CHAPTER FOUR

DISTINCTIVE FEATURES OF SAMBALPURI PHONEMES AND REDUNDANCY RULES
4.1 Distinctive Features of Sambalpuri Phonemes

As has been mentioned earlier (cf. SS 2.2.1), a phoneme is not further divisible. It can, however, be viewed as a bundle of simultaneous units called distinctive phonological features. These features of a phoneme, and not the phoneme itself, are the smallest and most basic units of phonological analysis. This sort of analysis is highly rewarding for the insightful capturing of phonological processes. Therefore, generative phonology employs distinct features theory as its basis for phonological analysis of language.

As stated earlier (cf. SS 1.4) for the purpose of a generative phonological analysis of Sambalpuri, we shall primarily follow the model of Chomsky and Halle (1968) as illustrated in SPE. In places where we feel SPE model inadequate for the analysis of Sambalpuri, we would refine the model to suit our purpose.

Though the phonetic parameters are by and large sufficient as a set of features to make the phonemes of a language distinctive, yet some refinement is still
necessary to make the feature theory completely foolproof. Therefore, we have to incorporate features like [aspiration] and [dental] to suit to our study of Sambalpuri phonemes.

As the features have their foundations in phonetics they have either articulatory (e.g. [coronal], [high]), or acoustic (e.g. [sonorant]), or perceptual (e.g. [syllabic]) correlates.

4.1.1 A Common Set of Features for Vowels and Consonants

Keeping in design with the generative approach, we should try to avoid the problems of having distinct sets of features for vowels and consonants. Having two such different sets of features is certainly uneconomical and undesirable where the expression of the phonemic contrast of a language is concerned. Further, compartmentalised features cause a hindrance in the expression of phonological generalisations because a sharp division into consonant and vowel features makes little sense in phonetic terms. There is nothing, for instance, in the definitions for the tongue body features that forbids us to use them for analysing consonants also. We, therefore, select a common and relevant set of features from the entire set of features proposed in the SPE framework.
4.1.2 Major Classes: [Consonantal], [Sonorant], [Syllabic] and [Continuant]

4.1.2.1 [Consonantal]

According to the Generivists, the term 'consonant', when defined phonetically, refers to only one function of a particular sound in the syllable. However, the feature [consonantal] does have a phonetic definition. A phonetically non-consonantal sound is likely to function as a consonant in a syllable.

[Consonantal]: Consonantal sounds are produced with a radical obstruction in the vocal cavity.

To understand the definition clearly, we need to comprehend "radical obstruction" (Chomsky and Halle 1968: 302). It implies that the obstruction is "at least as extreme as in fricative consonants" (Anderson 1974: 208). Keeping the feature [consonantal] in view, the classifications of Sambalpuri phonemes would be like this:

[+Consonantal] [-Consonantal]
stops, fricatives /j, h/,
nasals, lateral, trill vowels

4.1.2.2 [Sonorant]

The feature [sonorant] is defined in SPE (1968) in terms of the vocal cavity configuration. It refers to the sonorant quality of a sound, which has spontaneous voicing.
[Sonorant]: Sonorant sounds are produced when the phonetic content is predominantly made up by the sound waves associated with voicing.

Chomsky and Halle (1968), however, do not consider voicing as a pre-requisite for sonorant sounds. When sounds produced with a constriction more radical than [j] and [w], voicing is not spontaneous, and therefore, according to Chomsky and Halle (1968), such sounds are [-sonorant]. On the other hand, [h] is [+sonorant] since vocal cavity configuration for this sound allows spontaneous voicing.

Though such a feature is necessary for phonological analysis, to define it in terms of spontaneous voicing and nonspontaneous voicing does not sound scientific. However, it captures our intuition and includes Sambalpuri vowels, nasals, lateral and approximant in one natural class, as opposed to the other natural class comprising Sambalpuri stops, fricatives and trill.

So applying the feature [Sonorant], we can classify the Sambalpuri sounds in the following manner:

$$
\begin{align*}
\text{[+Sonorant]} & \quad \text{[-Sonorant]} \\
/m, n, \eta, \delta, j/ \quad & /p, p^h, b, b^h, t, t^h, \\
\text{Vowels} & \quad /\ddot{d}, \ddot{d}^h, \ddot{t}, \ddot{t}^h, \ddot{d}, \ddot{d}^h, \\
& \quad /c, c^h, j, j^h, k, k^h, \\
& \quad /g, g^h, s, h/.
\end{align*}
$$
Nonsonorants are also called "Obstruents" because they are produced with an obstruction of the air stream that results in friction or closure. Voicing is not essential in such sounds. Therefore, obstruents may be voiced or voiceless.

