Chapter II: Psychological or Human Behavior Base of Bhopal Urdu

In the first chapter, we explained how the various physiological characteristics of vocal tract and the dynamics of sound production (aperture, articulator, distribution of air source), effect the make-up and distribution of the phonological units in Bhopal Urdu. In the present chapter, an attempt will be made to explain the non-random character of Bhopal Urdu Phonology, in terms of its psychological base (human behavior characteristics), another important orienting principle of Form-Content linguistics.

Language is generally defined as a system of arbitrary vocal symbols, used for communication by human beings. Human beings, being what they are, behave in a specific way in all situations which makes all human endeavors different from the performance of non-humans (animals, machines), language being no exception. Human beings are a complex of many physical and mental abilities and traits, which effect their behavior in all situations. They are gifted with intelligence, memory, reasoning, thinking, imagining etc. Apart from the above mentioned abilities, there are certain weaknesses too in human behavior. One of the weaknesses, characterizing human behavior, is his persistent desire to be inert, be lazy and do nothing. In other words, laziness is also an integral part of human behavior. The various traits mentioned above interact
as well as contradict in different situations; nevertheless they are a determining factor in the structure and functioning of the language.

It is human laziness (desire to use minimum possible effort), and human intelligence (through which maximum output is sought), which together exert tremendous pressure on the language, and produce various skewings. It is not to say that other aspects of human behavior do not play any role in the functioning of language, but our interest is here limited in those characteristics of human psyche that produce skewings in language. It is to be pointed out that the phonological skewings caused by the various traits of human behavior may not be idiosyncratic to a particular language; in fact, their general characteristics may recur from language to language.

We have stated earlier in the Introduction, that it is through an interaction of human laziness and human intelligence that we as hearers and speakers save our time and effort to get the maximum output by inferring from the context (linguistic/non-linguistic/past experience). Inference is one of the manifestations of the human behavior that has bearing on the total functioning of a language. There are innumerable instances where we see that the phonology of a language too, is particularly effected by the human traits of laziness and intelligence.

The concept of linking phonological analysis to the human behavior characteristics may seem strange to the
traditional phonemicist, but to us it is an important orientation. It is Prof. William Diver, who through his writings has highlighted the significance of human behavior in phonological analysis. In one of his papers 'Phonology as Human Behavior' (1979), he has explained many skewings of distribution of phonological units of English in terms of human behavior as an orienting principle for Phonology.

Let us now come to the link between phonology and human behavior. In all languages, the paradigmatic make-up and the combinatory patterns of Phonological units are effected by the well defined characteristics of human behavior. We can see that out of many potentialities of combinations of articulators and aperture to form phonological units in a language, few units are realized in actuality. (cf. Diagram I-1 for 'gaps' at many intersections in the Phonological Grid of Bhopal Urdu.) Furthermore, certain phonological units and some combinatory patterns are more frequently used than other units and combinations of units. The realization of phonological units in the paradigm, as well as the greater preference for a phonological unit or a combination of units, can be seen to be correlating to the presence or absence of difficulty involved in the learning to acquire their articulation as a single unit or as a combinatory pattern.

Difficulty of articulation can be measured in terms of the mobility and manipulations of the articulators to
various points of articulation at different apertures or combination of apertures, in the production of phonological units or of the sequences of these units. Owing to human laziness, it is most probable that the speaker will economize in his effort by choosing the easier and simpler movements of articulatory organs that do not demand much "precision of control" over articulator(s) to produce a single unit or a combination of units.

It is to be seen in this chapter, how human behavior characteristics (laziness, intelligence) correlate with the various observed skewings in Bhopal Urdu Phonology.

The psychologically oriented analysis of Bhopal Urdu Phonology is presented in three sections in this chapter. Section A deals with the human behavior trait whereby gross coordination in the articulatory movements is preferred over their fine coordination. In Section B, we present the human behavior justifications for the phonological grid (Diagram I-1), established earlier on the basis of physiological mechanism. The summary and conclusions for the chapter are given in Section C.

**Section A: Relative Preference of Gross Articulatory Movements Over Fine Articulatory Movements**

Gross, roughly coordinated movements are easier to learn than are fine, precisely coordinated movements.

As we have expressed in chapter I, phonological
units are produced by various configurations of the vocal tract through speech organs, with the current of air flow coming from the lungs. Native speakers have to learn to command the entire repertory of articulatory gestures singly or in combination. Owing to human laziness, the articulatory movements that require gross and rough coordination are preferred to those that require fine and precise coordination. We may now specify as to what are the gross and rough coordinations, and which ones can be labelled as fine and precise coordinations.

The fine and precise coordination is necessitated when we simultaneously use multiple articulators, or when we employ a single articulator to contact more than one points of articulation, or when we combine two apertures simultaneously, in the production of phonological units of a language. The precise and fine coordination is also required when successive phonological units are produced by smaller and multi-directional changes of apertures, or by polar distinctions of articulators.

In contrast, the gross and rough coordination may be made between the articulators, points of articulation and apertures to produce less complex phonological units and easy to pronounce phonological sequences of a language. This coordination is accomplished through the use of fewer articulators, the contact of an articulator with the adjacent point of articulation, and the larger
In this section, an attempt will be made to show how favorable and unfavorable phonological skewings in Bhopal Urdu are caused by the gross and fine coordination of articulatory movements.

The non-random characteristics of Bhopal Urdu Phonology caused by the favorings and disfavorings outlined above, are dealt with under nine sub-sections below. In Section A1, the combinatory characteristics of Phonological units are assessed in terms of the degree of aperture change. Section A2 deals with the effect of aperture change in one or more direction on the combination of phonological units. Preference for phonological units produced by fewer articulators over those produced by more articulators, is dealt within Section A3. The Sections A4, A5 and A6 deal with the effect of muscular tension of a particular articulator in approaching a near or distant point of articulation in the production and distribution of apico-dental and apico-palatal consonants. In Section A4, we show that apico-dental consonants, with preximate point of articulation are preferred over the apico-palatal consonants, with remote point of articulation. In Section A5, we give the psychological rationale for the recurrence of apico-palatal consonants, rather than its apico-dental counterparts in a syllable that begins with an apico-palatal consonant. In Section A6, we explain the preference for a larger aperture at post vocalic position.
Section A7 deals with the combinations of stable and mobile consonants. In section A8, we provide human rationale for neighboring phonological units tending to become like each other. In Section A9, we present concluding remarks for the entire section.

Section A1: Aperture change and Combination of Phonological Units.

In successive segments, large changes of aperture are preferred to small changes of aperture. (Phonological units conere 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 Bhopal Urdu Phonological units in the monosyllabic words is taken up in three sub-sections below. In Section A1(a) we compare the potential and actual number of CVC, CCVC and CVCC words in terms of the degree of aperture change.
Section A1(b) deals with the impact of aperture change on CCVC words. In Section A1(c) we have dealt with the effect of degree of aperture change on CVCC words.

Section A1(a): 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-I.
Table II-I: Potential and Actual Number of Words:

Total Number of consonants = 45
Total Number of vowels = 16

(1) Potential CVC = $C^2 \times V$ 45$^2 \times 16$ = 32,400
Actual CVC = 1669 (5.14% of 32,400)

(2) Potential CCVC = $C^3 \times V$ 45$^3 \times 16$ = 14,58,000
Actual CCVC = 13 (0.00090% of 14,58,000)

(3) Potential CVCC = $C^3 \times V$ 45$^3 \times 16$ = 14,58,000
Actual CVCC = 167 (0.01% of 14,58,000)
Comments on table II-I:

(1) As shown in the table, total number of consonants for Bhopal Urdu is 45, and total number of vowels is 16. Given the total number of consonants and vowels the potential number of CVC words is 32400 and the actual turnout for CVC words 1669 (5.14% of 32400). For CCVC and CVCC words the potential number is 14,58,000 but their actual number are much lower than CVC. The actual number for CCVC words is 13 (0.00090% of 14,58,000) and actual turnout for CVCC words is 167 (0.01% of 14,58,000). Even a cursory glance at table for actual and potential number for CVO, 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 (\(1,2,3\)) 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). Therefore, CVC words which carry larger changes of apertures in the successive segments are preferred over CCVC and
Section A1(b): **Large Aperture Change versus small Aperture Change in CCVC words.**

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

The following points suggest a favoring of large change of aperture in CCVC words.

1. **There are only thirteen words having $\emptyset$, 1, 2 as first member of consonant cluster and aperture 3 units (w, y) as second member of consonant cluster.** There are twelve words of the type $\emptyset + 3$ (kya: kwaːr) etc. and one of 2 + 3 type (xwaːr), these clearly show the preference for greater change of aperture. After aperture $\emptyset$ or 2 unit of aperture 3 is found.

