element \{a\} pharyngeal constriction governs openness and \{i\} Palatal constriction governs advanced tongue root. As for the element of \{u\} which, in acoustic terms, corresponds to gravity, subsumes two distinct articulatory properties: velar constriction and lip rounding. While referring to the rounding enhances the acoustic effect of velar constriction.

Following Anderson (2002) an attempt has been made to represent the Assamese vowel inventory in the framework in DP model, as shown in (3/18):

\[(3/18)\]

\[\{i/\} \ (=[i]) \quad \text{e.g.} \quad /xit/ \quad \text{“winter”}\]

\[\{i\} \ (=[e]) \quad \text{e.g.} \quad /xetu/ \quad \text{“bridge”}\]

\[\{a\}\]
In this representation of the vowel set /e,o,o,o/ can be acclaimed as mixed vowels on the ground that they have more than two components in their configuration. In this kind of representation one component is functioning as governor and the other as dependent, as shown below in 3/19):

(3/19)  
/e/  
   i  governor  
      |  
      a  dependent
From this representation what is evident is that the dominance in palatality gives rise to high mid vowel /e/ and where lowness is dominant we get the low mid vowel /ɛ/. This infrasegmental representation of governance and dependence can be represented by a semicolon within DP model. As, for instance, /e/ is represented as {i ; a} and /ɛ/ as {a ; i}. Here, semicolon implies dominance. The notation used in DP adheres to the principle of componentiality assumption (Anderson & Ewen 1987: 8) which is cited below:

(3/20)

Componentiality assumption

The representation of the internal structure of segments optimises the expression of phonological relationships (‘classes’, ‘regularities’) that are (a) recurrent and (b) natural.

This assumption can help in the representation of natural classes, classes whose members share a phonetic property and which recur in phonological frameworks. As, for illustration, the set of high vowels are characterized by predominant i or u, that is, predominant tonality. The mid vowels such as e, ɛ, ɔ are represented by a combination of the sonority feature with a tonality one.

3.3.4 Categorial gesture and consonantal representation in DP model:

In DP model, the major class of segments are represented by categorical gesture which can be divided in to two subgestures: a phonatory subgesture comprised of sonority based components and an initiatory subgesture that is concerned with air stream mechanism (Anderson & Ewen 1987; Davenport & Staun 1986). The notions such as voice, sonoranace, consonantality and continuancy are subsumed under the umbrella term categorical gesture. It is the categorical gesture under which the vowels and various consonant types can be differentiated. Anderson (2002) views that it is possible to draw a line of demarcation between different categories associated with “manner of articulation” including voice, in
terms of combinations of the two components, V, corresponding with periodicity and presence of a well defined formant structure, and C, involving reduction in periodic energy. In DP framework the categorical gestures C and V are shown to occur alone or in various dependency combinations as opposed to the binary feature proposed by Jakobson. Some basic representations are given in 3/21 wherein it can be perceived that the proportion of V decreases from left to right:

\[(3/21)\]

\[
\begin{array}{ccccccc}
V & V & V & V:C & V:C & C & C \\
\mid & \mid & \mid & \mid \\
V, C & C & V & V \\
\end{array}
\]

vowels liquids nasals vd fric vl fric vd pl vl pl

This representation intends to reflect the fact that placement of particular segment types on the sonority scale is predictable from the representation of those types based on unary components and the dependency relation. Different segment types, classified in term of their non-location properties (in terms of the components of their categorical gesture) can be assigned to relative positions or a scale of ‘inherent sonority’ which is manifested in a number of phonological domains, including lenition and the determination of syllable structure (cf. E.g. Lass and Anderson 1975). Vowels are maximally sonorous and voiceless plosives minimally,. So in the unary notation, vowels are represented by the unique presence of the v component in the categorical gesture and C for voiceless plosives. Other segments involve co-presence of the two components which can show weakening of their individual qualities: they are characterized as intermediate. However, intermediates are differentiated in terms of their relative preponderance of the two components in the representation for their categorical gesture. Relative preponderance is interpreted as a manifestation of dependency relation: the less preponderant consonant depends on, or modifies the more; the more preponderant governs the less

As, for instance, liquid differs from nasal in having a V as well as a C (mutually dependent) dependent on V; it is thus more sonorous. The voiced obstruents (where obstruents are characterized as lacking a non-dependent V) show a dependent V in addition is the specification for their voiceless congener; they are thus more sonorous.
The notation employed in above DP model can be further represented in the following fashion. Consider the representation in figure no 3/J as given by Anderson (2002):

\[ \{V\} \{V; (V: C)\} \{V; C\} \{(V: C); V\} \{V: C\} \{(V: C); (V: C)\} \{(V: C); C\} \{C; V\} \{C\} \]

vowel liquid nasal vd sib vless sib vd fric vless fric vd pl vl pl

e.g.