4.1.2.3 [Syllabic]

The Jakobsonian features [Consonantal] and [Vocalic] define four major classes of segments: True consonants, Vowels, Liquids and Glides. However, Chomsky and Halle (1968:354) replace the feature [Vocalic] by the feature [Syllabic], though the latter is not explicitly defined. However, it is suggested that the feature [Syllabic] characterizes the role a segment plays in the stress of the syllable. Thus, we can formally define it in the following way:

[Syllabic]: The syllabic sound serves as a syllable peak in a syllable.

We then have the following classification of the Sambalpuri phonemes:

[+Syllabic]
Vowels

[-Syllabic]
stops, fricatives, nasals, lateral, /r,l,j/
4.1.2.4 [Continuant]

Sambalpuri fricatives can be kept distinct from stops by the feature \(^{-}\)Continuant].

[Continuant]: A continuant is a sound during whose production the air stream is not blocked off completely in the oral cavity.

\(+\)Continuant \quad [-\)Continuant

fricatives, vowels, \quad stops, nasals
/r, j, l/

Using the two features [Sonorant] and [Continuant], we find the following four major classes of sounds:

\begin{align*}
\begin{array}{c}
\text{[+Sonorant]} \\
\text{[+Continuant]} \\
\text{[+Sonorant]} \\
\text{[-Continuant]} \\
\text{[-Sonorant]} \\
\text{[-Sonorant]} \\
\text{[-Continuant]} \\
\end{array}
\end{align*}

= Approximants

= Nasals

= Fricatives

= Stops

As the natural class "Approximants" includes both "Liquids" and "Glides" the above distinction does not
differentiate between vowels and approximants. Therefore, we take the help of the feature [Consonantal] to project the major class features as shown in Table IV.1.

<table>
<thead>
<tr>
<th></th>
<th>Stops</th>
<th>Fricatives</th>
<th>Nasals</th>
<th>Liquids</th>
<th>Glides</th>
<th>Vowels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sonorant</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Continuant</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Consonantal</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Examples**: p b t d s h m n n' l r j i e u

**Table IV.1** Major Class Features of Sambalpuri

4.1.3 [Nasal]

The distinctive feature [Nasal] refers to the manner of articulation of Sambalpuri sounds. We can formally define this feature in the following way:

*Nasal*: A nasal sound is produced with a lowered velum which allows the air stream to escape through the nose; a non-nasal sound is produced with a raised velum so that the air stream can only escape through the mouth.

We can deduce from the definitions of the features [Sonorant] and [Continuant] that a sound which is both sonorant and noncontinuant must be a nasal. This can be expressed by the following universal redundancy rule:
What makes the feature [Nasal] redundant not only in sonorant noncontinuants but in all phonemes of Sambalpuri is the fact that the language has no nasal phonemes other than sonorant noncontinuants, viz., /m,n, ñ,ŋ/. Again, Sambalpuri does not have the nasal vowel phonemes that are sometimes found in certain other languages.

4.1.4 [Coronal] and [Anterior]

These two features refer to the place of articulation. However, to avoid likely confusion, instead of using [bilabial], [dental] or [velar] as binary features, for instance, we shall use the features [Coronal] and [Anterior]. Their definitions are given below:

[Coronal]: A coronal sound is articulated with the blade of the tongue raised above its neutral position, on the other hand, a non-coronal sound is produced with the blade of the tongue in the neutral position.

[Anterior]: An anterior sound is produced with an obstruction that is located in front of the
palato-alveolar region of the mouth, a non-
ante
terior sound, on the other hand, is 
produced without such an obstruction.

According to the phonetic description of consonants, 
[+anterior] is a cover term for bilabial, labio-dental, 
dental, and alveolar places of articulation. Therefore, 
we classify post-alveolar, palato-alveolar, palatal, velar 
and glottal sounds as [-anterior].

