Chapter II

ROLE OF HUMAN BEHAVIOR IN THE PHONOLOGY OF DELHI URDU

In the previous chapter, we examined as to how the physiological mechanism governs the paradigmatic make-up of physiological units and their sequences in the speech chain in Delhi Urdu. In the present chapter, an attempt will be made to explain the paradigmatic make-up and the syntagmatic distribution of phonological units in Delhi Urdu in terms of human behavior, another important orienting principle of form-content linguistics.

It is an inherent human trait to resort in their daily endeavors to minimax solution, i.e., maximum output through minimum input. Human laziness (desire to use minimum possible effort) and human intelligence (through which maximum output is sought), interact to exert tremendous pressure on the language, producing phonological skewings that could only be explained in terms of human behavior. Whereas there may be other aspects of human behavior that may have some bearing on the functioning of language, our interest is here limited to only two traits of human psyche (the laziness and the intelligence), which together can account for the language skewings motivated by human behavior.
It is noteworthy that the phonological skewings caused by the two traits of human behavior may not be idiosyncratic to a particular language; in fact, their general characteristics may recur from language to language.

As we have stated earlier in the Introduction, it is through an interaction of human laziness and human intelligence that we as speakers and hearers save our time and effort to get the maximum output by inferring from linguistic or non-linguistic context or from past experience. Inference is therefore one of the manifestations of human behavior that has bearing on the total functioning of a language.

Although the human traits of intelligence and laziness affect both phonology and grammar, our interest is here limited to assessing the impact of these traits on phonology.

The human behavior-oriented analysis of Delhi Urdu phonology is presented in six sections in this chapter. Section A deals with the preference for fewer articulators over more articulators in the production of phonological units. In section B, we show that apico-dental ("dental") consonants with proximate point of articulation, are prefered over the apico-palatal ("retroflex") consonants with remote point of articulation. Section C, deals with the assimilative trait of neighboring phonological units. In section D, we study the aperture change and combination of phonological units. In section E, we discuss the human behavior justification for the phonological grid of Delhi Urdu. In section E, we present summary and conclusions with regard to the impact of human behavior on the phonology of Delhi Urdu.
SECTION A: Preference for Fewer Articulators Over More Articulators

Phonological units are produced by combining articulators with degrees of apertures. These units may be produced by fewer articulators or more articulators.

Due to the well-known trait of human beings to minimize and economize in all situations, it is to be anticipated that phonological units using fewer articulators will be preferred over units using more articulators. For the simultaneous use of greater number of articulators requires fine and precise coordination of the articulators that is disfavored due to the laziness factor of human behavior.

It may be noted that the preference for fewer articulators over more articulators will affect the distribution of phonological units on both the syntagmatic and the paradigmatic levels. The skewings on both these levels will be taken up as we deal with the phonological dichotomies involving the use of fewer versus more articulators.

There are three main dichotomies among the phonological units of Delhi Urdu that are produced by the use of an extra articulator: Voiced versus Voiceless consonants, Aspirated versus Unaspirated stops, and Nasal versus Oral vowels. The three types of opposing units will be dealt with in subsections A, A, and A respectively, to be followed by the concluding remarks in subsection A.
SECTION A1: Glottis as an Additional Articulator: Voiced versus Voiceless Consonants

Of the Delhi Urdu consonants, the stops and the fricatives are characterized by a distinction of voicing and voicelessness. Whereas voiceless consonants are produced by only the supraglottal articulators, their voiced counterparts are produced by an additional articulator: the glottal. The simultaneous use of the glottal articulator (i.e., the vocal folds, producing voice) 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 voiced consonants in Delhi Urdu.

The impact of fewer versus more articulators on Delhi Urdu phonology is taken up in three subsections below. In section A1 (a), we examine the make-up of the voiceless and voiced consonants in the phonological paradigm of Delhi Urdu, in terms of the number of articulators. In section A1(b), we present and evaluate, in terms of the same criterion, the proportionate occurrences of voiceless and voiced consonants in the syntagmatic organization of the word in Delhi Urdu. Section A1 (c) contains the concluding remarks with regard to the impact of this criterion on the phonology of Delhi Urdu.
Section A1 (a): Make-up of the Voiceless and Voiced Consonants in the Phonological Paradigm

As shown in the phonological grid (Diagram I - 1), the distinction of voiced and voiceless is restricted to the stops (phonological units at aperture 0), and the fricatives (phonological units at aperture 1, 1 1/2 and 2) in Delhi Urdu.

Of the 21 stops in Delhi Urdu, 11 stops (p t ç c k g; ph th ðh ðh ðh kh) are voiceless and 10 stops (b d ç j g; bh dh ðh jh gh) are voiced. This skewing in favor of the voiceless units is justified in terms of the fewer versus more articulators.

It may be noted that the skewing among the stops occurs at the physiologically disfavored post-dorsal axis. There is no voiced counterpart of the voiceless stop q, which is what we expect in terms of the criterion under study here.

Among the 9 fricatives at apertures 1, 1 1/2 and 2, there are 4 voiceless and 5 voiced. This paradigmatic skewing of fricatives in Delhi Urdu, is clearly against our expectation. But we need to examine these phonological units more carefully. At aperture 1, there is a parity between the voiceless fricative f and the voiced fricative v: this parity is neither against nor in favor of the criterion under study here.

The voiced h at aperture 1 1/2 is a very special case. This h is required to support the voiced aspirated series (bh dh ðh jh gh) in Delhi Urdu, as in other Indo-Aryan Languages. The fact however remains that there is no voiceless h in Urdu or in any of its dialects, including Delhi Urdu. This skewing in Urdu and other Indo-Aryan Languages requires additional acoustic research, which is beyond the scope of our study here.
Of the 6 fricatives at aperture 2 in Delhi Urdu, there are 3 (s v x) voiceless and 3 (z ɣ ɣj) voiced. This parity between the voiceless and voiced fricatives can be said to be only apparent. For the voiced (z), in opposition to the voiceless v, is only a marginal phonological unit that does not occur at all in the monosyllabic words being analyzed in the present work. If we take this skewing into account, there is a clear preference for the voiceless fricatives over the voiced fricatives at aperture 2.

Notwithstanding the above explanation, it must be admitted that there is only a slight preference for the voiceless consonants over their voiced counterparts in the make-up of phonological units in the paradigm. However, we expect that the tilt in favor of the voiceless consonants and against the voiced consonants will show up in their frequencies of usage in the word; this syntagmatic usage of the opposing consonants will be taken up in the following section.
Section Al (b) : Distribution of Voiceless and Voiced Consonants in the Word.

In this section, we deal with the impact of fewer versus more articulators on the voiceless and the voiced consonants (stops and fricatives) in their frequency of usage in the monosyllabic words in Delhi Urdu. This syntagmatic distribution of the opposing consonants is taken up in three subsections pertaining to (i) the consonants (both stops and fricatives) in their entirety, (ii) the stops and (iii) the fricatives.

Section Al (b) (i) : Voiceless versus Voiced Consonants (Stops and Fricatives)

We first compare the voiceless and the voiced consonants (both stops and fricatives combined) in their frequencies of usage in the monosyllabic words. The frequencies of the opposing consonants are presented in Table II - 1.

Table II - 1:

Frequency of Voiceless and Voiced Consonants in Monosyllabic Words

<table>
<thead>
<tr>
<th>Consonants</th>
<th>CVC</th>
<th>CVCC</th>
<th>CCVC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Voiceless</td>
<td>1410</td>
<td>62.36</td>
<td>71</td>
<td>51.08</td>
</tr>
<tr>
<td>Voiced</td>
<td>851</td>
<td>37.64</td>
<td>68</td>
<td>49.92</td>
</tr>
<tr>
<td>Total</td>
<td>2261</td>
<td>100</td>
<td>139</td>
<td>100</td>
</tr>
</tbody>
</table>
Comments on Table II - 1:

1. Of the 2413 consonants (stops and fricatives) used in monosyllabic words, 1489 (61.71 %) are voiceless and 924 (38.29 %) are voiced. That is, there is a clear skewing in favor of the voiceless and against the voiced in the over-all usage of the opposing consonants in the word in Delhi Urdu.

As we have pointed out in the previous section, there is no clear-cut preference for the voiceless consonants over their voiced counterparts in the make-up of units in the phonological paradigm of Delhi Urdu. In the syntagmatic organization of the word, however, it is noteworthy that the voiceless consonants produced by fewer articulators become highly favored in comparison with the voiced consonants produced by more articulators.

