The Rules Governing the Writing-Pronunciation Contrast in Urdu: A Phonological study

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ABSTRACT

Languages have differences in orthographic and phonetic representations i.e. words are not pronounced as they are represented orthographically. These transitions are normally governed by some underlying phonological rules. These rules are mostly language specific. This paper discusses the phonological rules of various languages. Moreover, it identifies similar rules for Urdu language.

1. INTRODUCTION

Phonology is the study of system and pattern of sounds that occur in natural language. It identifies distinctive sounds of a language and formulates rules to describe the sound changes. Such rules are called phonological rules.

Phonological rules have been formulated for many languages. This paper lists such rules for Urdu language. These rules have been identified by analysis of a respectable set of data for Urdu.

2. LITERATURE REVIEW

2.1 Phonology and Writing Systems

Majority of the world's languages are unwritten (Fromkins, Victoria. 2000, p. 528). For most languages that are, their spelling or orthography is irregular and does not represent sounds in a consistent way [4]. They violate the fundamental principle that each letter should represent one sound and each sound should be represented by one symbol. English is one of these languages since it uses only 24 letters to represent its 40 basic sounds (Fromkins, A.2000, p.483).

When linguists record words as sequence of basic sounds in that language, the result is termed as phonemic transcription. This is distinguished from phonetic transcription, which goes beyond this to give more details of how it is pronounced (Fromkins, A. 2000, p.489). In languages, words may exist that are not often pronounced the way they are supposed to be. This results in phonetic and phonemic transcriptional contrast. The environment in which these changes take place can be studied and phonological rules can be developed to explain these changes.

Referring back to writing systems, the spelling system for Urdu is much more consistent than English. In this case each orthographic symbol maps to exactly one basic sound although the converse is not true. Unlike English where written 'u' can be phonemically transcribed in more than one-way: put /pʊt/ and but /bʌt/. Since each letter of Urdu corresponds to one sound, representing each letter by its basic sound can roughly be called phonemic transcription. There are few exceptions though, such as in case of /ŋ/ sound produced by combination of two letters. This orthographic type phonemic transcription can be used to develop phonological rules in Urdu, by studying how they vary in Phonetic transcription. This is what phonology is all about. It can be imagined as an assembly line, which takes in phonemic forms, applies phonological rules and outputs phonetic form.

2.2 Phonological Rules

No serious effort has been done in studying phonological rules governing Urdu. A Lot of work has been done in English and other languages. The collective set of rules those were defined for these languages are stated next from Fromkins (p. 520-566), Napoli (Napoli, D.J. 1996) and Clark & Yallop (p. 99-104).

- **Assimilation**: This is a collection of all feature-changing rules. This may involve feature of voicing, manner, tongue position such as high, low, place, etc. Starting with voicing, a phonological rule in English

devoices a lateral when preceded by a voiceless consonant:

l $\rightarrow$ [-voiced] / C___
                  [-voiced]

In another rule dentalization of velarized /l/ takes place when preceded by a dental fricative theta:

l $\rightarrow$ ļ / ___ θ

In Spanish, a non-nasal voiced non-continuant becomes a continuant when it comes after a stop:

$$\begin{bmatrix} \text{+voiced} \\ \text{-cont} \\ \text{+nasal} \end{bmatrix} \rightarrow \text{[+cont] / [+cont] ___}$$

Again in English, all vowels are nasalized before a nasal:

[+vocalic] $\rightarrow$ [+nasal] / ___[+nasal]

- **Loss:** A rule that deletes a sound segment. There is a deletion rule in English in which a t is deleted when it is followed by an unstressed vowel.

$$t \rightarrow \emptyset \text{ / } n\text{__} \begin{bmatrix} \text{+vowel} \\ \text{-stress} \end{bmatrix}$$

- **Epenthesis:** Opposite to loss rule, it adds a sound segment in a word. In Komo, spoken in Russia the vowel [t] is inserted between consonants to avoid clusters of three consonants. The insertion rule is:

