CHAPTER II

HUMAN BEHAVIOUR: ITS ROLE IN THE PHONOLOGY OF LUCKNOW URDU
CHAPTER-II

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The previous chapter was an attempt to highlight the role of physiological mechanism in the paradigmatic makeup and the syntagmatic usage of the phonological units of Lucknow Urdu. In the present chapter, we will be making an attempt to explain the paradigmatic makeup of the phonological units and their sequences in the speech chain in Lucknow Urdu in terms of human behaviour which is a very important orienting principle of Form-Content Linguistics.

Humans resort to minimax solution, i.e. maximum output through minimum input. This is an inherent trait of human beings which they resort to in their daily endeavours. Human laziness (desire to use minimum possible effort) and human intelligence (through which maximum output is sought), interact to exert great pressure on the language, which result in phonological skewings and are explainable in terms of human behaviour. It is to be noted here that whereas, there may be other aspects of human behaviour which influence the functioning of language, our interest is here limited to only two traits of the human psyche (laziness and intelligence), which together explain the skewing motivated
by the human behaviour.

It may be pointed out here, that the phonological skewings which are resultant of the two traits of human behaviour may not be specific to a particular language; in fact, their general characteristic may recur from language to language.

As we have mentioned in our Introduction, it is through an interaction of the two traits of human behaviour namely, human laziness and intelligence that we as speakers and hearers of the language minimize time and effort to get the maximum output by inferring from linguistic or non-linguistic context or from past experience. Thus, inference is one of the manifestations of human behaviour which has an impact on the total functioning of a language.

The human traits of laziness and intelligence have a bearing on both the grammar and phonology of a language, we are limiting ourselves in assessing the impact of these traits on the phonology of Lucknow Urdu.

We have divided this chapter on human behaviour into six sections. In Section-A we highlight the preference for fewer articulators over more articulators in the production of the phonological units. In Section B, we show that the apico-dental ("dental") consonants with proximate point of
articulation, are preferred over the apico-palatal ("retroflex") consonants with remote point of articulation. In Section C, we discuss the assimilative traits of phonological units whereby they tend to become similar in succession. In Section D, we analyze the aperture change and combination of the phonological units. In Section E, we make an attempt to assess the role of human behaviour in the makeup of the phonological grid of Lucknow Urdu. In Section F, we present summary and conclusions with regard to the impact of human behaviour on the phonology of Lucknow Urdu.

Section A: Preference for Fewer Articulators Over more Articulators

Phonological units are a product of the combinations of articulators and various degrees of apertures. The phonological units may be produced by fewer or more articulators. It has been mentioned in the beginning of this chapter that it is an inherent human trait to minimize and economize in all situations. It is thus anticipated that phonological units employing fewer articulators will be preferred over those using more articulators. The simultaneous use of the greater number of articulators requires fine and precise coordination of the articulators that is disfavoured due to the laziness trait of human
behave.

The paradigmatic makeup and the syntagmatic distribution of the phonological units will be affected by the preference of fewer articulators over more articulators. The skewings on both these levels will be taken up as we deal with the phonological dichotomies involving fewer versus more articulators.

The dichotomies among the phonological units of Lucknow Urdu are mainly three in number that are produced by the use of an extra articulator:

Voiced versus Voiceless consonants
Aspirated versus Unaspirated consonants
Nasal versus Oral Vowels.

We will deal with the three types of opposing units in Subsections A1, A2, A3 respectively, followed by concluding remarks in Subsection A4.

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

Among the consonants of Lucknow Urdu, the stops and the fricatives show a distinction of voicing and voicelessness. The voiceless consonants are produced by only the supraglottal articulators as opposed to their voiced counterparts which are produced by an additional
articulator: the glottis. The simultaneous use of the glottal articulator (i.e., the vocal folds, producing voice) makes the voiced consonants less favoured than their voiceless counterparts in terms of the number of articulators. We therefore expect a great skewing in favour of the voiceless consonants as compared to their voiced counterparts.

Three subsections are presented here to show the impact of fewer versus more articulators on Lucknow Urdu phonology. In Section A1(a), we examine the makeup of the voiceless and voiced consonants in the phonological paradigm of Lucknow 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 Lucknow Urdu. In Section A1(c) we present the concluding remarks with regard to the impact of this criterion on the phonology of Lucknow Urdu.

Section A1(a): Makeup of the Voiceless and Voiced Consonants in the Phonological Paradigm

The phonological grid of Lucknow Urdu (Diagram I-1), shows that the voiceless and voiced distinction is restricted to the stops (phonological units at aperture /\),
and the fricatives (phonological units at aperture 1, 1 1/2, and 2).

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

It is worth noting here, that among the stops, the skewing occurs at the physiologically disfavoured post dorsal axis. This can be seen in the absence of a voiced counterpart of the voiceless stop q, which is in accordance with our expectations.

Of the 8 fricatives at apertures 1, 1 1/2, and 2, there are 4 voiceless and 4 voiced units. There is a parity between the voiceless-voiced units here which is not as we expect. But we need to examine these phonological units more carefully. At aperture 1, the parity between the voiceless fricative f and voiced fricative v is neither against nor in favour of the criterion here.

The voiced-h at aperture 1 1/2 is a very special case. This voiced-h is required to complement or support the voiced aspirated series (bh dh dh ðh gh) in Lucknow Urdu, as in other Indo-Aryan languages. Urdu and its dialects,
including Lucknow Urdu, lacks a voiceless-h. This skewing in Urdu and other Indo-Aryan languages requires additional acoustic research, which is beyond the scope of our study here.

At aperture 2 in Lucknow Urdu, we find 5 fricatives: 3 voiceless (s, s, x) and 2 voiced (z, ɣ). The preference for the voiceless units over their voiced counterparts goes in favour of our expectations with regard to the number of articulators.

Inasmuch as the preference in the paradigmatic makeup of the voiceless and voiced consonants is concerned, it must be stated that the preference for the voiceless consonants over their voiced counterparts is only slight in the makeup of the phonological units in the paradigm. However, we expect the tilt in favour of the voiceless consonants against the voiced consonants to show up in the syntagmatic usage of the word which will be dealt with in following subsections.

Section A1(b): Voiceless and Voiced Consonants; Distribution in the Word.

This section deals 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 Lucknow Urdu. This syntagmatic distribution of the opposing consonants has been taken up in three subsections dealing with (i) the consonants (both stops and fricatives) in their entirety, (ii) the stops and (iii) the fricatives.

Section A1(b): Voiceless versus Voiced Consonants (Stops and Fricatives).

Here the voiceless and voiced consonants (both stops and fricatives combined) are compared to highlight their frequency of usage in the monosyllabic words. We present the frequencies of the opposing consonants in Table II-1.

<table>
<thead>
<tr>
<th>Consonants</th>
<th>CVC</th>
<th>CVCC</th>
<th>CCVC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voiceless</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>1432/</td>
<td>130/</td>
<td>7/</td>
<td>1569/</td>
</tr>
<tr>
<td></td>
<td>Voiceless</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voiced</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>858/</td>
<td>69/</td>
<td>3/</td>
<td>930/</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2290/</td>
<td>199/</td>
<td>10/</td>
<td>2499/</td>
</tr>
</tbody>
</table>

Table II-1: Frequency of the Voiceless and Voiced Consonants in the Monosyllabic Words.
Comments on the Table:

1) Of a total of 2499 consonants (stops and fricatives) used in the monosyllabic words, 1569 (62.79%) are voiceless and 930 (37.21%) are voiced. Thus, we encounter a clear skewing in favour of the voiceless consonants as opposed to their voiced counterparts in the overall usage in the word in Lucknow Urdu.