2. In the CVC words with 2261 consonants (stops and fricatives), there are 1410 (62.36 %) occurrences of the voiceless consonants and 851 (37.64 %) occurrences of the voiced consonants. The skewing in favor of the voiceless consonants (with fewer articulators) is thus slightly increased vis-a-vis the voiced consonants (with more articulators) among the CVC words, as compared to the monosyllabic words in their entirety.

3. Among the 13 occurrence of consonants in the CCVC words, there are 8 (61.54 %) instances of voiceless consonants vis-a-vis 5 (36.46 %) instances of the voiced consonants. This usage fully conforms
to our expectations. For the percentage of usage for the voiceless consonants and their voiced counterparts in the CCVC words is almost the same as in the monosyllabic words of Delhi Urdu in their entirety.

4. Among the 139 consonants (stops and fricatives) occurring in the CVCC words, however, there is almost a parity between the voiceless consonants (71; 51.08%) and the voiced consonants (68; 49.92%). To be sure, there is a slight edge in favor of the voiceless consonants vis-a-vis their voiced counterparts even among these monosyllabic words with final consonant clusters. But inasmuch as the voiced consonants fare well in the CVCC words against our expectation, we need to examine the CVCC words more closely.

Of the 139 occurrences of stops and fricatives in the CVCC words, 59 appear in word initial position, 12 occur as the first member (C₁) of the final consonant cluster, and 68 occur as the second member (C₂) of that cluster.

Among the 59 initial consonants (stops and fricatives) in the CVCC words, there are 30 (50.85%) occurrences of voiceless consonants as compared to 29 (49.15%) occurrences of voiced consonants. Thus, there is almost a tie between the voiceless and the voiced among the consonants in word initial position. Though unexpected in terms of fewer versus more articulators, this near parity between the opposing units is brought about by the communicative factor. For there is a fair competition between the opposing phonological units in the communicatively important initial position of the word. (Cf. chapter III, section C.)
The 12 occurrences of \( C_1 \) in the CVC\(_1\)C\(_2\) words contain 11 (91.67 %) voiceless consonants and only 1 (8.33 %) voiced consonants. Here we find almost a total skewing against the voiced consonants and in favor of the voiceless consonants. This disfavoring for the voiced consonants may will be attributed to the use of an additional articulator: the glottis, for the production of voice.

The 68 occurrences of \( C_2 \) in the CVC\(_1\)C\(_2\) words include only 30 (44.12 %) voiceless consonants vis-a-vis 38 (55.88 %) voiced consonants. This turnabout is certainly against our expectations in terms of the human preference for phonological units with fewer articulators. With a view to find out the rationale for this discrepancy, we need to examine the syntagmatic context that may determine the voicing and voicelessness of the 68 occurrences of the second member (\( C_2 \)) of the final consonant cluster.

The syntagmatic distribution of the 68 \(-C_2\) occurrences is presented in Table II - 2.

Table II - 2:

Voicing and Voicelessness in \( C_2 \) of the CVC\(_1\)C\(_2\) words

<table>
<thead>
<tr>
<th>Consonants</th>
<th>Voiceless No.</th>
<th>Voiceless %</th>
<th>Voiced No.</th>
<th>Voiced %</th>
<th>Total No.</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>After Nasal</td>
<td>16</td>
<td>32.65</td>
<td>33</td>
<td>67.35</td>
<td>49</td>
<td>100</td>
</tr>
<tr>
<td>After ( C_{vd} )</td>
<td>3</td>
<td>37.50</td>
<td>5</td>
<td>62.50</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>After ( C_{vl} )</td>
<td>11</td>
<td>100</td>
<td>0</td>
<td>0.00</td>
<td>11</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
<td><strong>44.12</strong></td>
<td><strong>38</strong></td>
<td><strong>55.88</strong></td>
<td><strong>68</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Of the $68$ $-C_2$ occurrences, $49$ appear after nasal consonants, $8$ occur after other voiced consonants, and $11$ appear after voiceless consonants.

As shown in the above table, the $11$ occurrences appearing after the voiceless consonants are all voiceless. This total skewing in favor of the voiceless consonants and against the voiced consonants is brought about by the interaction between two human behaviour traits, namely, the preference for fewer articulators over more articulators and the assimilative trait of neighbouring phonological units. (Cf. section C.) For the two traits reinforce each other in producing the skewing in favor of the voiceless consonants here.

Among the $8$ occurrences of $-C_2$ appearing after the voiced consonants, only $3$ are voiceless and $5$ are voiced. This is against our expectation in terms of the number of articulators. Here the assimilative trait goes against the voiceless consonants to produce a skewing in favor of the voiced consonants. (Cf. section C.)

As pointed out above, $49$ of the $68$ $-C_2$ occurrences appear after the nasal consonants, whose production is accompanied by the acoustically desirable voicing. The assimilative trait would therefore have a bearing on the following $-C_2$ consonants that would go against the preference for fewer articulators dealt with here.
Thus, of the $49 - C_2$ occurrences after the nasal consonants, only 16 are voiceless and 33 (more than double) are voiced. It may be noted that this vast skewing in favor of the voiced consonants and against the voiceless consonants is further increased (four to one) after the velar nasals. For there are 12 voiced and 3 voiceless consonants in this syntagmatic environment. This tilt is justified in terms of both assimilative trait and acoustic requirements. For the production of voiceless consonants is even more difficult after the velar nasal. (Cf. section C; chapter IV.)
Section A₁ (b) (ii): Voiceless versus Voiced stops

In this section, our comparison of the frequencies for the voiceless and voiced units is restricted to only the stops. The actual occurrences of the opposing stops in monosyllabic words are presented in Table II - 3.

Table II - 3:
Frequency of Voiceless and Voiced Stops in Monosyllabic Words

<table>
<thead>
<tr>
<th>Stops</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</td>
<td>1112</td>
<td>59.31</td>
<td>41</td>
<td>41.00</td>
<td>7</td>
<td>63.64</td>
<td>1160</td>
<td>58.41</td>
</tr>
<tr>
<td>Voiced</td>
<td>763</td>
<td>40.69</td>
<td>59</td>
<td>59.00</td>
<td>4</td>
<td>36.36</td>
<td>826</td>
<td>41.59</td>
</tr>
<tr>
<td>Total</td>
<td>1875</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>11</td>
<td>100</td>
<td>1986</td>
<td>100</td>
</tr>
</tbody>
</table>

Comments on Table II - 3:

1. Of the 1986 stops in monosyllabic words, 1160 (58.41 %) are voiceless and 826 (41.59 %) are voiced. There is a clear preference for the voiceless stops over the voiced stops, though the margin of preference is slightly lower than that for the voiceless consonants (stops and fricatives combined) over their voiced counterparts. (Cf. Table II - 1.) The clear disfavoring for the voiced stops can be attributed to the use of an additional articulator: the glottis, for these stops.
2. In the CVC words with 1875 stops, there are 1112 (59.31%) instances of the voiceless stops and 763 (40.69%) instances of the voiced stops. Thus, the voiceless stops (with fewer articulators) are favored almost 3 to 2 vis-a-vis the voiced stops (with more articulators).

3. Among the 11 occurrences of stops in CCVC words, 7 (63.64%) are voiceless, and 4 (36.36%) are voiced. This vast skewing in favor of the voiceless stops vis-a-vis their voiced counterparts may well be attributed to the preference in terms of fewer versus more articulators.

4. Among the 100 occurrences of the stops in the CVCC words, there are 41 (41.%) instances of the voiceless and 59 (59.%) instances of the voiced. This skewing is clearly against our expectation from the viewpoint of fewer versus more articulators. For the rationale of this unexpected skewing, we need to examine the syntagmatic context.

Of the 100 stop occurrences of the CVC\(_1\)C\(_2\) words, 43 appear in word initial position and 57 show up as -C\(_2\) of the final consonant cluster.

Among the 43 initial stops in the CVCC words, there are 20 (46.51%) occurrences of voiceless stops and 23 (53.49%) occurrences of voiced stops. This skewing against our expectation is brought about by communicative factor. (Cf. Table II - 1, comment 4.)
The 57 occurrences of -C₂ in the CVC₁C₂ words contain only 21 (36.84%) voiceless stops as compared to 36 (63.16%) voiced stops. The syntagmatic distribution of the 57 -C₂ occurrences is presented in Table II - 4.