[a] [i] [n] [z] [s] [D] [T] [d] [t]

vd= voiced; vl= voiceless; sib= sibilant; fric= fricative; pl= plosive

Figure No 3/J: Representation of consonant sounds in DP framework

The notation as shown in (3/J) introduces a relation of mutual dependency, noted as ‘.’, where ‘x:y’= ‘x:y & y:x’ that is, either x preponderates y or y preponderates x. This representation further shows second order dependencies, as shown in the representation for liquid, where the mutually dependent V and C are further dependent on V.

Secondly, the notion of markedness is mirrored by the notation since vowels and voiceless plosives appear as unmarked which has evidence from developmental and cross linguistic data whereas other segment types falling in between them. In addition to allowing the expression of natural classes and reflecting markedness, these notions define a hierarchy, the sonority hierarchy, manifested in the process of lenition, approximation to V, and fortition, approximation to C. Indeed, the notations in DP are instrumental in exhibiting explicitly a hierarchy of sonority from \{V\} to \{C\}, that is, from vowels to voiceless plosives in descending order. (3/22) provides a couple of instances exhibiting diachronic weakening taken from Anderson (2002):

(3/22)

Latin aqua→ Spanish agua

-k→ -g→ -γ-
\[(/C/) \rightarrow (/C; V/) \rightarrow ((V:C); V)\]

Old English dragon → Middle English drawe → Modern English draw

-\(y\) → -\(w\) → -\(u\) (→ monophthong)

\(((V:C); V) \rightarrow (V;(V:C)) \rightarrow (/V/)\)

These two instances exemplify progressive approximation to a vowel intervocalically, i.e. in a highly vowelly environment.

Consider the data showing word final spirantization in Assamese as shown below:

(3/23)  /k\(\text{ph}\)/  [k\(\text{f}\)]  ‘phlegm’

/\(\text{b}\)\(\text{ph}\)/  [\(\text{b}\)\(\text{f}\)]  ‘ice, snow’

/\(\text{m}\)\(\text{ph}\)/  [\(\text{ma}\)]  ‘excuse’

/\(\text{s}\)\(\text{ph}\)/  [\(\text{s}\)]  ‘clean’

/\(\text{l}\)\(\text{bh}\)/  [\(\text{l}\)]  ‘profit’

/\(\text{x}\)\(\text{ul}\)\(\text{bh}\)/  [\(\text{x}\)\(\text{u}\)]  ‘cheap’

/\(\text{gor}\)\(\text{b}\)\(\text{h}\)/  [\(\text{gor}\)\(\text{v}\)]  ‘pregnancy’

/\(\text{kh}\)\(\text{j}\)\(\text{bh}\)/  [\(\text{kh}\)\(\text{j}\)]  ‘anger’

From the data it is evident that in word final position, the aspirated stops in Assamese/\(p\)\(h\)/ and /\(b\)\(h\)/ are spirantized to /\(f\)/ and /\(v\)/. This data can be shown as the instance of lenition by using the DP framework as shown below:

(3/24)

/\(p\)\(h\)/ \(\rightarrow\) /\(f\)/

\{\(C\)\} \(\rightarrow\) \{(\(V:C\);\(C\)\}

/\(b\)\(h\)/ \(\rightarrow\) /\(v\)/
From the above notation it is evident that DP, through the use of unary features can provide more appropriate account of phonological regularities in the sense that the inherent complexity of a segment can be directly measured in terms of the complexity of its representation.

