CHAPTER TWO

THEORETICAL GROUNDWORK
2.1 Phoneme and Various Approaches to Phonological Analysis

It must always be kept in mind that the sole function of sound (i.e., speech sound or phone) in language is to keep utterances apart. The phonological system of a language is, therefore, not so much a 'set of sounds' as it is a "network of differences between sounds" (Hockett 1973: 24). In this frame of reference, the elements of a phonological system cannot be defined positively in terms of what they are, but only negatively in terms of what they are not, what they contrast with (Ibid). Though we should ordinarily use the term 'speech sound' while talking of the phonological systems of different languages we do not do so because though we produce the same sound several times, it is not qualitatively exactly the same at all times and at all places. It also sounds different to different people depending upon their own individual capability of perception. That is to say, a particular speech sound, though in terms of articulation is the same, it is not exactly the same in terms of acoustic or auditory qualities. For example, English /p/ will have different qualities
depending upon who the speaker is, the perception of /p/ in an utterance (depending upon what his mother tongue has taught him), the person who hears it, the medium through which it is spoken (telephone or television or radio - that is, medium and quality of transmission), the environment in which it is spoken (total silence or total noise etc.). That's why we prefer to talk in terms of phonemes - not phones - and say that English /p/ is a phoneme.

A phoneme is, therefore, defined as the smallest contrastive unit in the sound system of a language. The phonemes of a language, then, are the elements which stand in contrast with each other in the phonological system of the language. Hence, the first step to be taken in the phonological analysis of a language is to prepare an inventory of the phonemes in that particular language.

An early approach which still holds good is to take a word, i.e., phonemes arranged in a particular order, and replace one sound by another to see if it causes a change of meaning or not. If a change of meaning occurs, then the changed or replaced sound is said to constitute another phoneme along with the one that has been changed or replaced. This technique which is known as the 'minimal pair' test is a highly convenient way of discovering phonemes in a language. It must, however, be remembered
that this method does not work for all the languages of the world as there may be languages where such minimal pairs are not available. But for our purpose, this method works without causing any problem.

As said earlier, a pheneme is basically a sound segment or a 'phone'. Hence, in all phonological analysis it is necessary to recognise both phonetic units (phones) and phonological units (phonemes). All phonologists agree on the basic point that it is necessary to recognize both phonetic units and phonological units. But beyond this basic point of agreement they differ on the nature of the phoneme. There are atleast four major different views on what a phoneme actually is. These are:

(1) Phonemic Theory,
(2) Prosodic Theory,
(3) Distinctive Feature Analysis, and
(4) Generative Phonology.
2.2 Phonemic Theory

The concept of the basic phonological unit called 'phoneme' dates back to the first use of the alphabetic system of writing a language. The letters of the alphabet were supposed to represent, though inadequately, the distinctive sounds found in a particular language. Such an idea is based on what Sapir calls "phonemic intuitions" (1933: 30) of the native speakers.

Though several centuries before Christ, Indian scholars were devoting themselves to the description of Sanskrit and achieving remarkable accuracy in articulatory phonetics (Allen 1953: 24) the first formulation of the phonemic theory is mostly ascribed to Jan Baudouin de Courtenay (1845-1929), an eminent Polish linguist. Soon after, the theory was enquired into in Western Europe, chiefly by Henry Sweet (1845-1912), Paul Passy (1959-1940) and Daniel Jones (1881-1967).

Inspite of having different attitudes towards the phoneme, the phonemic theory is characterized by an attempt at discovering the phonemes in a language. This attempt is based on the principle that
there are in each language a limited number of elemental type of speech sounds called phonemes, peculiar to that language; that all sounds produced in the given language are referable to its set of phonemes; that only its own phonemes are at all significant in the given language (Morris Swadesh, 1934: 117).

In a slightly different vein, Jones defines the phoneme as

a family of sounds in a given language which are related in characters and used in such a way that no one member ever occurs in a word in the same phonetic context as any other member (1962: 10).

Each language has a pretty large number of segments or phones. Much of the variation in the phonetic quality of these segments may be referred to by their phonetic context, called environment. As the use of each member of the family is conditioned by the phonetic context no member of a phoneme (allophone) ever occurs in the same environment as any other member. The members of the same family are said to be in 'complementary distribution'. They are mutually exclusive in that particular context.
A significant corollary from the above concept is that if two segments of a language can occur in the same phonetic environment, they must belong to separate phonemes in that language, unless they are in 'free variation'. It suggests that sounds belonging to separate phonemes are able to distinguish words, while sounds belonging to the same phoneme are not. Therefore, the phonemes of a language are normally established by discovery of minimal pairs, as in \textit{pat, fat, bat, vat, cat, sat} and \textit{rat} which are separate words in English. The different words are formed by replacing the first element in each sound sequence, thus giving us a set of phonemes like /p, f, b, v, k, s, r/. In fact, the discovery of phonemes is the first and foremost step in the phonemic analysis of a language. From our discussion above, a few salient features of phonemes may be enumerated below:

a) Phonemes are language-specific and unique. They can be described only in connection with a given language.

b) Phonemes are groups of similar sounds - each phoneme being a family of sounds - which are closely related to each other.

c) Phonemes have positional variants called 'allophones' which are in complementary distribution.
d) Phonemes bring about distinctions in meaning because they are the minimal distinctive sound segments of a language.

e) Phonemes are generally symmetrical in nature. Therefore, particular formulations are found to be keeping in design with the general patterns of the given language.

2.2.0 Various Approaches to the Phoneme

Over the last few decades, the concept of the phoneme has been viewed from several viewpoints by different linguists. From among the various approaches to the phoneme, in its relation to sound, here are a few most significant ones.