2. **In all the thirteen words, the vowels used are a and aː, which are the most open vowel for the dialect (cf. Phonological Grid Diagram I-1).** This also shows the preference for large change of aperture, 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, aː)

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 $\emptyset$, 2, w appears 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/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 $\emptyset$ or 2 as a first member of cluster, a unit from aperture 3 ($v$) is preferred over aperture 1 unit ($v$) because the former represents large aperture change than the later.

Section A 1(c): **Large Aperture Change versus Small Aperture Change in CVCC words.**

In this sections, we will explain the phonological skewings in Bhopal 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 $a$, $a:$, these vowels occur 107 times in 167, (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**

\[
\emptyset + \emptyset = 2 \text{ (i.e. sidq, wajd)} \\
1 + 1 = 0 \\
2 + 2 = 1 \text{ (i.e. i\text{"x})} \\
3 + 3 = \emptyset \\
3 + \text{nasal} = 1 \text{ (i.e. jurm)}
\]

**Total**

\[= 4\]

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

\[
\emptyset + 1 = 5 \text{ (i.e. lutf, vaqf)} \\
1 + 2 = 10 \text{ (i.e. havs)} \\
2 + 3 = 12 \text{ (i.e. visl)} \\
2 + \text{nasal} = 10 \text{ (i.e. nazm)}
\]

**Total**

\[= 37\]

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

\[
\emptyset + 2 = 35 \text{ (i.e. dost)} \\
1 + 3 = 11 \text{ (i.e. galv)} \\
1 + \text{nasal} = \emptyset \text{ (see foot note)}
\]

**Total**

\[= 46\]

---

**Ftn.** Lack of the combination of 1 + nasals 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 I, Section 12).
(iv) Number of words with three aperture change

\[ \emptyset + 3 = 21 \ \text{(i.e. burj, gird)} \]

\[ \emptyset + \text{nasal} = 59 \ \text{(i.e. nánd, mánd)} \]

Total \[ = 80 \]

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 37, with two aperture change 46 and with maximum aperture change (3) the number is 80.

To Conclude:

1. In Bhopal Urdu, successive segments comprising of large changes 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 (\(\emptyset + 3\)), since nasality, their main characteristics comes from an open nasal passage to aperture 3, therefore they can 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 A2: Unidirectional Combinations versus Multidirectional Combinations.

In a series of successive segments, aperture change in one direction is preferred to change in more than one direction.

In the combination of the phonological units changes of articulators and apertures are to be made, since the same units cannot be used in large number of words. As it was pointed out in A1 above large the changes of aperture are favored. But the change of aperture can be in many directions. The change of aperture can be in one direction, it can equally be in more than one direction. The combinations of phonological units that represent a gradual decrease or increase of aperture change are unidirectional changes of apertures. For example combination of $3+4+2+1$ aperture can be termed as unidirectional combination, because on the direction of aperture is changed once (for the following vowel) and then gradually lowered. On the other hand a combination consisting of $3+4+2+1$ apertures represent multidirectional change of aperture because there is increase of aperture (for the vowel), and then there is decrease followed by an increase in aperture (at the end of word.)

The direction of aperture change in the successive segments corresponds to different adjustment of articulator(s). Multidirectional changes of apertures require finer coordination of articulator(s), since they have to move in different direction, that too in quick succession. It
is therefore not surprising that multidirectional changes of aperture are not favored in successive segments. In everyday life too we can witness disfavoring for activities comprising of manipulation of various parts of body (hand, foot etc.) in opposite directions.

Effect of direction of aperture change on the combinatory pattern on Bhopal Urdu monosyllabic words is taken up in two sub-section below. Section A2 (a) deals with the effect of change of direction of aperture on CCVC words. Effect of change of direction of aperture on CVCC words is taken up in Section A2 (b).

Section A2 (a): Unidirectional versus Multidirectional change of Aperture in CCVC words.

There are only 13 words of CCVC types, all having w or y as second member of cluster. All these 13 words are characterized by combination of apertures as follows.

\[ \emptyset, 2 + 3 + 7, 3 (+3, 2) \]

Sample word:

\[ p + y + a:\ (s) = pya:s 'thirst' \]

In the above pattern there is unidirectional change of aperture. The aperture increases from 2 or 3 to 7 or 8 and it is in few cases reduced to 3, 2 at the end. In diagram II-2, we have shown direction of aperture change for some CCVC words, found in Bhopal Urdu with a view to exemplify why these combinations are found and their opposites are not found.
Diagram II-2: Initial Clusters in Terms of Direction of Aperture Change

* Indicates not found)
Comment on Diagram II-2:

Even a cursory glance at diagram II-2 shows why combination like ypaːr, ypaːz and wxaːr are not found and combinations pyaːr, pyaːz, and wxaːr are realized in Bhopal Urdu. Combinations pyaːr, pyaːz and wxaːr represent unidirectional change of aperture and combination pyaːr, ypaːz and wxaːr involve multidirectional change of aperture.

Section A2 (b): Unidirectional versus Multidirectional change of Aperture in CVCC words.

There are 167 words of CVCC types. These words are characterized by the combination of apertures as follows:

\[
\emptyset - 3 + 4 - 3 + \emptyset - 3 + \emptyset - 3
\]

Sample Word:

\[p + a + s + t = \text{past 'low, mean'}\]

These words too are characterized by their preference for aperture change in one direction, because in most words the aperture is increased at the beginning for the following vowel and then gradually reduced to minimum, there are very few words which involve alternating between small and large apertures, and hence involve multidirectional changes of apertures at the end of word.

In table II-3, II-4, we have given the number of words for final clusters in terms of unidirectional and multidirectional changes the of apertures. Table II-3
contains the number of combinations for unidirectional change of aperture and Table II-4 provides number of combinations for multidirectional change of aperture. When we look at table II-3, and II-4, it becomes clear to us that combinations of aperture that involve unidirectional change of apertures are overwhelmingly preferred over the multidirectional change of aperture.
Table II-3: Final Clusters Yielding Unidirectional change of Aperture in CVCC words.

<table>
<thead>
<tr>
<th>Combination</th>
<th>No. of words</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2 + Ø</td>
<td>32</td>
</tr>
<tr>
<td>3 + Ø</td>
<td>21</td>
</tr>
<tr>
<td>Nasal + Ø</td>
<td>58</td>
</tr>
<tr>
<td>2 + 1</td>
<td>2</td>
</tr>
<tr>
<td>nasal + 1, 2</td>
<td>2</td>
</tr>
<tr>
<td>3 + 1, 2</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>132</td>
</tr>
</tbody>
</table>
Table II-4: Final Clusters yielding Multidirectional Change of Aperture in CVCC words:

<table>
<thead>
<tr>
<th>Combination</th>
<th>No. of words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø + 1, 2</td>
<td>3</td>
</tr>
<tr>
<td>Ø + 3</td>
<td>1</td>
</tr>
<tr>
<td>Ø + Nasal</td>
<td>0</td>
</tr>
<tr>
<td>1 + 2</td>
<td>3</td>
</tr>
<tr>
<td>1, 2 + 3</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
</tr>
</tbody>
</table>
There are 132 words for unidirectional change of aperture and only 23 words for multidirectional change of apertures. The numbers clearly show that final clusters that yield unidirectional changes of aperture are preferred over the final clusters that yield multidirectional changes of aperture in CVCC words. It is the preference for unidirectional changes of aperture that combinations of $1, 2 + \emptyset$ are 32 (cf. Table II-3) and $\emptyset + 1, 2$ are 8 (cf. Table II-4), only. Likewise $3 + \emptyset$ is 21 (cf. Table II-3) but $\emptyset + 3$ (cf. Table II-4) only. Comparison of the figures of Table II-3, with the figures of Table II-3 shows a very clear favoring for the unidirectional changes of apertures. In diagram II-5, we have shown direction of aperture change for some of the final clusters listed in table II-3 and II-4, with an intent of showing direction of aperture change for the combinations specified in the Tables.
Diagram II-5: Final clusters in terms of Direction of Aperture change.

(a) Diagrammatical Representation of some combination listed in Table II-3.

(b) Diagrammatical Representation of some combinations listed in Table II-4.
We can clearly see in the diagrammatical representation of some of the words listed in table II-3 and II-4, that combination listed in table II-3 produce unidirectional change of aperture. On the contrary combinations listed in Table II-4 yield multidirectional change of apertures. It is the reason that figures of table II-3 are higher than those of II-4.