**Table II - 4: Voicing and Voicelessness of the Stops in -C₂ of the CVC₁C₂ Words**

<table>
<thead>
<tr>
<th>Stops No.</th>
<th>Voiceless No.</th>
<th>Voiceless %</th>
<th>Voiced No.</th>
<th>Voiced %</th>
<th>Total No.</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>After Nasal</td>
<td>12</td>
<td>38.32</td>
<td>33</td>
<td>61.68</td>
<td>45</td>
<td>100</td>
</tr>
<tr>
<td>After C⁹d</td>
<td>2</td>
<td>40.00</td>
<td>3</td>
<td>60.00</td>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>After C⁸l</td>
<td>7</td>
<td>100</td>
<td>0</td>
<td>0.00</td>
<td>7</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>12</td>
<td>33.33</td>
<td>36</td>
<td>66.67</td>
<td>57</td>
<td>100</td>
</tr>
</tbody>
</table>

Of the 57 -C₂ occurrences of the stops, 45 appear after nasal consonants, 5 occur after other voiced consonants and 7 appear after the voiceless consonants.

As shown in the above table, all the 7 stops are voiceless that occur after voiceless consonants. This total skewing in favor of the voiceless stops and against the voiced stops is brought about jointly by two human behavior traits, namely, the preference for fewer versus more articulators and the assimilative trait of the neighboring phonological units. (Cf. section C.)
Of the $2^c_2$ stops appearing after the voiced consonants, $2$ are voiceless and $3$ are voiced. Though it is against our expectation in terms of preference for fewer articulators, this distribution is brought about by the assimilative trait. (Cf. section C; Table II-1, comment 4.)

Among the $4^c_2$ stops occurring after the nasal consonants, $33$ are voiced and only $12$ are voiceless. This vast skewing (almost 3 to 1) in favor of the voiced stops and against the voiceless stops is further increased (six to one) after the velar nasal. For there are $12$ instances of voiced stops and only $2$ instances of voiceless stops that appear in the syntagmatic context. This tilt is produced jointly by assimilative trait and acoustic desirability of voicing after the velar nasal. (Cf. section C; chapter IV.)
Section A1 (b) (iii): Voiceless versus Voiced Fricatives

Here we compare the impact of fewer versus more articulators on the voiceless and voiced fricatives in their frequency of usage in the monosyllabic words of Delhi Urdu. The frequencies of the opposing units are presented in Table II - 5.

Table II - 5: Frequency of Voiceless and Voiced Fricatives in Monosyllabic Words.

<table>
<thead>
<tr>
<th>Fricatives</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</td>
<td>298</td>
<td>77.20</td>
<td>30</td>
<td>76.92</td>
<td>1</td>
<td>50</td>
<td>329</td>
<td>77.05</td>
</tr>
<tr>
<td>Voiced</td>
<td>88</td>
<td>22.80</td>
<td>9</td>
<td>23.08</td>
<td>1</td>
<td>50</td>
<td>98</td>
<td>22.95</td>
</tr>
<tr>
<td>Total</td>
<td>386</td>
<td>100</td>
<td>39</td>
<td>100</td>
<td>2</td>
<td>100</td>
<td>427</td>
<td>100</td>
</tr>
</tbody>
</table>

Comments on Table II - 5:

1. Of the 427 fricatives in all the monosyllabic words, 329 (77.05 %) are voiceless and 98 (22.95 %) are voiced. The voiceless fricatives outnumber 3 1/3 to 1 the voiced fricatives. This vast skewing against the voiced fricatives is due to the use of one more articulators, namely, the glottis, used in their production.

2. The vast skewing in favor of the voiceless fricatives is further increased among the CVC words. These words, with 386 occurrences of the fricatives, contain 298 (77.20 %) voiceless fricatives and
88 (22.80 %) voiced fricatives. This increase in the usage of the voiceless among the CVC words conforms to our expectation in terms of fewer versus of more articulators.

3. In the CVCC words with 39 fricatives, there are 30 (76.92 %) occurrences of the voiceless fricatives and 9 (23.08 %) occurrences of the voiced fricatives. This frequency of usage for the voiceless fricatives and their voiced counterparts for the CVCC words is almost the same as for the monosyllabic words of Delhi Urdu in their entirety. (Cf. comment 1 above.)

4. Of the 2 fricatives occurring in the CCVC words, 1 (50 %) is voiceless and 1 (50 %) is voiced. Although the number of occurrences is insignificant to draw definitive conclusions, the parity between the voiceless and voiced fricatives is neither against nor in favor of the criterion under study here.
Section A1 (c) : Concluding Remarks

1. In the make-up of units in the phonological paradigm of Delhi Urdu, there is no clear-cut preference for the voiceless consonants produced by fewer articulators over the voiced consonants produced by more articulators. There are eleven (11) voiceless stops vis-a-vis ten (10) voiced stops, whereas there are only four (4) voiceless fricatives vis-a-vis five (5) voiced fricatives (including the marginal \( \ddot{z} \)).

2. However, the preference for voiceless consonants in comparison with their voiced counterparts clearly shows up in the syntagmatic organization of the word in Delhi Urdu. For the voiceless and the voiced consonants appear in the ratio of 3 to 2 in monosyllabic words in their entirety. This preference is justified in terms of fewer versus more articulators.

It may be noted that the favoring for the voiceless consonants is slightly increased in the CVC words. Whereas the ratio of the voiceless consonants and their voiced counterparts remains 3 to 2 in the CCVC words, there is almost a parity between the voiceless and the voiced consonants in the CVCC words. This unexpected increase in the usage of the voiced consonants in CVCC words is brought about by the interaction of fewer versus more articulators with assimilative trait and communicative factor.

3. The voiced and the voiceless opposition is limited to only the stops and the fricatives among the consonants.
4. There is a vast skewing in favor of the voiceless stops vis-a-vis their voiced counterparts among the monosyllabic words, though the margin of preference is slightly lower than that for the voiceless consonants (stops and fricatives combined) over their voiced counterparts. The voiceless stops fare even better (almost 3 to 2) vis-a-vis their voiced counterparts in the CVC words. Also there is an overwhelming preference for the voiceless stops over the voiced stops in the CCVC words. This preference for the voiceless vis-a-vis the voiced among the stops can only be attributed to the non-utilization of larynx as an additional articulator.

However, the ratio of the syntagmatic usage is reversed (almost 2 to 3) for the voiceless and the voiced stops in the CVCC words. The skewing against our expectation in the distribution of the voiceless and the voiced stops is brought about by the assimilative trait and the communicative factor.

5. The voiceless fricatives and their voiced counterparts appear in the ratio of $3 \frac{1}{3}$ to 1 in monosyllabic words in their entirety. The frequency of usage for the voiceless fricatives and their voiced counterparts for the CVC and the CVCC words is almost the same as for the monosyllabic words. This preference is justified in terms of fewer versus more articulators.

However, there is a parity between the voiceless and the voiced fricatives in CCVC words. Inasmuch as the occurrence of the opposing fricatives is here limited to one word each, this parity of usage is totally insignificant to draw any conclusions.
6. As we have demonstrated through statistical support, there is a substantial skewing in favor of the voiceless consonants over their voiced counterparts in the syntagmatic organization of the word in Delhi Urdu. This skewing is brought about by the human trait of minimizing the effort by avoiding the use of greater number of articulators.

7. In some instances, there may be a total skewing in favor of the voiceless consonants and against their voiced counterparts. This may happen when the preference for fewer articulators may be reinforced by some other phonological principle(s). Thus, all consonants appear voiceless after a voiceless consonant in monosyllabic words in Delhi Urdu as a result of interaction between the preference for fewer articulators and the assimilative trait.

8. The criterion of fewer versus more articulators may also interact with communication to produce total skewing in favor of the voiceless consonants in word final position. This total skewing, traditionally known as "neutralization" obtains in German and Russian.
Section A_2: Glottis as an Additional Articulator: Aspirated versus Unaspirated Stops

Of the Delhi Urdu consonants, only the stops are characterized by a distinction of aspiration and unaspiratedness. Whereas unaspirated stops are produced by the supraglottal articulators alone, their aspirated counterparts are produced by an additional articulator: the glottal. The aspiration is produced 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 that brings about aspiration. This additional use of the glottal articulator makes the aspirated stops less favored than their unaspirated 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 unaspirated and aspirated stops in Delhi Urdu.

The impact of this criterion on the number of unaspirated and aspirated stops, and their frequency of usage in the word in Delhi Urdu is taken up in three subsections. In section A_2 (a), we examine the make-up of the unaspirated and aspirated stops in the phonological paradigm of Delhi Urdu, in terms of the number of articulators. In section A_2 (b), we present and evaluate, in terms of the same criterion, the proportionate occurrences of unaspirated and aspirated stops in the syntagmatic organization of the word in Delhi Urdu. Section A_2 (c) contains the concluding remarks with regard to the impact of this criterion on the phonology of Delhi Urdu.
Section A2 (a): Make-up of the Unaspirated and Aspirated
tops in the Phonological Paradigm

As shown in the phonological grid (Diagram 1-1), there are 21 stops
in Delhi Urdu, 11 unaspirated and 10 aspirated. Thus, the unaspirated
stops produced by fewer articulators, are slightly favored over the aspirated
stops produced by more articulators.