Now we can categorise the Sambalpuri consonantal 
features employing the binary features of [+sonorant] and 
[continuant] on the one hand, as well as [anterior] and 
[coronal] on the other (cf. Table: IV.2).

<table>
<thead>
<tr>
<th>[+Anterior]</th>
<th>[-Anterior]</th>
</tr>
</thead>
<tbody>
<tr>
<td>[-Continuant]</td>
<td>m</td>
</tr>
<tr>
<td></td>
<td>p pʰ b bʰ</td>
</tr>
<tr>
<td>[+Continuant]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>[-Coronal]</td>
<td>[+Coronal]</td>
</tr>
</tbody>
</table>

Table: IV.2. Sambalpuri Consonantal Features: Cross Classification
Though two features [anterior] and [coronal] are somewhat non-mnemonic, in terms of their classificatory potential they have great advantages over the place labels used in Sub-section 4.1.4. Table IV.2 lists the consonant phonemes of Sambalpuri in such a way that the different rows represent the four combinatory possibilities of [continuant] and [sonorant], and four combinatory possibilities of [anterior] and [coronal]. Voiced obstruents like /b,d,g,j/ etc. are omitted from the tabular display (cf. Table IV.2) as these are likely to coincide with /p,t,k,s/ etc.

The display in Table IV.2 has four binary features having $2^4 = 16$ combinatory possibilities. Each of these is represented by a separate box in the table. Distinctive consonantal features may be elicited from the same tabular display as exemplified below:

/ŋ/ =

-continuant
+sonorant
+anterior
+coronal
There are, however, four features in the Table IV.2 where two or more phonemes are in the same box, showing the same specifications for the few features. The following contrasts are not expressed by the four binary features:

(i) /p/ and /pʰ/ are

(ii) /t, tʰ, t, tʰ/ are
(iii) /c/ and /cʰ/ are

\[
\begin{array}{c}
-\text{continuant} \\
-\text{sonorant} \\
-\text{anterior} \\
+\text{coronal}
\end{array}
\]

(iv) /k/ and /kʰ/ are

\[
\begin{array}{c}
-\text{continuant} \\
-\text{sonorant} \\
-\text{anterior} \\
-\text{coronal}
\end{array}
\]

We shall handle the problem related to aspiration feature in Sub-section 4.1.10.2.

4.1.5 [Lateral]

The feature theory provides yet another feature of manner of articulation for phonological analysis. Though nasals and laterals together form one natural class, the feature [nasal] keeps the Sambalpuri nasals distinct from the laterals. In spite of having one lateral sound in contrast with its neighboring Oriya language which has two = one lateral and another rétroflex, it needs feature specification to make the analysis significant.
[Lateral]: A lateral sound is produced by lowering the mid-section of the tongue at one or both sides, thereby allowing the air to flow out of the mouth in the vicinity of the molar teeth; in non-lateral sounds no such side passage is open. (Giegerich 1994:125).

It may be pointed out that the feature [lateral] is, like [nasal], redundant phonemically in Sambalpuri. Below is given the redundancy rule relating to a lateral:

\[
\begin{align*}
+\text{sonorant} \\
+\text{continuant} \\
+\text{anterior} \\
+\text{coronal}
\end{align*} \rightarrow [+\text{lateral}]
\]

4.1.6 Tongue-body Features: [B̥äck], [High] and [Low]

These three features are related to the placement of the body of the tongue. The features are characteristic in terms of the "Neutral position of the tongue" (Chomsky and Halle 1968:300). It is the "speech-readiness" position of it in which it is
rained to above the level that it occupies in the articulation of the English vowel [e] in the word bed. (Ibid.).

The reference to "neutral position" is not very cut because the exact quality of the vowel may vary between the half-open and the half-close positions (Gimson 1970:104). Another point of disagreement with regard to the neutral position is that there is no evidence that this position is the level of that in the vowel [e]. (Ladefoged 1972:99).

However, for the purpose of the classification of sounds, we assume that such features like [back], [high] and [low] refer to the dimensions of the vowel trapezium. It is the position of the body of the tongue in the oral cavity. The front-back dimension indicates the location of the highest point or the back of the mouth. In other words, front-back describes whether the front or the back part of the tongue-body is raised. The high-low dimension of the trapezium refers to the degree of such raising.
4.1.6. The Feature [\text{Back}]

The basic vowel system of Sambalpuri may be divided into 'front' and 'back' categories. Though the Cardinal Vowels are highly idealized, they are nonetheless greatly relevant in the analysis of an actual vowel system such as that of Sambalpuri in terms of features. There are, however, subtle differences in the degree of backness and frontness in the vowel system.