At the end, we want to point out that we have not dealt with CVC words in our discussion of direction of aperture change for the monosyllabic words in Bhopal Urdu, because CVC words potentially lack any multiplicity of direction of aperture change. In CVC words aperture is first changed from small (consonant) to large (vowel) and then aperture is lowered back (to consonant) at the end.
To Conclude:

1. In a series of successive segments, aperture change in one direction is preferred to multi-directional changes of apertures, because aperture change in multiple directions requires fine and precise coordination of articulators, which is avoided by human beings.

2. CCVC words in Bhopal Urdu are all characterized by unidirectional aperture change, since they all represent gradual increase in aperture.

3. In Bhopal Urdu, CVCC words also represent bias favoring for unidirectional change of aperture. Of the 167 CVCC words, there are 132 words for unidirectional changes of aperture. These 132 words show an increase of aperture for vowel and then a gradual lowering of aperture. Only 33 words represent multidirectional changes of aperture.

Section A3: Preference for Fewer Articulators over More Articulators.

Sounds produced by combination of fewer articulators are preferred to sounds produced by combination of more articulators.

Phonological units are produced by combining articulators with degrees of apertures. Phonological units that are produced by combination of fewer articulators are easy to produce than those that are produced by combining more articulators. Because use of greater number articulators, that too in simultaneity, require fine and precise coordination and control of the articulators. By simultaneity
we mean the combined use of articulators in the production of a single unit. William Diver has shown voicing in terms of the control of two simultaneous movements: one of some oral articulator and the other of glottis (for voicing) (cf. W. Diver 1979:175).

We can similarly present aspiration and nasality in terms of control of additional movements of articulatory organs (glottis or velum).

As said earlier in this chapter it is a well known trait of human beings to minimize and economize in all situations, therefore, it is well anticipated that phonological units using more articulators will be disfavored to those phonological units that use lesser number of articulators, because manipulation of many articulators requires finer coordination. As a matter of fact, coordination of different activities is known to be a problem in human behavior in general and language too as we know, is a manifestation of human behavior. It is therefore expected that the use of greater number of articulators will be disfavored and will effect the distribution of phonological units on both the syntagmatic and paradigmatic levels. The number of phonological units as well as their frequency count will be affected by the addition of extra articulators. The number and frequency of phonological units involving more articulators will be less as compared to those which involve lesser number of articulators. Thus, in comparison to voiceless consonants voiced consonants should be disfavored; likewise unaspirated consonants should
be preferred over aspirated consonants. Accordingly, nasalized vowels should be disfavored to their oral counterparts. The reason for the disfavoring of voiced, aspirated and nasalized units lies in the fact that they involve use of additional articulators in their production: glottis for aspiration and voicing and velum for nasality.

Impact of additional articulators on Bhopal Urdu Phonology is taken up in three subsections below. In Section A3(a), we examine Phonological Grid of Bhopal Urdu in terms of greater or lesser number of articulators. In Section A3(b) we present and discuss the proportionate occurrences of phonological units in terms of fewer and more articulators. The Section contains the comparison of occurrences of voiceless-voiced, unaspirated-aspirated consonants and oral-nasalized vowels in CVC words. Section A3(c) contains the concluding remarks on the effect of additional articulators on the number and frequencies of phonological units.

Section A3(a): Number of Articulators and Phonological Grid of Bhopal Urdu.

Here the grid of Bhopal Urdu phonological units is to be checked to show the favoring or disfavoring in the number of phonological units with regard to number of articulators. Diagram I-1 presents all the phonological units on their relevant axes. By a close examination of the diagram, we can see that number of phonological units is also affected with the addition of more articulators, because there are many instances for disfavoring units.
involving more articulators. On \( \phi \) aperture the number of voiceless-voiced, unaspirated-aspirated stops is almost the same. But unaspirated nasals outnumber their aspirated counterparts: \( 5:2 \). Further, on \( \phi \) aperture one phonological unit \( g \) has no aspirated and voiced counterparts. On aperture 1 and 2 one phonological unit \( y \) lacks voiced counterpart. On aperture 3 the number of aspirated and unaspirated, differ by big margin of \( 3, w, y, l, \) do not have aspirated counterparts. For vowels, the addition of one more articulator, namely, the velum does not affect the number of phonological units because the number of oral and nasalized vowels is the same.

Section A3(b): Number of Articulators and the Occurrence of Phonological Units.

In this section we will compare the proportionate occurrences of phonological units in terms of the number of articulators, by comparing frequencies of voiceless-voiced, unaspirated-aspirated, and oral-nasalized units. The impact of additional articulators on the occurrence of phonological units is assessed in three sub-sections below. Section A3(b)(i) deals with the human behavior skewings in voiceless-voiced consonants in CVC words. The occurrences of unaspirated-aspirated consonants/words is studied in section A3(b)(ii). Section A3(b)(iii) compares occurrence of oral-nasalized vowels in CVC words.
Section A3 (b) (i): Glottis as an Additional Articulator. Voiceless versus Voiced Consonants.

Here we make comparison of voiceless stops and voiceless fricatives with voiced stops and fricatives in CVC words. We deal with the effect of voicing on the occurrence of stops and fricatives in two sub-sections below. In Section A3 (b) (i) (1), we compare the frequencies of voiceless and voiced stops in CVC words. Section A3 (b) (i) (2) contains proportionate occurrences of voiceless and voiced fricatives in CVC words.

Section A3 (b) (i) (1): Voiceless versus Voiced stops.

Here we make comparisons of the numbers and percentages of voiceless and voiced stops in CVC words. The combined frequencies of initial and final positions for stops in CVC words are presented in Table II-6.
Table II-6: Glottis as an additional articulator (voicing): In the production of stops in CVC words.

<table>
<thead>
<tr>
<th></th>
<th>Voiceless</th>
<th></th>
<th>Voiced</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of words - %</td>
<td></td>
<td>No. of words - %</td>
<td></td>
<td>No. of words - %</td>
<td></td>
</tr>
<tr>
<td>Unaspirated</td>
<td>865 - 60.79</td>
<td></td>
<td>558 - 39.21</td>
<td></td>
<td>1423 - 100</td>
<td></td>
</tr>
<tr>
<td>Aspirated</td>
<td>191 - 55.69</td>
<td></td>
<td>152 - 44.31</td>
<td></td>
<td>343 - 100</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1056 - 59.80</td>
<td></td>
<td>710 - 40.20</td>
<td></td>
<td>1766 - 100</td>
<td></td>
</tr>
</tbody>
</table>
Comments on Table II-6:

1. Of the 1766 stops in CVC words, 1056 (59.80%) are the voiceless stops and 710 (40.20%) are voiced stops. The break-up into the unaspirated and aspirated stops stays almost at the same ratio, though the difference is less in case of voiceless aspirated and voiced aspirated series.

2. There is preference for the voiceless stops of approximately 20%. This preference for the voiceless stops can be attributed to the use of an additional articulator (glottis) for the voiced stops.

Section A3(b)(i)(2): Voiceless versus Voiced Fricatives:

Here we will compare the occurrence of the voiceless and voiced fricatives for CVC words. The combined frequencies of fricatives in the initial and final positions are presented in Table II-7.
Table II-7: Glottis as an Additional articulator (voicing): In the production of Fricatives in CVC words.

<table>
<thead>
<tr>
<th></th>
<th>VOICELESS</th>
<th>VOICED</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of words</td>
<td>329</td>
<td>131</td>
<td>460</td>
</tr>
<tr>
<td>%</td>
<td>71.53</td>
<td>28.47</td>
<td>100</td>
</tr>
</tbody>
</table>
Comments on Table II-7:

1. As in the case of stops above, there is clear preference for the voiceless fricatives over voiced fricatives. Of the 460 fricatives in combined initial and final positions in CVC words, 329 (71.53%) are voiceless fricatives and only 131 (28.47%) are voiced fricatives.

2. There is preference for the voiceless fricatives of approximately 43%. The low frequency of voiced fricatives in comparison to the high frequency of voiceless fricatives is due to the use of one more articulator, namely, glottis in the production of voiced fricatives.


In this section, we make comparison of unaspirated and aspirated consonants for CVC words. The impact of aspiration on the occurrence of consonants for CVC words is taken up in three subsections below. In section A3(b)(ii)(1), we discuss the occurrence of unaspirated and aspirated stops. Section (2) contains the comparison of unaspirated and aspirated nasals. In Section (3), we deal with the comparison of the proportionate occurrence of unaspirated and aspirated liquids.


In this section, we compare the frequencies of unaspirated and aspirated stops in the combined initial and final positions for CVC words. These frequencies are presented in Table II-8.
Table II- Glottis as an additional articulator (Aspiration): In the production of stops in CVC words.