Whereas the unaspirated stops include p t t ş c k q and b d đ đ j
g, the aspirated stops comprise ph th þh ch kh and bh dh đh jh gh. It is noteworthy that the paradigmatic skewing among the stops occurs
at the physiologically disfavored post-dorsal axis. For there is no aspirated
counterpart of the unaspirated stop q, which is what we expect in terms
of the criterion under study here.

While there is only a slight preference for the unaspirated stops
over their aspirated counterparts in the make-up of phonological units
in the paradigm, we encounter a vast skewing in favor of the unaspirated
stops and against the aspirated stops in their frequency of usage in
the word; this syntagmatic usage of the opposing stops will be taken
up in the following section.
Section A_2 (b): Distribution of Unaspirated and Aspirated Stops in the word

In this section, we examine the distribution of unaspirated and aspirated stops in the phonological make-up of the word in Delhi Urdu from the viewpoint of fewer versus more articulators. We therefore compare the frequencies of unaspirated and aspirated stops as they appear in the monosyllabic words. The actual occurrences of the opposing stops are presented in Table II - 6.

Table II - 6:

Frequency of Unaspirated and Aspirated Stops in Monosyllabic words

<table>
<thead>
<tr>
<th>Stops</th>
<th>CVC No.</th>
<th>CVC %</th>
<th>CCVC No.</th>
<th>CCVC %</th>
<th>CVCC No.</th>
<th>CVCC %</th>
<th>Total No.</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unaspirated</td>
<td>1506</td>
<td>80.32</td>
<td>8</td>
<td>88.89</td>
<td>74</td>
<td>92.50</td>
<td>1588</td>
<td>80.86</td>
</tr>
<tr>
<td>Aspirated</td>
<td>369</td>
<td>19.68</td>
<td>1</td>
<td>11.11</td>
<td>6</td>
<td>7.50</td>
<td>376</td>
<td>19.14</td>
</tr>
<tr>
<td>Total</td>
<td>1875</td>
<td>100</td>
<td>9</td>
<td>100</td>
<td>80</td>
<td>100</td>
<td>1964</td>
<td>100</td>
</tr>
</tbody>
</table>

Comments on Table II - 6:

1. Of the 1964 stops used in the monosyllabic words, there is a vast preference for the unaspirated stops (1588; 80.86%) vis-a-vis the aspirated stops (376; 19.14%). The vast skewing in favor of the unaspirated stops and against their aspirated counterparts may well be attributed to the preference in terms of fewer versus more articulators that is being discussed here. The reinforcement for this
vast skewing is also brought about by physiological mechanism that disfavors aspiration. (Cf. Chapter 1, Section B.)

2. In the CVC words with 1875 stops, there are 1506 (80.32%) occurrences of the unaspirated stops and 369 (19.68%) occurrences of the aspirated stops. The skewing in favor of the unaspirated stops (with fewer articulators) is thus slightly decreased *vis-a-vis* the aspirated stops (with more articulators) among the CVC words, as compared to the monosyllabic words in their entirety. However, the insignificant difference in distribution by a decimal fraction among the CVC words does in no way reduce the vastness of skewing in favor of the preferred unaspirated stops.

3. Among the 9 instances of stops in the CCVC words, there are 8 (88.89%) occurrences of unaspirated stops and only 1 (11.11%) occurrence of aspirated stops. Thus, the skewing in favor of the unaspirated stops and against their aspirated counterparts is greatly increased among the CCVC words. This particular distribution of the opposing units can best be explained in terms of fewer versus more articulators, supported by physiological mechanism that also disfavors aspiration. The tilt against the more complex aspirated units is also brought about by the syntagmatic complexity inherent in the cluster words. For both CCVC and CVCC words are disfavored *vis-a-vis* the CVC words in terms of human trait of avoiding smaller aperture change in the syntagmatic make-up of the word. (Cf. Section D.)
4. Of the 80 occurrences of stops in CVCC words, there are 74 (92.50%) unaspirated and 6 (7.50%) aspirated. Here we find a near total skewing in favor of the unaspirated stops and against the aspirated stops. The rationale for this distribution is the same as presented in (3) above.

Section A.2 (c): Concluding Remarks

1. In the make-up of units in the phonological paradigm of Delhi Urdu, there is a clear-cut, though slight preference for the unaspirated stops produced by fewer articulators as compared to the aspirated stops produced by more articulators. There are eleven (11) unaspirated stops vis-a-vis ten (10) aspirated stops.

2. There is a vast skewing in favor of the unaspirated stops in comparison with their aspirated counterparts in the syntagmatic organization of the word in Delhi Urdu. For the unaspirated and the aspirated stops appear in the ratio of about 4 to 1 in the monosyllabic words in their entirety. This syntagmatic distribution is explained in terms of fewer versus more articulators that favors unaspirated stops vis-a-vis the aspirated stops. Support for this syntagmatic distribution is also provided by physiological mechanism that disfavors aspiration.

The ratio for the opposing unaspirated and aspirated stops remains almost the same (4 to 1) among the CVC words for the reasons stated above.
3. The tilt in favor of the unaspirated stops and against the aspirated stops is further enlarged in the CCVC words and the CVCC words. The rationale for the additional tilt is to be found in the syntagmatic complexity of these cluster words. The smaller change of aperture in the make-up of the cluster words makes them less favored than the CVC words produced by larger change of aperture. The less favored aspirated stops are therefore additionally disfavored in the syntagmatically complex cluster words.

4. It may be noted here that there is a total skewing in favor of the unaspirated stops and against the aspirated stops in word final position in Delhi Urdu. This total skewing is brought about jointly by the human trait preferring fewer articulators and the communicative load; we will deal with this particular skewing in chapter III.
Section A_3: Velum as an Additional Articulator: Nasal versus Oral Vowels

In Delhi Urdu, as in Standard Urdu, we have both consonants and vowels as nasal phonological units produced by velum as an additional articulator. Nasal consonants (m n n n n) are produced by the velum at aperture 3 in combination with the relevant oral articulators, supported by larynx with the voicing.

As we have discussed in section A_1, stops and fricatives are characterized by a distinction of voicing and voicelessness. Whereas both voiceless and voiced consonants (stops and fricatives) share the oral articulators, the voiced consonants are produced by the larynx as an additional articulator.

In comparison with the voiced stops (and voiced fricatives), nasal consonants may seem to be more complex in that they are produced by three articulators—the relevant oral articulator, the velum (Nasality) and the larynx (Voicing). However, the larynx (Voice) should not be considered an additional, complicating articulator in the case of the nasal consonants. For Voice is required for the excitation of the vocal cavity for all the phonological units at aperture 3 and above. Therefore, the nasal consonants should be placed on a par with the voiced stops (and the voiced fricatives) in terms of the number of articulators.

However, the situation is different in the case of the oral versus nasal vowels. For, as pointed out above, all phonological units at open apertures (3 through 8) require Voice for the excitation of the cavity. Both the oral and the nasal vowels have, thus, an investment in Voice.
The addition of N(asality) through velum as an extra articulator makes the nasal vowels more complex than the oral vowels. We therefore expect that the oral vowels should be preferred over the nasal vowels.

The impact of the velum as an additional articulator on the oral and nasal vowels is assessed in three subsections below. In section A\textsuperscript{3} (a), we examine the make-up of the oral and nasal vowels in the phonological paradigm of Delhi Urdu, in terms of the number of articulators. In section A\textsuperscript{3} (b), we present and discuss in terms of the same criterion, the proportionate occurrences of the oral and nasal vowels in the syntagmatic organization of the word in Delhi Urdu. Section A\textsuperscript{3} (c) contains the concluding remarks on the effect fewer versus more articulators on the oral versus nasal dichotomy among the vowels in Delhi Urdu.

Section A\textsuperscript{3} (a): Make-up of the Oral and Nasal Vowels in the Phonological Paradigm

As shown in the phonological grid (Diagram I-1), there are 16 vowels in Delhi Urdu, \( \{\hat{i}, \hat{u}, \hat{a}; i; e; u; o; a:\} \) oral and \( \{\hat{i}, \hat{u}, \hat{a}; i; e; u; o; a:\} \) nasal. Thus, there is a parity in Delhi Urdu between the oral vowels produced by fewer articulators and the nasal vowels produced by the more articulators. It must be pointed out here that this parity is certainly against our expectations.