It is to be noted here that there is a clear cut preference for the voiceless consonants produced by fewer articulators over the voiced consonants produced by more articulators in the syntagmatic usage in the word in Lucknow Urdu. Here compared to the paradigmatic aspect, the effect of fewer versus more articulators is more pronounced in the syntagmatic organization of the word.

2) In the CVC words with 2290 consonants (stops and fricatives), there are 1432 (62.53%) occurrences of the voiceless consonants and 858 (37.47%) occurrences of the voiced consonants. The CVC words show a favourable skewing as compared to the monosyllabic words in their totality in terms of fewer versus more articulators.

3) Of a total of 199 consonants (stops and fricatives) in the CVCC words, we find 130 (65.33%) occurrences of the voiceless consonants as opposed to only 69 (34.67%) occurrences of the voiced consonants. Here again we get
figures which show a skewing in favour of the voiceless consonants in comparison to the voiced consonants, which is what we expect in terms of fewer versus more articulators.

4) Of a total of 10 occurrences of consonants in the CCVC words, there are 7 (70.00%) instances of voiceless consonants vis-a-vis 3 (30.00%) instances of the voiced consonants. The figures fully conform to our expectations.

Section A1(bii): Voiceless versus Voiced Stops.

Here we make an attempt to compare the frequencies for the voiceless and the voiced units, limiting ourselves to the stops. The actual occurrences of the opposing stops in the monosyllabic words of Lucknow Urdu are presented in Table II-2, below.
<table>
<thead>
<tr>
<th>Stops</th>
<th>CVC</th>
<th>CVCC</th>
<th>CCVC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Voiceless</td>
<td>1129/</td>
<td>69/</td>
<td>5/</td>
<td>1203/</td>
</tr>
<tr>
<td></td>
<td>60.41</td>
<td>57.98</td>
<td>62.50</td>
<td>60.27</td>
</tr>
<tr>
<td>Voiced</td>
<td>740/</td>
<td>50/</td>
<td>3/</td>
<td>793/</td>
</tr>
<tr>
<td></td>
<td>39.59</td>
<td>42.02</td>
<td>37.50</td>
<td>39.73</td>
</tr>
<tr>
<td>Total</td>
<td>1869/</td>
<td>119/</td>
<td>8/</td>
<td>1996/</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Table II-2: Frequency of the Voiceless and Voiced Stops in the Monosyllabic Words

Comments on the Table:
1) Among a total of 1996 stops in the monosyllabic words, 1203 (60.27%) are voiceless and 793 (39.73%) are voiced. There is a clear skewing in favour of the voiceless stops over the voiced stops. However, the margin of preference is slightly lower than that for the voiceless consonants (stops and fricatives combined) over their voiced counterparts (cf. Table II-2). The use of an additional articulator, namely, the glottis for the voiced stops result in their disfavouring as compared to the voiceless stops.
2) Of a total of 1869 CVC stops, there are 1129 (60.41%) voiceless stops and 740 (39.59%) voiced stops. Thus,
the voiceless stops employing fewer articulators are being favoured over the voiced stops with more articulators in the ratio 3:2.

4) Of a total of 119 occurrences of the stops in the CVCC words, 69 (57.98%) are voiceless and 50 (42.02%) are voiced. Here again, the voiceless consonants have an edge over their voiced counterparts which is justified from the viewpoint of fewer versus more articulators.

5) Of the 8 occurrences of the stops in the CCVC words, 5 (62.50%) are voiceless and 3 (37.50%) are voiced. This clear skewing in favour of the voiceless stops and against the voiced stops can be attributed to the preference in terms of fewer versus more articulators.

Section A1(biii): Voiceless versus Voiced Fricatives

In this section we make an attempt to highlight the impact of the fewer versus more articulators on the voiceless and voiced fricatives in their frequency of usage in the monosyllabic words. Table II-3 gives us the frequencies of the opposing units below:
Table II-3: Frequency of the Voiceless and Voiced Fricatives in the Monosyllabic Words

Comments on the Table:

1) Among a total of 504 fricatives in the monosyllabic words, we find 366 (72.62%) instances of voiceless fricatives. The voiceless fricatives outnumber almost 3 to 1 voiced fricatives. This apparent skewing in favour of the voiceless fricatives as against the voiced fricatives is due to a preference for fewer versus articulators.

2) Of a total of 421 CVC words, we find 303 (71.97%) occurrences of the voiceless fricatives and 118 (28.03%) of the voiced fricatives. There is an almost a ratio of 2 1/2 voiceless fricative to 1 voiced fricative. This vast skewing in favour of the voiceless fricatives as against the voiced fricatives is due to the use of one more articulator namely, the glottis, used in their...
3) Of total of 80 CVCC fricatives in the monosyllabic words, 61 (76.25%) are voiceless and 19 (23.75%) are voiced. This vast skewing in favour of the voiceless fricatives is justified from the viewpoint of fewer versus more articulators.

4) Among the 3 instances of fricatives in the CCVC words we find 2 (66.67%) voiceless fricatives and 1 (33.33%) voiced fricatives. Thus, this major skewing in favour of the voiceless fricatives as against their voiced counterparts is explainable in terms of the use of an extra articulator for the voiced fricatives.

Section A1(c): Concluding Remarks

1) In the paradigmatic makeup of the phonological units of Lucknow Urdu, there is a slight preference for the voiceless consonants which are produced by fewer articulators over the voiced consonants produced by more articulators. We have 11 voiceless stops as opposed to 10 voiced stops and 4 voiceless fricatives as opposed to 3 voiced fricatives.

2) This preference for the voiceless consonants over their voiced counterparts are more significant in the syntagmatic usage of the word in Lucknow Urdu. The ratio for the voiceless and voiced consonants is 3:2 in production.
the monosyllabic words in their entirety, which is justified in terms of fewer versus more articulators.

It is to be noted that the favouring for the voiceless consonants is slightly higher for the CVC words as compared to CVCC and the CCVC words.

3) This opposition of voiceless and voicing is limited to only the stops and the fricatives among the consonants.

4) We encounter vast skewings in favour of the voiceless stops as against the voiced stops in the monosyllabic words. The margin for the preference is slightly lower as in the case of the consonants (stops and fricatives combined) in their entirety. The CCVC and the CVCC stops also show preference for the voiceless stops over their voiced counterparts. This favouring for the voiceless stops is also due to the non-utilization of the larynx as an additional articulator.

5) The frequency of occurrence of the voiceless and voiced fricative is almost 3:1 in the monosyllabic words. We also encounter a preference for the voiceless fricatives over the voiced fricatives in the CVC, CVCC and the CCVC words, which is justifiable in terms of fewer versus more articulators.