2.2.1 The physical view

Daniel Jones (1976) happens to be the chief mentor of this view. According to him, the phoneme is opposed to speech sound as 'class' to 'specimen', because he assumes the phoneme as a class of sounds in a given language. Each member of the class contains phonetic similarities and each of them is conditioned by the phonetic context. Jones' definition of phoneme is considered to be quite objective. It provides a method in intricate cases for selecting the phoneme regarding the inclusion of a given sound.
2.2.2 The Functional view

Foremost among those who assume this view are Nikolai Trubetzkoy and Leonard Bloomfield. They regard phonemes as minimal segmental elements of a language that are capable, by substitution, of distinguishing one word from another. This view assumes that the phoneme cannot be described in terms of the sounds by which it is manifested, but by reference to its function in the structure of a language.

The yardstick for determining the sounds that are significantly contrastive is meaning. Phonetic differences which do not indicate semantic differences are not distinctive, and thus, they are not phonemic. The sounds in a language functioning phonemically are determined simply by contrasting two sounds of identical environments. If this contrast indicates a semantic difference, then the phonetic contrast is also phonemic.

A word like 'cap' /kʰp/, for instance, consists of three sounds: /k/, /x/ and /p/. When we say that each one of them is a distinctive sound, it implies that the substitution of the sound /k/ by the sound /t/ in the word 'cap', the meaning of the word will change. It will become a different word ('tap') altogether. Thus each sound is distinctive in nature, because the substitution of one sound with the other sound will bring about a change in the meaning.
2.2.3 The psychological view

The chief exponent of the psychological or mental view of the phoneme is Boudouin de Courtenay (1939: 38-39). For him, phonemes are 'mental images' or 'abstract sounds'. Edward Sapir (1933: 23-24) talks of 'ideal sounds' which implies that a phoneme is not a physical reality but a mental reality. As a matter of fact, what is realized physically are the various allophones or realization of the abstract concepts. So the phoneme is nothing but an imagined and idealised sound (Adapted from Hyman 1975: 72-74).

As it seems, the psychological view is quite tenable because our common experience suggests that during our speech or writing, we find ourselves making frequent use of inexact and inadequate terms and yet succeed in conveying our message.

Jones, though in practice, preferred the physical view of the phoneme, felt himself closely drawn to the psychological view. But the only thing is that he did not find it easy to implement the psychological view while teaching spoken language. However, he did not hesitate at times to take recourse to psychological norms although he found the physical view better suited to the students for learning languages.
2.3 Prosodic Theory

As a strong reaction against the phonemic principle, prosodic analysis of language came into being. J.R. Firth, the main propounder of the latter, records his dissatisfaction with the former in the following way:

Such constructs (as the phoneme) have no ontological status and we do not project them as having being or existence. They are neither immanent nor transcendent, but just language turned back on itself (Firth 1957: 12).

It was strongly felt that the concept of the phoneme was basically related to transcription. It also heavily concentrated on minimal contrasts in identical phonetic contexts. In other words, it emphasized the paradigmatic relations at the cost of the syntagmatic or structural aspect.

On the other hand, prosodic analysis took both paradigmatic and syntagmatic relations into consideration. In this connection, the earlier approach, that is the phonemic approach was regarded ‘unidimensional’ whereas, prosodic approach ‘multidimensional’. In the same vein, the former approach was considered ‘monosystematic’ while the latter ‘polysystematic’. While prosodic approach requires
different segmental systems to be set up for different places in the syllable and word structure, phonemic approach sets up the same systems for all such places.

Prosodic theory explicitly recognises the features that may be called non-segmental or syntagmatic in contrast to paradigmatic. These features, otherwise called prosodies, fall in three groups:

(i) Demarcative Prosodies,
(ii) Prosodies characteristic of the longer features,
(iii) Morphological Prosodies.

Demarcative prosodies are, in fact, not realized over a whole or a large part of a structure. However, they serve the purpose of delimiting it, for example, 'aspiration' to mark initial syllable in some situations in English.

Prosodies characteristic of the longer piece, are related with a syllable, a word, a phrase, or a sentence. Stress, pitch, length, palatalization, velarization, nasalization etc., constitute the examples of syllable prosodies. In Turkish, vowel harmony constitutes an instance of word prosody. Further, in English, intonation is an example of phrase, clause or sentence prosody.
Morphological prosodies link grammar with phonetics, for example, nasalization in certain verbal forms in Hindi, when used as an exponent of inflexional process - [है] 'is', [है] 'are'.

Another aspect of the prosodic approach is that it recognizes 'phonematic units' (Firth 1948) that are invariant segmental features occurring in all contexts. [t], for instance, is divested of its aspiration and [l] divested of its velarization in the English word tell [tel].

Lyons (1962 in Fudge (ed.) 1973: 197) divides Firth's prosodies into two separate kinds of phonological units, viz.,

(i) Prosodic features comprising stress, pitch, length; and
(ii) Suprasegmental consonantal and vocalic features operating as 'long components' such as nasalization, palatalization, velarization, and so on.

Prosodic analysis does altogether invalidate the traditional phonemic approach. In fact, a few languages are successfully analysed and described by the one than by the other. Further, the phonetic features that are treated as prosodic in one language may not be so treated in other languages.
Though considerable work on the prosodic analysis of several languages was done in the 1950's, it is no longer in fashion today. However, some of its underlying notions are unanimously accepted everywhere. In this regard, Palmer's observation is worthy to note here:

...many of the points that were made are now quite widely accepted. The transformational-generative school of linguistics wholly accepts the notion that a phonological statement should be quite explicitly geared to the grammar ... (1970: XV).

