CHAPTER II
HUMAN BEHAVIOR ORIENTATION OF DECCANI URDU PHONOLOGY
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In this chapter, an attempt is made to explain the paradigmatic make-up and the syntagmatic distribution of phonological units in Deccani Urdu, in terms of human behavior, an orienting principle for the theoretical framework of Columbia school of linguistics.

The human beings, in their daily endeavors of life, including language, resort to their underlying behavioral characteristics: the human intelligence and laziness. As a repercussion of these inherent human traits (intelligence and laziness), human beings seek a minimax solution between minimum effort and maximum accomplishment.

As stated earlier in the introduction, human beings utilize their intelligence or problem solving ability to infer the meaning of even complex expressions, with the help of situation and context. The human laziness refers to the economy of effort, that is, a general avoidance of the use of a greater degree of precision than is necessary for the accomplishment of any given task.
Thus, the power of inference and the economy of effort are the products of human intelligence and laziness. And it is both inference and economy that interact to exert tremendous pressure on language.

In phonology, as we have noted earlier, we particularly look for skewings (readily observable favorings and disfavorings) in the paradigmatic make-up of the phonological units and their frequency of occurrence in the word. For we predict that all these skewings can be satisfactorily explained in terms of our five orienting principles--the communicative intent, the physiology of the vocal tract, the acoustic medium, the vision, and the human factor. Some of the phonological skewings, both syntagmatic and paradigmatic, as encountered in Deccani Urdu, are, in our judgement, clearly motivated by the human trait of intelligence (the power of inference) and laziness (the economy of effort). It is these skewings that are dealt with in this chapter.

The phonological analysis of Deccani Urdu in terms of human behavior is presented in six sections. Section A deals with the preference of fewer articulators over more articulators in the production and distribution of phonological units. In section B, we analyze the relation between the apico-dental ("dental") consonants with the proximate point of articulation and the apico-palatal ("retroflex") consonants with the remote point of articulation. In section C, we evaluate the impact of
assimilative trait of neighboring phonological units on the combinatorial phonology of Deccani Urdu. In section D, we examine the effect of the degree of aperture change in terms of precision of control, on the favoring and disfavoring of phonological units. In section E, we discuss the human behavior justification for the phonological grid of Deccani Urdu. In section F, we present summary and conclusions with regard to the impact of human behavior on the phonology of Deccani Urdu.

**Section A: Preference for Fewer Articulators over More Articulators**

In view of the well-known trait of human beings to minimize and economize in all situations, it is to be anticipated that phonological units produced by fewer articulators will be preferred over units produced by more articulators. For the simultaneous use of greater number of articulators requires fine and precise coordination of the articulators that is disfavored in view of the human trait pertaining to the economy of effort.

It may be noted that the preference for fewer articulators over more articulators affects the distribution of phonological units on both the syntagmatic and the paradigmatic levels. The phonological skewings as encountered in the paradigmatic make-up and the syntagmatic distribution of the
phonological units are here explained in terms of fewer versus more articulators.

The three main dichotomies among the phonological units of Deccani Urdu brought about by the use of an extra articulator, are Voiced versus Voiceless consonants, Aspirated versus Unaspirated among the voiceless stops, and Nasal versus Oral vowels. These three types of opposing units will be dealt with in subsections A1, A2, and A3, respectively.

Section A1: Glottis as an Additional Articulator: Voiced versus Voiceless Consonants

The unaspirated stops and the fricatives of Deccani Urdu are characterized by a distinction of voicing and voicelessness. Whereas voiceless consonants are produced by only the supraglottal articulators, their voiced counterparts make use of an additional articulator, namely, the glottis, in their production. The simultaneous use of the glottal articulator makes the voiced consonants less favored than their voiceless counterparts in terms of the number of articulators. We therefore expect a skewing, commensurate with this criterion, in the make-up and distribution of the voiceless and the voiced consonants in Deccani Urdu.

In the following subsections, we evaluate the impact of the glottis, as an additional articulator for V(oeicing), in the paradigmatic make-up and the syntagmatic distribution of the unaspirated stops and the fricatives in Deccani Urdu.
Section A1(a): Voiced versus Voiceless among the Unaspirated Stops

As seen in the phonological grid (Diagram I-1), there are 20 phonological units ("stops") in Deccani Urdu. Traditionally, the stops are divided into four types in terms of voicing and aspiration—the voiceless unaspirated, voiced unaspirated, voiceless aspirated, voiced aspirated --, as presented in Table II-1 below.

<table>
<thead>
<tr>
<th>Stop Types</th>
<th>Points of Articulation</th>
<th>Number of units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voiceless Unaspirated</td>
<td>p  t  T  c  k</td>
<td>5</td>
</tr>
<tr>
<td>Voiced Aspirated</td>
<td>b  d  D  j  g</td>
<td>5</td>
</tr>
<tr>
<td>Voiceless Aspirated</td>
<td>p^h t^h T^h c^h k^h</td>
<td>5</td>
</tr>
<tr>
<td>Voiced Aspirated</td>
<td>b^h d^h D^h j^h g^h</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>4  4  4  4  4</td>
<td>20</td>
</tr>
</tbody>
</table>

Table II-1: Traditional Stop Types of Deccani Urdu in Terms of Voicing and Aspiration

In traditional analysis, it is assumed that the aspirated b^h d^h g^h etc., are the voiced counterparts of p^h t^h k^h etc. However, as discussed in our four-way classification of stops (cf. Chapter V, section D), the relationship of the voiced aspirates to other stop types in this classification, is much
more complex. Therefore, our analysis of the voiceless versus voiced stops is here limited to only the unaspirated stops.

As seen in Table II-1, of the 10 unaspirated stops in Deccani Urdu, 5 stops (p t T c k) are voiceless and 5 (b d D j g) are voiced. That is, there is a parity in the number of units for the voiceless and the voiced stops. This parity is okay, for it neither proves nor disproves that the simple p t k etc., are favored over the complex b d g etc.

It is noteworthy that the post dorsal voiceless unaspirated stop q, produced by the post dorsum as an articulator, did exist in old Urdu and has been preserved in classical Urdu, as well as in modern standard Urdu. However, this "uvular" stop was lost in Deccani Urdu, and was merged with the dorsal x. This elimination of the voiceless post dorsal stop q has wiped out the obvious skewing in favor of the voiceless stops, and has brought about a parity in the number of units between the voiceless and the voiced stops in Deccani Urdu.

Nevertheless, the preference for the voiceless stops, vis-a-vis the voiced stops, clearly shows up in their frequency of usage in the word in Deccani Urdu, as seen in Table II-2 below.
### Table II-2: Frequency of the Voiceless and the Voiced among the Unaspirated Stops in the Monosyllabic Words.

#### Comments on Table II-2

Comment 1: As seen in the last column in this table, of the 1503 occurrences of unaspirated stops in all the monosyllabic words, 868 (57.75%) occurrences are voiceless and 635 (42.25%) are voiced. Thus, there is a sharp skewing in favor of the voiceless stops and against the voiced stops. This clear skewing can best be explained in terms of human preference for phonological units with fewer articulators.

Comment 2: In the CVC words, as seen in Table II-2, of the 1298 occurrences of the unaspirated stops, there are 775 instances of the voiceless stops and 523 instances of the voiced stops. Thus, the voiceless stops (produced by only the supraglottal articulators) are favored almost 3 to 2 in comparison with the voiced stops (produced with an extra, glottal articulator).

<table>
<thead>
<tr>
<th>Stops (Unaspirated)</th>
<th>CVC No</th>
<th>CVC %</th>
<th>CVCC No</th>
<th>CVCC %</th>
<th>CCVC No</th>
<th>CCVC %</th>
<th>Total No</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voiceless (p t k etc.)</td>
<td>775</td>
<td>59.71</td>
<td>89</td>
<td>44.72</td>
<td>4</td>
<td>66.67</td>
<td>868</td>
<td>57.75</td>
</tr>
<tr>
<td>Voiced (b d g etc.)</td>
<td>523</td>
<td>40.29</td>
<td>110</td>
<td>55.28</td>
<td>2</td>
<td>33.33</td>
<td>635</td>
<td>42.25</td>
</tr>
<tr>
<td>Total</td>
<td>1298</td>
<td>100</td>
<td>199</td>
<td>100</td>
<td>6</td>
<td>100</td>
<td>1503</td>
<td>100</td>
</tr>
</tbody>
</table>
This vast skewing in favor of the voiceless stops and against the voiced stops is fully justified in view of the overall human preference for simpler phonological units over more complex units in any language.