$\emptyset \rightarrow$ t / XCC__CCY

- **Compensatory Lengthening:** The kind of change, where something is lost and something else consequently lengthens. In Seri, Language of North West Mexico, if a verb stem begins with a vowel, then when the prefix si is attached, we get not siV but ssV:

$\emptyset \rightarrow$ s / s___+V

i $\rightarrow \emptyset$ / s___+V

- **Metathesis:** The rule that transposes or reorders two sounds or sound sequences usually adjacent to each other. (Lass, Roger. 1995). An interesting instance arises in Hebrew. When verb stem begins with [s] [ʃ], we get a metathesis of the final [t] of prefix [hit] and the initial consonant of stem:

t C$\rightarrow$ Ct / h i___+___

- **Dissimilation:** Sounds can change in order to be unlike the segments near them. The rules governing these changes are dissimilation rules. In Balto-Slavic Language, the nucleus N of the final syllable of root increases in duration when the suffix V is short or vice versa:

N [+duration] / N (C$_0$) + ___
                [±duration]

- **Neutralization:** It is the identical phonetic realization of distinct phonemic norms. This happen in Korean, where /ptk/ vs. /mnŋ/ are neutralized in the context of following nasal.

[otʃiŋətfət] [otʃiŋətfən nɛmsɛkə]

[otʃiŋətfən] [otʃiŋətfən nɛmsɛkə]

    And are given by the rule:

[+stop] $\rightarrow$ [+nasal] / ___ [+nasal]

The primary purpose of the present study was to investigate the phonological rules in different languages and then examine and formulate similar rules for Urdu. The results of this examination are presented and discussed here.

3. METHODOLOGY

A Small pocket dictionary (Azhar-ul-Lughat) of approx 25,000 words served as a subject for present study. The dictionary was examined in three phases. In the first phase 250 words at random were selected and

analyzed without any fruitful consequences. In the second phase the dictionary was examined selectively. Only those words that seemed to be read differently from the way they were written were traced. These were phonemically (i.e. orthographically) and phonetically transcribed and investigated. On the basis of this investigation, many environments in which phonological changes occur were found. And in the final phase a thorough search was made to come up with data that specifically supported or violated the devised rules. Once again they were analyzed and rules formulated to explain them.

Although phonological rules can best be handled by geometrical phonology rather than linear phonology, however, in this paper, both systems are interchangeably used where appropriate to enhance clarity.

4. RESULTS

4.1 Vowel-Consonant behavior

Urdu vowels are written with the help of three oral phonemes and three diacritics as already stated in Hussain (Hussain, S. 1997). The long vowels are written using one of the three letters *vao*, *yay*, *alif*, with or without one of the diacritics on the preceding consonant. At the start of the syllable, the behaviors of *vao* ({v}[1]), *yay* ({j}) is however like a consonant.

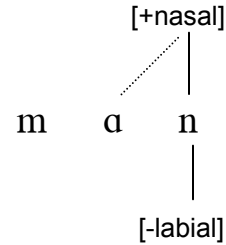$$\{ j \} \rightarrow [j] / . \underline{\quad} V$$
Vowel otherwise

$$\{ v \} \rightarrow [v] / . \underline{\quad} V$$
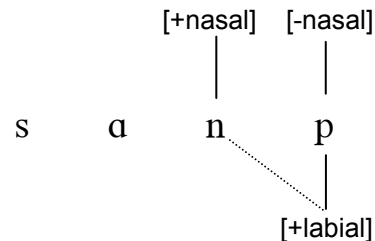Vowel otherwise

4.2 Manner Spread

- **Nasal**
  All long vowels occurring before a nasal lying *within* a syllable are nasalized.   Short vowels remain unaffected and {m} has no effect on its neighboring segments. Consider the word {man} with three time slots, this rule can be represented as:
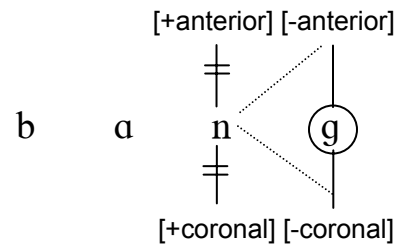