Although the complexity produced by the velum as an additional articulator does not show up in the paradigmatic make-up of the nasal vowels \textit{vis-a-vis} the oral vowels, we do encounter a vast skewing in favor
of the oral vowels and against their nasal counterparts in the frequency of usage in the word; this syntagmatic usage of the opposing vowels will be taken up in the following section.

Section A3 (b): Distribution of oral and Nasal Vowels in the word

In this section, we examine the distribution of oral and nasal vowels in the phonological make-up of the word in Delhi Urdu from the viewpoint of fewer versus more articulators. We therefore compare the frequencies of oral and nasal vowels as they appear in monosyllabic words in Delhi Urdu. The actual occurrences of the opposing vowels are presented in Table II-7.

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

<table>
<thead>
<tr>
<th>Vowels</th>
<th>CVC</th>
<th></th>
<th>CVCC</th>
<th></th>
<th>CCVC</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Oral</td>
<td>1262</td>
<td>71.14</td>
<td>17</td>
<td>23.61</td>
<td>7</td>
<td>87.50</td>
<td>1286</td>
<td>69.36</td>
</tr>
<tr>
<td>Nasal</td>
<td>512</td>
<td>28.86</td>
<td>55</td>
<td>76.39</td>
<td>1</td>
<td>12.50</td>
<td>586</td>
<td>30.64</td>
</tr>
<tr>
<td>Total</td>
<td>1774</td>
<td>100</td>
<td>72</td>
<td>100</td>
<td>8</td>
<td>100</td>
<td>1854</td>
<td>100</td>
</tr>
</tbody>
</table>
Comments on Table II - 7:

1. Of the 185 vowels in all the monosyllabic words, 1286 (69.36%) are oral and 568 (30.64%) are nasal. That is, there is a vast skewing in favor of the oral and against the nasal vowels. This vast skewing against the nasal is due to the use of one more articulator, namely, the velum used in their production.

2. The vast skewing in favor of the oral vowels is further increased among the CVC words. These words, with 1774 occurrences of the vowels, contain 1262 (71.14%) oral vowels and 512 (28.86%) nasal vowels. This increase in the usage of the oral vowels among the CVC words conforms to our expectation in terms of fewer versus more articulators.

3. The 8 occurrences of CCVC words contain 7 (87.50%) oral vowels and only 1 (12.50%) nasal vowels. Here we find almost a total skewing against the nasal vowels and in favor of the oral vowels. Again this disfavoring for the nasal vowels may well be attributed to the use of velum as an additional articulator in the production of these vowels.

4. Among the 72 vowels occurring in the CVCC words, there are 17 (23.61%) instances of oral vowels vis-a-vis 55 (76.39%) instances of the nasal vowels. This skewing is clearly against our expectation from the viewpoint of fewer versus more articulators. For the rationale of this unexpected skewing, we need to examine the syntagmatic context.
Of the 72 vowels in the CVCC words, it is noteworthy that 54 appear before nasal consonants and 18 occur before other consonants. This syntagmatic distribution, which brings about an unexpected drastic skewing in favor of the nasal vowels and against the otherwise favored oral vowels, is presented in Table II-8.

Table II - 8:

Frequency of oral and Nasal Vowels in CVCC words

<table>
<thead>
<tr>
<th>Vowels</th>
<th>Oral No.</th>
<th>Oral %</th>
<th>Nasal No.</th>
<th>Nasal %</th>
<th>Total No.</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasal</td>
<td>0</td>
<td>0.0</td>
<td>54</td>
<td>100</td>
<td>54</td>
<td>100</td>
</tr>
<tr>
<td>Other</td>
<td>17</td>
<td>94.45</td>
<td>1</td>
<td>5.55</td>
<td>18</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>23.61</td>
<td>55</td>
<td>76.39</td>
<td>72</td>
<td>100</td>
</tr>
</tbody>
</table>

As shown in the above table, all the 54 vowels that occur before the nasal consonants are nasal. Here, there is a total skewing in favor of the nasal vowels and against the preferred oral vowels. This diametrically opposed skewing is brought about by the assimilative trait. (Cf. section C.)

However, it is noteworthy that the other 18 vowels of the CVCC words occurring before the non-nasal consonants, 17 are oral and only 1 is nasal. Even this lone nasal vowel occurs after a nasal consonant in the word *nars* 'nurse'. In the non-nasal syntagmatic context, there is almost a total skewing in favor of the oral vowels and against the nasal vowels. This skewing is brought about jointly by the preference for fewer articulators and the assimilative trait. (Cf. section C.)
Section A3 (C) : Concluding Remarks

1. In the make-up of units in the phonological paradigm of Delhi Urdu, there is a parity between the oral vowels (produced by fewer articulators) and the nasal vowels (produced by more articulators). There are 8 oral vowels vis-a-vis 8 nasal vowels.

2. There is a vast skewing in favor of the oral vowels in comparison with their nasal counterparts in the syntagmatic organization of the word in Delhi Urdu. For the oral and the nasal vowels appear in the ratio of 3 to 2 in monosyllabic words in their entirety. This preference is justified in terms of fewer versus more articulators.

3. The vast skewing in favor of the oral vowels is further increased among the CVC words. This increase in the usage of the oral vowels is justified in terms of number of articulators.

4. It may be noted here that there is almost a total skewing against the nasal vowels and in favor of the oral vowels among the CCVC words. Again this disfavoring for the nasal vowels may well be attributed to the use of velum as an additional articulator in the production of these vowels.

5. In the syntagmatic distribution which brings about an unexpected drastic skewing in favor of the nasal vowels and against the otherwise favored oral vowels among the CVCC words. This skewing is brought about jointly by the preference for fewer articulators and the assimilative trait.
Section B: Proximate Point of Articulation versus Remote Point of Articulation

Sounds produced by an articulator at the nearest point of articulation are preferred to sounds produced by the same articulator at some more remote point of articulation. For it is easier for an articulator to approach the nearest point of articulation, whereas that articulator has to twist and turn or to advance farther to approach a distant point of articulation.

In Delhi Urdu, the apex of the tongue, being the most adroit articulator among all the lingual articulators, comes in contact with two separate point of articulation, namely, the teeth and the palate to produce two series of consonants, the apico-dental and the apico-palatal, traditionally known as the "dental" and the "retroflex" consonants respectively. (Cf. chapter I, section C.)

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

In contradistinction to the apico-dental consonants, the apico-palatal ("retroflex") consonants require a difficult maneuvering of the apex in their production. The tip of the tongue has to curl back to an almost semicircular position to contact the hard palate. As this is a difficult task for the tongue to perform, we expect that the apico-palatal consonants should be disfavored. We also expect that disfavoring for these consonants and the relative favoring of the apico-dental consonants should show
up in both the paradigmatic make-up of the opposing phonological units and in the syntagmatic distribution of these units.

In section B₁, we compare the number of the apico-dental ("dental") consonants produced at the proximate point of articulation, with the number of the apico-palatal ("retroflex") consonants produced by the remote point of articulation. In section B₂, we compare the frequency of these opposing phonological units in the syntagmatic organization of the word in Delhi Urdu. In section B₃, we present our conclusions with regard to the impact of the proximate versus remote point of articulation on the phonology of Delhi Urdu.

Section B₁: Impact of Proximate versus Remote Point of Articulation on the Make-up of Phonological units in the Paradigm

As shown in the phonological grid (Diagram 1-1) of Delhi Urdu, the apico-palatal ("retroflex") units are found at aperture 0 and 3 only, and the apico-dental ("dental") units are found at aperture 0, 2, and 3. Total number of apico-dental consonants is 9 (n t th d dh s z l r), while there are only 7 (n t th d dh l r) apico-palatal consonants. Therefore, the number of apico-palatal consonants is less than their apico-dental counterparts, and this skewing is definitely due to the fact that apico-palatal consonants are produced by the contact of apex at a distant place (the palate) and require fine and precise coordination.

At aperture 0, there are 4 (t th d dh) apico-dental stops and 4 (t th d dh) are apico-palatal stops. Here there is a parity between the apico-dental stops and the apico-palatal stops. This parity is neither
against nor in favor of the criterion under study here.

Among the 2 nasals at aperture 0 in Delhi Urdu, there is only 1 (n) apico-dental, and only 1 (n) apico-palatal nasal. Here we also found a parity between the apico-dental nasal and apico-palatal nasal.

At aperture 2, all the 2 (s z) fricatives are apico-dental. Here we find a total skewing in favor of the apico-dental fricatives and against the apico-palatal fricatives. This is due to the fact that this preference can be attributed to the use of the palate (a distant place) as point of articulation.