6) As seen in the syntagmatic organization of the word, we find that the voiceless consonants are preferred over
the voiced consonants. This skewing is brought about by the human trait of minimizing the effort by avoiding the use of greater number of articulators.

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

The stops of Lucknow Urdu possess the unaspirated/aspirated feature among all other consonants. The unaspirated stops are produced by the supraglottal articulators. On the other hand, the aspirated stops are produced by an additional articulator: the glottis. Aspiration is the result of the upcoming puff of breath from the lungs, channeled through a particular maneuvering of the glottal articulator. The triangular configuration of the vocal folds force the air through a small channel which produces aspiration. The additional use of the glottal articulator makes the aspirated stops less favoured than their unaspirated counterparts which do not employ an additional articulator. Keeping this in mind, we expect a favouring in favour of the unaspirated stops vis-a-vis the aspirated stops, both in the paradigmatic makeup and syntagmatic distribution in the word.

In Section A2(a), we examine the makeup of the unaspirated and aspirated stops in the phonological paradigm.
Keeping in mind the same criterion, we present and assess the proportionate of occurrences of the two opposing categories of stops in the syntagmatic organization of the word in Section A2(b). In Section A2(c) we present concluding remarks.

Section A2(a): Makeup of the Unaspirated and Aspirated Stops in the Phonological Paradigm

The phonological grid of Lucknow Urdu (Diagram 1-1), presents 21 stops - 11 unaspirated and 10 aspirated. We may thus point out that the unaspirated stops are slightly more preferred over their voiced counterparts in terms of the number of articulators.

The unaspirated stops are p t t s k q and b d δ j g and the aspirated stops are ph th əh ch kh and bh dh gh jh gh. It is to be noted that the paradigmatic skewing here occurs at the physiologically disfavoured post dorsal axis. Thus, there is no aspirated counterpart for the unaspirated stop q, which fully conforms to our expectations.

The preference for the unaspirated stops over their aspirated counterparts is only marginal in the paradigmatic makeup, we encounter a vast skewing in favour of the unaspirated stops as against the aspirated stops in their
frequency of usage in the words; which is to be valuated in
the following section.

Section A2(b): Distribution of the Unaspirated and Aspirated
Stops in the word

Here, we assess the effect of fewer versus more
articulators on the syntagmatic distribution of the
unaspirated and aspirated stops in Lucknow Urdu. The
frequencies of the unaspirated and the aspirated stops to
evaluate their actual occurrences are presented below in
Table II-4:

<table>
<thead>
<tr>
<th>Stops</th>
<th>CVC</th>
<th>CVCC</th>
<th>CCVC</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No %</td>
<td>No %</td>
<td>No %</td>
<td>No %</td>
</tr>
<tr>
<td>Unaspirated</td>
<td>1506/80.58</td>
<td>127/98.45</td>
<td>7/87.5</td>
<td>1640/81.75</td>
</tr>
<tr>
<td>Aspirated</td>
<td>363/19.42</td>
<td>2/1.55</td>
<td>1/12.5</td>
<td>366/18.25</td>
</tr>
<tr>
<td>Total</td>
<td>1869/100</td>
<td>129/100</td>
<td>8/100</td>
<td>2006/100</td>
</tr>
</tbody>
</table>

Table II-4: Frequency of Occurrence of the Unaspirated and
Aspirated Stops in the Monosyllabic Words

Comments on the Table:
1) Among the 2006 stops in the monosyllabic words, 1640
(81.75%) are unaspirated and 366 (18.25%) are
aspirated. There is a vast skewing in favour of the
unaspirated stops *viz-a-viz* the aspirated stops, which can be explained in terms of fewer versus more articulators being discussed here. This claim is further supported by physiological mechanism (cf. Chapter I, Section B).

2) Of a total of 1869 CVC words, there are 1506 (80.58%) occurrences of the unaspirated stops and 363 (19.42%) of the aspirated stops. When monosyllabic words in entirety are compared with the unaspirated and aspirated stops, it may be observed that the skewing in favour of the unaspirated stops (with fewer articulators) is slightly lowered against the aspirated stops in the CVC words. This minute difference however does not affect or reduce the clear skewing in favour of the unaspirated stops in the CVC words in terms of the human trait for preference of fewer versus more articulators.

3) Among 129 stops in the CVCC words, 127 (98.45%) are unaspirated and 2 (1.55%) are aspirated instances of the stops. Here we find a near total skewing in favour of the unaspirated stops as compared to the aspirated stops which is attributed to preference for fewer versus more articulators.

4) Of the 8 occurrences of the CCVC stops, there are 7 (87.5%) occurrences of the unaspirated stops and only 1
(12.5%) occurrence of the aspirated stops. Thus, we encounter a vast skewing here in favour of the unaspirated stops and against their aspirated counterparts. The rationale can be given in terms of the fewer versus more articulators, supported by the physiological mechanism that further disfavours aspiration. The disfavouring against the more complex aspirated units is further magnified by the syntagmatic complexity inherent in the cluster words. For both CCVC and CVCC words are disfavoured as compared to the CVC words in terms of the human trait of avoiding smaller aperture change in the syntagmatic makeup of the words (cf. Section D).

**Section A2(c): Concluding Remarks**

1) The phonological paradigm of Lucknow Urdu projects a clear-cut, though slight preference for the unaspirated stops (fewer articulators) as opposed to the aspirated stops (more articulators). The unaspirated stops are 11 in number vis-a-vis 10 aspirated stops.

2) The syntagmatic distribution of the word in Lucknow Urdu highlights the preference for fewer versus more articulators in the form of vast skewings in favour of the unaspirated stops. Among the monosyllabic words the ratio of the unaspirated and aspirated stops is almost
4:1. This clear cut preference is explained in terms of fewer versus more articulators and is also supported by physiological mechanism which disfavours aspiration.

In the CVC words, the ratio remains almost the same as above, the rationale being provided by the above mentioned factors.

3) Among the CVCC and the CCVC words, the tilt in favour of the unaspirated stops as against the aspirated stops is more obvious. The syntagmatic complexity of these cluster words accounts for the additional tilt found in them. The change of aperture in these cluster words is also small as compared to the non-cluster words produced by larger change of aperture, which makes them less favoured. Thus, the less favoured aspirated stops are further disfavoured in the syntagmatically complex cluster words.

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

The consonants and vowels in Lucknow Urdu, like standard Urdu, appear as nasal phonological units produced by the velum as an additional articulator. At aperture 3, the nasal consonants (m n ñ ŋ ñ) are produced by the velum in combination with the relevant oral articulators and the voicing being provided by the larynx.
As discussed earlier in Section A1, the voicing/voiceless distinction are found in the stops and fricatives. The oral articulators are shared by both the voiceless and voiced consonants (stops and fricatives), the voiced consonants are produced by the larynx as an additional articulator.

The nasal consonants seem to be more complex as compared to the voiced stops and voiced fricatives, 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 nasal consonants because it is an essential tool or basic feature for all the phonological units at aperture 3 and above. Therefore, we may place the nasal consonants at par with the voiced stops and the voiced fricatives in terms of the number of articulators.