For the front-back contrast of vowels, we need only one binary feature, that is [\text{back}]. So back vowels are [\text{+back}] and front vowels are [\text{-back}]. Below is given the formal definition of this feature:

\text{[Back]}: Back sounds are produced by retracting the body of the tongue from the neutral position; non-back sounds are produced without such a retraction from the neutral position. (Chomsky and Halle 1968:395)

\text{[+Back]} \quad \text{[+Back]}

\{i, e\} \quad \{\partial, a, o, u\}

It may be mentioned here that /\partial/ is referred to as [\text{+back}] for our descriptive convenience (cf. SS 3.5.2.2).
4.1.6.2 The Features [High] and [Low]

To express the three degrees of vowel height, we require two binary features — [high] and [low]. These are defined like this:

[High]: High sounds are produced by raising the body of the tongue above the level it occupies in the neutral position, non-high sounds are produced without such a raising of the tongue body, (Ibid.:304).

[Low]: Low sounds are produced by lowering the body of the tongue below the level that it occupies in the neutral position; non-low sounds are produced without such a lowering of the body of the tongue. (Ibid.:305)

These two binary features can have four possible permutations as shown below:

(a) \[
\begin{bmatrix}
+\text{high} \\
-\text{low}
\end{bmatrix}
\]  

(b) \[
\begin{bmatrix}
-\text{high} \\
+\text{low}
\end{bmatrix}
\]  

(c) \[
\begin{bmatrix}
-\text{high} \\
-\text{low}
\end{bmatrix}
\]  

(d) \[
\begin{bmatrix}
+\text{high} \\
+\text{low}
\end{bmatrix}
\]
Out of these four possible permutations, (d) is not possible because it is ruled out by the definition of the two features. In fact, no sound can be produced by simultaneous actions of raising and lowering the body of the tongue. Therefore, it is redundant that [+high] is automatically [-low] and [+low] is automatically [-high]. This redundant rule, formulated below, is universally valid for all languages, including Sambalpuri.

\[
\begin{align*}
[+\text{high}] & \rightarrow [-\text{low}] \\
[+\text{low}] & \rightarrow [-\text{high}]
\end{align*}
\]

The above rules give us three heights -- high vowels are [+high], redundantly also [-low]; low vowels are [+low], redundantly [-high]; and vowels of medium height are neither high nor low, they are [-high, -low].

Now employing the three features, viz., [back], [high] and [low], we can express the contrasts of the Sambalpuri vowel system as shown in the next page:
The three features introduced so far (cf. SS 4.1.6) express all the phonemic contrasts of the Sambalpuri vowel system, except one: /ɔ/ and /ɔ/ are both [+back] and [+low]. Of the other vowel phonemes, each one differs from all others in terms of at least one feature. As for /ɔ/ and /ɔ/, the feature [round] will express the contrast.

4.1.7 The Feature [Round]

The feature [round] is closely associated with the tongue body features; though, basically it refers to lip-rounding during the production of a vowel phoneme. It is defined in the following way:

[Round]: Rounded sounds are produced with a narrowing of the lip orifice; unrounded sounds are produced without such a narrowing.

(Ibid: 309)
Normally by using this feature, in addition to the other tongue body features, /ɔ/ can be distinguished from /ʌ/.

\[
/ɔ/ = \begin{bmatrix} +\text{back} \\ +\text{low} \\ +\text{round} \end{bmatrix} \quad /ʌ/ = \begin{bmatrix} +\text{back} \\ +\text{low} \\ -\text{round} \end{bmatrix}
\]

In all other contrasts of the basic Sambalpuri vowel system, the feature [round] is not useful. So, this feature is operative in the phonological analysis of Sambalpuri to a limited extent only.