At aperture-2 we encounter a hole in the pattern in that there is a total absence of any unit at the apico-palatal order as opposed to two units (s z) at the apico-dental axis. It is to be pointed out that physiologically it is not impossible to articulate apico-palatal s and z. In Sanskrit, we do find an apico-palatal s, which has either been dropped or merged with s in Hindi and Urdu. The evidence reinforces our claim that proximate point of articulation is preferred over remote point of articulation.

Among the 4 liquids at aperture 3 in Delhi Urdu, there are 2 (l r) apico-dental and 2 (l r) apico-palatal. This parity between the apico-dental and apico-palatal liquids can be said to be only apparent. For the apico-palatal (l) is only a marginal phonological unit that does not occur at all in the monosyllabic words being analyzed in the present work. If we take this skewing into account there is a clear preference for the apico-dental liquid over the apico-palatal liquids at aperture 3.
Notwithstanding the above explanation, there is a clear-cut preference for the apico-dental consonants over their apico-palatal counterparts in the make-up of phonological units in the paradigm, we do encounter a vast skewing in favor of the apico-dental consonants and against the apico-palatal consonants in the frequency of usage in the word. This syntagmatic usage of the opposing units will be taken up in the following section.
Section B2: Impact of Proximate versus Remote Point of Articulation on the Frequency of Occurrences of Phonological Units

Here we will compare the frequencies of usage of the apico-dental and apico-palatal consonants in the monosyllabic words of Delhi Urdu. The actual occurrences of the opposing consonants are presented in the Table II - 9.

Table II - 9:

Frequency of Apico-dental consonants and Apico-palatal consonants in Monosyllabic words

<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>1064</td>
<td>75.30</td>
<td>77</td>
<td>68.14</td>
<td>7</td>
<td>100</td>
<td>1148</td>
<td>74.89</td>
</tr>
<tr>
<td>Apico-dental</td>
<td>349</td>
<td>24.70</td>
<td>36</td>
<td>31.86</td>
<td>0</td>
<td>-</td>
<td>385</td>
<td>25.11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1413</strong></td>
<td><strong>100</strong></td>
<td><strong>113</strong></td>
<td><strong>100</strong></td>
<td><strong>7</strong></td>
<td><strong>100</strong></td>
<td><strong>1533</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Comments on Table II - 9:

1. Of the 1533 consonants used in monosyllabic words, 1148 (74.69%) are apico-dental and 385 (25.11%) are apico-palatal. That is, there is a clear skewing in favor of apico-dental and against the apico-palatal in the over-all usage of the opposing consonants in the word in Delhi Urdu.
2. In the CVC words with 1413 consonants, there are 1064 (75.30%) occurrences of the apico-dental consonants and 349 (24.70%) occurrences of the apico-palatal consonants. The skewing in favor of the apico-dental consonants a proximate point of articulation is thus slightly increased vis-à-vis apico-palatal consonants a remote point of articulation among the CVC words, as compared to the monosyllabic words in their entirety.

3. Among the 113 occurrence of consonants in the CVCC words, there are 77 (68.14%) instances of apico-dental consonants vis-à-vis 36 (31.86%) instances of the apico-palatal consonants. This usage fully conforms to our expectation. The disfavoring for the apico-palatal consonants can be attributed to the use of palatal (a distant place) as point of articulation.

4. As shown in the above table, all the 7 consonants are apico-dental. This total skewing in favor of the apico-dental consonants and against the apico-palatal consonants from the viewpoint of proximate point of articulation versus remote point of articulation.
Section B3: Concluding Remarks

1. In Delhi Urdu, the apex of the tongue, being the most adroit articulator among all the lingual articulators, comes in contact with two separate points of articulation, namely, the teeth and the palate to produce two series of consonants, the apico-dental and the apico-palatal, traditionally known as the "dental" and the "retroflex" consonants respectively. Since palatal is distant place for apex as compared to dental, therefore apico-palatal units require fine coordination.

2. In the make-up of units in the phonological paradigm of Delhi Urdu, there is a clear-cut preference for the apico-dental consonants produced at proximate point of articulation over the apico-palatal consonants produced at remote point of articulation. There are 9 apico-dental consonants vis-a-vis 7 apico-palatal consonants.

3. However, the preference for apico-dental consonants in comparison with apico-palatal consonants also clearly shows up in the syntagmatic organization of the word in Delhi Urdu. For the apico-dental and the apico-palatal consonants appear in the ratio of 3 to 1 in monosyllabic word in their entirety. This preference is justified in terms of proximate versus remote point of articulation.

It may be noted that the favoring for the apico-dental consonants is slightly increased in the CVC words, whereas the favoring for the apico-dental consonants is lower is CVCC words. In the CCVC words, we find a total skewing in favor of the apico-dental consonants and against the apico-palatal consonants in terms of proximate versus remote point of articulation.
4. The psychologically motivated disfavoring of apico-palatal consonants vis-a-vis apico-dental consonants in the monosyllabic words of Delhi Urdu is mainly validated through statistical support.
Section C: Assimilative Trait of Neighboring Phonological Units

The characteristics of neighboring segments and tend not be precisely differentiated.

As we know, phonological units are combined to form signal meaning units (signes). Phonological units carry distinction of articulator, aperture, points of articulation, relative mobility and muscular tension of the articulator. Phonological units may also differ in the use of additional articulator for voicing, aspiration or nasality. Two successive phonological units may share some feature of articulation or may be different in all the features of articulation. For example a segment st shares two features of articulation, articulator (apex) and voicelessness. But on the other hand gt do not share such features, since g is front-dorsal voiced units and t is voiceless apical units. If two successive segments are very different from each other then fine and precise manipulation of articulators are required to distinguish these segments. But if two successive segments share some feature of articulation, then we can carry on freely from one unit to another without such precision of control of articulators keeping in view general disfavoring of human being for fine and precise coordination, we may expect of favoring for the combination of phonological units, sharing some feature of articulation.

The assimilative trait can be seen in the combination of phonological units. The precise coordination is also avoidance by making certain phonological changes and making neighboring segments similar.
The explanation of the assimilative trait in the monosyllabic words of Delhi Urdu is taken up in two subsections below. In Section C₁ we compare occurrences of phonological units in terms of the assimilative trait of human beings. In Section C₂, we take up certain phonological changes that tend to make characteristics of neighboring segments, similar. Section C₃ contains the concluding remarks on the entire section C.

Section C₁: Assimilative Trait and the occurrence of phonological Units.

Assimilative trait can be observed in the monosyllabic words of Delhi Urdu, in the occurrence of voiceless, voiced and nasalized units in CVC and CVCC words.

1. Initial voiceless stop + Final voiceless stop
   Total Number of words = 189

2. Initial voiced stop + Final voiced stop
   Total Number of words = 84

   Initial voiceless stop + Final voiced stop

3. Initial voiced stop + Final voiceless stop
   Total Number of words = 50

4. Initial voiceless fricative + Final voiceless fricatives
   Total Number of words = 15

5. Initial voiced fricative + Final voiced fricative
   Total Number of words = 1
(6) Initial voiceless fricative + Final voiced fricative  
Total Number of words = 11

(7) Initial voiced fricative + Final voiceless fricative  
Total Number of words = 5

The number of CVC words for occurrence of initial voiceless and final voiceless units are more than those of initial voiceless and final voiced units. Likewise the number for initial and final voiced units is more than that of either initial voiceless and final voiced unit or initial voiced and final voiceless units. Thus, in CVC words voiceless units occur with voiceless units and voiced occur with voiced units.

In CVCC words, in final cluster, we get preference of the occurrence of voiced unit with voiced units and voiceless units with voiceless. The number of words for final cluster with reference to voiceless and voiced units are given below.

(1) Voiceless fricative + voiceless stop = 30
Voiced fricative + voiced stop = 39

(2) Voiceless fricative + voiced stop  
or  
Voiced fricative + voiceless stop = 13

Further, in CVCC words, in final cluster nasals mostly occur before voiced stops; because nasal + voiced stop occur 33 times and nasal + voiceless stop occur 16 times.
Assimilative trait can also be seen in the occurrence of nasalized vowels in CVC and CVCC words. In CVCC all nasalized vowels occur before nasalized consonants. In CVC words too, we get preference for nasalized vowels before nasal and non-nasal:

Consonants:

<table>
<thead>
<tr>
<th>Consonants</th>
<th>Number of words</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVC(^1)</td>
<td>9</td>
</tr>
<tr>
<td>CVN(^2)</td>
<td>61</td>
</tr>
<tr>
<td>CV:C</td>
<td>64</td>
</tr>
<tr>
<td>CV:N</td>
<td>118</td>
</tr>
</tbody>
</table>

The figures of nasalized vowels in CVC words presented above, show the preference of nasalized vowels before nasal consonant, and it may well be taken as an instance*.