It may be pointed out that the case of the oral versus nasal vowels is quite different. As mentioned above, the phonological units at open apertures (3 through 8) require V(oice) for the excitation of the cavity. Thus, both the oral and nasal vowels have an investment in V(oice). The nasal vowels are however, made more complex due to the addition of N(asality) in the form of an extra articulator;
velum. We therefore expect that the oral vowels should be favoured over the nasal vowels.

In the subsections below, we make an attempt to validate the claim that the oral vowels will be preferred over the nasal vowels in terms of the number of articulators involved. In Section A3(a) we examine the makeup of the oral and nasal vowels in the phonological paradigm of Lucknow Urdu. The actual occurrences in terms of frequency counts of the oral and nasal vowels in the syntagmatic organization of the word is presented in Section A3(b). In Section A3(c) we present concluding remarks on the impact of the fewer versus more articulators on the oral versus nasal opposition of vowels in Lucknow Urdu.

Section A3(a): Makeup of the Oral and Nasal Vowels in the Phonological Paradigm

The phonological grid of Lucknow Urdu (Diagram I-1) presents a total of 20 vowels consisting of 10 oral vowels (I U a: i: u: o: a: ; ai au) and 10 nasal vowels (I U a; i: u: o: a: ; ai au). We encounter a parity between the oral vowels (fewer articulators) and the nasal vowels (more articulators) which goes against our expectations.

The paradigmatic makeup of the nasal vowels vis-a-vis the oral vowels is not affected by the complexity produced
by the velum as an additional articulator as far as their number is concerned. However, we do encounter vast skewing in favour of the oral vowels as against their nasal counterparts in the syntagmatic organization of the word, which is evaluated through frequency counts below.

Section A3(b): Distribution of Oral and Nasal Vowels in the Word

Here we assess the impact of fewer versus more articulators on the frequency of occurrence of the oral and nasal vowels in the monosyllabic words of Lucknow Urdu. Table II-5, presents the actual occurrences of the opposing vowels below:

<table>
<thead>
<tr>
<th>Vowels</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>Oral</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1237</td>
<td>74.12</td>
<td>69/</td>
<td>68.32</td>
</tr>
<tr>
<td>Nasal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>432</td>
<td>25.88</td>
<td>32/</td>
<td>31.68</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1669</td>
<td>100</td>
<td>101/</td>
<td>100</td>
</tr>
</tbody>
</table>

Table II-5: Frequency of the Oral and Nasal Vowels in the Monosyllabic Words
Comments on the Table:

1) Among a total of 1778 vowels in the monosyllabic words, 1313 (73.85%) are oral and 465 (26.15%) are nasal. Thus, we encounter a vast skewing in favour of the oral vowels as against their nasal counterparts which can be attributed to the human trait of preferring fewer versus more articulators.

2) The CVC words show a further increase in this favouring for the oral vowels as opposed to the nasal vowels. Of the 1669 occurrences of the vowels, 1237 (74.12%) are oral and 432 (25.88%) are nasal. The figures conforms to our expectations in terms of the number of articulators.

3) When we examine the 101 CVCC words, we find 69 (68.32%) oral vowels and 32 (31.68%) nasal vowels. The figures for the frequency of occurrence fully conform to our expectations in terms of the human trait of fewer versus more articulators.

4) Of the occurrences of vowels in the CCVC words, 7 (87.50%) are oral and 1 (12.50%) are nasal. The near total skewing in favour of the oral vowels as against the nasal vowels is attributed to the use of velum as an additional articulator in the production of the nasal vowels.
Section A3(c): Concluding Remarks

1) We encounter a parity between the oral vowels (fewer articulators) and the nasal vowels (more articulators) in the paradigm of the phonological units of Lucknow Urdu.

2) The syntagmatic organization of the word in Lucknow Urdu shows up vast skewing in favour of the oral vowels as against the nasal vowels which is justified in terms of fewer versus more articulators.

3) The frequencies of the oral and the nasal vowels in the CVC words also conforms to our expectations in terms of the number of articulators.

4) The vast skewings in favour of the oral vowels is further increased among the CVCC words which can be attributed to the preference for fewer versus more articulators.

5) It may be pointed out that there is an almost total skewing against the nasal vowels and in favour of the oral vowels among the CCVC words, which is the result of the use of the velum as an additional articulators.
Section B: Proximate Point of Articulation versus Remote Point of Articulation

Sounds produced by an articulator at a proximate point of articulation are preferred over sounds produced by the same articulator at some remote point of articulation. This statement is in the light of the fact that it is much easier for an articulator to approach a nearer point of articulation, whereas that same articulator will have to make complicated movements forward and backward, to approach a distant point of articulation.

The apex of the tongue being most adroit, comes in contact with two separate points of articulation, namely, the teeth and the palate to give us the apico-dental and the apico-palatal series of consonants traditionally termed as the "dental" and "retroflex" consonants respectively (cf. Chapter I, Section C).

The apex comes in contact with the teeth in the production of the apico-dental consonants. The direct proximity of the teeth to the apex make them the natural target of the apex. Thus, it is easier to produce apico-dental ("dental") consonants.

As opposed to the apico-dental consonants, the apico-palatal ("retroflex") consonants require a complex curling back of the tip of the tongue in an almost semicircle to
touch the hard palate. This procedure being more complex, we expect a disfavouring for the apico-palatal consonants as compared to the apico-dental consonants, both in their paradigmatic makeup and syntagmatic organization in the word.

The following sections deal with both the paradigmatic and syntagmatic aspects of the impact of the proximate point of articulation versus the remote point of articulation. In Section B1, the number of the apico-dental ("dental") consonants produced at the proximate point of articulation and the apico-palatal ("retroflex") consonants produced at the remote point of articulation are compared. In Section B2, we compare the frequency of occurrence of these opposing phonological units in their syntagmatic distribution in the word in Lucknow Urdu. Section B3, presents concluding remarks.

Section B1: Impact of the Proximate versus Remote Point of Articulation on the Paradigmatic Makeup of the Phonological Units

The phonological grid of Lucknow Urdu (Diagram I-1), shows that the apico-palatal ("retroflex") consonants are found at apertures 0 and 3 only, and the apico-dental ("dental") units appear at apertures 0, 2 and 3.
There are a total of 9 apico-dental units (nt th d dh s z 1 r), as opposed to only 8 apico-palatal units (ŋ ʈ ʈh ɖ ɖh ɭ r ŋh). Thus, we find that the number of the apico-dentals exceed the number of apico-palatais, which is due to the fact that the apico-dentals are produced at a proximate point of articulation, in contrast to the apico-palatais produced at a remote point of articulation requiring fine and precise coordination.

There are 4 (t th d dh) apico-dental stops and 4 (ʈ ʈh ɖ ɖh) apico-palatal stops at aperture ø. There is a parity between the two here, which is neither against nor in favour of the criterion under study.

The 2 nasals at aperture ø, show 1 apico-dental and 1 apico-palatal units. Here, again we find a parity among the two categories.

There are 2 fricatives (sz) at aperture 2, and both apico-dental units. Thus, we encounter a total skewing against the less favoured apico-palatal consonants which can be attributed to the use of the palate (a distant place) as point of articulation.

It is to be noted that we encounter a hole in the pattern at the apico-palatal order as opposed to the two apico-dental units (sz). Physiologically, it is not
impossible to articulate apico-palatal $s$ and $z$, for we encounter apico-palatal $s$ in Sanskrit, which has either been dropped or merged with $s$ in Hindi and Urdu. Thus, our claim is further reinforced by the above statements.