However, applying the feature [round], we can deduce that Sambalpuri has no non-back rounded vowels. So redundantly, all round vowels are back. We can formalise this concept in the following ways:

(a) \([-\text{back}] \rightarrow [-\text{round}]\)

(b) \([+\text{round}] \rightarrow [+\text{back}]\)
Sambalpuri vowels can now be expressed in terms of features as posited in Table: IV.3 as given below:

<table>
<thead>
<tr>
<th></th>
<th>i</th>
<th>e</th>
<th>ɔ</th>
<th>a</th>
<th>o</th>
<th>u</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>[Consonantal]</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>[Sonorant]</strong></td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td><strong>[Continuant]</strong></td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td><strong>[Back]</strong></td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td><strong>[High]</strong></td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td><strong>[Low]</strong></td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>[Round]</strong></td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Table: IV.3  A Distinctive Feature Matrix of Sambalpuri Vowels
4.1.9 The feature [Voice]

The feature [Voice] is related to the vibration of the vocal cords. Voicing contrasts occur only within the class of [-songrant], otherwise called [+obstruent], phonemes such that all oral stops occur in voiced or voiceless pairs. Though Chomsky and Halle (1968) refer to this feature in connection with English fricatives also, Sambalpuri has only two fricative phonemes, viz., /s, h/, without having their voiced counterparts.

[Voice]: Voiced sounds are produced with a glottal setting consistent with vocal fold vibration; voiceless sounds are produced with a glottal setting inconsistent with vocal fold vibration. (1968: 326-7)

A phoneme specified as [+voice] is, in fact, potentially voiced. On the other hand, a [-voice] phoneme in voiceless in all contexts.

[+Voice]

/b, b\text{\textsuperscript{h}}, \text{\textase}, \text{\textase}^\text{h}, \text{\textddot{u}}, \text{\textddot{u}}^\text{h} /

[=Voice]

/p, p^\text{h}, t, t^\text{h} /

/s, s^\text{h}, k, k^\text{h}, s, h /
It may be redundant to say that all sonorants are voiced. This redundancy rule is shown as:

\[ [+\text{sonorant}] \longrightarrow [+\text{voice}] \]

\(/m,n,\eta,\eta,l,r,j/\),

vowels

In connection with the actual voicing pattern of phonemes marked as 'voiced' or [+voice], it has been proposed (Ó'Connor 1973:40) that the relevant contrast should be described as one of "fortis" versus "voiced" phonemes rather than "voiced" versus "voiceless". We, however, prefer to use the feature [voice] owing to obvious perception of the phonemic contrast.

4.1.10 Additional Features

Certain unique features of Sambalpuri are not possible to be accounted for with the help of the SPE model. Therefore, we propose the following additional features to capture the contrasts between different plosives, viz., [dental] and [aspiration].

As a matter of fact, along with Sambalpuri most of the Indian languages would require such additional features
to capture the phonological contrast between the plosives because basically they originated from the common source, i.e., the Sanskrit language. In the earliest records of speech analysis from ancient India, sounds are labelled and classified by various criteria. The feature 'dantya' was used by the Sanskrit grammarians in much the same way as modern phonologists and phoneticians use its English equivalent 'dental' to identify the point of articulation of certain plosive consonants. Many of the terms used in Sanskrit grammar have a similarly direct reference to articulation and, therefore, have influenced the terminology of modern phonetics. However, others may have been motivated more by systemic considerations than by articulatory accuracy. In fact, features are not uncontroversial labels for objective characteristics of speech but may be used in various ways to indicate the nature and functions of sounds within a linguistic system.

In connection with the two additional features in question (i.e. [dental] and [aspiration], we do not find any concrete reference either in Jakobsonian or in
Chomskyan distinctive feature system. Therefore, as stated in SS 1.2, we would prefer to use these two features to differentiate the distinctive status between plosives. Out of twenty Sambalpuri plosives, viz., /p, ph, b, bh, t, th, d, dh, t, th, d, dh, c, ch, j, jh, k, kh, g, gh/, the feature [dental] would capture the difference between the Sambalpuri dental plosives and the retroflexes. On the other hand, the feature [aspiration] is capable of indicating the difference between the ten Sambalpuri aspirates and non-aspirates.

The two additional features suggested by us are rather cover features which conveniently refer to specific classes of sounds. In spite of their articulatory specification and similarities, they have perceptual differences in articulation.
4.1.10.1 The Feature [Dental]

The Chomsky and Halle (1968) framework does not seem to account for the contrasts between /t/, /tʰ/, and /d/ and /dʰ/ in Sambalpuri. To capture these contrasts, we would like to propose the introduction of an additional feature [dental]:

[Dental]: Dental sounds are produced in the articulation of which there is a stricture in the dental or pre-alveolar region.