Comment 3: In the CCVC column, as seen in the table, there are only 6 occurrences of the unaspirated stops in the monosyllabic words with initial consonant cluster. Of these 6 occurrences, the 4 instances of the voiceless stops appear in a ratio of 2 to 1 the 2 instances of the voiced stops. This tilt in favor of the voiceless stops and against the voiced stops, fully conforms to our expectations in terms of the human trait of preferring phonological units with fewer articulators over those with more articulators. It may however be noted that the insignificant number of occurrences (6) for both the voiceless and the voiced stops cannot have any statistical validity.

Comment 4: As seen in the column for the CVCC words in Table II-2, of the 199 occurrences of unaspirated stops, there are 89 occurrences of the voiceless stops vis-a-vis 110 occurrences of the voiced stops. The clear skewing in favor of the voiced stops and against the voiceless stops in the CVCC words, is against our expectation from the viewpoint of the human preference for phonological units with fewer articulators over those with an additional articulator. The rationale for this unexpected skewing may be provided by analyzing these occurrences in their syntagmatic context.
Thus, of the 199 occurrences of the unaspirated stops in the CVC$_1$C$_2$ words, 73 appear in word initial position. Of the remaining 126 occurrences, 13 appear in C$_1$ position, and 113 show up in C$_2$ position of the final consonant cluster.

Among the 73 occurrences in the initial position of the CVCC words, there are 37 instances of voiceless stops and 36 instances of voiced stops. Though there is a slight edge in favor of the voiceless stops, it is clear that there is a competitive use of the voiceless and the voiced stops in word initial position. However, it is noteworthy that this near parity in the frequency of usage between the opposing units is brought about by the communicative factor. For we expect fair competition between the opposing phonological units in the communicatively important initial position of the word. (Cf. Chapter III, section B.)

Of the 126 occurrences of the unaspirated stops appearing in the final consonant cluster, 13 appear in the C$_1$ position, and the remaining 113 in the C$_2$ position. Of the 13 C$_1$ occurrences, 9 are voiceless and 4 voiced. This vast skewing in favor of the voiceless stops and against the voiced stops is best explained in terms of human preference for fewer articulators over more articulators.

Of the 113 C$_2$ occurrences of the unaspirated stops in the final consonant cluster, 43 are voiceless, whereas 70 are voiced. This skewing in favor of the voiced stops and against
the voiceless stops is clearly contrary to our expectation in terms of the human trait of favoring fewer articulators over more articulators. The rationale for this unexpected skewing may well be found in the assimilative trait of neighboring phonological units. We present the syntagmatic distribution of these 113 occurrences in Table II-3.

| C₂ Stops | Voiceless | | Voiced | | Total |
|----------|-----------|----------|---------|----------|
|          | No.  | % | No.  | % | No.  | % |
| After C'' | 9   | 14.75 | 52   | 85.25 | 61   | 100 |
| After C' | 7   | 28.00 | 18   | 72.00 | 25   | 100 |
| After C'' | 27  | 100.00 | 0   | 0.00 | 27   | 100 |
| Total    | 43  | 38.05 | 70   | 61.95 | 113  | 100 |

Table II-3: Frequency of the Voiceless and the Voiced Unaspirated Stops in the C₂ Position of the CVC₁C₂ Words.

As shown in Table II-3 above, of the 113 C₂ occurrences for the unaspirated stops, 61 appear after nasal consonants, 25 after other voiced consonants, and 27 after voiceless consonants.

As seen in the table, the 27 occurrences appearing after the voiceless consonants are all voiceless. This total skewing in favor of the voiceless and against the voiced stops is brought about by the interaction between two human behavior traits, namely, the preference for fewer articulators over more articulators and the assimilative trait of neighboring
phonological units. (Cf. section C.) For the two human traits reinforce each other in producing the total skewing in favor of the voiceless stops here.

As seen in the table, of the 25 occurrences of the unaspirated stops in the C2 position after the (non-nasal) voiced consonants, only 7 are voiceless and 18 are voiced. This vast preference for the voiced stops is against our expectation in terms of the number of articulators. However, it is noteworthy that this sharp skewing in favor of the voiced stops is brought about by the assimilative trait of the preceding voiced consonants in this syntagmatic context (Cf. section C.)

As seen in Table II-3, of the remaining 61 occurrences of the C2 stops that appear after the nasal consonants, only 9 occurrences are voiceless and 52 are voiced. That is, the voiced stops appear in a ratio of almost 6 to 1 in comparison with the voiceless stops. This vast skewing, approaching a tilt, in favor of the more complex voiced stops and against the simpler voiceless stops, is contrary to our expectations in view of the human preference for the simpler phonological units. Again, this extraordinary preference for the voiced stops is brought about by the powerful assimilative trait of the preceding voiced nasal consonants (particularly the dorsal nasal η) in this syntagmatic context.
Section A1(b): Voiced versus Voiceless Fricatives

In this subsection, we evaluate the impact of the glottis as an additional articulator on the make-up and distribution of the voiced and the voiceless "fricatives" in Deccani Urdu. We first present the paradigmatic make-up of the fricatives, based on Diagram I-1, in Table II-4 below.

<table>
<thead>
<tr>
<th>Fricatives</th>
<th>APERTURES</th>
<th>Number of units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Labial</td>
<td>2 Apical Medial Dorsal</td>
</tr>
<tr>
<td>Voiceless</td>
<td>f</td>
<td>s f x</td>
</tr>
<tr>
<td>Voiced</td>
<td>v</td>
<td>z □ γ h</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>2 1 2 1</td>
</tr>
</tbody>
</table>

Table II-4: Paradigmatic Make-up of Deccani Urdu

Fricatives

Comments on Table II-4

As seen in the table above, of a total of 8 fricative units, there are 4 voiceless and 4 voiced. Apparently, therefore, there is a parity in the number of units between the voiceless fricatives and the voiced fricatives.

However, it may be noted that the voiced h at aperture 1½ has a special status in the phonological paradigm of Deccani Urdu. This h is required to support the voiced aspirated series (bʰ dʰ gʰ etc.) in Deccani Urdu, as in some other Indo-Aryan languages. (Cf. Diagram I-2, Comment c).

If we exclude the voiced h (produced at aperture 1½), we see that of the 7 fricative units, produced at apertures 1 and
2, 4 units are voiceless and 3 are voiced. This skewing in favor of the voiceless fricatives in the phonological paradigm is motivated by the human preference for simpler, less complex phonological units.

Finally, it may be noted that the empty slot for the voiced fricative in Deccani Urdu appears at the axis of the medium, the less adroit articulator in terms of the hierarchy of adroitness of articulators. (Cf. Chapter I, section B.) That is, the total skewing against the voiced medial fricative, is brought about by the interaction of two orienting principles – the physiologically based adroitness of articulators disfavoring the medial consonants, and the human trait of disfavoring the more complex voiced consonants.

Further, the impact of the larynx as an additional articulator for V(oiceing) is more clearly manifest in the frequency of usage for the voiceless and the voiced fricatives in Deccani Urdu. The frequencies of the opposing units are presented in Table II-5.
Table II-5: Frequency of Voiceless and Voiced Fricatives in the Monosyllabic Words

Comments on Table II-5:

Comment 1: As seen in the last column in the table, of the 561 occurrences of the fricatives in all the monosyllabic words, 418 are voiceless and 143 are voiced. That is, the voiceless fricatives appear in a ratio of almost 3 to 1 the voiced fricatives. This vast skewing in favor of the voiceless fricatives is in conformity with our expectation in terms of the human preference for phonological units produced by fewer articulators.