2.4 Distinctive Feature Analysis

The phonemic analysis is based upon the basic assumption that the phonemes of a language are not further analysable because they are the minimal distinctive units. However, this assumption is challenged by Trubetzkoy, Jakobson and other members of the Prague School of Linguistics. They claim that a phoneme could be further analysable into distinctive features. Jakobson and Halle define these features in the following words:
Linguistic analysis gradually breaks down complex speech units into morphemes as the ultimate constituents endowed with proper meaning and dissolves these minutest semantic vehicles into their ultimate components, capable of differentiating morpheme from each other. These components are termed 'distinctive features' (1956: 3-4).

As we have stated earlier (cf. ss 2.1), the phonemic approach regarded the phoneme as the minimum distinctive unit of sound capable of bringing about a semantic change. However, the distinctive feature approach claims that it is not the phonemes but a much smaller number of distinctive phonetic features in a language that bring about all the distinctions in meaning. In this context, the statement of Giegerich is highly pertinent:

While a phoneme cannot by definition be broken up into shorter successive units, it can be viewed as a bundle of simultaneous units called phonological features: individual properties whose sum makes up the phoneme (1994: 89).

The English phoneme /b/, for example, regarded as a bundle of features [+ labial, - alveolar, + voiced, - strident, - continuant]. These bundle of features distinguish /b/ from /p/ which is [+ labial, - alveolar, - voiced, - strident, - continuant].
2.5 The need for distinctive features

The distinctive feature theory is basically a phonetic theory rather than a phonological one. It is not necessarily tied to the function of distinctions in a given language, its search being for language universal features. The significant impetus to feature analysis emanated from the United States after the classic studies by Jakobson, Fant and Halle (1952), and by Jakobson and Halle (1956). However, Trubetzkoy's Grundzüge der Phonologie (1939) (translated in 1969 as Principles of Phonology) records the initial formal conception of features which are more complex than that of Jakobson et al. (1952).

Description in terms of features helps us draw relations not only between sounds, but also between the sound systems of different languages. The individual sound features are drawn from a hypothetical universal set of possible features in the languages of the world. The individual languages select certain components and certain combinations out of which they construct their sound system. Thus, the inventory of some languages, for example, Arabic, includes sounds produced by the pharynx (called "pharyngeals"). English, however, does not include such consonants in its inventory of phonemes.
Various feature systems have been proposed for languages, some based on articulatory principles and some on acoustic ones. For our study, however, the articulatory features will suffice. One of the advantages of the feature approach to sounds is that it enables us to capture similarities in the ways sounds behave. Sounds sharing specific features are likely to have similar variants in similar environments, as in case of English stops— to cite just one example. Based on these common features of English stops, we can make a rule that sounds that are [+] stop and [- voice] acquire the feature of aspiration word-initially (Traugott and Pratt 1980: 58-60).

The phonological description of a language should not only specify what phonemes or sound segments combine or possibly combine in a particular language but it should also point out which phonemes are not likely to combine to form a morpheme or word. In terms of features of sounds it means that the phonological description should also tell which features combine or can combine and which cannot or may not. Such are the features which make the languages distinctive.
Distinctive Feature Theory has been primarily used by generative phonologists in their attempt at providing an account of phonology that can be integrated within a theory of grammar. It is argued that 'distinctive features' are the most important facts to take into account when carrying out a phonological analysis, as they reveal more about the way in which the sounds of a language are organised. They also more readily permit generalised statements within and between languages, than do descriptions based on phonemes and allophones. A particular advantage is that the same set of terms can be used for describing both vowels and consonants - something traditional articulatory descriptions were unable to do (Crystal 1975: 162).

We shall, therefore, describe Sambalpuri phonemes in terms of distinctive features in Chapter IV before looking into its phonological processes.

2.5.1 The Binary Nature of Distinctive Features

Distinctive features are binary. They have one of the two values, plus or minus. A listener confronts a two-choice situation when he gets a message, for instance, /t/ is [- voice] and /b/ is [+ voice]. So the obvious advantage of the system is that one can clearly show how members of the pairs, viz; 'nasal - oral', 'voiced - voiceless' or
'consonantal — non consonantal' are related to each other. It also implies that a stricture with pairings of 'voiceless — nasal' are not possible.

The labels of Jakobsonian distinctive features are of a mixed nature. They are mostly based on acoustic and articulatory considerations though a few references are related to perception here and there in Preliminaries to Speech Analysis (1952) and Fundamentals of Language (1956).

Jakobson and Halle (1956) record twelve inherent distinctive features:

(i) Vocalic / non-vocalic
(ii) Consonantal / non-consonantal
(iii) Compact / diffuse
(iv) Tense / lax
(v) Voiced / voiceless
(vi) Nasal / oral
(vii) Continuant / discontinuous
(viii) Strident / mellów
(ix) Checked / unchecked
(x) Grave / acute
(xi) Flát / plain
(xii) Sharp / plain
The distinctive features mentioned above are claimed to be language universals on the ground that 'the articulatory apparatus of man is the same everywhere' (Halle 1964: 333). Each language, however, selects a requisite number of features out of a comprehensive list. Inspite of the features being claimed to be binary, in actual phonetic realisation, they may be multi-valued in a few languages. As Clark and Yallop point out:

Each feature is nevertheless binary, with two opposed values along a single dimension, although a third 'unmarked' value is sometimes implied (1990: 311).

When more and more 'oppositions' came to be identified, the list of features also increased, particularly in the event of the study of hitherto uninvestigated languages. Chomsky and Halle (1968) expounded twentyone, while later, Ladefoged (1971) enlisted twenty six 'proposed features'. After four years, Ladefoged (1975) posited twenty 'Prime features', that are mostly based on articulation of the sounds. While sharing Jakobsonian view that 'the binary principle is a major factor in human communication' (Ladefoged 1971: 91), Ladefoged strongly believed that some features have to be 'multi-valued'. The feature 'place', for instance, has eleven phonological values (1975: 258-9), even though no language selects more than six out of them.
2.6.0 Functions of Phonological Features

A set of well-defined distinctive phonological features are expected to perform three major functions, viz:

(a) Contrastive function,
(b) Classificatory function, and
(c) Descriptive function.