4.3 Place Spread

- **Labial**
  A Nasal before a bilabial stop gets labialised:
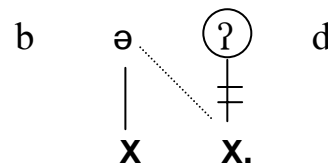

- **Velar**
  Nasal /n/ before a voiced velar stop *within* a syllable is assimilated to a velaric nasal:

4.4 Compensatory Lengthening
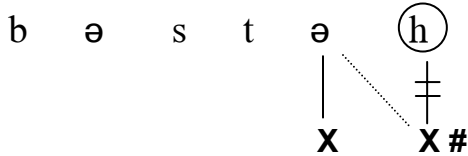
Research showed that the glottal stop *ayn* ({ʔ}) is normally not spoken. It gets deleted whenever it occurs after a vowel, which lengthens to occupy its time slot. Assuming X to be time slot of associated segments it turns out to be something like:


Similarly /h/ preceded by /a/ in word-final position is deleted and /a/ lengthens to [ɑ].

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[1] {…} represent orthography throughout.

b   ə   s   t   ə   (h)

X   X #

4.5 Deletion

Urdu does not allow a diphthong Xɑ where X is any short vowel other than /ə/. Speaking in terms of orthography, *zer* or *pesh* before *alif* cannot be combined and pronounced as one vowel. In case of such occurrence, the vowel X forces a deletion of /ɑ/. Consider the example for [bɪlkʊl]:

**Orthographic** { b ɪ(a)l   k ʊ l }

Phonetic   [b ɪ   l   k ʊ l]
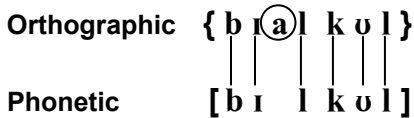
This rule can therefore be represented as:

$$\alpha \rightarrow \phi \ / \ V_s \_\_\_$$

Where V_s is small vowel [ɪ], [ʊ]

Again referring to glottal stop *ayn*, it is deleted in all contexts except at start of word depending on speaker. Also, *alif* ({ɑ}) appearing at the start of the syllable is deleted. Consider an example [ɪnɑm] where both these rules apply:

Orthographic {(ɑ)ɪ n(?)ɑ m }

Phonetic   [ɪ n   ɑ m   ]
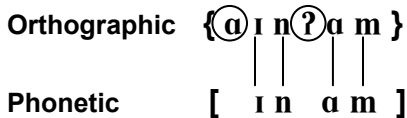
And this rule can be stated as:

$$\alpha \rightarrow \phi \ /. \_\_ \ V_s$$
$$? \rightarrow \phi \ /. \_\_ \ V$$

Where V_s is any small vowel.

Similarly, alveolar nasal followed by voiced velar stop gets assimilated to velaric nasal as stated above, but the voiced velar stop /g/ gets deleted as already explained in [bɑŋ].

$$g \rightarrow \phi \ / \ n\_\_ \ .$$

5. DISCUSSION

In Urdu, all long vowels except for /ɑ/ are formed by the combination of three diacritics with *vao* and *yay*. *Vao* and *yay* are otherwise consonants mapping onto /v/ and /j/. /j/ is only a bit more constricted than the otherwise similar vowel [i] (Fromkins, Victoria A. 2000, p. 510). This makes it a glide or semi vowel. But what about *vao* ({v})? During vocalic articulation *vao* gets mapped on to w, again a semivowel. Since [v] and [w] occur in complementary distribution, they are therefore allophones of the phoneme /v/. The presence or absence of diacritic on the preceding consonant influence *vao* and *yay* as can be seen from the data.