Comment 2: In the syntagmatically simple CVC words, as seen in the table, we encounter a vast skewing, appearing in a ratio of over 3 to 1 in favor of the voiceless fricatives (309) and against the voiced fricatives (100). Again, this skewing is
primarily motivated by the human triad of preferring fewer articulators over more articulators.

Comment 3: As seen in Table II-5, of the 149 fricative occurrences in the syntagmatically complex CVCC words, there are 107 occurrences of the voiceless and 42 occurrences of the voiced. Here we find that the ratio is reduced to 2:4 to 1 in favor of the voiceless fricatives and against the voiced fricatives. This clear, though comparatively reduced preference for the voiceless fricatives, is primarily motivated by the human preference for the simpler, less complex phonological units.

Comment 4: As seen in the table above, of the 3 occurrences of the fricatives in the CCVC words, 2 are voiceless and 1 is voiced. Although the number is statistically insignificant to draw any definitive conclusions, the favoring for the voiceless fricatives over the voiced fricatives appears in a ratio of 2 to 1 even here. This skewing is also in conformity with our expectation in terms of the fewer versus more articulators.

Comment 5: Finally, a word about the frequency of the voiced h in Deccani Urdu. As shown in Table II-5, the figures for the voiced fricatives (143) also include the occurrences of the voiced h. As it happens, the voiced h has 53 occurrences in the monosyllabic words, 40 in the CVC words and 13 in the CVCC words. If we should accord a special status to the voiced h and exclude its occurrences from our consideration
of the voiceless versus voiced dichotomy for the fricatives, there will be a drastic skewing in favor of the voiceless fricatives and against the voiced fricatives. Thus, the revised figures would further highlight the validity of our claim that the human preference for simpler phonological units plays an important role in the phonology of a language.

Section A2: Glottis as an Additional Articulator: Aspirated versus Unaspirated among the Voiceless Stops

In Deccani Urdu, as in modern standard Urdu and some other Indo-Aryan languages, the stops are characterized by a distinction of aspiration and unaspiratedness. As the problem of aspiration in the voiced aspirated stops (bʰ dʰ gʰ etc.) is very complex, it will be taken up afterwards, when we introduce the four-way classification of the stops, in Chapter V. Therefore, our analysis of the aspirated versus unaspirated stops in terms of the number of articulators, is here limited to only the voiceless stops.

Whereas the voiceless unaspirated stops (p t k etc.) are produced by the supraglottal articulators (the labium, the apex, the dorsum etc.) alone, the voiceless aspirated stops (pʰ tʰ kʰ etc.) are produced by an additional articulator, namely, the glottis. The aspiration is formed by the puff of breath coming from the lungs through a particular maneuvering of the glottal articulator. The vocal folds in a triangular configuration
force the air to rush through this small opening (glottal aperture 2) that brings about aspiration. As indicated by A(spiration) in Diagram I-1, the aspiration so formed at the glottis is voiceless. As a matter of fact, this voiceless aspiration brought forth by the glottal articulator, is superimposed on the voiceless unaspirated stops to produce the voiceless aspirated stops. This superimposition of A(spiration) makes the voiceless aspirated stops physiologically acoustically more complex than their unaspirated counterparts. We therefore expect that the voiceless unaspirated stops would be favored over the voiceless aspirated stops in terms of human preference for the simpler, less complex phonological units.

In view of our discussion above, we now evaluate the impact of the glottis as an additional articulator, on the make-up of units for the aspirated and the unaspirated stops and their frequency of usage in the word in Deccani Urdu.

First a word about the paradigmatic make-up of the opposing aspirated and unaspirated stops. As seen in Table II-1, there is a parity in the number of units for the voiceless unaspirated stops (5: p t T c k) and the voiceless aspirated stops (5: pʰ tʰ Tʰ cʰ kʰ) in Deccani Urdu. This parity in the number of units for both the voiceless unaspirated and the voiceless aspirated stops does not indicate any favoring or disfavoring for either type, and as such it neither validates nor
invalidates our analysis. Therefore, we have to look into the syntagmatic context for the usage of the opposing units with a view to ascertaining if the skewings observed would conform to our expectations in terms of the human preference for phonological units with fewer articulators over those with more articulators.

In Table 11-6, we present the frequency of usage for the unaspirated and the aspirated within the voiceless stops, as they obtain in the monosyllabic words in Deccani Urdu.

<table>
<thead>
<tr>
<th>Stops (Voiceless)</th>
<th>CVC No.</th>
<th>CVC %</th>
<th>CVCC No.</th>
<th>CVCC %</th>
<th>CCVC No.</th>
<th>CCVC %</th>
<th>TOTAL No.</th>
<th>TOTAL %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unaspirated</td>
<td>775</td>
<td>79.16</td>
<td>89</td>
<td>95.70</td>
<td>4</td>
<td>100</td>
<td>868</td>
<td>80.67</td>
</tr>
<tr>
<td>Aspirated</td>
<td>204</td>
<td>20.84</td>
<td>4</td>
<td>4.30</td>
<td>0</td>
<td>0</td>
<td>208</td>
<td>19.33</td>
</tr>
<tr>
<td>Total</td>
<td>979</td>
<td>100</td>
<td>93</td>
<td>100</td>
<td>4</td>
<td>100</td>
<td>1076</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 11-6: Frequency of the Voiceless Unaspirated and the Voiceless Aspirated Stops in the Monosyllabic Words

Comments on Table 11-6

Comment 1: As seen in the last column in the table, of the 1076 occurrences of the voiceless stops in the monosyllabic words, 868 occurrences are unaspirated and 208 are aspirated. That is, the voiceless unaspirated stops appear in a ratio of over 4 to 1 to the voiceless aspirated stops. This vast skewing in favor of the unaspirated and against the aspirated
among the voiceless stops, may well be attributed to the human preference for phonological units with fewer articulators over those with more articulators.

Comment 2: As shown in Table II-6, of the 979 occurrences of the voiceless stops in the CVC words, 775 occurrences are unaspirated and 204 are aspirated. That is, the unaspirated occurrences appear in a ratio of about \( \frac{3}{4} \) to 1 to the aspirated occurrences. This ratio for the unaspirated versus aspirated stops in the CVC words is very close to the ratio as it is observed for these opposing units in the monosyllabic words. And therefore the rationale for this vast skewing is the same as provided in comment 1 above.

Comment 3: Of the 93 occurrences of the voiceless stops in the CVCC words, 89 occurrences are unaspirated and only 4 aspirated. Here we find a drastic skewing with a ratio of over 22 to 1 in favor of the unaspirated and against the aspirated stops. This drastic tilt in favor of the unaspirated stops is partly brought about by the human preference for fewer over more articulators. At the same time, it may be noted that most of the CVCC words in Deccani Urdu are borrowed from Persian, a language that does not have any aspirated consonant.

Comment 4: As seen in the table, there are only 4 occurrences of the voiceless stops in the CCVC words. Although this number is insignificant for any statistical analysis, it is
noteworthy that the favored voiceless unaspirated stops are used in all the 4 occurrences. That is, there is a total skewing against the disfavored voiceless aspirated stops in the CCVC words.

**Section A3: Velum as an Additional Articulator: Nasal versus Oral Vowels**

In Deccani Urdu, as in modern standard Urdu, we have both nasal consonants and nasal vowels that are produced by the velum as the nasal articulator. Although the velum is traditionally considered a point of articulation, it is noteworthy that this supraglottal organ is sufficiently adroit to open and close the passage to the nasal cavity.

As seen in the phonological grid (Diagram 1-1), nasal consonants (m n N n ñ ñ) are produced by the velum at aperture 3, in combination with the relevant oral articulators (labium, apex-teetch, apex-palate, medium, dorsum, respectively) at aperture Ø, and the glottal articulator at aperture 1 (for voicing).