<table>
<thead>
<tr>
<th></th>
<th>UNASPIRATED</th>
<th>ASPIRATED</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of words</td>
<td>%</td>
<td>No. of words</td>
</tr>
<tr>
<td>Voiceless</td>
<td>865</td>
<td>81.92</td>
<td>191</td>
</tr>
<tr>
<td>Voiced</td>
<td>558</td>
<td>78.60</td>
<td>152</td>
</tr>
<tr>
<td>Total</td>
<td>1423</td>
<td>80.57</td>
<td>343</td>
</tr>
</tbody>
</table>
Comments on Table II-8:

1. Of the 1766 instances of stops in the combined initial and final position of the CVC words, we have 1423 (80.57%) unaspirated stops and 343 (19.43%) aspirated stops. The break-up into the voiceless and voiced stops gives approximately the same result, though there is a slight preference for voiced aspirated stops as compared to voiceless aspirated. As a matter of fact the slight favoring of the voiced aspirated stops can be attributed to the history of the Indo-Aryan languages and in no way contradicts our hypothesis that sounds produced by more articulators should be disfavored. The voiced aspirates come down to us from Indo-European stage, the voiceless aspirates were introduced much later at the Indo-Iranian stage. What is important from our viewpoint is the fact that despite this diachronic impact, Bhopal Urdu has come a long way in accommodating voiceless aspirates vis-a-vis voiced aspirates, which confirm our hypothesis with regard to disfavoring of phonological units with greater number of articulators.

2. Irrespective of the point made above, what is of prime importance to us here is the fact that unaspirated stops are overwhelmingly preferred over the aspirated stops. The 61.14% preference for unaspirated stops over their aspirated counterparts, in CVC words in the combined initial and final positions, is definitely due to the use of glottis as an extra articulator. It is also to be pointed out that aspirated stops are more disfavored than voiced stops, because the difference between unaspirated and aspirated stops is greater than the difference between voiceless and voiced stops. The difference between voiceless and voiced stops for
CVC words is 20%, (cf. Table II-6) and the difference between unaspirated and aspirated stops for CVC words is 61.14% (cf. Table II-8). The greater disfavoring of aspiration in comparison to voicing is due to the fact that aspiration is more difficult to produce since it requires great amount of air supply. (cf. Chapter I, Section 31).

Section A3(b)(ii)(2): Unaspirated versus Aspirated Nasals.

Here we will present and discuss the proportionate occurrence of unaspirated and aspirated nasals in the combined initial and final positions of the CVC words. The frequencies are presented in Table II-9.
Table II-9: **Glottis as an additional articulator (Aspiration)**

*In the production of Nasals in CVC words.*

<table>
<thead>
<tr>
<th>UNASPIRATED</th>
<th>ASPIRATED</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of words</td>
<td>No. of words</td>
<td>No.</td>
</tr>
<tr>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>361</td>
<td>97.56</td>
<td>9</td>
</tr>
<tr>
<td>2.44</td>
<td>370</td>
<td>100</td>
</tr>
</tbody>
</table>
Comments on Table II-9:

1. Of the 370 instances of nasals in CVC words, only 9 (2.44%) are aspirated and 361 (97.56%) are unaspirated. The figures show that unaspirated nasals have a massive preference (95.12%) over the aspirated nasals. The disfavoring for the aspirated nasals is definitely caused by the use of glottis as an extra articulator.

Section A3 (b) (ii) (3): Unaspirated versus Aspirated Liquids.

In this section, we will compare the occurrence of unaspirated and aspirated liquids in the combined initial and final positions, in CVC words. The frequencies of the unaspirated and aspirated liquids in the two positions of the words in CVC words are given in Table II-10.
Table II-10: Glottis as an additional articulator (Aspiration):
In the production of liquids in CVC words.

<table>
<thead>
<tr>
<th></th>
<th>UNASPIRATED</th>
<th>ASPIRATED</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of words</td>
<td>539</td>
<td>10</td>
<td>549</td>
</tr>
<tr>
<td>%</td>
<td>98.17</td>
<td>1.83</td>
<td>100</td>
</tr>
</tbody>
</table>
Comments on Table II-10:

1. Even a cursory glance at Table II-10 shows a clear preference for the unaspirated liquids over their aspirated counterparts. Of the 549 occurrences of liquids in CVC words, 539 (98.17%) are unaspirated liquids and only 10 (1.83%) are aspirated liquids. Thus, as in the case of nasals above, unaspirated liquids too are overwhelmingly preferred over the aspirated liquids.


As we know, nasalized vowels are produced by lowering velum and opening the nasal passage to an aperture. Therefore, nasalized vowels have one more articulator (velum) as compared to their oral counterparts. Thus the addition of one more articulator makes them less preferred.

The skewings for the oral and nasalized vowels for the combined initial (VC), medial (CV) and final (CV) position of the CVC words, will be explained in terms of the frequency counts, presented in Table II-11.
Table II-11: Velum as an additional articulator (Nasality): In the production of vowels in CVC words.

<table>
<thead>
<tr>
<th></th>
<th>Oral No. of Words</th>
<th>%</th>
<th>Nasalized No. of Words</th>
<th>%</th>
<th>Total No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short</td>
<td>403</td>
<td>32.24</td>
<td>87</td>
<td>17.76</td>
<td>490</td>
<td>100</td>
</tr>
<tr>
<td>Long</td>
<td>813</td>
<td>68.96</td>
<td>366</td>
<td>31.04</td>
<td>1179</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>1216</td>
<td>72.86</td>
<td>453</td>
<td>27.14</td>
<td>1669</td>
<td>100</td>
</tr>
</tbody>
</table>
Comments on Table II-11:

1. Even a cursory glance at Table II-11 shows a clear preference for the oral vowels over their nasalized counterparts. Of the 1,669 occurrences of vowels in all the positions of CVC words, 1,216 (72.86%) are oral vowels and 453 (27.14%) are nasalized. The 45.72% preference for the oral vowels over their nasalized counterparts is certainly due to the use of velum as an additional articulator in the production of nasalized vowels.

2. The break-up into the short and long vowels shows more difference between short oral and short nasalized vowels. The greater difference between oral and nasalized vowels for short vowels may be attributed to the fact that physiologically short vowels are more difficult, so nasalization makes them more complicated.

Section A3 (c): Concluding Remarks:

1. Phonological units produced by combination of fewer articulators are preferred over those that are produced by combination of more articulators. Because the (simultaneous) use of multiple articulators necessitates fine and precise coordination of the articulators.

2. The preference for fewer articulators over more articulators can be seen in the preference of phonological units produced by fewer articulators. As such, voiceless stops and fricatives are preferred over voiced stops and fricatives unaspirated stops, nasals and liquids are favored over their aspirated counterparts. Likewise oral vowels are preferred over their nasalized counterparts.
The comparatively less frequent use of phonological units produced by more articulators in comparison to those produced by fewer articulators, as shown through number and tabular frequencies for voiceless-voiced, unaspirated-aspirated and oral-nasalized units for Shogal Urdu, proves that human behavior plays a role in the syntagmatic and paradigmatic make-up of phonological units.

Section A4: 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.

As said earlier in Chapter 1 Section A1, phonological units are produced by articulators singly or in combination with degrees of apertures. The almost immobile point of articulation acts as passive participant in the production of phonological units. In the production of consonants (units of apertures 0, 1, 2 and 3), the articulator has to make contact with the point of articulation. The point of articulation may be an adjacent place or it may be a distant place. The contact of articulator with a remote or distant point of articulation requires fine and precise coordination, because to make a contact at a remote point of articulation, the articulator has to move farther and even to stretch, which leads to muscular tension. As we have been viewing in this chapter, precise coordinations are avoided by human beings, therefore, we anticipate
disfavoring of phonological units produced by the contact of an articulator with a remote point of articulation vis-a-vis those units which are produced by the same articulator at some adjacent point of articulation.

In Bhopal Urdu, the apex of the tongue, being most mobile articulator among all lingual articulators and labium (cf. Chapter I Section D1), comes in contact with two separate points of articulation, namely, dentum and palatum to produce two series of stops and liquids. When apex blocks the air at dentum the resulting units are called apico-dentals, when apex contacts by curling back to block the air at palatum it produces apico-palatal units. Apico-palatal units are traditionally known as "retroflex sounds". As we know, palatum is a distant place for apex as compared to dentum. Therefore the apico-palatal units will require fine coordination in their articulation as compared to the apico-palatal units and as such, will be disfavored to their apico-dental counterparts.