Ox:	{bəjl}	[bæl]
Yellow:	{pɪjlɑ}	[pilɑ]
	{bjl}	[bel]
Ate:	{kʰɑjɑ}	[kʰɑjɑ]
All:	{pʊvrɑ}	[purɑ]
Senses:	{hvʃ}	[hoʃ]
Roundabout:	{tʃəvk}	[tʃɔk]
Wall:	{dɪjvɑr}	[divɑr]

From all this data one thing is clear that {j} maps on to front vowels due to its closeness to them while [w] roundedness maps it to rounded back vowels. The preceding segment then decides or influences to which front vowels should *yay* map and like wise for *vao*. The absence of diacritic orthographically implies a consonant-*yay* or consonant-*vao* cluster.

Having discussed all this one question remains: why is /j/ and /v/ consonants at the start of the syllable? The dependence of /j/ on the preceding segment *within* a syllable to decide which vowel to form, implies that if the semi vowels appear at the start of the syllable it has nothing to be influenced by and hence behaves a consonant.

And finally, there are two orthographic representations for sound /j/ and only differ in word-final position, where one of them maps on to [e] and other onto [i].

Turning to vowel nasalization, In Urdu long vowels preceding a nasal are nasalized. Labial nasal however has no effect on preceding vowel. Also short vowels are never nasalized. Consider the following data:

Happen: {ho}   [ho]
Am: {hon}   [hõ]
Accept: {man}   [mañ]
Mother: {man}   [mɑ̃]
Five: {pantʃ}   [pɑ̃ntʃ]
Ashamed: {ʃərmɪndəh}[ʃərmɪndɑ]
Work: {kɑm}   [kɑm]

In Urdu, the occurrence of {n} in word final position can have two meanings. It may either nasalized previous vowel as in [mɑ̃] or has no effect as in [mɑn]. The reason for this is that Urdu has two orthographic representations for the nasal. One of which called 'noon gunah' accounts for [mɑ̃n]. That is, it signifies nasalizing previous vowel. For [ho] vs. [hõ], in later case the word is ending with a noon gunah. Since [ho] vs. [hõ] are two separate words in Urdu and are distinct by nasalization of vowels only. Hence we can conclude that vowels and nasalized vowels are phonemes. Does [ŋ] nasalize preceding vowel? I will return to that later.

Now lets look at some adjectives that become adverb by addition of suffix [dɑr] or by deletion of /ɑ/ followed by addition of [gi].

[dʒɑn] → [dʒɑndɑr]
[ʃɑn] → [ʃɑndɑr]
[mərdɑnɑ] → [mərdɑngi]
[divɑnɑ] → [divɑngi]

In these sets of data, [ɑ] in all adverbs are not nasalized before [n], although they lie *within* a syllable. The reason for this may be that the adjectives, from which these words are derived, have no vowel nasalization. In the first pair, the orthography of /n/ come into play and for the second, the vowel and /n/ lie in separate syllables.

Place can also assimilate onto preceding segment. Through this study it was found that only nasals have the tendency to acquire place features. First lets talk about the spreading of labial feature, when a nasal and a non-nasal labial stop cluster occurs.

Heap: {ənbɑr}   [əmbɑr]
Support: {sənbʰɑlnɑ} [səmbhɑlnɑ]
Shiver: {kɑnptɑ}   [kɑmptɑ]
Priceless: {ɑənmol}   [anmol]

In all the data {n} changes to [m]. Their only difference is their place of articulation. The reason for this is that the following segment, which is either /p/ or /b/ or their aspirated versions, are bilabial. Their place of articulation is transferred to their previous segment, changing an alveolar nasal to bilabial. Note that the nasal and non-nasal stop cluster can lie *within* a syllable as in [kamp.ta] or in two separate syllables as in [am.bar]. [ŋ] is not influenced by the following bilabials. In fact as we are about to see [ŋ] does not form a {ŋp} or {ŋb} clusters.