As compared to the voiced (unaspirated) stops (b d g etc.), the nasal consonants may seem to be more complex in that they are produced by three articulators—the relevant oral articulator, the velum (for the production of nasality), and the larynx or the glottal articulator (for the production of voicing). However the larynx should not be considered an additional, complicating articulator in the case of the nasal consonants.
For V(oice) is required for the excitation of the vocal cavity for all the phonological units (the “nasals”, the “liquids”, and the vowels) at aperture 3 and above. Therefore the nasal consonants may well be taken on a par with the voiced (unaspirated) stops in terms of the number of articulators.

Again, as seen in the phonological grid (Diagram 1-1), the nasal vowels (i:\, u:\, a:\ etc.) are produced by the velum, the nasal articulator at aperture 3, in combination with the relevant oral articulators—the medium (“front”), the front dorsum (“central”), and the back dorsum (“back”)—at apertures 4 through 9, and the glottal articulator at aperture 1 (for voicing). But it is noteworthy that the V(oice) is a necessary concomitant not only for the nasal vowels, but also for their oral counterparts. That is, both the oral vowels and the nasal vowels have an investment in V(oice). That is why, the imposition of N(asality) through the velum as an extra articulator, makes the nasal vowels more complex than the oral vowels. In terms of human preference for simpler, less complex units, we therefore expect that the oral vowels should be preferred over the nasal vowels.

We now evaluate the impact of the velum as an additional articulator on the oral and the nasal vowels in the make-up of the vocalic units and their frequency of occurrence in the word, in Deccani Urdu.
As seen in the vocalic system of Deccani Urdu (Diagram 1-3), there are 20 vocalic units in this dialect of Urdu, 10 oral and 10 nasal. Further, it may be noted that in view of their substantive characteristics, these 20 vocalic units may be divided into the long vowels (14) and the short vowels (6). Again, it is worth noting that of the 14 long vowels, 7 are oral (i: u: a: e: o: ɛ: ɔ:) and 7 nasal (iː uː aː eː oː ɛː ɔː). Likewise, the 6 short vowels comprise 3 oral (ɪ A ʊ) and 3 nasal (ɪː ʊː ʊː). Thus, there is a complete parity in the number of units for oral vowels produced by fewer articulators and the nasal vowels produced by one additional articulator, the velum. It may be pointed out here that this parity in the number of vocalic units is neither in favor of nor against our expectations in terms of the human preference for simpler phonological units in any language.

Although the complexity produced by the velum as an additional articulator does not show up in the paradigmatic make-up of the nasal vowels vis-a-vis the oral vowels, we do encounter a vast skewing in favor of the oral vowels and against their nasal counterparts in their frequency of usage in the word. We now present the actual occurrences of these opposing vowels in Table 11-7.
<table>
<thead>
<tr>
<th>Vowels</th>
<th>CVC No.</th>
<th>CVC No. %</th>
<th>CVCC No.</th>
<th>CVCC No. %</th>
<th>CCVC No.</th>
<th>CCVC No. %</th>
<th>TOTAL No.</th>
<th>TOTAL No. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>1198</td>
<td>77.54</td>
<td>113</td>
<td>61.75</td>
<td>6</td>
<td>85.71</td>
<td>1317</td>
<td>75.91</td>
</tr>
<tr>
<td>Nasal</td>
<td>347</td>
<td>22.46</td>
<td>70</td>
<td>38.25</td>
<td>1</td>
<td>14.29</td>
<td>418</td>
<td>24.09</td>
</tr>
<tr>
<td>Total</td>
<td>1545</td>
<td>100</td>
<td>183</td>
<td>100</td>
<td>7</td>
<td>100</td>
<td>1735</td>
<td>100</td>
</tr>
</tbody>
</table>

Table II-7: Frequency of Oral and Nasal Vowels in the Monosyllabic Words

Comments on Table II-7

Comment 1: As seen in the last column in this table, of the 1735 vocalic occurrences in all the monosyllabic words, 1317 occurrences are oral and only 418 are nasal. That is, the simpler, oral vowels appear in a ratio of over 3 to 1 the more complex nasal vowels. This vast skewing in favor of the oral vowels and against the nasal vowels is justified in view of the use of an additional articulator, the velum, in the production of the nasal vowels.

Comment 2: The vast skewing in favor of the oral vowels and against the nasal vowels is further increased in the syntagmatically simple CVC words. As shown in the table, of the 1545 vocalic occurrences in the CVC words, 1198 (77.54%) occurrences are oral and only 347 (22.46%) are nasal. Again, this skewing perfectly conforms to our expectation in terms of the fewer versus more articulators and the syntagmatic simplicity of the CVC words.
Comment 3: Of the 183 vocalic occurrences, as shown in the CVCC column in the table, the nasal vowels (70) appear in a ratio of almost 2 to 3 in comparison with the oral vowels (113). Although even here, there is a clear skewing in favor of the oral vowels and against their nasal counterparts, it is also evident that the disfavored nasal vowels fare well in the syntagmatically complex CVCC words. (For further details, cf. Table II-8, comment 3 below.)

Comment 4: As shown in Table II-7, of the 7 vocalic occurrences in the CCVC words, there are 6 occurrences of the oral vowels and only 1 occurrence of the nasal. That is, we encounter a drastic skewing in favor of the oral vowels and against the nasal vowels here. Again, this rather extreme disfavoring for the nasal vowels may well be attributed to the use of the velum as an additional articulator.

We now present the actual occurrences of the oral versus nasal among the long vowels in the monosyllabic words in Deccani Urdu, in Table II-8.

<table>
<thead>
<tr>
<th>Long Vowels</th>
<th>CVC No.</th>
<th>CVC %</th>
<th>CVCC No.</th>
<th>CVCC %</th>
<th>CCVC No.</th>
<th>CCVC %</th>
<th>TOTAL No.</th>
<th>TOTAL %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>826</td>
<td>76.13</td>
<td>7</td>
<td>24.14</td>
<td>6</td>
<td>85.71</td>
<td>839</td>
<td>74.84</td>
</tr>
<tr>
<td>Nasal</td>
<td>259</td>
<td>23.87</td>
<td>22</td>
<td>75.86</td>
<td>1</td>
<td>14.29</td>
<td>282</td>
<td>25.16</td>
</tr>
<tr>
<td>Total</td>
<td>1085</td>
<td>100</td>
<td>29</td>
<td>100</td>
<td>7</td>
<td>100</td>
<td>1121</td>
<td>100</td>
</tr>
</tbody>
</table>

Table II-8: Frequency of Long Oral and Long Nasal Vowels
Comments on Table II-8

Comment 1: As seen in the last column in this table, of the 1121 long vocalic occurrences in all the monosyllabic words, 839 occurrences are long oral and only 282 are long nasal. That is, the simpler long oral vowels appear in a ratio of almost 3 to 1 the more complex long nasal vowels. This vast skewing in favor of the long oral vowels and against the long nasal vowels is brought about by the use of an additional articulator, the velum, in the production of the nasal vowels.

Comment 2: The vast skewing in favor of the oral and against the nasal among the long vowels, is further increased in the syntagmatically simple CVC words. As shown in the table, of the 1085 long vocalic occurrences in the CVC words, 826 (76.13%) occurrences are long oral and only 259 (23.87%) are long nasal. Again, this skewing perfectly conforms to our expectation in terms of the fewer versus more articulators and the syntagmatic simplicity of the CVC words.