2.6.1 Contrastive function

We expect a set of features to express the phonemic contrasts of a language 'fully and economically' (Giegerich 1992: 89). As the features are binary, that is of the form [+A] versus [-A], our purpose is to devise a set of features that expresses phonemic contrasts in the following way:

\[
\begin{array}{cccc}
\text{Phoneme P} & \text{Phoneme Q} & \text{Phoneme R} & \text{Phoneme S} \\
\end{array}
\]

Given a set of phonemes, and a set of features, we want each phoneme to differ from every other phoneme in terms of at least one of the 'plus / minus' specifications of the features. This function of features is referred to as the contrastive function.
2.6.2 Classificatory Function

Phonological features help in the expression of generalisations in the phonology of a language. Our set of features should be such that it would enable us to say, for example, that all sounds specified as [+A, -B] behave in a specific way in a specific context. Thus, features will not only define classes of phonemes but also will perform a classificatory function.

2.6.3 Descriptive Function

On the phonetic level of representation, the feature specification of every sound must describe accurately the phonetic nature of that sound. The difference between the two levels of representation is that on the phonemic level, sound segments are specified only by means of those features that are needed to express phonemic contrasts, while on the phonetic level, sound segments are fully specified. It means, on the phonetic level, one needs all those features that serve in the physical description of a sound, even the features that are unnecessary for the expression of contrast. Therefore, it may be said that some features are relevant on the phonetic level but redundant on the phonemic level.
2.7 Advantages of Distinctive Feature Analysis

One of the major advantages of the distinctive feature analysis is that when applied to a given language, one is able to view how similar or dissimilar various phonemes of the language are. It may be reiterated that under the phonemic analysis, all phonemes of a language are different from one another. Under the distinctive feature approach, however, one is able to capture the significant thing that some phonemes are more different from one another than others are. In English, for example, though /p/ is different from both /b/ and /n/, it is less different from /b/ than from /n/.

The distinctive feature analysis also enables us to define what are called natural classes. In native English, for instance, /s, z, ζ, ð, tr, dʒ/ and no other phonemes can form a natural class with the features [+ coronal, + strident]. Thus, distinctive feature analysis is able to define such a compact class only because it can closely observe similarities between different phonemes of a given language.

For a group of sounds to constitute a natural class, they must all share one or more features, and there should
be no other sounds that have this feature or combination of features. For instance, English has a voice – voiceless contrast which distinguishes sounds like [p, t, k] from [b, d, g] by the feature [voice] alone. Fewer features will therefore be required to describe a "natural class" than to describe any one of its members. Thus more features will be required to describe the sound [p] than to describe all the voiced stops of English, i.e., [b, d, g].

\[
\begin{array}{c|c}
\text{[p]} & \text{Voiced stops of English} \\
\hline
+ \text{consonantal} & + \text{consonantal} \\
- \text{vocalic} & - \text{vocalic} \\
- \text{voice} & + \text{voice} \\
+ \text{anterior} & \\
- \text{coronal} & \\
\end{array}
\]

Owing to the fact that features define natural classes, we say that it is not individual phonemes like /p/ and /b/ or /t/ and /d/ which contrast in English, rather the entire class of voiced stops contrasts with voiceless stops. It is not the individual segment but the feature [voice] which is contrastive. Since the single feature is involved in this
voice / voiceless contrast, we can state that [voice] is a distinctive feature of English.

Describing speech segments in terms of distinctive features reflects the coordinated activity of our speech. We know that speech is produced by a number of coordinated articulatory activities such as voicing, tongue position, lip rounding, etc. Features reflect individual aspects of articulatory control or acoustic effects produced by articulation. Features like [voice], [high], [round], [back] etc., directly reflect this activity. Each feature is rooted in an independently controllable aspect of speech production. A speech segment consists of a number of features, to repeat, called 'matrix', which when taken together describe a segment.

Distinctive features make it possible for a rule to be expressed in a simple way. Therefore, phonologists prefer to use features in the analysis of language. They agree that the notion "simplicity" is closely associated with the notion "generality". The more general a process, the more simply it should be statable. For example, let us consider the rules (a) and (b). If they are written as they are, it is not possible to convey the fact that rule (b) is more general than (a):
(a) \( k \rightarrow t\ddagger / \text{[I]} \)
(i.e., \( k \) becomes \( t\ddagger \) when it is followed by \( \text{[I]} \))

(b) \( k \rightarrow t\ddagger / \text{[I]} \)
\( \text{[c]} \)
\( \text{[x]} \)

(i.e., \( k \) becomes \( t\ddagger \) when it is followed by \( \text{[I]}, \text{[c]} \) and \( \text{[x]} \))

However, if we use distinctive features instead of phonemes, the two rules would be represented as (c) and (d) respectively:

(c) \( k \rightarrow t\ddagger / + \text{syllabic} \)
\( + \text{high} \)
\( - \text{back} \)

(d) \( k \rightarrow t\ddagger / + \text{syllabic} \)
\( - \text{back} \)

Thus, if we use distinctive features it becomes clear that rule (b) reformulated as (d) is more general than rule (a), because rule (d) utilizes fewer symbols than rule (c). Distinctive features thus make it possible for us to capture the notion "generality of a rule" or "simplicity of a rule".
Another advantage of distinctive features is that they transcend individual languages. They constitute a "universal set" that applies to all human languages in a uniform and unambiguous way. This is possible because features are set up on the basis of the characteristics of the vocal apparatus which is the same for all languages. On the other hand, making an inventory of the sounds of a language in terms of segments has the disadvantage that for every language a new phonemic chart will have to be created, because the value of a particular phoneme is defined in terms of the relationship it enters into with the other phonemes of the language.