3.4 A comparative study between DP and GP in regards to phonological strength and concluding remarks

From the above discussion on GP and DP along with their representational mechanism many generalizations can be drawn. The main locus of both the theories lies on phonological representation. Both the theories go against the principle of binarism as popularized in the generative paradigm and drive home the point that it is through the device of unarism the complexities involved in phonological representation can better be interpreted. According to these two perspectives in phonology features can be decomposed into unary components belonging to a universal set. In other words, phonological primitives are unary and they are organized hierarchically and that certain features enter into head dependent asymmetry. However in regards to the issue of phonological strength head dependent asymmetry as discussed in DP model and segmental complexity as well as Element theory discussed in GP model bears significance. The notion of constituency which is of prime concern in theoretical linguistics, is supposed to be derivable from the dependency relation coupled with linear precedence and rules of association. As, for instance, we have seen in the discussion on DP model as how the prime vowel components such as lowness, palatality and roundness attached with peripheral vowels combine in different fashion resulting in mid vowels in the language. In the representation of \( /e/ \) the unary component ‘i’ is the governor and ‘a’ is the dependent whereas in the representation of \( /a/ \) ‘a’ governs ‘i’ thereby paving the way for diverse segmental combination and distribution. The same kind of head dependent asymmetry is talked about within the rubric of Elemental theory of GP where it is shown that elements are assigned two functions: operator or head. When both the elements are equal they are termed as operators and when the elements display an asymmetric relation they are in headedness relation. In headedness, one of the constituents function as the head of the expression while other elements behave as operators. An element is assigned the status of head by taking into consideration the nature and behavior of phonological expressions it is embedded in. In the same way complexity relation is one of the strategies employed in GP
model which regulate the governing relations between constituent and interconstituent components. Complexity Condition implies that the element which occupies the governed position cannot be more complex than the governor. Kaye (1990) claims that the reason behind the postulation of Complexity Condition was to provide an explicit explanation concerning the constituent and interconstituent governing relations, specifically for branching onsets and branching rhymes. The governor has to be more complex than the governee in terms of the number of elements composing the phonological expression. Thus it tries to bring the element of strength in the patterning of segmental speech sounds in an explicit fashion.

However, as evident from the above discussion, it is found that DP is more concerned with the representational notation as compared to the theory of GP. DP claims that inherent complexity of a segment can be directly measured in terms of the complexity involved in its representation. From the DP notational framework it can be argued that the process of lenition involve more representational notation. In the same way, in the representation of vowels DP adopts the strategy of asymmetric fusion of three unary primes in different combinations. The representation employed in DP model intends to reflect the fact that placement of particular segment types on the sonority scale is predictable from the representation of those types based on unary components and the dependency relation. However, in this context it must be mentioned that although categorial gesture tries to represent the consonantal segments in different combination of vowel components, it fails to show the inherent components or elements which are responsible for the processes involving lenition and fortition. It fails to provide explicitly an account as why the segment behave differently in response to different prosodic environments. DP also does not show the relevant internal mechanisms involved in the makeup of a segment underlying behind the cause of diverse distribution of segments in a phonological domain. In that respect GP is more applicable as it deals with the issue of segmental patterning in terms of governing relations which can be either constituent government relation or interconstituent government relation. Element theory within the purview of Government phonology seeks to address the issue of internal strength of a segment in an indirect fashion. According to Element theory melodic headship is one of the strategies that languages use to indicate prosodic strength. Through the device of headship distinction it is possible to express difference in prosodic strength. Strong prosodic positions correspond to headed melodic expressions, while weak positions contain segments represented by non headed expressions. The syllabification of adjacent segments is motivated
by the principles and constraints as embedded in governing relations and infact, it is the
constituent government principles which are responsible for the emergence of a well formed
branching constituent. In addition to governing relation GP bears significance because of its
complexity condition principle which claims that governees can not be more complex than
governors. Crosslinguistically it is observed that nasals can precede liquids but not vice versa.
This distributional asymmetry is instrumental in providing explicitly the ability of the nasal to
govern the liquid. It can not be explained in relation to charm value as both the segments are
neutrally charmed. Here, the asymmetry is motivated by the Complexity Condition: nasals
containing three elements have priority over liquids, which contain two or sometimes only
one element. Even we have seen in our previous discussion that Government phonology
along with its use of phonetically interpretable unary primes, does have the potential to
provide an elegant accounts of many aspects of disordered speech as compared to traditional
feature based accounts. As, for instance, it can be observed that through the mechanics of
GovP it is possible to throw light on the works of vowel impairment reported in Ball (1996,
2002) and Harris, Watson, and Bates (1999). Many of the vowel disorders involve a move
towards the corner vowels [i, a, u]. Such instances of vowel patterning can be captured in GP
by a simplification of vowels to the three elements of [I,A,U].

In conclusion it can be argued that both the theories of GP and DP are concerned with the
issue of phonological representation. Nevertheless an attempt is made here to address the
notion of phonological strength in the framework of both these theories. Still these theories,
mainly of representation, do not correlate the internal acoustic phonetic cues pertaining to a
segment and its distribution in prosodic positions in phonological domain in explicit canvas.
However, it is only Element theory which tries to make a bridge between prosodic position
and headed segments and thereby highlighting the notion of intrinsic relation existing
between prosody and melody; but it requires more elaborative research work in this field to
explicitly establish the idea of strength relations responsible for the patterning of segmental
speech sounds in a non arbitrary way.