Comment 3: As seen in Table II-8, of the 29 long vocalic occurrences in the CVCC words, there are only 7 instances of the simpler, less complex long oral vowels and 22 instances of the more complex long nasal vowels. This vast skewing in the ratio of over 3 to 1 in favor of the long nasal vowels and against the long oral vowels is contrary to our expectations in terms of the human trait of preferring simpler phonological
It is however noteworthy that all the 22 occurrences of the nasal vowels appear before a nasal consonant in the CVCC words. This usage may be illustrated by the following words:

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Words</th>
<th>Form Class</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>ð̩ːŋg</td>
<td>V₁</td>
<td>doze</td>
</tr>
<tr>
<td>2.</td>
<td>peːŋNT</td>
<td>Nₘ</td>
<td>paint</td>
</tr>
<tr>
<td>3.</td>
<td>baːŋg</td>
<td>Nᵣ</td>
<td>crowing (of a cock)</td>
</tr>
<tr>
<td>4.</td>
<td>b̩aːŋg</td>
<td>Nᵣ</td>
<td>hemp plant; intoxicating drink made of the leaves of hemp</td>
</tr>
<tr>
<td>5.</td>
<td>d̩aːŋg</td>
<td>V₁</td>
<td>mess (bedding etc.)</td>
</tr>
<tr>
<td>6.</td>
<td>Taːŋg</td>
<td>Nᵣ</td>
<td>leg</td>
</tr>
<tr>
<td>7.</td>
<td>Taːŋg</td>
<td>V₁</td>
<td>hang</td>
</tr>
<tr>
<td>8.</td>
<td>Daːns</td>
<td>Nₘ</td>
<td>dance</td>
</tr>
<tr>
<td>9.</td>
<td>D̩oːŋg</td>
<td>Nₘ</td>
<td>deceit, fraud</td>
</tr>
<tr>
<td>10.</td>
<td>jaːŋg</td>
<td>Nᵣ</td>
<td>thigh</td>
</tr>
<tr>
<td>11.</td>
<td>Kɛːmp</td>
<td>Nₘ</td>
<td>camp</td>
</tr>
<tr>
<td>12.</td>
<td>gɛːŋg</td>
<td>Nₘ</td>
<td>gang</td>
</tr>
<tr>
<td>13.</td>
<td>maːŋg</td>
<td>Nᵣ</td>
<td>hair-parting</td>
</tr>
<tr>
<td>14.</td>
<td>maːŋg</td>
<td>Nᵣ</td>
<td>demand</td>
</tr>
<tr>
<td>15.</td>
<td>maːŋg</td>
<td>V₁</td>
<td>beg, ask</td>
</tr>
<tr>
<td>16.</td>
<td>muːŋg</td>
<td>Nᵣ</td>
<td>kind of pulse</td>
</tr>
</tbody>
</table>
The rationale for the use of the more complex nasal vowels before the nasal consonants will be provided, when we deal with the assimilative trait of neighboring phonological units later in this chapter.

Comment 4: As shown in Table II-8, of the 7 long vocalic occurrences in the CCVC words, there are 6 occurrences of the long oral vowels and only 1 occurrence of the long nasal. That is, we encounter a drastic skewing in favor of the long oral vowels and against the long nasal vowels here. Again, this rather extreme disfavoring for the long nasal vowels may well be attributed to the use of the velum as an additional articulator.

The actual occurrences of the oral versus nasal among the short vowels in the monosyllabic words in Deccani Urdu are presented in Table II-9.
Table II-9: Frequency of Short Oral and Short Nasal Vowels in the Monosyllabic Words

Comments on Table II-9

Comment 1: As seen in the last column in this table, of the 614 short vocalic occurrences in all the monosyllabic words, 478 occurrences are oral and only 136 occurrences are nasal. That is, the simpler oral vowels appear in a ratio of over $3\frac{1}{2}$ to 1 the more complex nasal vowels. This vast skewing in favor of the short oral vowels and against the short nasal vowels is justified in view of the use of an additional articulator, the velum, in the production of the nasal vowels.

Comment 2: The vast skewing in favor of the long oral vowels and against the long nasal vowels is further increased in the syntagmatically simple CVC words. As shown in the table, of the 460 short vocalic occurrences in CVC words, 372 (80.87%) occurrences are short oral and only 88 (19.13%) are short nasal. Again, this skewing perfectly conforms to our
expectations in terms of the fewer versus more articulators and the syntagmatic simplicity of the CVC words.

Comment 3: Of the 154 short vocalic occurrences, as shown in the CVCC column in the table above, the short nasal vowels (48) appear in a ratio of almost 1 to 2/4 in comparison with the oral vowels (106). Again, this skewing clearly conforms to our expectation in terms of the human trait of preferring fewer articulator over more articulator.

Section B: Proximate Place of Articulation versus Remote Place of Articulation

The apex of the tongue being the most adroit among all the supraglottal articulators, can come in contact with various places (or points) of articulation, to produce apico-interdental, apico-dental, apico-alveolar or apico-palatal consonants in a variety of languages. Thus, the tip of the apex as an articulator comes in between the upper and the lower teeth to produce the interdental fricatives in English, represented by “th” in thin and then. The apex also comes in contact with the inner side of the upper teeth to produce the apico-dental t d in French and Urdu. The apex is also used to produce apico-alveolar stops, such as t d in English, with the alveolar ridge as the place of articulation. Finally the apex can be curled back to hit the hard palate to produce the apico-palatal (or “retroflex”) consonants in Urdu and some other Indian languages.
Further, in Deccani Urdu, as in modern standard Urdu and in some other Indian languages, the apex of the tongue can come in contact with two separate places (or points) of articulation, namely, the teeth and the hard palate, to form two distinctive series of consonants—the apico-dental and the apico-palatal, traditionally known as the "dental", and the "retroflex" consonants, respectively. (Cf. Chapter I, section B.)

In the production of the apico-dental consonantal units, the apex comes in contact with the upper teeth. As the inner side of the upper teeth is directly faced by the tip of the tongue, the upper teeth are the ideal target of the apex. Therefore, it is easier to produce apico-dental ("dental") consonants.

In contradistinction to the apico-dental consonants, the production of apico-palatal ("retroflex") consonants requires a difficult maneuvering of the apex. The tip of the tongue has to be curled back to an almost semicircular position to hit the hard palate. Thus, it is relatively difficult to produce the apico-palatal consonants. In terms of the human preference for the economy of effort, we therefore expect that within the apical consonants, the apico-dentals would be preferred over the apico-palatal consonants.

As seen in Diagram 1-1, and Table 1-1, of the 8 apical stops at aperture Ø in Deccani Urdu, there are 4 apico-dental (t tʰ d dʰ) and 4 apico-palatal (T Tʰ D Dʰ). That is, there is a
parity in the number of units between the two opposing stop
types. But it may be noted that this parity is neither in favor of
nor against our expectation with regard to the favoring and
disfavoring for the two types of the apical stops.

Of the two apical nasal units (n N) that are produced
simultaneously at oral aperture ʘ and nasal aperture 3, n is
apico-dental and N is apico-palatal. Here again we find a
parity in the number of units. Again, this parity is neither
against nor in favor of our expectation. It may however be
noted that the apico-palatal N is a positional variant that can
only appear as the first member of a consonant cluster, when
the second member of that cluster is an apico-palatal
consonant.

Of the two apical fricatives (s and z) at aperture 2, both
of them are apico-dental. That is, we encounter a total
skewing in favor of the apico-dentals and against the apico-
palatal fricatives. The absence of any apico-palatal fricatives in the
phonological paradigm of Deccani Urdu may well be attributed
to the human trait of avoiding the difficult task of producing
any "retroflex sibilants" at aperture 2. It is noteworthy that the
"retroflex sibilant" s did exist in Sanskrit. However, it has
totally been eliminated in Urdu and Hindi.

Among the 5 apical liquids that appear at aperture 3,
there are only 2 apico-dental (I r), and 3 apico-palatal L R
Rʰ). This disparity in the number of units between the apico-
dental and the apico-palatal liquids is contrary to our expectations. It may however be noted that the apico-palatal L is only a marginal phonological unit that does not occur at all in the monosyllabic words being used for the statistical analysis in the present research. Further, the apico-palatal R is a positional variant that appears only in the final position of the monosyllabic words. In contrast, the apico-dental l and r are the most productively utilized phonological units in Deccani Urdu.

In the light of the discussion above, we can reasonably assume that despite some problems with regard to the number of units, the apico-dental consonants are actually favored over the apico-palatal consonants in the Deccani dialect of Urdu.

Now we present the frequency of occurrences of the opposing apico-dental and apico-palatal consonants in Table II-10, to evaluate the impact of the human trait pertaining to the proximate versus remote point of articulation.