In fact, the feature [+dental] captures the contrast between the Sambalpuri dental plosives and the Sambalpuri retroflexes. In other words [-dental] plosives are retroflexes that are produced in the articulation of which there is a stricture in the alveolar or post-alveolar region.

[+Dental]  [-Dental]

/t, tʰ, d, dʰ/  /t, tʰ, d, dʰ/
4.1.10.2 The Feature [Aspiration]

Chomsky and Halle (1968) characterize aspirated and unaspirated sounds in terms of the feature [heightened subglottal pressure]. They are of the opinion that /p^h/, /b^h/, /c^h/, /\theta^h/ etc. are produced with heightened subglottal pressure, and their counterparts like /p/, /b/, /c/, /\theta/ etc. are produced without any such subglottal pressure. However, this claim becomes controversial following the experimental findings from Sindhi language. It shows that although /b^h, c^h, \theta^h, g^h/ are articulated with greater subglottal pressure than their non-murmured counterparts, /\theta^h/ has less subglottal pressure than /\theta/. Thus, to characterize /\theta^h/ as [+heightened subglottal pressure] does not hold good for our purpose.

On the other hand, Anderson (1974) characterizes aspirated and murmured sounds in the following ways:

Aspirated Sounds $\rightarrow$ 
- [+stiff vocal cords]
- [+spread glottis]

Murmured Sounds $\rightarrow$ 
- [+slack vocal cords]
- [+spread glottis]
Though Anderson's treatment characterizes 'aspiration' and 'murmur' as phonologically unrelated phenomena, we propose to treat 'aspiration' and 'murmur' under the same feature [aspiration] to capture the contrast between aspirated and unaspirated sounds.

\[ +\text{Aspirated} \quad -\text{Aspirated} \]
\[
\begin{align*}
\text{/p}^h, \text{b}^h, \text{t}^h, \text{d}^h, \\
\text{c}^h, \text{s}^h, \text{h}^h, \\
\text{k}^h, \text{g}^h
\end{align*}
\]

Chomsky and Halle (1968) present twenty-seven distinctive features, grouped under five categories, viz., Major class features, Cavity features, Manner of articulation features, Source features and Prosodic features. As we have seen in the preceding sections of the present chapter, all the features of the SPE model are not relevant in the analysis of Sambalpuri speech sounds. Therefore, we have chosen only thirteen suitable features from SPE and proposed two additional features to analyse the phonological features of Sambalpuri. All the features that we have discussed for the analysis of the language have been presented in a tabular form in SS 4.1.11.
Given below is the Distinctive Feature Matrix for the Systematic Phonemes of Sambalpuri

Table IV.4. Distinctive Feature Matrix
4.2 Redundancy Rules

The redundancy features of phonemes should not be thought of as unimportant. They may also play a crucial role whenever we make a reference to a natural class comprising several segments.

Phonological features distinguish each segment of a language from the other. We specify each of the phonemes as '+' or '-' (cf. Chapter Two, SS 2.8.2) for that feature. In some cases, there is more than one difference involved in the contrast, for instance, /e/ contrasts with /o/ in rounding and backness. When we consider these features carefully, we shall find which difference is distinctive and which is redundant. We have to carefully observe the particular system in which the two occur, for example, in a language whose only vowels are /i, e, a, o, u/, backness is distinctive, while rounding is redundant. In other words, non-low back vowels are automatically round here. Like this, rules relating to the redundant features are called "redundancy rules":

The redundancy of a feature in a matrix of feature specifications characterizing a segment is called "segmental redundancy". It can be formalized using much the same conventions, notations and symbols as for phonological rules. Thus, if, as in the first case mentioned above (/i, e, a, o, u/), non-low back vowels are always rounded, we can write the constraint up as in (a) below. In some generative approaches, references to rounding would then be extracted from the matrices of these vowels, simplifying them. Some generative phonologists prefer the format shown in (b) so as to differentiate redundancy rules from other kinds of rules. However, either way, the arrow is understood as "implies the presence of".