Distinctive features also enable us to understand the nature of allophonic variation more exactly. Allophonic variation is now looked at not simply as the substitution of one sound for another, but rather as an environmentally conditioned change. For example, in English, when we state that liquids and glides (i.e., l, r, j) are devoiced when they are preceded by voiceless consonants, what we actually mean is that the feature [voice] changes its value from [+voice] to [-voice] when it is preceded by voiceless consonants.
Feature representation may at first look more complex and clumsy than segmental representation. However, in the long run, it is very advantageous. Instead of listing individual sets of contrastive phonemes, the contrasts can be easily expressed at the level of the feature. Since features are considered to be the ultimate building blocks of phonology, linguists have attempted to state all possible phonological facts about language with the fewest number of features possible.

We can, however, say that the distinctive feature analysis does not reject the concept of the phoneme. Rather, it goes beyond the phonemic concept and even deeper to capture similarities as well as dissimilarities between the phonemes, and their inter-relationship.
2.3 Generative Phonology

The publication of Chomsky and Halle's *The Sound Pattern of English* (1968) marked the emergence of Generative Phonology as a new theory and framework for the analysis of languages. Those who belonged to this new school of linguists - that is, the Transformational Generativists - were critical of the structuralists' approach current during that time. Chomsky himself accused them of attaching undue concern with inventories of elements and a classificatory or 'taxonomic' approach to linguistic analysis. Instead, the Generativists held that linguistic description ought to aim at constructing a grammar that would generate linguistic forms. The phonological component of such a grammar would be a set of phonological rules applying to the underlying forms of the language yielding surface phonetic representations. Since both underlying and surface forms were represented in features, the rules essentially changed feature specifications and the shape of a phonological description was indeed radically different from a typical 'inventory of phonemes and allophones' (Clark and Yallop 1990: 339-40).

2.3.1 *The Sound Pattern of English* (SPE)

Chomsky and Halle's *magnum opus* in phonology, *The Sound Pattern of English* (1968), is on the one hand an alternative
to 'taxonomic phonemics', and on the other, a classic attempt to build a description of English phonology on a transformational - generative theory of language. The book, widely referred to as SPE, became a trend-setter in phonological analysis, and served the purpose of a launching pad for the progress of post-generative phonological movements. It begins with a theoretical foundation, considering that a grammar is a system of rules that relate sound and meaning (P.3). Such a grammar contains several components, including a phonological one which relates grammatical structures, that is grammatically organised strings of morphemes to their phonetic representations. Primarily SPE deals with how such a component of English grammar can be formally and comprehensively expressed. The model shows phonology as a component 'fed' by a syntactic component that generates grammatical sequences of the language. These grammatical structures are complete with lexical items and reflect the grammatical rules of the language. The lexical items in surface structures carry with them their underlying phonological representations in the form of feature matrices. The surface structures serve as input to the phonological rules, which, responding both to underlying phonological representations and to their syntactic and phonological contexts, generate a phonetic representation. Here is a schematic generative model of grammar:
FIGURE IIa A Generative Model of Grammar
SPE is based to a great extent on Jakobson, Fant and Halle (1952) and Jakobson and Halle (1956). But it offers several modifications and improves upon the earlier two works. These modifications as presented in Chapter VII of SPE are (i) in the specific set of distinctive features used to capture contrasts, and (ii) in the conceptualization of these features. SPE explicitly distinguishes two functions of these features. These distinctive features are designed, on the one hand, to capture the phonological contrasts of languages and, on the other, to describe the 'phonetic' content of segments derived by phonological rules, as well as underlying segments (Hyman 1975: 42).

The 1952 and the 1956 Jakobsonian models of distinctive features stated the features in terms of their acoustic characteristics (cf 2.5.1). However, in the SPE model, in 1968, Chomsky and Halle modified the previous model where the features were redefined and restated in terms of their articulatory characteristics (though occasional reference was made to acoustic and perceptual correlates). In other words, sounds were described in terms of how they were produced in the vocal tract cavity. Jakobson, Fant and Halle (1952), for instance, had made a distinction between the features 'grave' and 'acute' where the feature 'grave' implied sounds which occupied the lower frequency regions of the spectrum while the feature 'acute' implied sounds which
occupied the higher frequency regions of the spectrum, while the feature 'acute' implied sounds which occupied the high frequency regions of the spectrum. Chomsky and Halle, however, reformulated this distinction in articulatory terms like [+ rounded] and [+ high] and [+back].

It would not be out of place to present here the modified version of distinctive features as described by Chomsky and Halle (1968). They divided the features into major class features, cavity features, manner of articulation features and source features. Further, they listed prosodic features, though did not discuss them in detail (1968: 298-329).

**Major Class Features**

(i) Sonorant
   (Nonsonorant = obstruent)

(ii) Vocalic
   (syllabic)

(iii) Consonantal

**Cavity Features**

(iv) Coronal

(v) Anterior

(vi) High

(vii) Low

(viii) Back
(ix) Round
(x) Distributed
(xi) Covered
(xii) Glottal constriction
(xiii) Nasal
(xiv) Lateral

Manner of Articulation Features
(xv) Continuant (Noncontinuant = stop)
(xvi) Instantaneous release
(xvii) Velaric suction
(xviii) Implosion
(xix) Velaric pressure
(xx) Ejection
(xxi) Tense (Nontense = lax)

Source Features
(xxii) HiChtened subglottal pressure
(xxiii) Voiced (Nonvoiced = voiceless)
(xxiv) Strident

Prosodic Features
(xxv) Stress
(xxvi) Pitch
(xxvii) Length
We may note, however, that not all languages use all these features. As we shall see later in Chapter IV, for the analysis of Sambalpuri, we need only fifteen distinctive features.