<table>
<thead>
<tr>
<th>Consonants</th>
<th>CVC No.</th>
<th>CVC %</th>
<th>CVCC No.</th>
<th>CVCC %</th>
<th>CCVC No.</th>
<th>CCVC %</th>
<th>TOTAL No.</th>
<th>TOTAL %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apico-Dental</td>
<td>1080</td>
<td>76.33</td>
<td>226</td>
<td>87.94</td>
<td>7</td>
<td>100</td>
<td>1313</td>
<td>78.2</td>
</tr>
<tr>
<td>Apico-Palatal</td>
<td>235</td>
<td>23.67</td>
<td>31</td>
<td>12.06</td>
<td>0</td>
<td>0</td>
<td>316</td>
<td>21.8</td>
</tr>
<tr>
<td>Total</td>
<td>1415</td>
<td>100</td>
<td>257</td>
<td>100</td>
<td>7</td>
<td>100</td>
<td>1679</td>
<td>100</td>
</tr>
</tbody>
</table>

Table II-10: Frequency of Apico-Dental and Apico-Palatal Consonants in the Monosyllabic Words
Comments on Table II-10

Comment 1: As seen in the last column of the table above, of the 1679 occurrences of the apical consonants in the monosyllabic words, 1313 are apico-dental whereas only 366 are apico-palatal. That is, the apico-dental consonants appear in a ratio of over $3\frac{3}{4}$ to 1 to the apico-palatal consonants. This vast skewing in favor of the apico-dental and against the apico-palatal units in the over-all usage of the opposing consonants in the word, is brought about by the human trait of favoring consonantal units with proximate point of articulation over those with the remote point of articulation.

Comment 2: As shown in the column for CVC words, of the 1415 occurrences of the apical consonants, there are 1080 occurrences of the apico-dental and only 335 occurrences of the apico-palatal. This vast skewing, appearing in a ratio of over 3 to 1, in favor of the apico-dental consonants and against the apico-palatal consonants may again be attributed to the human trait pertaining to the proximate versus remote point of articulation.

Comment 3: As seen in the CVCC column in the table above, of the 257 apical occurrences in the monosyllabic words, 226 are apico-dental and only 31 are apico-palatal. That is, the apico-dental consonants appear in a ratio of over 7 to 1 to the apico-palatal consonants. This drastic skewing in favor of the apico-dental and against the apico-palatal consonants, is
partly brought about by the human trait of preferring the proximate place of articulation over a remote place of articulation. At the same time, it may be noted that most of the CVCC words in Deccani Urdu are borrowed from Persian, a language that does not have any "retroflex" consonantal units.

Comment 4: As seen in Table II-10, all the 7 apical occurrences in the CCVC words, are apico-dental. Although this number is statistically insignificant, it may not be coincidental that there is a total skewing in favor of the favored apico-dental consonants and against the disfavored apico-palatal consonants.

In Table II-11, we present the frequency of occurrence in the monosyllabic words for the opposing apico-dentals versus apico-palatais for the stops, the nasals, the fricatives, and the liquids separately, with a view to evaluating the impact of the human trait of preferring proximate place of articulation over the remote place of articulation.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Apico-Dentals</td>
<td>370</td>
<td>194</td>
<td>281</td>
<td>468</td>
<td>1313</td>
</tr>
<tr>
<td>Apico-Palatal</td>
<td>269</td>
<td>10</td>
<td>0</td>
<td>97</td>
<td>366</td>
</tr>
<tr>
<td>Total</td>
<td>639</td>
<td>204</td>
<td>281</td>
<td>555</td>
<td>1679</td>
</tr>
</tbody>
</table>

Table II-11: Frequency of Apico-Dental versus Apico-Palatal Stops, Nasals, Fricatives, and Liquids
in the Monosyllabic Words

Comments on Table II-11

Comment 1: As seen in the table above, of the 639 stop occurrences in the monosyllabic words for the apicals, 370 occurrences are apico-dental and 269 apico-palatal. That is, there is a clear skewing, in a ratio of over one third to one, in favor of the apico-dental stops and against the apico-palatal stops. This moderate skewing is fully justified in terms of the human trait of preferring apico-dental consonants formed at the proximate place of articulation, over the apico-palatal consonants formed at a remote place of articulation.

Comment 2: As shown in the column for nasal consonants in Table II-11, of the 204 apical nasal occurrences in the monosyllabic words, there are 194 apico-dental nasals and only 10 apico-palatal nasals. That is, the apico-dental nasals appear in a ratio of over 19 to 1 to the apico-palatal nasals. This drastic skewing in favor of the apico-dentals and against the apico-platals is partly brought about by the human trait of preferring the proximate place of articulation over the remote place of articulation. Further, it is noteworthy that unlike the apico-dental n, which is a distinctive phoneme, the apico-palatal N is a positional variant that appears in the CVCC words only as the first member of a consonant cluster, when the second member of that cluster is an apico-palatal consonant.
Comment 3: As seen in the column for the fricatives in the table above, all the 281 apical occurrences in the monosyllabic words, are apico-dental with a total skewing against the apico-palatal. As we have explained earlier in this section, no apico-palatal fricative is established as a unit in the phonological paradigm of Deccani Urdu.

Comment 4: As seen in the column for the liquids in Table II-11, of the 555 appearances of the apical liquids in the monosyllabic words, there are 468 instances of the apico-dentals, and only 87 instances of the apico-palatals. That is, the apico-dental liquids appear in a ratio of almost 5¾ to 1 to the apico-palatal liquids. This vast skewing in favor of the apico-dental liquids and against the apico-palatal liquids can primarily be justified in terms of the human trait of preferring phonological units produced at proximate place of articulation over those produced at some remote place of articulation. Further, the tilt in favor of the favored apico-dental liquids is reinforced by two other principles based on physiology and communication. In fact, as we have noted earlier in this section, the apico-dental liquids (l r) are the most productively utilized consonantal units in Deccani Urdu. In contradistinction to the apico-dental liquids, the apico-palatal liquids (L R Rʰ), though greater in the number of units, are highly disfavored. As noted earlier, L is a marginal
phonological unit rarely used in the Deccani dialect of Hyderabad, and Rʰ is a positional variant in this dialect.

Section C: Assimilative Trait of Neighboring Phonological Units

The syntagmatic organization of the phonological units of a language is often motivated by the assimilative trait of neighboring phonological units. For the characteristics of neighboring segments tend not to be precisely differentiated.

It is noteworthy that the phonological units of a language that combine to form signal-meaning units \textit{(signes)}, are marked by distinction of articulator, points of articulation, aperture, relative adroitness of articulators and their muscular tension. Further, the phonological units may also differ in terms of certain other articulatory features, such as \textit{V}(oicing), \textit{A}(spiration), or \textit{N}(asality).

For example, st share two features of articulation, namely, articulator (apex) and voicelessness. Whereas qt, on the other hand, do not share these features for q is a front dorsal voiced unit, and t is a voiceless apical unit. It is to be noted that if two successive phonological units (e.g., qt) are very different from each other, then fine and precise manipulation of articulators are required to distinguish these segments. However, if two successive phonological units (e.g., st) that share some features of articulation, are combined, then it is easier to carry on without such precise
manipulation of articulators. Thus, in view of the general avoidance of fine and precisely coordinated movement of articulator, we expect that there will be a favoring for the combination of phonological units which share some features of articulation.

The impact of assimilative trait is manifest in the combination of phonological units in the word. The fine, precisely coordinated movement of the articulator is avoided by making certain phonological changes in the neighboring phonological units. As a result of these changes, the neighboring segment becomes similar.

With a view to evaluating the impact of assimilative trait, we compare the occurrences of the phonological units in the monosyllabic words of Deccani Urdu, in following section.

Section C1: Assimilative Trait and the Occurrence of the Phonological Units

We now present the occurrence of voiceless, voiced and nasalized phonological units, as they appear in the monosyllabic (CVC and CVCC) words in Deccani Urdu.

1. Initial Voiceless Stop + Final Voiceless Stop.
   Total Number of Words = 192

2. Initial Voiced Stop + Final Voiced Stop
   Total Number of Words = 72

3. Initial Voiceless Stop + Final Voiced Stop

Total Number of Words = 42.