Of the 5 liquids at aperture-3, there are 2 apico-dentals ($1 r$) and 3 apico-palatals ($l p h$). Here, we find that the less favoured apico-palatal consonants exceed the number of the more favoured apico-dental consonants. However, it is worthwhile to mention at this juncture, that the apico-palatal ($l$) is only a marginal unit that does not occur at all in the monosyllabic words being analyzed here and the apico-palatal $p h$ occurs in only a few monosyllabic words here. Thus, we can say that the apico-dentals are still preferred over the apico-palatals in the light of the above explanations.

The paradigmatic makeup of the phonological units in Lucknow Urdu show a favouring for the apico-dentals in comparison to the apico-palatals in terms of the proximate versus remote point of articulation. This favouring for the apico-dentals and against the apico-palatals is to be further evaluated in their syntagmatic usage in the word in the following section.
Section B2: Impact of the Proximate versus Remote Point of Articulation on the Frequency of Occurrence of the Phonological Units

In this section the actual occurrences of the apico-dental and apico-palatal consonants in the monosyllabic words are taken up to refute the preference for the apico-dentals (nearer point of articulation) in contrast to the apico-palatals (further point of articulation) in their syntagmatic usage. Table II-6, gives us the frequencies of the apico-dentals and apico-palatals in the 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>Apico-dental</td>
<td>1109/74.78</td>
<td>133/88.67</td>
<td>8/100</td>
<td>1250/76.17</td>
</tr>
<tr>
<td>Apico-palatals</td>
<td>374/25.22</td>
<td>17/11.33</td>
<td>0/</td>
<td>391/23.83</td>
</tr>
<tr>
<td>Total</td>
<td>1483/100</td>
<td>150/100</td>
<td>8/100</td>
<td>1641/100</td>
</tr>
</tbody>
</table>

Table II-6: Frequency of Occurrence of the Apico-dental and Apico-palatal Consonants in the Monosyllabic Words

Comments on the Table:

1) Of a total of 1641 consonants in the monosyllabic words, 1250 (76.17%) are apico-dental and 391 (23.83%)
are apico-palatal. We encounter, a clear skewing in favour of the apico-dentals as against the apico-palatals in their overall usage in the word here.

2) Among the 1483 occurrences in the CVC words, 1109 (74.78%) are apico-dentals and 374 (25.22%) are apico-palatals. The skewing in favour of apico-dentals (proximate point of articulation) is further increased as compared to the apico-palatals (remote point of articulation) among the CVC words vis-a-vis the monosyllabic words.

3) In the CVCC words, there are 133 (88.67%) apico-dental consonants and 17 (11.33%) apico-palatal consonants. The figures fully conform to our expectations.

4) Among the CCVC words, we find a total skewing against the apico-palatal consonants vis-a-vis a total of instances of apico-dental consonants which is justified in terms of the proximate versus remote point of articulation.

Section B3: Concluding Remarks

1) The apex, being the most adroit articulator, 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 "retroflex"
consonants. The palate being a distant point of articulation, as compared to teeth, requires fine and precise movements.

2) The phonological paradigm of Lucknow Urdu, shows a clear cut preference for the apico-dental consonants vis-a-vis the apico-palatal consonants.

3) However, the preference for the apico-dental consonants vis-a-vis the apico-palatal consonants clearly shows up in the syntagmatic organization of the word in Lucknow Urdu. The apico-dentals are preferred 3:1 against the apico-palataals in the monosyllabic words in their entirety.

   It is to be noted that the favourings for the apico-dental consonants are slightly increased in the CVC words and there is a total skewing in the CCVC words.

4) The validation of the claim that the proximate apico-dentals are to preferred over the remote apico-palataals is strengthened through statistical support.

Section C: Assimilative Trait of Neighbouring Phonological Units

In this section, we make an attempt to explain that the
characteristics of neighbouring segments tend not to be precisely differentiated.

It is well known that the phonological units combine to form signal-meaning unit or signes. The phonological units are marked by distinction of articulator, aperture, points of articulation, relative mobility and muscular tension of the articulator. They may also show distinctions based on a difference in voicing, aspiration or nasality. To exemplify, \textit{st} share two features of articulation - the apical articulator and voicelessness. On the other hand, \textit{qt} lack these features, since \textit{q} is front-dorsal voiced unit and \textit{t} is a voiceless apical unit. If two successive segments are very different from each other then fine and precise manipulation of articulators are required to distinguish these segments. However, if two successive segments share some features of articulation, then the movement from one unit to another is carried out smoothly, without precision of control of the articulators.

The human trait disfavours the use of fine and precise movements. Thus, keeping in mind this disfavouring we may expect a favouring 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
evident by making certain phonological changes and making neighbouring segments similar.

The assimilative trait is visible in the monosyllabic words of Lucknow Urdu. We compare the occurrences of the phonological units in terms of the assimilative trait of human beings in Section C1.

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

The monosyllabic words of Lucknow Urdu show the assimilative trait in the occurrence of the voiceless, voiced and nasalized units in CVC and CVCC words.

1) Initial Voiceless Stops + Final Voiceless Stops.
   Total Number of Words = 222
2) Initial Voiced Stops + Final Voiced Stops
   Total Number of Words = 87
3) Initial Voiceless Stops + Final Voiced Stops
   Total Number of Words = 50
4) Initial Voiced Stop + Final Voiceless Stop
   Total Number of Words = 141
5) Initial Voiceless Fricative + Final Voiced Fricative
   Total Number of Words = 5
6) Initial Voiced Fricative + Final Voiced Fricative
Total Number of Words = 2

7) Initial Voiceless Fricatives + Final Voiceless Fricative

Total Number of Words = 17

8) Initial Voiced Fricative + Final Voiceless Fricative

Total Number of Words = 6

We see that among the CVC words, the initial voiceless and final voiceless units exceed the number of initial voiceless and final voiced units. Similarly, the number of 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 the CVC words, the number of voiceless units occurring with the voiceless units is more as compared to the voiced units occurring with voiced units.

Among the CVCC words, in the final clusters, we find a preference for a combination of voiceless + voiceless over voiced + voiced consonants. The number of occurrences of the voiceless and voiced clusters are as follows:

1) Voiceless fricative + voiceless stops = 30
   Voiced fricative + voiced stops = 02
   ---
   32

2) Voiceless fricative + voiced stop = 1
   Voiced fricative + voiceless stop = 0
In the CVCC words, the nasals mostly occur before voiced stops, which is seen in 19 occurrences of the nasal + voiced stops and only 8 occurrences of nasal + voiceless stops.