The explanation of the skewings for apico-dental and apico-palatal consonants is taken up in two sub-sections below. In Section A4(a), we examine the Phonological Grid of Bhopal Urdu to show favoring or disfavoring in the number of phonological units, with regard to proximate and remote point of articulation. In Section A4(b) we present and discuss the proportionate occurrences of phonological units in terms of proximate and remote point of articulation.
Section A4 (a): Proximate versus Remote Point of Articulation and Phonological Grid of Bhopal Urdu.

When we look at the Phonological Grid of Bhopal Urdu, we note that apico-palatal units are found on aperture $\emptyset$ and 3 only. Total number of apico-dental consonants is 12 while there are only 8 apico-palatal consonants. Therefore, the number of apico-palatal consonants is less than their apico-dental counterparts, and this finding is definitely due to the fact that apico-palatal consonants are produced by the contact of apex at a distant place (palatum) and require fine and precise coordination.

Section A4 (b): Proximate versus Remote Point of Articulation and the occurrence of Phonological Units.

Here we will compare the occurrence of apico-dental and apico-palatal consonants. As said above in this section, apico-dental and apico-palatal distinctions are found on aperture $\emptyset$ and 3. But we are not comparing occurrence of apico-dental and apico-palatal units on aperture 3, because apico-palatal units of aperture 3, $r$, $l$, and $\lambda$ do not occur in all the positions of the word. None of the three occur in the initial position of the word. $l$ and $\lambda$ occur medially in polysyllabic words and $r$ occurs in the medial and final position. Due to the limited occurrence of $r$, $l$ and $\lambda$ we have not compared $r$ with $r$, $l$ with $l$ and $\lambda$ with $\lambda$. When both apico-palatal and apico-dental occur in the same position, the occurrence of apico-dental is much greater, for example both $r$, $r$...
occur in final position of the word in CVC words, r occurs 134 times and r 64 times. The limited occurrence of apico-palatals liquids vis-à-vis apico-dentals and the greater frequency of r as compared to r in the final position of CVC words is due to the fact that apico-palatals requiring finer coordination are disfavored by the native speakers of Bhopal Urdu.

Now we compare the occurrence of apico-dental and apico-palatal stops. The frequencies of apico-dental and apico-palatal stops in the combined initial and final positions for CVC words are given in Table II-12.
Table II-12: *Apico-dentals* versus *Apico-palata* stops in *CVC* words.

<table>
<thead>
<tr>
<th></th>
<th>APICO-DENTAL</th>
<th></th>
<th>APICO-PALATAL</th>
<th></th>
<th>TOTAL</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of words</td>
<td></td>
<td>No. of words</td>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>Voiceless</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>unaspirated</td>
<td>155</td>
<td>44.15</td>
<td>196</td>
<td>55.85</td>
<td>351</td>
<td>100</td>
</tr>
<tr>
<td>Voiced</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>unaspirated</td>
<td>131</td>
<td>71.19</td>
<td>53</td>
<td>28.81</td>
<td>184</td>
<td>100</td>
</tr>
<tr>
<td>Voiceless</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>aspirated</td>
<td>37</td>
<td>57.82</td>
<td>27</td>
<td>42.18</td>
<td>64</td>
<td>100</td>
</tr>
<tr>
<td>Voiced</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>aspirated</td>
<td>33</td>
<td>60</td>
<td>22</td>
<td>40</td>
<td>55</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>356</td>
<td>54.43</td>
<td>298</td>
<td>45.57</td>
<td>654</td>
<td>100</td>
</tr>
</tbody>
</table>
Comments on Table II-12:

1. Of the 654 instances of apical stops in the initial and final positions of the CVC words 356 (54.43%) are apico-dentals stops and 298 (45.57%) are apico-palatal stops. The 10% preference for apico-dental stops in the CVC words can be attributed to the use of palatum (a distant place) as point of articulation.

2. The break-up into the voiceless-voiced, unaspirated-aspirated and voiceless aspirated-voiced aspirated shows much greater preference for apico-dental stops vis-à-vis apico-palatal stops, because difference is more between voiced and voiced aspirated apico-dental and apico-palatal stops as compared to voiceless and voiceless aspirated stops, and to our surprise voiceless unaspirated apico-palatal stops are more frequent than their apico-dental counterparts. But with the increase of additional articulator, as in the case of voiced and aspirated units, the preference for simpler apico-dental stops is also increased.

To Conclude:

1. In Bhopal Urdu, the apex of the tongue comes in contact with two separate point of articulation, namely, dentum and palatum to produce two series of stops and liquids, known as apico-dentals and apico-palataals. Since palatum is a distant place for apex as compared to dentum, therefore apico-palatal units require fine coordination.

2. As a general rule of human behavior, fine and precise coordinations are avoided, therefore apico-palatal units are disfavored to their apico-dental counterparts.
The psychologically motivated disfavoring of apico-palatal consonants vis-a-vis apico-dental consonants in the monosyllabic words of Shopal Urdu is mainly validated through statistical support.
Section 4.5: Re-use of the Same Point of Articulation versus change of Point of Articulation.

After an articulator has performed the difficult task of obtaining an unfavorable position, there is preference for keeping it there rather than making quick adjustment to bring it back to a favorable position.

As said earlier in this chapter section 4.4, apico-palatal units are disfavored to their apico-dental counterparts, since apico-palatal units involve extra effort on the part of the apex to contact palatum. But if there is apico-palatal unit at the beginning of a word, then in all likelihood there will be preference for the apico-palatal units over the apico-dental unit at the end of the word. Because after an initial apico-palatal unit in a word, production of an apico-dental unit at the end will require fine and precise coordination of articulatory gestures in two ways:

1. It will make the single articulator, namely apex to contact at two separate points of articulation in quick succession.

2. It will require quick adjustment to bring back apex to an easy position to make contact at dentum after a relatively difficult articulatory position (making contact at palatum).

It is thus, easy for apex to articulate at a single point of articulation (palatum) rather than to change from one articulatory position to another.

In Bhopal Urdu, there is only one word dāt, 'big mosquito' which has apico-dental stop at the end after an
initial apico-palatal stop, and there are twenty words having apico-palatal stops at the beginning and end.

Further, in CVCC words after an initial apico-palatal stop not only the final stop is apico-palatal, but the medial nasal too is apico-palatal (thúnt, tónt).

It may also be pointed out that one word dāːt, having apico-dental stop after an initial apico-palatal is in no way an exception to the disfavoring of apico-dental stop after an initial apico-palatal stop, since the use of t in place of ŋ is communicatively motivated.

The use of apico-dental stop (t) after an initial apico-palatal stop (t) in the word-final position is a device to avoid homonymous clash of dāːt with another homonymous pair.

dāːt 'rebuke'

dāːt 'tucks in shirt' (cf. Chapter III Section 12(e)(i)).

To Conclude:

1. Apico-palatal units are difficult to produce and are disfavored to their apico-dental counterparts. But if there is an apico-palatal unit at the beginning of a word, then apico-palatal unit is preferred at the end of the word. The preference of apico-palatal unit at the end after an initial apico-palatal unit, is justified by the very low occurrence of apico-dental unit after an initial apico-palatal unit in CVCC words vis-a-vis high occurrence of apico-palatal units after an initial apico-palatal unit.

2. The use of apico-dental unit at the end, after an initial apico-palatal unit requires a single articulator apex to contact at two points of articulation
in succession and requires fine and precise coordination.

Section A6: Enlargement of Aperture for Consonants with Unfavorable point of Articulation.

In post vocalic position, there is preference to enlarge the aperture of the sounds that are produced by some articulator at an unfavorable point of articulation.

As we have seen in Section A4 above apico-palatal units are strenuous in the sense that these units involve contact of apex with palatum, a distant place. This difficulty increases in the production of phonological units of aperture Ø (stops), in the post-vocalic position of words (medially and finally). It is more difficult for the apex to make a complete clousure (stoppage) at the palate for the apico-palatal stops at the end or middle or a word than at the beginning of a word. The production of the vowel before an apico-palatal stop makes it difficult for the articulator to go back to Ø aperture in a very short time that too at an unfavorable point of articulation.

Given the greater difficulty involved in the production of apico-palatal stops at the post vocalic position, we should expect less number of apico-palatal stops at the post vocalic position. On the other hand a phonological units of 3 aperture produced at apex-palatum axis is not as difficult at the post vocalic position; since apex does not make a complete stoppage for r, rh at palatum as for Ø, dh.

The manifestation of the greater difficulty in the
production of aperture \( \emptyset \) units after vowel can be seen in
the preference of \( r, rh \) over \( ç, ch \) in the word final
position, since in monosyllabic words \( ç, ch \) or \( r, rh \) can
not occur at the middle of word.