Urdu contrasts three places of articulation in nasals: /m/ vs. /n/ vs. /ŋ/. These can be justified by minimal triplets, such as [səm] vs. [sən] vs. [səŋ]. At the beginning only /m/, /n/ can occur. A phonological rule forbids /ŋ/ appearing word-initially. In the present study it was revealed that the existence of /ŋ/ is dependent on the context in which {n} occur. Which is that whenever /n/ is followed by a voiced velaric stop /g/ *within* a syllable, it changes to /ŋ/. This is because /g/ (voiced velar stop) assimilate its place to the following nasal changing it to [ŋ]. Acoustic Analysis by Saleem (Saleem, Manan. 2002) shows that in the process of /n/ velarization, /g/ is deleted, as shown by the following data:

Yawn: {əngɾaʔi}   [əŋɾai]
Uproar: {həngəməh} [həŋəma]
Manly: {mərdɑngi}   [mərdɑngi]

This is not true for unvoiced glottal stop. Neither it is deleted nor velarization of preceding nasal occurs. In fact the vowel before /n/ is nasalized and /n/ is deleted as in:

Throw: {pʰəjnk}   [pʰæ̃k]

Smartness: {bɑnkpən}   [bə̃kpən]

Interestingly through acoustic analysis by Saleem (Saleem, Manan 2002), it was determined that the vowel preceding the /ŋ/ also gets nasalized without the deletion of /ŋ/. So referring back to the long vowel nasalization rule, it can now be said that like /n/ and unlike /m/, /ŋ/ assimilates its manner to preceding long vowel.

Now lets look at the compensatory lengthening rules. Consider the following data, in which /ʔ/ and /h/ get deleted and its preceding vowel duplicates:

Invitation: {dəʔvət}   [dɑvət]

Way: {rɑstəh}   [rɑsta]

Unlike these counter examples where /ʔ/ is deleted without the lengthening of previous vowel and /h/ is not deleted at all.

Sin: {gʊnɑh}   [gʊnɑh]

Start: {ʃʊrʊvʔ}   [ʃʊru]

Gathering: {ɪdʒtəmaʔ}   [ɪdʒtəmɑ]

Urdu always ends with a long vowel or a consonant. Also Urdu natives tend to end words or syllables of words with long vowels where possible. /h/ and /ʔ/ occurring in word final position create this possibility where they are forced to deletion as preceding short vowel tends to elongate. In case of [gʊnɑh] or [təfrih], since the preceding vowel is already long so most probably there is not real motivation for deletion of /h/. What about /ʔ/? The /ʔ/ sound is normally not pronounced except sometimes at start of words depending on speaker. Because of /ʔ/ *unlikeness* to be pronounced, it exhibits this behavior even at syllable level as in [nɔmɑn] or when preceded by a long vowel as shown in [ʃʊru].

Finally turning to deletion rules. Once again consider the data set given below in which *alif* ({ɑ}) is deleted without any compensatory lengthening.

Definitely: {bɪɑlkul}   [bɪlkul]

Capital: {dɑrʊalhʊkʊvmət}

                  [dɑrʊlhʊkumət]

At the moment: {fɪɑlhɑl}   [filhɑl]

Drink: {pɪjɑ}   [piɑ]

As can be seen /ɑ/ is deleted when preceded by a higher short vowels. However, this is not the case when schwa or any long vowel follows as in:

Unmannerly Person: {bʊvɑəlfʊzʊvl}

                  [buəlfʊzul]

Expert: {maɑhir}   [mɑhir]

What: {kɪjɑ}   [kiɑ]

What could be the reason behind this? One reason could be that in Urdu does not allow an *alif* and short vowel diphthongs such as /ɪɑ/ and /ʊɑ/. Or for that matter any diphthong with a following *alif* which in the case of long vowels no longer remains a diphthong but actually separates into different syllables such as /iɑ/ combination in [liɑ] or in {bʊvɑəlfʊzʊvl} where /ʊv/ first maps to [u]. And then [ʊɑ] can form a diphthong but break up into syllables. By the deletion rule [ɑ] at start of syllable is deleted and [bualfʊzul] results. Finally a schwa before /ɑ/ is not really a diphthong, its merely an elongation of *alif* as in [mɑhir]. On the basis of above data, it is evident that the motivation for this rule is the diphthonisation constraint that disallow [ɪɑ], [ʊɑ] vowels.