4. Initial Voiced Stop + Final Voiceless Stop
Total Number of Words = 111

5. Initial Voiceless Fricative + Final Voiceless Fricative
Total Number of Words = 19

6. Initial Voiced Fricative + Final Voiced Fricative
Total Number of Words = 2

7. Initial Voiceless Fricative + Final Voiced Fricative
Total Number of Words = 5

8. Initial Voiced Fricative + Final Voiceless Fricative
Total Number of Words = 7

As seen in the CVC words, of the 417 stop occurrences, initial voiceless stops plus final voiceless stops appear in 192 words, initial voiced stops plus final voiced stops in 72, initial voiceless stops plus final voiced stops in 42, and initial voiced stops plus final voiceless stops in 111. That is, the combination of physiologico-acoustically simpler and similar phonological units (initial voiceless stops plus final voiceless stops) is preferred over the combination of more complex and similar units (initial voiced stops plus final voiced stops) which is perfectly in conformity with our expectation. It may however be noted here that the greater number of initial voiced stops plus final voiceless stops (111) vis-a-vis initial voiced stops plus final voiced stops (72) is against our expectation in terms of the assimilative trait of neighboring
phonological units. The rationale for this sharp skewing in favor of the voiced voiceless combination is brought about by the joint interaction of communication with the human trait of preferring fewer articulator over more articulator.

Of the 33 occurrences of fricatives in the CVC words, the combination of initial voiceless fricatives plus final voiceless fricatives appear in 19 words, initial voiced fricatives plus final voiced fricatives in 2 words, initial voiceless fricatives plus final voiced fricatives in 5 words, and initial voiced fricatives plus final voiceless fricatives in 7 words. That is, the initial and final voiceless combination (19) is highly preferred over the initial and final voiced combination (2) which is perfectly in conformity with our expectation in terms of assimilative trait. The rationale for the unexpected skewing in favor of the voiceless-voiced combination (5) and voiced-voiceless combination (7), and against the voice combination (2), is again brought about by the joint interaction of communication with the human trait of preferring fewer articulator over more articulator.

The actual occurrence of the final consonant cluster in the CVCC words of Deccani Urdu are now presented below.

1. Voiceless Fricative + Voiceless Stop

   Total Number of Words = 27

2. Voiced Fricative + Voiced Stop
Total Number of Words = 3

3. Voiceless Fricative + Voiced Stop

Total Number of Words = 0

4. Voiced Fricative + Voiceless Stop

Total Number of Words = 0

As seen in the CVCC words, of the 30 final consonant clusters, the combination of voiceless units appears in 27 words, and the combination of voiced units obtains in 3 words, whereas the combination of voiceless-voiced or voiced-voiceless has 0 occurrence in Deccani Urdu. That is, in final clusters, we observe a preference in the occurrence of voiceless units with voiceless units over voiced units with voiced units. Further, 0 occurrence for voiceless-voiced and voiced-voiceless combinations is fully motivated by the assimilative trait of neighboring phonological units.

Further, nasal consonants in final cluster in the CVCC words combine most frequently with voiced stops (53) vis-a-vis voiceless stops (11) in Deccani Urdu, which is again motivated by assimilative trait.

The impact of assimilative trait can also be seen in the occurrence of nasalized vowels in the CVC and the CVCC words in Deccani Urdu. In CVCC words, all vowels that appear before nasal consonants are nasalized. In the CVC words, we also encounter a favoring for nasalized vowels before nasal
consonants. The actual occurrence of the nasalized vowels in the CVC words of Deccani Urdu is presented below.

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV(^n)C</td>
<td>126</td>
</tr>
<tr>
<td>CV(^n)N</td>
<td>177</td>
</tr>
<tr>
<td>NV(^n)C</td>
<td>26</td>
</tr>
<tr>
<td>NV(^n)N</td>
<td>14</td>
</tr>
</tbody>
</table>

Section C2: Ad Hoc Phonological Change and Assimilative Trait

In Deccani Urdu, we encounter an ad hoc phonological change as a result successive phonological unit becomes similar. For example, classical Urdu b becomes p in Deccani Urdu.

<table>
<thead>
<tr>
<th>Classical Urdu</th>
<th>Deccani Urdu</th>
</tr>
</thead>
<tbody>
<tr>
<td>zAbt</td>
<td>zApt</td>
</tr>
<tr>
<td>XAbt</td>
<td>XApt</td>
</tr>
</tbody>
</table>

As seen in the above listed words, the voiced stop b that appears before voiceless stop t, becomes voiceless stop p. The loss of voicing in this case makes the neighboring segment similar, which is clearly motivated by assimilative trait.

\(^3\)C = any consonant  
\(V^n\) = any nasalized vowel  
N = any nasal consonant
Section D: Aperture Change and Combination of Phonological Units

In this section, we examine the syntagmatic organization of phonological units of Deccani Urdu in view of the claim that in successive segments, large changes of aperture are preferred over small changes of aperture.

The phonological units of a language or dialect cohere to form greater segments. The larger changes of aperture are likely to be preferred in successive segments. For it provides greater freedom of movement for articulators and therefore less precision of control is required in the articulation of these segments. The segments produced by small changes of aperture, on the other hand, involve greater precision of control. Thus, there is a general disfavoring for small changes of aperture.

The impact of the degree of aperture change on the combinatory pattern of Deccani Urdu phonological units in the monosyllabic words is taken up in the following subsection.

Section D1: Large Aperture Change versus Small Aperture Change: CVC versus CVCC and CCVC Words

In this section, we compare the potential and the actual number of CVC, CVCC, and CCVC words to validate the claim that large changes of aperture are preferred over small changes of aperture. The potential and the actual number of CVC, CVCC, and CCVC words are presented in Table II-12.
<table>
<thead>
<tr>
<th>Type</th>
<th>Potential</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVC $C^2V = 40^2 \times 20$</td>
<td>32000</td>
<td>1545 (4.83% of potential)</td>
</tr>
<tr>
<td>CVCC $C^3V = 40^3 \times 20$</td>
<td>1280000</td>
<td>183 (.014% of potential)</td>
</tr>
<tr>
<td>CCVC $C^3V = 40^3 \times 20$</td>
<td>1280000</td>
<td>7 (.00054% of potential)</td>
</tr>
<tr>
<td>Total</td>
<td>2592000</td>
<td>1735</td>
</tr>
</tbody>
</table>

Total Number of Deccani Urdu Consonants: 40
Total Number of Deccani Urdu Vowels: 20

**Table II-12 Potential and Actual Number of Monosyllabic Words in Deccani Urdu**

**Comments on Table II-12**

Comment 1: As shown in the table above, the total number of consonants for Deccani Urdu is 40, and the total number of vowels is 20. Given the total number of consonants (40) and vowels (20), the potential number of the CVC words is 32000 whereas the actual turn-out is 1545 (4.83\% of 32000).

For CVCC and CCVC words, as seen in the table, the potential number is 1280000, but their actual turn-outs are much lower than the CVC words. The actual number of CVCC and CCVC words is 183 (.014\% of 1280000) and 7 (.00054\% of 1280000), respectively. Even a cursory glance at the table for the actual and the potential number of CVC, CVCC and
CCVC words shows that there is a clear preference for the CVC words, because CVC words appear in absolute majority.

Comment 2: The preference for the CVC words is brought about by the maximum change of aperture in successive segments. In CVC words, there is a maximum change of aperture from constriction (0,1,2,3) to opening (4,5,6,7,8,9), then back to constriction. In the CVCC and CCVC words, on the other hand, the initial and the final clusters demand for smaller changes of aperture (from consonant to consonant). Therefore, the CVC words which involve large changes of aperture in the successive segments are preferred over the CVCC and the CCVC words in Deccani Urdu, as in many other language or dialect.