In CVC words, when a vowel is either preceded or followed by nasal consonants then we find a preference for nasalized vowels which is a clear case of assimilative trait. Similarly, in the case of the CVCC words, when a vowel is either preceded by a nasal consonant or the first member of the cluster following the vowel is a nasal consonant, then we encounter a preference for the nasalized vowels. Moreover, there are instances of loan words (5) showing preference for nasalization in which although the preceding consonant is nasal, none of the members of the cluster is a nasal consonant. In the data, there are also two instances of non-nasalization despite the vowel being preceded by nasal consonant and the following clusters being non-nasals. This is probably because of the fact that in standard Urdu these words occur without nasalization and therefore the status quo is being maintained. We present the occurrence of nasalized vowels below:
<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVC</td>
<td>134</td>
</tr>
<tr>
<td>CVN</td>
<td>180</td>
</tr>
<tr>
<td>NVN</td>
<td>37</td>
</tr>
<tr>
<td>Total of CVN+NVN</td>
<td>217</td>
</tr>
</tbody>
</table>

\*

\*C\(^{1}\)V\(^{1}\)N\(^{2}\) 26
N\(^{1}\)V\(^{1}\)N\(^{2}\) 4
N\(^{1}\)C\(^{1}\)C\(^{2}\) 2
C\(^{1}\)V\(^{1}\)C\(^{2}\) 0
N\(^{1}\)C\(^{1}\)C\(^{2}\) 5

\*Ftn N\(^{1}\) = C\(^{1}\) of the CVC\(^{1}\)C\(^{2}\) words
N\(^{2}\) = C\(^{2}\) of the CVC\(^{1}\)C\(^{2}\) words
C = any consonant (p, t, c, s etc.)
N = nasal consonant (m, n, etc.)
Section C2: Ad-hoc Phonological Changes and the Assimilative Trait

In Lucknow Urdu, we come across a few ad-hoc phonological changes as a result of which phonological units become similar.

The ad-hoc phonological changes are given below:

Set 1  Classical Urdu b  →  f in Lucknow Urdu
nabs  nafs

Set 2  Classical Urdu b  →  p in Lucknow Urdu
zabt  zapt
xabt  xapt
haps  haps

In the words listed above the change of b to f (set 1) and p (set 2) is taking place to make phonological units similar occurring in quick succession.

i) In the word listed above (set 1), voiced stop changes to voiceless fricative as a result of regressive assimilation where the last consonant is a voiceless fricative which is influencing the preceding voiced consonant to lose its voiceness.

ii) In three words listed above, b changes to p. The voiced stop b is being followed by a voiceless consonant in these words. The loss of voiceness is a clear case of regressive assimilation and may also be explained in
terms of human psyche which invariably goes for economy of effort.

Section C3: Concluding Remarks

1) The characteristics of the neighbouring phonological units tend not to be precisely differentiated.

2) In the CVC and the CVCC words, the occurrence of two voiceless or voiced sounds in quick succession are preferred over one voiceless and one voiced units. Nasalized vowels mostly occur before nasal consonants.

3) Assimilative trait among phonological units is seen when two units become similar.

Section D: Impact of the Aperture Change on the Combination of the Phonological Units

In this Section, we make an attempt to validate the claim that in successive segments, large changes of apertures are preferred over small changes of apertures and combinations of unidirectional aperture changes are favoured over combinations with multidirectional aperture changes.

Similarly for the unidirectional aperture changes the articulatory movements are easier. On the other hand, for the multidirectional aperture changes we require fine and precise coordination of articulators.
We analyze the effect of the degree of aperture change on the combinatory pattern of Lucknow Urdu in Section D1 and its subsections. In Section D2 and its subsections, we take up the undirectional and multidirectional changes of apertures. Finally in Section D3, we sum up the entire Section D.

To put it differently, greater changes of aperture are likely to be preferred because greater precision of control is required for units at the same aperture or slightly different aperture. We require difficult and rigid movements for small changes of apertures. In contradistinction, the large changes of apertures, allow greater freedom of movement and need less precision and fineness of coordination among articulators.

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

Here we compare the potential and actual number of the CVC, CCVC and CVCC words to ascertain our claim that units with large changes of aperture are preferred over small changes of aperture. In Table-II-7 below, we present the potential and actual number of CVC, CCVC and CVCC words.
Total Number of Consonants - 41
Total Number of Vowels - 20

\[
\begin{align*}
\text{CVC} &= C^2V = 41^2 \times 20 = 33620 \quad 1669 \ (4.96\% \ of \ 33620) \\
\text{CCVC} &= C^2V = 41^2 \times 20 = 1378420 \quad 101 \ (0.01\% \ of \ 1378420) \\
\text{CVCC} &= C^2V = 41^2 \times 20 = 1378420 \quad 9 \ (0.0005\% \ of \ 1378420) \\
\end{align*}
\]

\[
\begin{align*}
\text{Table II-7: Potential and Actual Number of Monosyllabic Words in Lucknow Urdu} \\
\end{align*}
\]

Comments on the Table:

1) As evident from the table, the total number of consonants for Lucknow Urdu is 41 and the total number of vowels is 20. Given the total number of consonants and vowels, the potential number for the CVC words is 33620 and the actual turnout is 1669 (4.96% of 33620).

In the case of CCVC and CVCC words, the potential number is 1378420 but their actual occurrences are much lower than the CVC words. The actual number of the CCVC words is 101 (0.0005% of 1378420) and of the CVCC words is 9 (0.0005% of 1378420). Thus, we find, that the table for the actual and potential number for the CVC, CCVC and CVCC words show a clear preference for the CVC words, because the CVC words are in absolute majority.
2) The preference for the CVC is motivated 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 consonant). Thus, the CVC words, involving large changes of aperture are preferred over the CCVC and CVCC words in successive segments.

Section D1(a): Large Changes of Aperture versus Small Changes of Aperture in CCVC Words

The impact of the aperture change on the CCVC words is discussed in this section.

1) We find only eight words in Lucknow Urdu, all having 0,1,2 as first member of the consonant cluster and aperture 3 units (w,y) as the second member of the consonant cluster. We have 7 words of the type 0+3 (kya:, pya:s etc.), and only 1 of the type 2+3 (xwa:b). The figures clearly show a skewing in favour of the large changes of aperture.

2) Of a total of 8 CCVC words, we find that the most open vowels a or a: (cf. Phonological Grid, Diagram I-1), are utilized in all the words here. This also shows a preference for large aperture changes, since after $\emptyset, 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 point which suggests the preference for large changes of aperture in successive segments is the fact that in initial clusters where the first member of the 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 a second member of cluster over v is explainable only in terms of avoidance of small changes of apertures. w is a unit of aperture 3 as opposed to v which is a unit of aperture 1, which is why w is preferred over v in successive segments. w represents large changes of aperture than v.

Section D1(b): Large Changes of Aperture versus Small Changes of Aperture in the CVCC Words

We will make an attempt to explain the phonological skewing in the CVCC words of Lucknow Urdu, which are resultant of the degrees of aperture changes in the CVCC words, in this Section through suitable comments below:

1) As seen in the CCVC words earlier, the CVCC words too utilize the most favoured vowels a, a: and ə, ə: in terms of degrees of aperture change. These vowels occur 62 times in a total of 101 CVCC words. Thus, we can say that in the CVCC
words, after an initial consonant (C-) and before a final cluster (-CC), the most favoured vowels are the most open vowels, since these vowels yield the maximal difference of aperture from one consonant to another consonant.