*Foot Notes: 1. C = any consonant (c, d, p etc.)

N = Nasal consonant (m, n, etc.)

of making neighboring phonological segments similar.
Section C₂: Ad-hoc phonological change and Assimilative Trait.

In Delhi Urdu monosyllabic words, we are encountered by some apparently ad-hoc phonological changes. These changes are nothing but an instance of making successive phonological units similar. In Delhi Urdu in 12 CVCC words, p, b, are changed into f, v.

We list below all the CVCC words, in which p, b are changed into f, v, in three subsets below, with their respective meanings.

<table>
<thead>
<tr>
<th>Set 1: Classical Urdu p</th>
<th>f in Delhi Urdu</th>
<th>Delhi Urdu</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.No.</td>
<td>Classical Urdu</td>
<td>Delhi Urdu</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>tāps</td>
<td>tafs</td>
<td>ear-rings</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set 2: Classical Urdu b</th>
<th>v in Delhi Urdu</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>balb</td>
</tr>
<tr>
<td>2.</td>
<td>qalb</td>
</tr>
<tr>
<td>3.</td>
<td>habs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set 3: Classical Urdu b</th>
<th>f in Delhi Urdu</th>
</tr>
</thead>
<tbody>
<tr>
<td>S.No.</td>
<td>Classical Urdu</td>
</tr>
<tr>
<td>1.</td>
<td>zabt</td>
</tr>
<tr>
<td>2.</td>
<td>xabt</td>
</tr>
</tbody>
</table>

In the words listed above the change of p, b to f, v is making successive segment similar in two ways.

(a) Change of labial stops p, b into labio-dental fricatives f, v before or after apico-dentals results into sharing same point of articulation (dentum). After or before a labial steps, it is difficult to produce an apico-dental fricative or liquid in quick succession, therefore
p, b are changed into labio-dental fricatives and in this way successive segments are made similar in terms of point of articulation.

(b) In two words b changes into f before voiceless stop t i.e.

\[\begin{array}{ll}
4 & z\text{abt} \\
& z\text{aft} \\
& x\text{abt} \\
& x\text{aft}
\end{array}\]

In words before voiced units, b changes into v, but due to the voiceless stop t that follows it b in the above words changes into f and not v, because f also shares voicelessness with t.

Section C.3: Concluding Remarks

1. The characteristics of neighboring phonological units tend not to be precisely differentiated.

2. There is preference in CVC and CVCC word for the occurrences of two voiceless or voiced sounds over the occurrence of one voiceless and voiced unit. Nasalized vowels mostly occur before nasal consonants.

3. In quite a few labial stops p, b change into labio-dental fricatives, and this change is definitely caused by the tendency to assimilate the labial stops to labio-dental fricatives in order to make them similar in terms of point of articulation to their neighboring apico-dental units.
Section D: Aperture change and combination of Phonological Units.

In successive segments, large changes of aperture are preferred to small changes of aperture.

Phonological units cohere to form larger segments. Greater changes of aperture are likely to be preferred in successive segments because pronouncing same aperture or slightly different aperture in a sequence requires greater precision of control. Small changes of apertures involve rigidity of articulators since they have less freedom of movement. On the other hand, greater changes of apertures carry greater freedom for articulatory organs and need no precision of control or fineness of coordination among the articulators. The impact of the degree of aperture change on the combinatory pattern of Delhi Urdu phonological units in the monosyllabic words is taken up in three sub-sections below. In section D₁ we compare the potential and actual number of CVC, CCVC and CVCC words in terms of the degree of aperture change. Section D₂ deals with the impact of aperture change on CCVC words. In section D₃ we have dealt with the effect of degree of aperture change on the CVCC words. In section D₄ we present the concluding Remarks.

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

In this section, we will compare the potential and actual number of CVC, CCVC and CVCC words. The potential and actual number for CVC, CCVC and CVCC words are given in table II - 10.
Table II - 10 :

Potential and Actual Number of words in Delhi Urdu

<table>
<thead>
<tr>
<th></th>
<th>Potential</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of consonants</td>
<td>41</td>
<td>1675 (6.23% of 26896)</td>
</tr>
<tr>
<td>Total Number of vowels</td>
<td>16</td>
<td>72 (0.01% of 1102736)</td>
</tr>
</tbody>
</table>

**Comments on Table II - 10 :**

1. As shown in the table, total number of consonants for Delhi Urdu is 41 and total number of vowels is 16. Given the total number of consonants and vowels the potential number of CVC words is 26896 and the actual turnout for CVC words 1675 (6.23% of 26896). For CCVC and CVCC words the potential number is 1102736 but their actual number are much lower than CVC. The actual number for CCVC words is only 8 (0.0072% of 1102736) and actual turnout for CVCC words is 72 (0.01% of 1102736). Even a cursory glance at table for actual and potential number for CVC, CCVC and CVCC words shows clear preference for CVC words, because CVC words are in absolute majority.
(2) The preference for CVC words is caused by the maximum change of aperture in successive segments. In CVC words, there is maximum change of aperture from constriction (0, 1, 2, 3) to opening (4-8), then back to constriction on the other hand in CCVC and CVCC words the initial and final clusters demand for smaller changes of aperture (from consonant to consonants). Therefore, CVC words which carry larger changes of apertures in the successive segments are preferred over CCVC and CVCC.

Section D₂: Large Aperture Change versus small Aperture Change in CCVC Words

In this section we will study the impact of aperture change on CCVC words.

(1) There are only eight words all having 0, 1, 2 as first member of consonant cluster and aperture 3 units (w,y) as second member of consonant cluster. There are seven words of the type 0 + 3 (kya: kwa:r) etc. and one of 2 + 3 type (xwa:r), these clearly show the preference for greater change of aperture. After aperture 0 or 2 units of aperture 3 is found.

(2) In all the eight words, the vowels used are a and a:, which are the most open vowel for the dialect (Cf. Phonological Grid Diagram I-1). This also shows the preference for large of aperture, since after 0, 2 aperture 3 unit is used and then from 3 there is maximum aperture change, to 7 or 8 aperture for the following vowels (a, a:).
(3) Another very interesting point which suggests the preference for the large change of aperture in successive segments is the fact that in initial clusters, where first member of cluster is a unit of aperture 0, 2, w aperture as second member of cluster, though in other combinations v occurs. The preference of w as second member of cluster over v can only be explained in terms of avoidance of small change of aperture. w as we know is a aperture 3 unit and v is a unit of aperture 1. Therefore after a unit of aperture 0, or 2 as a first member of cluster, a unit from aperture 3 (w) is preferred over aperture 1 unit (v) because the former represents large aperture change than the later.

Section D_3 : Large Aperture Change versus Small Aperture Change in CVCC words.

In this section, we will explain the phonological skewing in Delhi Urdu CVCC words, which are caused by the degree of aperture change in CVCC words.

(1) As in the case of CCVC words above, in CVCC words too, the most favored vowels are a, a:, and a: these vowels occur 47 times in 72, (total for CVCC words.) It is to be noted therefore that in CVCC words, after an initial consonant (c-) and before a final cluster (-cc), the most favored vowels are the most open vowels, since these vowels yeild the maximal difference of aperture from one consonant to another consonant.
When we compare the consonant cluster in terms of the degree of aperture change in CVCC words. We get the following numbers:

(i) **Number of words with no aperture change**

\[
\begin{align*}
0 + 0 &= 0 \\
1 + 1 &= 0 \\
2 + 2 &= 0 \\
3 + 3 &= 0 \\
3 + \text{nasal} &= 6 \text{ (i.e. jurm lemp)}
\end{align*}
\]

**Total** = 6

(ii) **Number of words with one aperture change**

\[
\begin{align*}
0 + 1 &= 0 \\
1 + 2 &= 5 \text{ (i.e. havs)} \\
2 + 3 &= 0 \\
2 + \text{nasal} &= 2 \text{ (i.e. nazm)}
\end{align*}
\]

**Total** = 7

(iii) **Number of words with two aperture change**

\[
\begin{align*}
0 + 2 &= 6 \text{ (i.e. dost)} \\
1 + 3 &= 4 \text{ (i.e. qalv)} \\
1 + \text{nasal} &= 0 \text{ (see foot note)}
\end{align*}
\]

**Total** = 10

**Ftn.** Lack of the combination of 1 + nasal is due to the fact that aperture 1 involves greater effort and difficulty and hence is used in the minimum number of combination (Cf. Chapter I, section B).
(iv) **Number of words with three aperture change**

\[ 0 + 3 = 0 \text{ (i.e. burj, gird)} \]
\[ 0 + \text{nasal} 1 = 49 \text{ (i.e. nand, mand)} \]

**Total** = 49

As we expect, the number of combination in cluster in CVCC words with no aperture change is four only. But as the difference of aperture increases, the number of words also increase. With one aperture change the number is 7, with two aperture change 10 and with maximum aperture change (3) the number is 49.