(a) \[
V \\
\left[ \begin{array}{c}
-\text{low} \\
+\text{back}
\end{array} \right] \rightarrow [ +\text{round} ]
\]

(b) \[
V \\
\left[ \begin{array}{c}
-\text{low} \\
+\text{back}
\end{array} \right] \downarrow \\
\quad \quad [ +\text{round} ]
\]
Another kind of redundancy is called "sequential redundancy". In this case a feature specification which is otherwise distinctive is predictable in certain contexts. English /f, s, j, e/, for example, generally contrast (cf. fin, sin, shin, thin), but in a word's initial cluster with a following obstruent, only /s/ can occur: cf. stick; but not *ftick, *ghtick, *htick. As a matter of fact, one can generalize further: of all the fricatives that English has, only /s/ is possible here — contrasts among fricatives are neutralized in this position. This is both a constraint on sequences of phonemes and an observation about the structure of English morphemes; a morpheme beginning with /vg/, /ɔb/, /ɛt/, /fpt/, /ɔk/, etc. would be conspicuously "un-English". The redundancy rule can be formalized as shown in (c).

\[
\begin{align*}
\text{(c)} & \quad \left[ \begin{array}{c}
+\text{consonant} \\
+\text{continuant} \\
-\text{sonorant}
\end{array} \right] & \rightarrow & \left[ \begin{array}{c}
-\text{voice} \\
+\text{coronal} \\
+\text{anterior} \\
+\text{strident} \\
-\text{high}
\end{array} \right] & \# & \left[ -\text{sonorant} \right]
\end{align*}
\]
4.2.1 Considering the preceding discussion on redundant implication of distinctive features in the distinctive feature matrix, now we present some of the basic redundancy rules of the Sambalpuri language. By and large, they are not explicitly shown in the phonological representations.

1. Nasals are always voiced,

\[ [+\text{nasal}] \rightarrow [+\text{voice}] \]

ii. Sounds that are dental are also coronal and anterior. According to this redundancy rule, Sambalpuri dentals, viz., /t, t^h, d, d^h/ are anterior, and redundantly coronal, too.

\[ [+\text{dental}] \rightarrow \begin{bmatrix} +\text{coronal} \\ +\text{anterior} \end{bmatrix} \]

iii. Sambalpuri vowels are syllabic and continuants.

\[ [+\text{syllabic}] \rightarrow [+\text{continuant}] \]
iv. Sonorant sounds which include /m, n, ŋ, j, l, j/ as well as vowels are voiced.

\[ \text{[+sonorant] } \rightarrow \text{[+voice]} \]

v. Nasals have the features of sonorant and non-syllabic.

\[ \text{[+nasal]} \rightarrow \begin{cases} \text{[+sonorant]} \\ \text{-syllabic} \end{cases} \]

vi. Nasals are non-continuant in Sambalpuri.

\[ \text{[+nasal]} \rightarrow \text{[-continuant]} \]

vii. Nasals have the feature consonantal.

\[ \text{[+nasal]} \rightarrow \text{[+consonantal]} \]

viii. Stops and fricatives are non-nasal. Stops are also consonantal and non-low.
ix. The lateral of Sambalpuri is sonorant, continuant and non-nasal.

Unlike two laterals in Oriya, Sambalpuri has only one lateral phoneme. Though it is consonantal, it has also the feature continuant, because during the articulation of this sound the pulmonic air flows out of the mouth laterally, in the vicinity of the molar teeth (cf. SS 4.1.5).

x. A sound that is syllabic, non-consonantal and high is non-low.
xi. A sound that is syllabic, non-consonantal, and low is non-high.

xii. A vowel that is non-low and back is always rounded.
xiii. A sound that is either coronal or anterior or both is non-back and non-low.

\[
\left\{ \begin{array}{c}
[+\text{anterior}] \\
[+\text{coronal}]
\end{array} \right. \quad \rightarrow \quad \begin{array}{c}
[-\text{back}] \\
[-\text{low}]
\end{array}
\]

xiv. A sound that is syllabic is a continuant.

\[ [+\text{syllabic}] \longrightarrow [+\text{continuant}] \]

xv. Non-consonantal sounds are continuant.

\[ [-\text{consonantal}] \longrightarrow [+\text{continuant}] \]

The above list of redundancy rules is not exhaustive. The set of rules needs a lot of addition and possibly certain modification.