The relative frequencies of apico-dental liquids and
apico-palatal stops in the initial and final positions of
CVC words are presented in Table II-13.
Table II-3: *Apico-palatal stops / apico-palatal liquids (r) at the word final position, in CVC words.*

<table>
<thead>
<tr>
<th></th>
<th>APERTURE Ø</th>
<th></th>
<th>APERTURE 3</th>
<th></th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of words - %</td>
<td></td>
<td>No. of words - %</td>
<td></td>
<td>No. %</td>
</tr>
<tr>
<td>Initial</td>
<td>49 - 100</td>
<td></td>
<td>84 - 76.36</td>
<td>110 - 100</td>
<td></td>
</tr>
<tr>
<td>Final</td>
<td>26 - 23.64</td>
<td>84 - 76.36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>75 - 47.16</td>
<td>84 - 52.84</td>
<td>159 - 100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Comments On Table II-13:

1. Of the total 150 apico-palatal stops and liquids in the combined initial and final positions of CVC words, 75 (47.16%) are apico-palatal stops and 75 (52.84%) are apico-palatal liquids.

2. In the initial position of the word, occurrence of apico-palatal stops is 100%, but in the final position it is reduced to 3.64%. In contradistinction to apico-palatal stops, apico-palatal liquids are nil at the word initial position but are 76.36% at the word final position.

3. The overwhelming preference of apico-palatal liquids at the word final position vis-a-vis apico-palatal stops in that position of the word can be attributed to the fact that apico-palatal stops are more difficult to produce in the final position of the word, and require fine and precise coordination on the part of the apex, to make complete stoppage at an unfavorable position after a preceding vowel.

To Conclude:

1. Apico-palatal stops are more difficult at the post-vocalic position than at the initial position of the word.

2. In Bhopal Urdu, there is overwhelming preference for the apico-palatal liquids over the apico-palatal stops in the word final position, though apico-palatal liquids do not occur at the word initial position. The use of apico-palatal liquids in the word final position can be attributed to the avoidance of precise coordination required to make a complete stoppage at an unfavorable position that too in a post-vocalic position.
Section A7: Stable versus Mobile Consonants:

In successive segments, a combination of two stable or of two mobile articulators is referred to a combination of either stable + mobile or mobile + stable.

Phonological units do not differ only in combination of articulator and apertures, they also differ in the relative force executed by the articulator concerned.

As we have said in Chapter I, Section A4(12), phonological units on aperture 3 are to be distinguished in term of stable and mobile articulation. Phonological units r, rh, r, rh are characterized by violent articulation and are called mobile units. On the other hand, l, lh and l are pronounced with relatively less force and are therefore termed stable units. The stable and mobile distinctions are also made on apertures θ, 1 and 2.

Aperture θ units, that is stops, are produced by complete stoppage and abrupt release of the air stream, their violent release makes them mobile units. In contradistinction to aperture θ units (stops), units of aperture 1, 2 are all characterized by partial blockage and gradual release of air stream, may be termed stable units. Thus, stops and r, rh, r, rh are characterized by mobile articulation and l, lh, 1 and fricatives involve stable articulation.

As it is evident from the discussion in this section stable and mobile articulations are two different articulatory conditions, mobile articulation is characterized by greater force and stable articulation involve relatively
less force. As we know from the discussion in this chapter, coordination of different activities is a problem in human behavior in general, since it requires fine and precise coordination. Thus, we may expect disfavoring of combination of one stable + mobile or mobile + stable. To pronounce a stable after a mobile or a mobile after a stable in succession will require quick adjustment of articulator(s) to different articulatory conditions.

The explanation of the skewing for combination of stable and mobile combinations is taken up in this section. We compare the combinations of phonological units in terms of stable and mobile combinations in CVCC words, because in CVC words, the two consonants are separated by a vowel. The frequencies of final clusters in CVCC words for combinations of stable and mobile unit are presented in Tables II-14 and II-15. In table II-14, we present the frequencies of stable + stable and mobile + mobile combinations. In table II-15, we present frequency count of stable + mobile and mobile + stable combinations.
Table II-14: Stable + Stable, and Mobile + Mobile Combinations for Final Clusters in CVCC words.

<table>
<thead>
<tr>
<th>Combinations</th>
<th>No. of words</th>
<th>Sample of words with meanings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable + Stable</td>
<td>9</td>
<td>zulf 'curling-lock'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>visl 'whistle'</td>
</tr>
<tr>
<td>Mobile + Mobile</td>
<td>18</td>
<td>çard 'dust'</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>27</strong></td>
<td></td>
</tr>
</tbody>
</table>

Total Number of words = 27
Table II-15: Stable + Mobile and Mobile + Stable Combinations for Final Clusters in CVCC words.

<table>
<thead>
<tr>
<th>Combination</th>
<th>No. of words</th>
<th>Sample of words with meanings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable + Mobile</td>
<td>4</td>
<td>jahr 'resurrection day'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>vald 'son'</td>
</tr>
<tr>
<td>Mobile + Stable</td>
<td>13</td>
<td>nars 'nurse'</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

Total Number of words = 17
Comments on Table I-14 and II-15.

1. When we compare Tables I-14 and II-15 we find clear favoring for stable + stable and mobile + mobile combinations over the stable + mobile and mobile + stable combinations. There are 27 combinations of stable + stable and mobile + mobile and only 17 of stable + mobile and mobile + stable. Of the 27 favored combinations of two stable or two mobile, 9 are combinations of stable + stable and 18 of mobile + mobile. Of the 17 occurrences of stable + mobile or mobile + stable, 4 are stable + mobile and 13 are the combinations of mobile + stable.

2. It is to be pointed out that though there is general disfavoring for stable + mobile or mobile + stable combinations but there is greater disfavoring for stable + mobile than for mobile + stable combination. A slight favoring for mobile + stable combinations with 13 words may be due to the fact that after an explosive articulation of a mobile unit a stable articulation is not as difficult as is a mobile unit after a stable unit, because after a violent articulation of mobile unit articulation of a stable unit, that too in the final position of a words does not create problem.

To Conclude:

1. Successive segments involving extreme articulatory conditions require quick adjustment of articulator (s), and is thus avoided in shahal udhu.

2. The avoidance of extreme articulatory conditions can be seen in the disfavoring of stable + mobile or mobile + stable combination and favoring of
Section A8: Assimilative Trait of Neighboring Phonological Units.

The characteristics of neighboring segments tend not to 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 γt do not share such features, since γ is front-dorsal voiced unit and t is 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. But if two successive segments share some feature of articulation, then we can carry on freely from one unit to another without much precision of control of articulators. Keeping in view general disfavoring of human beings for fine and precise coordination, we may expect 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 avoided by making certain phonological changes and making neighboring segments similar.

The explanation of the assimilative trait in the monosyllabic words of Bhopal Urdu is taken up in two subsections below. In Section A8(a), we compare occurrences of phonological units in terms of the assimilative trait of human beings. In Section A8(b), we take up certain phonological changes that tend to make characteristics of neighboring segments similar.

Section A8(a): Assimilative Trait and the Occurrence of Phonological Units.

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

In Bhopal Urdu after initial voiceless consonants voiceless consonants are more frequent and voiced consonants are preferred after initial voiced consonants. The occurrence of voiceless and voiced stops and fricatives in CVC words is presented below:

(1) Initial voiceless stops + Final voiceless stop

Total Number of words = 191

(2) Initial voiced stop + Final voiced stop

Total Number of words = 81

(3) Initial voiceless stop + Final voiced stop
or

Initial voiced stop + final voiceless stop

Total Number of words = 60

(4) Initial voiceless fricative + final voiceless fricatives

Total Number of words = 13

(5) Initial voiceless fricative + final voiced fricative

Total Number of words = 2

(6) Initial voiceless fricative + final voiced fricative

or

Initial voiced fricative + final voiceless fricative

Total Number of words = 10

The number of CVC words for occurrence of initial voiceless and final voiceless unit are more than those of initial voiceless and final voiced units. Likewise the voiced number for initial and final 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 units occur with voiced units.

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

(1) Voiceless fricative + voiceless stop = 36
Voiced fricative + voiced stop = \( \frac{6}{12} \)

(2) Voiceless fricative + voiced stop

or

Voiced fricative + voiceless stop = 13

Thus, we find that voiceless fricatives mostly occur with voiceless stops and voiced fricatives occur with voiced stops.