2.8.2 Distinctive Features in Generative Phenology

Fascinated by the approach of the distinctive features analysis, most generative phonologists have taken recourse to it for their analyses. The distinctive features as used in generative phonology are characterised by three main tendencies as explained in the following lines:

(i) The tendency to establish a relatively small set of distinctive features for the analysis of the phonological structures of all languages. It aims to be a part of a universal phonetic theory which needs formulation of universal constraints on feature co-occurrence and feature contrasts.

(ii) The tendency to interpret phonetic correlates of distinctive features not in articulatory terms alone but in terms of categories which can be given an acoustic as well as articulatory interpretation.

(iii) The tendency to analyse all possible contrasts and similarities in terms of one or several binary features, having ' + ' or ' - ' values.
2.9. Levels of Representations

As stated earlier (cf. ss 2.8 and 2.8.1), the basic goal of generative phonology is to account for all the linguistically significant sounds produced by the human vocal apparatus. For this purpose, two levels of representations are considered necessary in generative phonology, viz; 'systematic phonemic representation' and 'systematic phonetic representation'.

The systematic phonemic representation is an underlying phonological representation of an utterance, which is converted into the systematic phonetic one by a set of rules called 'phonological rules' or 'P-Rules'. Morphemes are represented at the systematic phonemic level by a sequence of columns containing the required distinctive feature specifications. Each column represents a segment, the concern here being the features within segments rather than with segments as a whole.

At the systematic phonetic level, utterances are made up of morphemes and junctures which are related to feature columns, corresponding to the phones of a traditional segmental description. The feature matrices at the systematic phonetic level differs from those at the phonemic level in that they are fully specified for all
classificatory features and the features themselves have numerical values in addition to plus or minus values.

Phonological rules apply to sentences sequentially, and very often in a specific order. Each application of the P-Rule brings about a change in the phonological representation of the sentence in some way or the other, leading to the final phonetic representation.

Most generative phonologists frequently quote rules containing segmental symbols. It is to be noted that such symbols are merely 'convenient shorthand for arrays of features' (Clark and Yallop 1990: 156). In this regard, the symbol [u] is in fact short hand for something like

```
+ syllabic
- consonantal
+ voiced
+ high
... (etc.) ...
```

where the segment is specified as a set of phonetic feature values. A sequence of segments in comparable notation is referred to as a 'matrix', because each segment can be considered as a set of values entered against the features. The word 'peak' [pi:k] may be displayed in the following way:
It must be kept in mind that in spite of the claim of generative phonology, in reality, barring a few cases like *sane, sanity, opaque, opacity* etc., the systematic phonemic representation of the approach is not much different from the orthodox phonemic representation called 'taxonomic phonemic representation' (Schane 1973: 97). Therefore, there is no gain in dispensing with the latter. Favouring the retention of the phonemic representation, O'Connor states:

Yet there is something lost if the phoneme is abandoned, ... The real solution in the long term is to combine the two approaches (phonemic and generative) to the benefit of both, and there are already hopeful signs of this happening (1973:213-14).
2.10 Post Generative Scenario

Generative phonology as postulated in SPE pervades the scene in the 1970's. But it is not without its natural reactive offshoots. Some of such reactions were in the forms of Natural Generative Phonology (NGP), Natural, Autosegmental Phonology, CV Phonology, Metrical Phonology, Lexical Phonology, Dependency Phonology, Experimental Phonology. We present below a brief discussion on the above post generative phonological trends.

2.10.1 Natural Generative Phonology (NGP)

Natural generative phonology (NGP) emerges from a few papers by Vennemann in the early 1970's and is most comprehensively expounded by Hooper in a 1976 book (Vennemann 1972,1974; Hooper 1976). As the title of this 'school' suggests its proponents do not claim to depart radically from the mainstream of generative phonology. They describe their school as 'based in part on transformational generative theory as developed since mid-1950's but point to a major difference concerning the abstractness of phonological representations and rules (Hooper 1976: xi).

In fact, NGP is quite radical in its attack on abstractness, though less now than in its earliest formulations. At one stage, Vennemann has proposed to rule out any underlying form that is not identical to a surface form: if a morpheme shows no alternation, then its underlying form must be identical to one of the surface allomorphs. Hooper herself assesses this proposal; and states that it goes 'too far. As an illustration, she considers pairs of words showing different vowels reduced to [ə], depending on where the stress falls, such as
A strict constraint on abstractness would mean that one of the surface forms will have to be chosen as underlying. But, of each pair of forms given above, neither seems genuinely underlying in the context of generative description: if the term 'underlying form' has any value at all, the root should not contain any occurrence of [ə], as this vowel is derived by reduction from other vowels.

In a sense, NGP directs phonology back towards the more concrete concerns of phonemics. This point is underlined by Hooper's recognition of a distinction among rules that virtually revives the traditional categorization into phonetic and morphophonemic rules. Hooper distinguishes between rules that refer only to phonetic information and reflect the 'automatic' pronunciation habits of a speaker (which she terms P-rules), and rules that refer to grammatical or lexical contexts and often do admit exceptions (MP-rules) (Hooper 1976: 15)

2.10.2. Natural Phonology.

Though similar in name to natural generative phonology, natural phonology represents a more dramatic departure from the mainstream of generative phonology. It has its origins in David Stampe's dissertation on natural phonology published in 1979. Stampe begins his dissertation in the context of children's acquisition of phonology and draws attention to what he calls 'phonological processes' (Stampe 1979:1). These processes are not rules of the language, acquired as the child masters a language, but reflections of what might call the child's inbuilt tendencies. Thus, by the
nature of the human articulatory and perceptual organism, a child will prefer to articulate plosives as voiceless rather than voiced because of the relative difficulty of maintaining voicing, while the supraglottal tract is closed off or will prefer to nasalize vowels next to nasal consonants. Processes are revealed in the consequent substitutions which children make in the early stages of acquisition, for example, when they neutralize the voicing distinction of English by substituting voiceless plosives for voiced.