Section E: Human Behavior Justification for the Phonological Grid of Deccani Urdu

As discussed earlier (cf. Chapter I), the phonological grid of Deccani Urdu (Diagram I-1), is primarily established by physiological mechanism and communication. However, besides these two orientations, human behavior and acoustic medium also play a role in the formation of the phonological grid. In this section, therefore, we take up those human behavior (psychological) factors which provide reinforcement to the validity of the phonological units in Deccani Urdu.

It is generally agreed that the principle laid down below represents a common trait of human behavior:
"It is easier to learn the use of a smaller number of tools than of a larger, and up to a certain point it is easier to learn to perform a given task of combining the resources of tools with which one is familiar than by learning the use of a new tool".

Thus, in view of the above, the make-up and the distribution of the phonological units of a language are motivated as follows;

"It is well-known that phonological system tend to be organizations of a relatively small number of units used in varying combinations, rather than collection of a relatively large number of non-combining phonological units".

It is to be noted that there are 60 phonological units in Deccani Urdu. Of the 60 units, 40 are consonantal and 20 vocalic (Cf. Diagram I-1). It is these rather small number of distinct units which recur in different permutations and combinations to form the entire inventory of signals of the signal-meaning pairs (signes) of this Deccani dialect of Urdu. This is, one way in which human language minimizes the effort on the specific part of the memory. The economy so achieved in the formation of siginals, is actually developed by Andre Martinet under "double articulation".

Furthermore, the total bulk of phonological units is formed by the combination of a relatively small number of articulators and apertures. For we have only 7 articulators
(labium, apex, medium, front dorsum, back dorsum, velum and glottis) and 11 degrees of aperture (Ø, 1, 1½, 2, 3, 4, 5, 6, 7, 8, and 9) for Deccani Urdu.

In fact, whereas both physiology and human behavior contribute significantly to the asymmetrical nature of the phonological grid, it is only the human factor that is taken up here. The physiologico-acoustically simpler, less complex phonological units that are produced with less effort, outnumber more complex units which require more effort in their production.

Even a quick look at the phonological grid, reveals that there is a lack of symmetry in the number of units on the various intersections of axes. It is beyond the scope of the present research to explain the absence of each and every potential phonological units in Deccani Urdu. Thus, we will provide justification only for those holes or gaps that are found relative to some existing phonological units in the grid. (Cf. Diagram I-1.)

1. Scarcity of the Phonological Units at Aperture 1

There are only 2 phonological units, ʃ and ʋ that appear at aperture 1 as opposed to 5 units at aperture 2. For the perforated surface of the teeth is ideally suited to produce fricatives by releasing air stream through a very restricted channel whereas the palate or the lip as place of articulation provide air tight contact which is not suitable for the
production of fricatives. Therefore, members of the first degree of aperture using the teeth as place of articulation are preferred to those using the palate (or the lip) as place of articulation.

2. Absence of the Voiced Counterpart of the Voiceless Medial Fricative at Aperture 2

As seen in the phonological grid (Diagram 1-1), a voiceless medial fricative \( \hat{I} \) does occur in Deccani Urdu which is recognized by the absence of its voiced counterpart at aperture 2. The non-occurrence of the more complex voiced fricative with medial articulator can partly be attributed to the use of more articulator (glottis for voicing).

3. Two Axes for Apex in Opposition to One Each for Other Articulator

The human behavior interplay is clearly visible in the asymmetrical use of articulators in the formation of phonological units. Of all the supraglottal articulators, the most adroit apex is conveniently utilized to make dual distinction between the “dental” and the “retroflex” among the consonants by the speakers of many Indian languages.

On observing the phonological grid of Deccani Urdu (Diagram 1-1), it is clear that the apex keeps distinction of articulation at two points, namely, the dental and the palatal, at aperture \( \emptyset \) and 3. The use of apex on two distinct points is
due to the greater adroitness of apex among all the lingual articulators (medium, dorsum).

It is therefore concluded that the human behavior orientation provides reinforcement to the validity of the phonological grid of Deccani Urdu, which is established earlier in terms of physiological mechanism.

Section F: Summary and Conclusions

In this section, we summarize our findings as a whole, in terms of human behavior orientation, dealt within this chapter. Here an attempt has been made to explain both the paradigmatic and the syntagmatic aspects of distribution of the phonological units.

In section A, we have dealt with the preference of fewer articulators over more articulators in the production and distribution of phonological units. The three main dichotomies among the phonological units of Deccani Urdu brought about by the use of an extra articulator, are Voiced versus Voiceless consonants, Aspirated versus Unaspirated among the voiceless stops, and Nasal versus Oral vowels. Further, in view of the preference for fewer articulator, we predicted that the voiceless consonants over the voiced, the unaspirated stops over the aspirated, and the oral vowels over the nasal, should be favored. And we have successfully demonstrated through the actual counts that the paradigmatic and the
syntagmatic distribution of phonological units clearly conforms to our expectations.

In section B, we have analyzed the relation between the apico-dental ("dental") consonants with the proximate place of articulation and the apico-palatal ("retroflex") consonants with the remote place of articulation. As it is easier for the apex to come in contact with the adjacent place of articulation (the teeth) than the distant place of articulation (the palate), the production of apico-dental consonants involves less human effort. Thus, we predicted that the apico-dental consonants should be preferred over apico-palatal consonants, both in the number of units and in their frequency of usage in the word in Deccani Urdu, as in any other language or dialect. It has been successfully demonstrated through actual counts that both the paradigmatic and the syntagmatic distribution of phonological units fully conforms to our expectations.

In section C, we have evaluated the impact of the assimilative trait of neighboring phonological units that are manifest in the combinatory phonology of Deccani Urdu. As noted, the fine and precisely coordinated movement of the articulator is avoided by making certain phonological changes in the neighboring phonological units. Thus, in view of the general avoidance of fine, precisely coordinated movement of articulator, we predicted that there should be a favoring for the combination of units that become similar. For example, the
voiceless unit should preferably occur with voiceless unit, and voiced unit should preferably combine with voiced unit. It has been amply demonstrated through the actual frequency counts that the syntagmatic distribution of phonological units is clearly motivated by assimilative trait, and therefore this skewed distribution fully conforms to our expectations.

In section D, we have examined the impact of the degree of aperture change on the combinatory pattern of Deccani Urdu. It has been argued that large changes of aperture which require less precision of control are preferred. We therefore compared the potential and the actual number of CVC, CVCC, and CCVC words and demonstrated clearly that the CVC words which involve large changes of aperture are drastically favored. This is perfectly in conformity with our expectations.

In section E, we have shown that human behavior orientation provides reinforcement to the validity of phonological units in the grid (Diagram I-1), established earlier in terms of physiological mechanism in Chapter I. The phonological skewings in the grid have been explained in view of human preference for the physiologico-acoustically simpler, less complex phonological units. Further, it has been argued that the perforated nature of the teeth is ideally suited for the production of fricatives at aperture 1 whereas palate or upper lip makes tight contact at this aperture. Thus, only two phonological units (f v) which are conveniently articulated,
appear at this aperture. Furthermore, we have also justified the use of the most adroit apex to make the dual distinction between the "dental" and the "retroflex" among the consonants ("stops" and "liquids"), in Deccani Urdu.

To conclude:

(1) The phonological units produced by fewer articulators are preferred over those produced by more articulators. For, the use of an extra articulator requires additional effort on the part of speaker which is disfavored in terms of human behavior. As a result, the voiced over the voiceless among unaspirated stops, voiced fricatives over voiceless fricatives, aspirated over unaspirated among the voiceless stops, and nasal vowels over oral vowels are disfavored because all of them involve an extra articulator.

(2) The apico-dental ("dental") consonants with the proximate place of articulation are preferred over the apico-palatal ("retroflex") consonants with the remote place of articulation, both in the number of units and in the frequency of usage.

(3) The neighboring phonological units become similar in view of the assimilative trait to avoid fine precisely coordinated movement of articulator.

(4) The large changes of aperture are preferred over small changes of aperture. A comparison of CVC, CVCC and CCVC,
words is made through frequency counts to show that the CVC words are highly preferred.

(5) The reinforcement of the validity of the phonological units in the grid, is further justified in terms of the human behavior orientation.