Similarly glottal stop /ʔ/ already discussed in different context is deleted when it appears at the start of the syllable and the following segment is not word-final yay. In the later case it maps yay on to vowel depending on its orthography:

Cow: {gɑʔj}   [gɑe]

Fight: {ləɽaʔj}   [ləɽɑi]

Problems: {məsaʔɪl}   [məsɑɪl]

Fortunate: {səʔɪjd}   [sɑid]

In /səʔɪjd/, first /ʔ/ is deleted: occurring at start of syllable, then / ɪj / map onto /i/ and [sɑid] results. Also if {ʔ} occurs in the middle of the word (but at the start of syllable), it may sometime generate diphthongs as in [məsɑɪl].

6. REFERENCES

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Appendix A: Rule Ordering
(An Extract from Fromkins, Victoria A. 2000, p. 566-570)

An interesting aspect of phonological systems is that some rules apply in environments defined phonemically, rather than phonetically. Such a rule looks like it is applying in the wrong environment if one examines only the phonetic data.

The discussion of this phenomenon will be based on two phonological rules of Urdu discussed in the paper. One rule is of labial Spread:

$$/n/ \rightarrow \text{[+labial]} / \underline{\quad} \begin{bmatrix} +\text{labial} \\ -\text{nasal} \end{bmatrix}$$

That is: Alveolar /n/ is realized as a labial nasal when followed by a non-nasal bilabial. As a result of this rule we find the following distributions.

Heap:	/anbɑr/	[ambɑr]
Support:	/sanbʰɑlnɑ/	[sambhɑlnɑ]
Shiver:	/kɑnptɑ/	[kɑmptɑ]
Snake:	/sanp/	[samp]
Entrust:	/sɔnpɑ/	[sɔmpɑ]
Leaf:	/konpal/	[kompal]

....

Priceless: /anmol/ [anmol]

The other rule vowel nasalization:

$$V_L \rightarrow \widetilde{V}_L / \underline{\quad} \begin{bmatrix} +\text{nasal} \\ -\text{labial} \end{bmatrix}$$
$$\text{DELETED}$$

That is: Any long vowel is nasalized when it comes before a nasal and the nasal is deleted. As a result of this rule we find the following distributions.

Am:	/hon/	[hɔ̃]
Accept:	/man/	[mañ]
Mother:	/man/	[mɑ̃]

....

Ashamed:	/ʃarmɪndah/	[ʃarmɪndɑ]
Work:	/kam/	[kɑm]

Manly: /mardɑngi/   [mardɑngi]

With these two rules in hand, we can now see how they might interact. Crucial words that would bear on the question are the following, are transcribed phonemically for the moment.

Shiver: /kɑnptɑ/
Snake: /sanp/
Entrust: /konpal/

The crucial point here is that nasalization depends on the nasal /n/ of the following segment. If vowels nasalization depends on a phonemic environment, then we would expect to get a nasalized vowel. However if vowel depends on phonetic form of the following consonant, it will not apply and vowel remains non-nasalized. Consider the following example using both orderings.

1. **Nasalization preceding Labialisation:**

   Shiver:
kɑnptɑ	phonemic form
kɑ̃ptɑ	Nasalization
--------	Labialisation (no change)
kɑ̃ptɑ	Phonetic form

2. **Labialisation preceding Nasalization:**

   Shiver:
kɑnptɑ	phonemic form
kɑmptɑ	Labialisation
--------	Nasalization (no change)
kɑmptɑ	Phonetic form

In the two cases, correct phonetic form occurs in the second case. In conclusion, the difference such as the one just shown above proves that ordering of phonological rules makes a difference.