The application of phonological processes is not as straightforward as simple examples might suggest. Not only are there many such processes, but some of them are contrary to others. For example, a process of vowel denasalisation reflects the goals of articulatory ease and auditory distinctness in vowel production; but this to some extent counter by the process of nasalising vowels next to nasal consonants. In early stage of language acquisition, the unconstrained operation of natural processes will tend to reduce every potential utterance to something like a monosyllabic [pa](Stampe 1979:xvii). As the child comes closure to an adult competent, processes will be suppressed or limited in response to the demands of the phonological system. Hence, if acquiring a language in which nasalized vowels are distinctive, a child will have to suppress the relevant natural processes and thus achieve control of vowel nasalisation. But in a language in which vowel nasalisation is not distinctive, the natural process of nasalising vowels next to nasal consonants may persist as an allophonic rule of adult speech.

Donegan and Stampe claim that their theory is natural because it seeks to explain why language is the way
it is. The theory offers genuine explanation by presenting language not as merely 'conventional but as a 'natural reflection of the need, capacities and world of its users' (Donegan and Stampe 1979:127).

10.2.3 Autosegmental Phonology

The phrase 'autosegmental phonology' is the title of Goldsmith's dissertation published in 1976. His initial concern is with what may seem to be a limited and particular problem, that of segmental organization, or more particularly, that of phenomena which have evaded segmental classification. The longest chapter in the thesis is devoted to the 'tonology' of Igbo, a West African tonal language. He includes substantial attention both to other tonal languages and to stress and intonation in English.

Goldsmith's work nevertheless goes beyond tone and intonation. His thesis announces a claim about the 'geometry' of phonetic representation in the context of what he calls 'the absolute slicing hypothesis (1976:16). His fundamental point is that speech, observed as articulatory activity, consists of gestures--such as tongue movement, lip movement, laryngeal activity--which are coordinated but which by no means start and finish all at the same instant. The point is a familiar one in modern phonetics. Goldsmith's reiteration of it leads him to what he calls a 'multilinear phonological analysis in which different features may be placed on separate tiers' (1979:202). The tiers are connected to each other by 'association lines', which allow for the fact that there may not always be a neat one-to-one mapping between tiers. Thus, an autosegmental notation can show tonal features on
The approach can be extended to other features. Nasality, for instance, may also be represented on a separate tier, allowing for similar spreading across segmental boundaries. Where a consonant is prenasalised and the preceding vowel nasalized, we may represent

\[ \text{damba} \] as N

Goldsmith himself remarks that the system of analysis itself was 'originally suited to fit the intricacies of African tone languages (1979:212). Similar notation can be applied to other phenomena, especially vowel harmony, where the spread of vowel features across segmental boundaries can be treated analogously to the examples of tone and nasality shown above.

2.10.4 CV Phonology

The concept of tiers is also found in CV phonology, which arose from work by Kahn on syllabic organization (Kahn 1980; Clements and Keyser 1983). The original contribution of CV phonology is the postulation of a CV tier, a tier of C and V 'slots' which are filled by the segments. Often segments (or the set of features represented by a segment) can be mapped straightforwardly on to these CV positions. Charting the relationships in
similar fashion to autosegmental notation, we might represent English *map* and *landed* as

\[ \text{C V C} \quad \text{C V C} \quad \text{C V C} \]
\[ m \times p \quad i \times n \times d \quad e d \]

But, just as autosegmental phonology allows other kinds of mapping, so CV phonology offers the possibility of capturing the special nature of complex segments that traditionally require structural interpretation. Thus, a diphthong can be shown as two vowel qualities functioning as, or filling the position of, a single vowel; or a lengthened or geminate consonant can be represented as a single segment spreading over two C positions:

\[ \text{V} \quad = [a i] \quad \text{C} \quad \text{C} \quad = [t : ] \]

In keeping with their generative antecedents both autosegmental and CV phonology incorporated derivational processes into their phonological modelling. The CV tier, also referred to as the 'skeletal' tier or 'timing tier', now forms part of what Clements and Keyser call 'a universal theory of syllable'. The tier not only defines the timing of segmental organization but also takes over the role of the feature [syllabic].

The model has affinities with metrical phonology, which is discussed in the following section. Goldsmith (1989) suggests that the convergence of autosegmental, CV and metrical phonology is yielding 'a new synthesis'.
2.10.5 Metrical Phonology

Metrical Phonology has its origin in a doctoral dissertation submitted by Liberman in 1979. Just as autosegmental phonology began with tone and was then extended to other phenomena, metrical phonology began as a theory of stress and later widened its horizons.

The starting point of metrical phonology is an assumption about the nature of stress and its representation, namely that stress patterns reflect an underlying structure in which stronger and weaker constituents are juxtaposed. To say that a certain syllable is stressed is to make a judgement about its strength relative to adjacent syllable. Using the kind of tree structure, we can display the stress pattern of disyllabic words as either

\[ \text{S} \quad \text{W} \quad \text{S} \quad \text{or} \quad \text{S} \quad \text{W} \quad \text{W} \quad \text{S} \]

where \( \text{S} \) and \( \text{W} \) simply indicate stronger and weaker constituents. Much of metrical theory is then devoted to explaining how more complex patterns are derived from these basic patterns within certain postulated constraints. It is assumed in some versions of metrical theory that the relationship between \( \text{S} \) and \( \text{W} \) is binary, so that the polysyllabic patterns entail subsidiary branching, e.g.

\[ \text{S} \quad \text{W} \quad \text{S} \quad \text{W} \quad \text{W} \]
The above discussion was part of a revival of interest in the concepts of feet and syllables, an interest evident also within autosegmental and CV phonology. In the new formalism, the foot, traditionally recognized in English poetry, could also be identified as a tree structure.