**Section D**: Concluding Remarks

1. In Delhi Urdu, successive segments comprising of large change of aperture are preferred over small changes of apertures.

2. The preference for large changes of aperture can be seen in the massive favoring for CVC words over CCVC and CVCC words. This favoring for CVC words is definitely caused by the fact that CVC words represent maximum change of aperture for successive segments, from constriction to opening and then back to constriction.

3. Preference for large change of aperture can also be seen in the absolute favoring for most open vowels in between consonants in both CCVC and CVCC.

**Ftn**: 1. Nasals are produced on two apertures simultaneously \((0 + 3)\), since nasality their main characteristics comes from an open nasal passage to aperture 3, therefore they can also be regarded as a unit of aperture 3.
4. The preference for large change of aperture can also be seen in the increase in the combination for final clusters with the increase in the difference of aperture change.
Section E: Human Behavior Justification for the Phonological Grid of Delhi Urdu.

This section deals with psychological factors which, provide reinforcement to the validity of phonological units in Delhi Urdu which are set up in terms of the physiological mechanism in Chapter I Diagram I-1.

The principle laid down below which is generally agreed represents a common trait of human behavior:

"It is easier to learn the use of smaller number of tools than of larger, and up to a certain point it is easier to learn to perform a given task by combining the resources of tools with which one is familiar than by learning to use a new tool".

It is the above stated fact of human behavior that motivates the make-up and distribution of phonological units in human language which 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 collections of a relatively large number of non-combining phonological units".

It is to be kept in mind that in Delhi Urdu there are fifty seven phonological units: forty one consonantal and sixteen vocalic. (cf. Diagram I-1) It is these rather small number of distinct units which recur in different combinations to form the entire inventory of singals of the singal-meaning pairs (singes) of the Urdu dialect which is under
study. This is one way in which human language minimizes the effort on that specific part of the memory. The economy so achieved in the formation of signals 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 apertures and articulators. This dialect of Urdu fifty seven phonological units which are formed by combination of only nine degrees of aperture (0, 1, 2, 3, 4, 5, 6, 7, 8) and eight articulators (labium, apex, medium, front dorsum, back dorsum, post dorsum, velum and glottis). On closer examination of the phonological grid of Delhi Urdu, we further realize that orientation of human behaviour has contributed significantly to their contributed justification.

The phonological units which are produced with less effort and precision are greater in number than those units that are more complicated physiologically which require more precision and control in their production. In fact, the unsymmetrical nature of grid is due to both physiological and human behavior rationale.

Even a quick look at the phonological grid, reveals lack of symmetry in the number of units on various axes. It is beyond the scope of the present work to explain absence of each potential phonological unit in Delhi Urdu. So we will continue to explain only those gaps that are found relative to some existing phonological units in the grid. (cf. Diagram I-1).
(1) Non-occurrence of voiced and aspirated stops relative to post-dorsal q.

A voiceless unaspirated post-dorsal stop does occur in Delhi Urdu, this phonological unit (q) is recognized by the absence of its voiced or counterparts on aperture 0 (zero). This non-occurrence of the more complex voiced stops with post-dorsal articulator can partly be attributed to the use of more articulators which are required in their production compared to q which is produced with fewer articulators. However, the situation is more complex in case of post-dorsal axis. The sole phonological unit, i.e. q, at this axis is characterized by a very low frequency in comparison, to the frequency of other stops in Delhi Urdu. It is predominantly the physiologico-acoustic factor that causes the skewing in formation of phonological units at the post-dorsum.

(2) Scarcity of phonological units on aperture 1.

Aperture 1 has only two phonological units, i.e. f and v while on aperture 2 there are six phonological units. Least number of phonological units on aperture 1 is because of force and effort involved in the production of aperture 1 units, because of their releasing air stream through a very restricted channel. As the tips of the teeth provide the physiologically ideal surface for aperture 1, less precision is required with the place of articulation well-suited to the aperture are more in number.

(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 used
to make dual distinction between the "dental" and "retroflex" among the consonants by the speakers of many Indian languages.

On observing the phonological grid of Delhi Urdu, it is clear that the apex keeps distinction of articulation at two points i.e. (dental, the palate), on aperture 0 and 3. The use of the 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 orientation human behavior provides reinforcement to the validity of the phonological grid of Delhi Urdu, which is established earlier in terms of the physiological mechanism.
Section F: Summary and Conclusions

In this section, we summarize our findings as a whole for this chapter.

Section A of this chapter concerns with explaining the favorable and unfavorable phonological skewings in Delhi Urdu in terms of human beings avoidance of fine and precise coordination of the articulatory movements. In this section an attempt is made explain the aspects of distribution of phonological units on both the syntagmatic and paradigmatic levels. We finally summarize the analysis in the following paragraphs as carried over in this section.

The first phonological aspect of Delhi Urdu which is explained in terms of human behavior, is the preference given to phonological units produced by fewer articulators. The number of phonological units frequency counts for phonological units involving less no. of articulators is more than those involvings more number of articulators. Thus, voiceless consonants are preferred over voiced consonants, unaspirated consonants are preferred over aspirated counterparts and nasalized vowels are not favored to their oral counterparts. The voiced, aspirated consonants and nasalized vowels involve greater precision & control in production because they use more articulators in comparison voiceless, unaspirated consonants and oral vowels.

The second type of phonological skewing which is explained in section B of the chapter under review is the disfavoring of apico-palatal consonants over apico-dental consonants. It is seen that it is easier for the apex to contact dentum, an adjacents point of articulation than to contact
palatum which is a far point of articulation. So, the apico-palatal consonants require much precision and are not favored as compared to their apico-dental counterparts. The disfavoring for apico-palatal consonants can be seen by the comparison of number of units and frequency counts of apico-dental and apico-palatal consonants.

Third we have dealt with a combinatory aspect of Delhi Urdu phonology in terms of the favor for the large changes of apertures. It has already been shown through the comparison of CVC, CCVC and CVCC words, that CVC words are preferred over CVCC and CCVC. This preference of CVC words is due to the maximum change of aperture in CVC words, from consonant (constriction) to vowel (opening) and then back to consonant. Further more there is an increase in combinations for final cluster in CVCC words with a difference in aperture change.

The next phonological skewing which is explained by avoiding the fine coordination, is the assimilative trait of the neighboring phonological units. Occurrence of phonological units in most cases depends on their environment. As a result the voiceless phonological units occur mostly with voiceless consonants and voiced consonants mostly occur with voiced consonants. As such, there is a marked preference for nasalized vowels before nasal consonants. Further, in CVCC words, all nasalized vowels occur before nasal consonants. Thus, to make vowels and nasal consonants similar nasalization is added to the oral vowel preceding nasal consonants, although nasalized vowels are disfavored to their oral vowels.

The assimilative trait of the neighboring phonological units has been evaluated by listing some of CVCC words, where p, b change into f, v in the final cluster, before or after apico-dental consonants and thus compute the final segments which is easy to articulate, by creating a
similarity in terms of point of articulation, as a result leading to precise coordination of articulatory movement to make many distinction in succession. According to section D of the chapter we have dealt with the human factors which provide reinforcement to the validity of phonological units in Delhi Urdu, as set in terms of the physiological mechanism in chapter I, Diagram 1-1. It has been shown that human behavior orientation provides reinforcement for the validity of the phonological grid of Delhi Urdu, established earlier in terms of the physiological mechanism. As demonstrated in sections, the phonological units are produced with much less effort and precision out number those units that are more complex physiologically and would require more precision and control. The preference for the production simple units can be visible clearly in more number for those phonological units which involve less articulators. The voiceless and unaspirated units are greater than the voiced and apsirated units. Similarly, there are less number of units on aperture 1, the most difficult aperture for Delhi Urdu. In same way two axes for apex in the opposition to one each for other articulators is also a reinforcement by the human behavior. The use of apex on two distinct points of articulation can be attributed to the greater adroitness of apex amongst the lingual articulators and labium.

Thus, in the chapter under review, makes an attempt to assess the role of human behavior in the non-random distribution of phonological units on both the syntagmatic and paradigmatic levels in Delhi Urdu. It has been shown that human trait play an important role in the production of phonological units and their distributive patterns in Delhi Urdu, wherever a precise coordination is avoided.