Further, in CVCC words, in final clusters nasals mostly occur before voiced stops; because nasal + voiced stop occur 36 times and nasal + voiceless stop occur 19 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 consonants. We present below occurrence of nasalized vowels before nasal and non-nasal:

Consonants:

<table>
<thead>
<tr>
<th>Consonants</th>
<th>Number of words</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVCC</td>
<td>3</td>
</tr>
<tr>
<td>CVNC</td>
<td>56</td>
</tr>
<tr>
<td>CVN:C</td>
<td>64</td>
</tr>
<tr>
<td>CVN:C</td>
<td>113</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 (t, d, p etc.)

N = Nasal consonant (m, n etc.)
of making neighboring phonological segments similar.

Section Ad hoc: Ad hoc Phonological changes and Assimilative Trait.

In Bhupal 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 Bhupal 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.

Set 1: Standard Urdu p \(\rightarrow\) f in Bhupal Urdu

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Standard Urdu</th>
<th>Bhupal Urdu</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>ta:ps</td>
<td>ta:fs</td>
<td>ear-rings</td>
</tr>
</tbody>
</table>

Set 2: Standard Urdu b \(\rightarrow\) v in Bhupal Urdu:

<table>
<thead>
<tr>
<th>S.No</th>
<th>Standard Urdu</th>
<th>Bhupal Urdu</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>qurb</td>
<td>gurv</td>
<td>nearness, approach</td>
</tr>
<tr>
<td>2.</td>
<td>jazb</td>
<td>jazv</td>
<td>absorption</td>
</tr>
<tr>
<td>3.</td>
<td>nabz</td>
<td>navz</td>
<td>the pulse</td>
</tr>
<tr>
<td>4.</td>
<td>qabz</td>
<td>qavz</td>
<td>constipation</td>
</tr>
<tr>
<td>5.</td>
<td>sabz</td>
<td>savz</td>
<td>green</td>
</tr>
<tr>
<td>6.</td>
<td>salb</td>
<td>bilv</td>
<td>bulb</td>
</tr>
<tr>
<td>7.</td>
<td>qalb</td>
<td>qalv</td>
<td>the heart</td>
</tr>
<tr>
<td>8.</td>
<td>nabz</td>
<td>nabs</td>
<td>confinement</td>
</tr>
<tr>
<td>9.</td>
<td>salb</td>
<td>salv</td>
<td>crucifying</td>
</tr>
</tbody>
</table>
Set 3: **Standard Urdu b —> f in Bhopal Urdu**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Standard Urdu</th>
<th>Bhopal Urdu</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>zabt</td>
<td>zaft</td>
<td>restraint</td>
</tr>
<tr>
<td>2.</td>
<td>xabt</td>
<td>xaft</td>
<td>madness</td>
</tr>
</tbody>
</table>

In the words listed above the change of p, b to f, v is making successive segments 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 stops, 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.,

4 zabt ——> zaft

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 in v, because f also shares voicelessness with t.

**To Conclude:**

1. The characteristics of neighboring phonological units tend not to be precisely differentiated.
2. There is reference in CVC and CVCC word for the occurrence of two voiceless or voiced sound over the occurrence of one voiceless and voiced unit. Nasalized vowels mostly occur before nasal consonants.

3. In quite a few words 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 labio-dental units.

Section A9: Concluding Remarks:

1. In section A1, we have dealt with the human behavior trait whereby gross coordination in the articulatory movement is preferred over the fine and precise coordination.

2. In Section A2, dealing with the combinatory aspect of Bhopal Urdu Phonology, we have shown the preference for such combinations of phonological units that lead to large changes of aperture. Preference for large changes of aperture is justified by showing preference of CV- word over CVCC and CCVC words and increase in number of words with the increase of aperture difference in the clusters in CVCC words.

3. A manifestation of the bearings of human behavior on the combinatory aspect of phonological units of Bhopal Urdu can be seen in the preference of unidirectional changes of aperture in the successive segments in CCVC and CVCC words. As shown in A2, the combination of phonological units that lead to unidirectional change of aperture are those that
involve gradual decrease of aperture or increase of aperture. All those combinations which involve alternation between increase and decrease of aperture and lead to multiple direction changes of aperture are disfavored.

4. Human beings' avoidance of fine and precise coordination is also shown through the reference of phonological units produced by fewer articulators over those produced by more articulators. As demonstrated in Section 4.3, there is marked skewing in favor of voiceless consonants in comparison to voiced consonants. Likewise, unaspirated consonants are preferred over their aspirated counterparts, for the reason of the preference of similar units. For the same rationale, use of one more articulator, oral vowels are preferred over their nasalized counterparts. Preference for phonological units with fewer articulator is established through both the number of phonological units and their frequency counts.

5. As the phonological units carrying greater precision and coordination are disfavored. Phonological units produced by the contact of articulator at a remote point of articulation, are not preferred. The preference of phonological units with proximate point of articulation over those with remote point of articulation is established through the comparison of apico-dental and apico-palatal consonants, whereby apico-dental consonants out number apico-palatal consonants.

6. Despite the greater precision involved in the production of apico-palatal consonants, after an initial apico-palatal consonant there is an overwhelming preference for the apico-palatal unit at
the final position of the word in Bhopal Urdu. The recurrence of the apico-palatal consonant rather than apico-dental consonant in a syllable that begins with apico-palatal consonant, as demonstrated in Section A5, is a manifestation of human beings avoidance for making quick adjustment of apex to contact two distinct point of articulation in succession.

7. As the phonological units require greater precision to contact a remote point of articulation vis-a-vis an adjacent point of articulation, the apico-palatal consonants are disfavored to their apico-dental counterparts. Further it requires greater precision for apex to make a complete closure (for stop) at palatum in the post vocalic position than at the pre-vocalic position. A clear manifestation of this psychological aspect can be seen in section A6, where there is marked preference for apico-palatal liquids over the apico-palatal stops, while the apico-palatal liquids do not occur at the word initial position.

8. As the combination of phonological units involving quick adjustment of articulator(s) to different conditions in the successive segments necessitates precise coordination of articulators, a combination of two stable or two mobile units is preferred to a combination to either stable + mobile units or mobile + stable units. This psychologically motivated through frequency counts in Section A7.

9. Avoidance of precision of coordination of articulators can also be seen in the assimilative trait of making successive phonological units similar with respect to some articulatory feature i.e., articulator,
aperture, point of articulator etc. The assimilative trait as dealt with in Section A8, is first explained with the help of occurrence of phonological units, whereby voiceless consonants mostly occur after voiceless consonants and voiced consonants mostly follow voiced consonants. Likewise nasalized vowels occur in majority of CVC words before nasal consonants. Further in CVCC all nasalized vowels occur before nasal consonants. As we have later shown in Section A8, in quite a few CVCC, in the final clusters, labial stops /, b change into labio-dental f, v before or after t, s, z, r and l and this change makes neighboring segments similar with regard to point of articulation.
In this section we deal with psychological factors that provide reinforcement to the validity of phonological units in Bhopal Urdu as set up in terms of the physiological mechanism in Chapter I Diagram I-1.

It will be generally agreed that the principle laid down below 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 facet of human behavior that motivates the make-up and distribution of 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 collections of a relatively large number of non-combining phonological units".

It is to be noted that in Bhopal Urdu there are sixty-one phonological units: forty-five consonantal and sixteen vocalic. (Cf. Diagram I-1). It is this 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 under study. It is clear that this is one way in which human
language minimizes effort on the part of the memory. As a matter of fact, the economy so achieved in the formation of signals is developed by André Martinet under "double articulation". (Cf. Introduction: Section B3.)

Further, the total bulk of phonological units is formed by combining a relatively small number of apertures and articulators. In this dialect of Urdu sixty-one phonological units are formed by combining only nine degrees of aperture (∅, 1, 2, 3, 4, 5, 6, 7, 8) and eight articulators (Labium, apex, medium, front dorsum, back dorsum, post dorsum, velum and glottis).

If we examine the Phonological Grid of Bhopal Urdu, we further realize that the human behavior orientation has in another significant way contributed to its justification.

The phonological units that are produced with less effort and precision outnumber those units that are more complicated physiologically and would require more precision of control in their production. In fact, the phonological holes, in the grid that make it unsymmetrical, are due to both physiological and human behavior rationale.

Even a cursory glance 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 Bhopal Urdu. We will thus confine ourselves to explaining 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.

While a voiceless unaspirated post-dorsal stop does occur in Bhopal Urdu, this phonological unit (q) is characterized by the non-occurrence of its voiced or aspirated counterparts on aperture Ø (zero). The non-occurrence of the more complex voiced or aspirated stops with post-dorsal articulator can be partly attributed to the use of more articulators to be required in their production compared to q that is produced with fewer articulators. However, the situation is more complex than that at the post-dorsal axis. The sole phonological unit, namely q, at this axis is characterized by a very low frequency as compared to the frequency of other stops in Bhopal Urdu. It is mainly the physiologico-acoustic factor that causes the skewings in the formation of phonological units at post-dorsum

(2) Fewer phonological units as aspirated nasals than as unaspirated nasals.