2.10.6 Lexical Phonology

Lexical phonology reflects most clearly the concerns of pregenerative phonemics. Originally developed by Strauss, Kiparsky and Mohanan, it shows a revived interest in morphology and asserts a level of representation, which is comparable to that of taxonomic phonemics.

Despite the willingness to recognize value in traditional phonemics, lexical phonology is not as concrete as natural generative phonology or natural phonology. Lexical phonology does allow for abstract underlying forms and in that light is 'a standard generative phonology' (Kaisse and Shaw 1985:3). Lexical rules are fed by morphology. The morphological component supplies the various affixed and compounded forms of the language, and lexical rules then apply, to modify these forms in accordance with the phonological requirements of the language. In English, a lexical rule might ensure that the final consonant of stems such as logic, critic and electric is 'softened' to /s/ before the suffixes '-ism' and '-ity'; or another lexical rule might apply to the suffix '-ed' to devoice the /d/ in forms like tapped and licked, in conformity with the patterning of English consonant clusters.

The postlexical rules, applying to the output of lexical rules, include those that apply to larger domains than words - rules, for instance, that need to refer to phrasal structure or that apply across word boundaries. In
English, the assimilation of /s/ and /z/ to /f/ and /ʒ/ before /j/ must be postlexical; since it applies not only within words (as in tension and usual) but also across word boundaries (as in I miss you or as you wish). Rules of the postlexical component also fill in the redundant features that have been unspecified in the lexical component.

It is noteworthy that lexical rules are by and large morphophonemic in traditional terms, including the rules familiar from SPE which apply to tense and lax vowels. Postlexical rules are similar to the allophonic processes of traditional phonemics. The consequence is that the output of lexical rules—termed lexical representation—is in some respects quite similar to a traditional phonemic transcription. It is recognized by lexical phonologists as a significant level within phonology, one which is likely to be real to native speakers in the sense that, for example, they are conscious of the different vowels in sane and sanity determined by lexical rules, but unaware of the extent to which they voice the plosive or nasalize the vowels in sanity.

2.10.7 Dependency Phonology

Dependency phonology (Anderson et al. 1985, Anderson and Ewen 1987) shares much of the modern interest in structures, such as feet and syllables and in the organization of features below the level of the segment. It is possible to model the structural organization of speech in a way that is reminiscent of metrical tree structures but different in important respects. A monosyllabic word like English print might be displayed as follows:
As in other kinds of tree diagram, the single node at the top can be said to dominate the structure, defining the unit—here a syllable in which the vowel serves as head or nucleus. But in dependency phonology there are no category symbols and structural relations are shown by dependency alone, reflected in the tree diagram. Thus, the vowel in our example is most prominent, and the consonants are subordinate or dependent. But dependency extends further than this, for the diagram shows the vowel both as head of the syllable and as head of the rhyme /int/. Moreover, /r/ is shown to be head of the initial consonant cluster, and /n/ head of the final cluster; conversely /p/ is dependent on /r/, /t/ on /n/ and both clusters are dependent on the nuclear vowel.

Features or components can also preponderate in dependency phonology. Where a language distinguishes /e/ from /e/, the higher vowel may be represented with frontness preponderant over lowness, as {a \rightarrow e}, the lower with lowness preponderant over frontness, as {a \rightarrow i}. But Anderson and Ewen (1987:127) point out that this relationship of preponderance can also be portrayed in a similar way to prominence relations within linear structure. Hence /i/ dominating /a/ can be shown as
A diphthong such as [ai] can be shown with the first target predominant:

\[
\begin{align*}
\text{a} & \quad \downarrow \\
\text{i} & \\
\end{align*}
\]

As Anderson and Ewen put it, preponderance relationship among features, and prominence relationships among linear elements are parallel: preponderance is the intrasegmental analogue of prominence (1987:128).

### 2.10.8 Experimental Phonology

Experimental phonology represents an attempt to draw together at least three research styles: experimental phonetics, experimental psychology and phonological theory. The intention is to submit hypotheses about phonological organization to testing and validation of the kind which is standard in the experimental sciences, and which has been taken over, to some extent at least, by researchers in fields such as psychology, psycholinguistics and instrumental phonetics. This move is not always free of the implication that phonology is speculative and that evidence obtained experimentally is superior to any other kind of evidence. Experimental phonology is also a kind of a reaction against generative phonology, or if not a direct reaction, then a reassertion of pregenerative interests. Proponents of experimental phonology like Ohala, Jaeger,
Hombert and Campbell take a rather generous view of what constitutes an experiment, and emphasize observation and careful refinement of one's beliefs rather than reliance on instrumental investigation or statistical processing of results. Both Hombert and Campbell suggest that evidence from word games provides a test of the psychological reality of phonological rules and structures. Hombert describes a word game in Bakwiri, a Bantu language which has no consonant clusters other than sequences of nasal followed by homorganic voiced stop. The word game involves reversing the two syllables of two-syllable words, so that e.g. [moko] would become [komo] and [lowa] would become [walo]. Now words such as [komba] and [kondi] are reversed as [mbako] and [ndiko], suggesting that the syllabic structure is [ko.mba] and [ko.ndi] rather than [kom.ba] and [kon.di].

It is refreshing that phonetics and phonology are meeting each other in this way — that experimental phoneticians are aware of the theoretical assumptions and implications of their work, and that phonologists are aware of empirical methods and the need for evidence.

As mentioned earlier (cf. SS 1.2) SPE is still considered the most comprehensive theory on generative phonology. Moreover, there has not been any phonological study of Sambalpuri along the generative lines. We here, therefore, made an attempt here to study Sambalpuri along the SPE model.