When a comparison is made of the consonant cluster in terms of the degree of aperture change in the CVCC words, we get the following figures:

(i) **Number of Words with No Aperture Change**

\[
\begin{align*}
&\emptyset+\emptyset = 7 \text{ (i.e. zapt, xapt)} \\
&1+1 = 0 \\
&2+2 = 2 \text{ (i.e. baxš, šaxš)} \\
&3+3 = 0 \\
&3+nasal = 1 \text{ (i.e. jurm)} \\
\text{Total} = 6
\end{align*}
\]

(ii) **Number of Words with One Aperture Change**

\[
\begin{align*}
&\emptyset+1 = 4 \text{ (i.e. koft, lutf)} \\
&1+2 = 1 \text{ (i.e. nafs)} \\
&2+3 = 9 \text{ (i.e. arz, arš)} \\
&2+nasal = 6 \text{ (i.e. cašm, hūsn)} \\
\text{Total} = 20
\end{align*}
\]
(iii) **Number of Words with Two Aperture Change**

\[
\begin{align*}
\emptyset + 2 &= 29 \text{ (i.e. dast, goşt)} \\
1 + 3 &= 2 \text{ (i.e. balf, zulf)} \\
1 + \text{nasal} &= 0 \quad \text{(see footnote 1 & 2)} \\
\text{Total} &= 31
\end{align*}
\]

(iv) **Number of Words With Three Aperture Change**

\[
\begin{align*}
\emptyset + 3 &= 18 \text{ (i.e. gard, tûrk)} \\
\emptyset + \text{nasal} &= 26 \text{ (i.e. bûnd, râñj)} \\
\text{Total} &= 44
\end{align*}
\]

The above figures conform to our expectations in terms of preference for units with large aperture changes as opposed to the units with small aperture changes. The number of combinations in the clusters in the CVCC words with no aperture change is only 4. But as the difference of aperture increases, the number of words also increase. Thus, we see that with one aperture change the number is 20, with two aperture change 31 and with maximal change in aperture, the number is 44.

* Ftn.1 A gap at 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 combinations (cf. Chapter 1, Section B).

Ftn.2 Nasals are produced at two apertures simultaneously (\(\emptyset + 3\)), since nasality, their main characteristic comes from an open nasal passage to aperture-3, therefore they can also be regarded as a unit of aperture-3.
Section D1(c): Concluding Remarks

1) We see that in Lucknow Urdu, in successive segments, units with large changes of aperture are preferred over small changes of aperture.

2) The preference for large aperture changes is visible in the massive favouring of the CVC words over the CCVC and CVCC words. This favouring for the CVC words is the result of the fact that the CVC words represent maximum change of aperture for successive segments, from constriction to opening and then back to constriction.

3) The preference for the most open vowels in between consonants in both the CCVC and CVCC words are a proof for preference for large changes of aperture and small changes of aperture.

4) The preference for large aperture change is also visible in the increase in the combination for final clusters with the increase in the difference of aperture change.

Section D2: Uni-directional Combinations versus Multidirectional Combinations

In this section, we highlight that in successive segments, aperture change in one direction is preferred over change in more than one direction.
In the combination of the phonological units, changes of articulators and apertures are to be made, because the same units cannot be used in a large number of words. It has been pointed out earlier in Section D1, that large changes of aperture are preferred over small changes of aperture. However, the change of aperture can be in one direction or in more than one direction. The combination of phonological units that represent a gradual decrease or increase of aperture change are unidirectional changes of apertures. To exemplify, a combination like $3+4+2+1$ is a unidirectional change and a combination like $3+4+0+2+1$ is a multidirectional change because it represents increase followed by decrease and again increase of aperture in the word.

In successive segments, the direction of aperture change corresponds to the different adjustments of articulators. We require a fine coordination of articulators for multidirectional changes because they have to be maneuvered to different directions in quick succession. As a result, we expect the multidirectional change of apertures to be avoided in usage and the more easier unidirectional change of aperture to be preferred.

In Section D2(a), the effect of the change of direction of aperture on the CCVC words is dealt with. In Section
D2(b), the effect of the change of direction of aperture on CVCC words is assessed. And finally, in Section D2(c), we present concluding remarks.

Section D2(a): CCVC words in Terms of the Unidirectional and Multidirectional Change of Aperture

The number of CCVC words in Lucknow Urdu is a meagre 8, all having w or y as the second member of the cluster. The combination of aperture followed by them is 0, 2 + 3 + 7, 8 + 3, 2

Example:

\[ p + y + a: (r) = pya:r \]  

In the above example, there is unidirectional change of aperture. The aperture increases from 0 or 2 to 3 then further increases to 7 or 8 and then is further reduced to 3 or 2 at the end of the word. In Diagram II-1, we show the direction of aperture change for some CCVC words found in Lucknow Urdu, with a view to exemplify why these unidirectional change of apertures are preferred over multidirectional change of aperture.
Diagram II-1: Initial Clusters in Terms of Direction of Aperture Change

* Ftn. Indicates not found.
A look at the diagram shows that combinations like ypːr, ypːs, wxːr are not encountered in Lucknow Urdu because they represent multidirectional change of aperture as opposed to combinations like pyːr, pyːs, wxːr which represent unidirectional change of aperture. It is interesting to note that all the 8 CCVC words are combinations of unilateral change of aperture.

Section D2(b): CVCC words in Terms of the Unidirectional and Multidirectional Change of Aperture

The number of CVCC words in Lucknow Urdu is 101. The combinations of apertures followed by them is as follows:

\[ 0 - 3 + 4 - 8 + 0 - 3 + 0 - 3 \]

Example:

\[ p + U + \frac{7}{8} + t = pU\hat{s}t \]

These words are also characterized by their preference for unidirectional aperture change because in a majority of words, the aperture is increased at the beginning for the following vowel, and then gradually reduced to minimum. There are few words which involve alternations between small and large apertures, and hence involve multidirectional change of aperture.

Of the 101 CVCC words, there are 81 CVCC words with unidirectional aperture change and 20 CVCC words with
multidirectional aperture change. Thus, there is a clear preference for words with unidirectional change of aperture as opposed to words with multidirectional change of aperture.

In Diagram II-2, we show some combinations that are unidirectional and multidirectional:

(a) *Diagramatical Representation of Unilateral Aperture change*

\[ \varnothing \]

\[ 1 \]

\[ 1 \ 1/2 \]

\[ 2 \]

\[ 3 \]

\[ 4 \]

\[ 5 \]

\[ 6 \]

\[ 7 \]

\[ 8 \]

pars  balf  qəsət
b) **Diagrammatical Representation of Multidirectional Aperture Change**

![Diagram](image)

Diagram II-2: **Final Clusters in Terms of Direction of Aperture Change**

A look at the diagrams show the unidirectional aperture changes are easier than multidirectional aperture changes, which is why the number of unidirectional combinations are more in number.

However, it may be pointed out that the CVC words have not been dealt with because they lack any multiplicity of direction of aperture change. In the CVC words, the aperture changes from small (consonants) to large (vowels) and then back to small (consonants) at the end of the word.
Section D2(c): Concluding Remarks

1) In a series of successive segments, aperture change in one direction is preferred to aperture changes in more than one direction for multidirectional changes require fine and precise coordination of articulators, which is avoided by humans.

2) In Lucknow Urdu, all the CCVC words are characterized by unidirectional aperture changes.