On Ø aperture, for aspirated nasals we get many gaps. Unaspirated nasals are five in number but aspirated nasals are two only. As we have shown in this chapter Section A3, aspiration is greatly disfavored, because it requires greater air supply through the glottis (an additional articulator). It is therefore, anticipated that unaspirated nasals will outnumber the aspirated nasals.
It is also to be pointed out that aspirated nasals occur in only ten monosyllabic words, which are reduced forms of the standard Urdu bisyllabic words. The greater disfavoring for the aspirated nasals can be due to the fact that nasals are complicated units, so aspiration is more disfavored.

(3) Scarcity of phonological units on Aperture 1.

Aperture 1 has only two phonological units, namely, f and v, though on aperture 2 there are six phonological units. Least number of phonological units on aperture 1 is due to greater force and effort involved in the production of aperture 1 units, in view of their releasing air stream through a very restricted channel.

As the tips of the teeth furnish the physiologically ideal surface for aperture 1, less precision of control is required with the place of articulation well-suited to the aperture.

(4) Absence of \( \tilde{z} \) relative to \( \tilde{y} \).

As regards the hole in the Phonological Grid on aperture 2 for \( \tilde{z} \), it can also be justified in terms of human behavior, for \( \tilde{z} \) being voiced has one more articulator (glottis) than its voiceless counterpart \( \tilde{y} \).

(5) Fewer aspirated liquids than unaspirated liquids.

Aperture 3 is also characterized by asymmetry in the number of phonological units. There are more un-aspirated
units than the aspirated units. In fact the number of unaspirated units is double that of aspirated units (6:3). For human rationale, cf. (2) above.

(6) Two axes for apex in opposition to one each for other articulators.

The human behavior interplay can also be seen in the asymmetrical use of articulators in forming the phonological units. Of all the supraglottal articulators, only the most mobile apex is conveniently used to make dual distinction of "dental" versus "retroflex" among the consonants by the speakers of many Indian languages.

If we look at the Phonological Grid of Bhopal Urdu, it becomes clear that the apex keeps distinction of articulation at two points (dentum and palatum), on apertures $\varnothing$ and $\emptyset$. The use of the apex on two distinct points is attributed to the greater adroitness of apex among all the lingual articulators (medium, dorsum).

We may therefore conclude that the human behavior orientation provides reinforcement for the validity of the Phonological Grid of Bhopal Urdu, established earlier in terms of the physiological mechanism.
Section C: Summary and Conclusion:

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

Section A of this chapter deals with the explanation of favorable and unfavorable phonological skewings in Bhopal Urdu in terms of human beings' avoidance of fine and precise coordination of the articulatory movements. An attempt is made to explain eight aspects of distribution of phonological units on both the syntagmatic and paradigmatic levels. We summarize in the following paragraphs, the analysis, as carried over in this section.

First we have dealt with a combinatorial aspect of Bhopal Urdu Phonology in terms of the preference for large changes of apertures. It has been shown through the comparison of CVC, CCVC, and CVCC words, that CVC words are preferred over CVCC and CCVC words. The preference of
CVC words is caused by the maximum change of aperture in CVC words, from consonant (constriction) to vowel (opening) and then back to consonant. Further, there is an increase in combinations for final cluster in CVCC words with the difference in aperture change.

The second phonological showing of Bhopal Urdu Phonology, explained through human behavior characteristics is the direction of aperture change. It has been shown that there is marked preference for unidirectional changes of aperture over the multiple directional changes. The unidirectional changes of apertures are accomplished in both CCVC and CVCC words by combination that lead to either a gradual decrease or an increase in aperture, and such combinations are preferred over those that lead to an increase and decrease of aperture in alternation.

The third phonological aspect of Bhopal Urdu, explained in terms of psychological mechanism, is the preference for phonological units produced by fewer articulators. The number of phonological units as well as the frequency counts for phonological units involving fewer articulators is more than those involving more articulators. Thus, voiceless consonants are preferred over voiced consonants, unaspirated consonants are favored to their aspirated counterparts and nasalized vowels are disfavored to their oral counterparts. The voiced, aspirated consonants and nasalized vowels involve greater precision of control since they use more articulators as compared to voiceless, unaspirated consonants and oral vowels. Therefore, given
the human beings avoidance of fine and precise coordination, voiced, aspirated and nasalized units are disfavored to their simple voiceless, unaspirated and oral counterparts.

The fourth type of phonological skewing explained in Section A of the Chapter under review, is the disfavoring of apico-palatal consonants over apico-dental consonants. It has been shown that it is easy for apex to contact dentum, an adjacent point of articulation than to contact palatum which is a remote point of articulation. Thus, apico-palatal consonants require greater precision and are disfavored to their apico-dental counterparts. The disfavoring for apico-palatal consonants has been shown by comparing number of units and frequency counts of apico-dental and apico-palatal consonants.

The fifth phonological skewing explained through human behavior trait whereby gross coordination of articulatory movements is preferred, is the recurrence of an apico-palatal consonant rather than apico-dental consonant in a syllable that begins with an apico-palatal consonant. As demonstrated in Section A, to pronounce an apico-dental consonant after an apico-palatal consonant, requires quick adjustment of apex to contact two points of articulation in succession and thus requires precise coordination.

The sixth phonological skewing deals with the enlargement of aperture for apico-palatal stops at the word final position in a syllable. It has been shown that since it is more difficult for apex to make a complete stoppage at palatum (a remote point of articulation) after
a vowel (a large opening), therefore, there is marked preference for the apico-palatal liquids over the apico-palatal stops in the word final position. r is thus preferred to 1 in word final position, though r does not occur at the initial position of word.

The seventh part of section A of the chapter under review, deals with the combination of phonological units in the syntax, in terms of the stable and mobile articulations. As it was established in Chapter I, phonological units of aperture 3 r, rh, r, rh and 1, lh, 1 differ in terms of mobile and stable articulation, and this is shown by separating r-1, rh-lh, r-1 on the grid, with the help of forks. Stops and fricatives too may be distinguished in terms of relative mobility of the articulators. Stops like r, rh, r, rh involve violent action of the articulator and are called mobile units. In the production of fricatives like 1, lh, 1, the articulators are in a stationary condition, therefore, they together share stable articulation. As, there is a preference for rough coordination of articulatory movement over their fine and precise coordination, in the successive segments, a combination of two stables or two mobiles is preferred to the combination of either one stable + mobile or mobile + stable. Because a combination of one stable and mobile or one mobile and stable will involve quick adjustment of articulator(s) to different physiological conditions and thus will lead to greater precision of articulatory movements.
The last phonological skewing explained through avoidance of fine coordination, is the assimilative trait of neighboring phonological units. The occurrence of phonological units is in most cases conditioned to their environment. Thus, voiceless phonological units mostly occur with voiceless consonants and voiced consonants mostly occur with voiced consonants. As such, there is 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, though nasalized vowels are disfavored to oral vowels.

The assimilative trait of neighboring phonological units has also been evaluated by listing some CVCC words, whereby p, b change into f, v in the final cluster, before or after apico-dental consonants, and thus make final segments, easy to articulate, by making them similar in terms of point of articulation, since this leads to precise coordination of articulatory movement to make many distinction in succession. In Section 3 of the chapter under review, we have dealt with the psychological factors that provide reinforcement to the validity of phonological units in Bhopal Urdu, as set in terms of the physiological mechanism in chapter I, Diagram I-1. It has been shown that human behavior orientation provides reinforcement for the validity of the Phonological Grid of Bhopal Urdu, established earlier in terms of the physiological mechanism.
As demonstrated in Section B, phonological units produced with less effort and precision out number those units that are more complicated physiologically and would require more precision of control. The preference for simple units can be seen in more number for those phonological units involving less articulators. There are more voiceless and unaspirated units than the voiced and aspirated units. Likewise, there is scarcity of units on aperture 1, the most difficult aperture for Bhopal Urdu. Similarly, two axes for apex in opposition to one each for other articulators is also a reinforcement psychologically. The use of apex on two distinct points of articulation may be attributed to the greatest adroitness of apex among all the lingual articulators and labium.

Thus, in the chapter under review, an attempt has been made to assess the role of human behavior in the non-random distribution of phonological units on both the syntagmatic and paradigmatic levels in Bhopal Urdu. It has been shown that psychological trait whereby precise coordinations are avoided, play an important role in the production of phonological units and their distributive patterns in Bhopal Urdu.