3) In the CVCC words also, we find a preference for the unidirectional change of apertures as compared to the multidirectional change of apertures.

Section D3: Summary Statements

1) Human beings prefer movements that need less precision and fineness of coordination among articulators.

2) As a result, large changes of apertures are preferred over small changes of aperture.

3) Among the monosyllabic words too, the CVC words involving large aperture changes over the CVCC, CCVC words which require smaller changes of apertures for clusters (consonant to consonant).

4) Even among the cluster words, preference in usage is given to those combinations that utilize large changes of aperture.
5) It is seen that unidirectional change of aperture is preferred over multidirectional change of aperture.

6) All CCVC words show unidirectional change of aperture. A majority of the CVCC words are also unidirectional in nature.

Section E: Justification of the Phonological Grid of Lucknow Urdu in Terms of Human Behaviour

Here, we make an attempt to provide reinforcement to the validity of the phonological units in Lucknow Urdu which are established on physiological factors in terms of the physiological mechanism in Chapter 1, Diagram I-1.

A common trait of Human behaviour in the form of a principle is:

"It is easier to learn the use of smaller number of tools than a 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".

The above mentioned principle motivates the makeup and distribution of the phonological units in human language 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 Lucknow Urdu has a total of 61 phonological units: 41 consonantal and 20 vocalic (cf. Diagram I-1). These handful of distinct units combine and permute to form the entire inventory of signals of the signal meaning (signes) of the Urdu dialect under study. The human language thus minimizes on the specific part of memory in this way. The concept of "double articulation", developed by Andre Martinet is utilized in the form of economy achieved in the formation of signals.

Moreover, the entire set of phonological units is formed by combination of a relatively small number of apertures and articulators. To be precise, we have only 9 degrees of apertures (Ø, 1, 1 1/2, 2, 3, 4, 5, 6, 7, 8), and 8 articulators (labium, apex, medium, front-dorsum, back-dorsum, post-dorsum, velum and glottis).

The unsymmetrical nature of the grid is due to both the physiological and human behaviour rational. The number of units produced with less effort and precision exceed those units that are more complicated physiologically and which require more precision and control in their production.
A cursory glance at the phonological grid of Lucknow Urdu shows holes or gaps in the pattern, thus making it unsymmetrical. It is beyond the scope of present research to explain the absence of each potential phonological unit here. We will thus take into account only those gaps that are found relative to some existing phonological units in the grid (cf. Diagram I-l).

1) **Absence of Voiced and Aspirated Stops Relative to Post-dorsal q**

In Lucknow Urdu, q, occurs as a voiceless, unaspirated post-dorsal stop and is marked by the absence of its voiced or aspirated counterpart. We can attribute the non-occurrence of the more complex voiced stop with post-dorsal articulator to the human trait of fewer versus more articulators. Moreover, q is the sole phonological unit at the post-dorsal axis and is marked by very low frequency in comparison to the frequency of other stops in Lucknow Urdu. The above statements are due to the effect of the physiologico-acoustic factors, that causes skewings in the formation of phonological units at the post-dorsum.

2) **Scarcity of the Phonological Units at Aperture-1**

In Lucknow Urdu, f and v are the only 2 phonological units at aperture-1 vis-a-vis 5 phonological units at aperture-2. The meagre number of phonological units at
aperture-1 is mainly due force and effort involved in the production of units at aperture-1, because the air is released through a very restricted channel.

3) Two axes for apex in opposition to one each for other articulator

The impact of human behaviour is explicit in the asymmetrical use of the articulators in the formation of phonological units. The most adroit apex is utilized to make two distinct categories of "dental" and "retroflex" consonants by the speakers of many Indian languages.

A look at the phonological grid of Lucknow Urdu shows that it distinguishes two points of articulation by the apex, namely, the dental and palatal at apertures 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).

Thus, we can say that the phonological grid of Lucknow Urdu, earlier established in terms of the physiological mechanism, is further reinforced through the human behaviour orientation.

Section F: Summary and Conclusions

The favourable and unfavourable skewings in terms of the avoidance of fine, precise coordination of articulatory
movements have been discussed in section-A. We make an attempt to explain both the paradigmatic and syntagmatic aspects of the distribution of the phonological units.

The first phonological aspect in terms of human behaviour orientation which is dealt here, is the preference for phonological units produced by fewer articulators. Phonological units which employ fewer articulators like the voiceless, unaspirated and non-nasal units (vowels) are preferred over the voiced, aspirated and nasal units (vowels) because the latter utilize more articulators in their production, and therefore, require greater precision of control.

In Section-B, the second type of skewing is in terms of the apico-palatal units being disfavoured over the apico-dental consonants. It is comparatively easier for the apex to come in contact with dentum which is an adjacent point, than it is to come in contact with the palate which is a distant point of articulation. Thus, the apico-palatais require more precision, so they are comparatively less favoured. The comparison of the number of units and their frequency of occurrence, clearly show the disfavouring for the apico-palatais as opposed to the apico-dentals.

In the combinatory aspect of Lucknow Urdu phonology, we have seen that the CVC words are preferred over the CVCC and
the CCVC words. This preference is attributed to large changes of aperture for the CVC words. The change taking place from constant (constriction) to vowel (opening) and than back to consonant. There is also an increase in the combination for final cluster in the CVCC which have greater change of aperture.

Further, another skewing is explained in terms of avoiding the fine coordination which is apparent in the assimilative trait of neighbouring phonological units. As a result of this assimilative trait, the voiceless units occur with voiceless units and the voiced units. The preference for nasalized vowels before nasal consonants is also a result of the assimilative trait.

Notwithstanding the two instances of non-nasalization in CVCC words, there is a clear case of assimilative trait in both CVC and CVCC words. In case of ad-hoc phonological changes, whether the change is from b to p or b to f there is a clear case of regressive assimilation in which the voiceless consonant has influenced the preceding voiced consonant to lose its voiceness.

In Section-D, we decrease the human trait of preferring large changes of apertures over small changes of apertures. Large changes of apertures require less precision of
movements, as a result they are favoured over small changes of apertures because they require fine and precise movements and coordinations. We also find that among the monosyllabic words, the CVC words are most preferred because they have maximum change of aperture. Amongst the CCVC and CVCC words, the frequency of such combinations are more which utilize large aperture changes.

Further, in the same section, we also highlight the fact that in terms of precision of control and fineness of movement, unidirectional changes are preferred over multidirectional changes of apertures.

In Section-E, we deal with the human factors which provide reinforcement to the validity of the phonological units in Lucknow Urdu, as established in terms of physiological mechanism in Chapter-I, Diagram I-1. As discussed in the sections, the phonological units that are produced with much less efforts and precision, outnumber those units that are physiologically more complex, hence requiring more precision of control. The preference for the production of simple units is visible in more number of units which involve articulators. In other words, the voiceless and unaspirated units are more as compared to the voiced and aspirated units. Also at apertures, the number of phonological unit is the least because it is the most
difficult aperture. Further, two axes for apex as compared to other articulators is also reinforcement by the human behaviour.

To conclude we can say that in this chapter, we make an attempt to assess the role of human behaviour in the non-random distribution of the phonological units on both the paradigmatic and syntagmatic levels.