ASSIMILATION RULES IN URDU

ABDUL MANNAN SALEEM

ABSTRACT

This paper tends to describe the role of assimilation in Urdu . Firstly the paper gives the brief introduction to assimilation rules and describes how assimilation plays a role in a language . Then it provides the information about the work done on different types of assimilation rules in different languages . And finally it provides the details of some of the assimilation rules in Urdu . These rules are complemented by the analysis of various words present in Urdu vocabulary.

1. INTRODUCTION

Everyone who knows a language knows the basic vocabulary of that language . This means he knows that an object like “pot” is represented by a sequence of phonemes, /pɔt/ . In other words, he knows both the sounds and meanings of these linguistic units . This knowledge must be part of the way he “stores” these words in his mental dictionary, since when he wants to refer to the concept “pot” he doesn’t produce the sound [t^hap] . But he needn’t represent the sounds of this word by including all the phonetic features of these sounds, as long as the relationship between the phonemic representation he has stored and the phonetic pronunciation is “rule-governed” . The rules, which relate the minimally specified phonemic representation to the phonetic representation, form part of the speaker’s knowledge of his language . They are part of the speaker’s grammar . One type of such rules is *assimilation rules* .

Assimilation is a process that makes two or more neighboring segments more similar by making the segments share some feature . The term *assimilation* is sometimes used in a rather general way, more or less synonymously with the co-articulation (John Clark & Colin Yallop, 1990) . Quite often the term refers only to those cases of context-sensitive articulatory overlap, which are reflected in a phonetic transcription . In this usage, the term becomes rather too dependent on ill-defined conventions about the nature of transcription . Thus assimilation may include instances of overlap which happen to generate a change from one common sound to another (as in Urdu the dental [n] becomes velar [ŋ] before a velar voiced stop [g] e .g . in [əngara], live coal, that becomes [əŋara]) but exclude instances that give rise to a less common sound for which there is no well-known phonetic symbol (as in English when the initial consonants of saw or sue are lip-rounded in anticipation of the following rounded vowels) . In other words, what counts, as assimilation tends to depend on the availability of symbols to indicate it and on conventional judgments about its auditory or linguistics salience . Many effects, such as changes in the tongue body posture of alveolar stops in the context of different vowels, are not even accounted for in conventional phonetic transcription, and so are likely to be ignored in accounts of assimilation (John Clark & Colin Yallop, 1990) . This paper describes some of the most common assimilation rules present in Urdu and provides data for these rules .

2. REVIEW OF LITERATURE

In assimilation one segment becomes more like (or identical to) another or the two become more like each other (Roger Lass, 1984, p.171) . Thus if /k/ becomes /x/ context-free, this is simply *spirantization* ; but if the same thing happens between vowels, this can count as assimilation : the stop takes on the more open stricture of its surroundings . Assimilation is so common and important that various types are worth being discussed as such.

2.1 Direction and Contiguity

The standard assimilation taxonomy involves *direction* ; the assimilating influence

may work either to the right or the left (Roger Lass, 1984, p.171) . Consider the English tempo variants given just below :

		Tempo1	Tempo2	
(a)	1	əʊpən	əʊpəm	'open'
	2	sɛvən	sɛnəŋ	'seven'
(b)	1	aɪm $k^hʌmɪŋ$	aɪŋ $k^hʌmɪŋ$	'I am coming'
	2	aɪm nɒt	aɪn nɒt	'I'm not'

In (a) the influence moves from left to right, or forward ; in (b) from right to left, or backward . This can be seen more clearly If we reformulate :

(a) 1 n ⟶ m / p ⟶ Direction

(b) 1 m ⟶ ŋ / k ⟵ Direction

Case (a) is *progressive* or *preservative assimilation* ; and case (b) is *regressive* or *anticipatory assimilation* .

Assimilation can be further categorized according to whether the segments involved are in contact or separated by others . In the examples given above we have *contact assimilation,* but there is also *distant assimilation,* in which, either progressively or regressively, the influence moves across some inventing segment(s) but this is not true for Autosegmental phonology.

The most characteristic distant assimilation is *metaphony* : non-contact vowel assimilation . Traditionally there are two types : (regressive) *umlaut* and (progressive) *vowel harmony* (though some writers use 'vowel harmony' for both) . Umlaut can be illustrated by the Germanic i-umlaut, in which (in general) back vowels fronted before a following /i/ or /j/, normally with one or more consonant intervening (Roger Las, 1984, p.172).

$$\begin{pmatrix} u(:) \\ o(:) \\ ɑ(:) \end{pmatrix} \longrightarrow \begin{pmatrix} y(:) \\ ø(:) \\ æ(:) \end{pmatrix} / \_\_\_ C \begin{Bmatrix} i \\ \\ j \end{Bmatrix}$$

Stating it in features, the nature of the assimilation is clear, with the SD being [+back] … [-back] and the SC [+back] becomes [-back] .

Vowel harmony as a systematic process can be illustrated from Hungarian . Here, most suffixes have two or more allomorphs, which are conditioned by the vowel(s) of the preceding root-morpheme . In the simplest case, the suffix has two allomorphs, one with a front and one with a back (or non-front) vowel, controlled by the stem (Roger Las, 1984, p.172).

	Root-N	'from inside N'	'in N'	'at N'
'House'	hä :z	hä :z-bo :l	hä :z-bɒn	hä :z-nä :l
'Garden'	kɛrt	kɛrt-bø :l	kɛrt-bɛn	kɛrt-ne :l

There is also a harmony involving frontness/roundedness (Roger Las, 1984, p.172) , as in this three-allomorph suffix :

	Root-N	'up to N'
'House'	hä :z	hä :z-hɔz
'Garden'	kɛrt	kɛrt-hɛz
'Squash'	tœk	tœk-hœz

Finally there are 'bi-directional' or *fusional* assimilations, in which a sequence SiSj (where S = 'segment') becomes Sk (where k = some combination of features from i, j) . A familiar example in English alveolar/palatal sandhi (Roger Las, 1984, p.173) .

hɪtju	hɪtʃu	'hit you'
$k^hɪdju$	$k^hɪdʒu$	'kid you'
mɪsjʊ	mɪʃu	'miss you'

The output of a fusion is usually a 'compromise' segment : in above example the alveolarity of the first element and the palatality of the second meet halfway, in a retracted alveolar with a raised tongue body (which is what a 'palaato-alveolar' really is) .

2.2 Basic Assimilation Types

There is probably no segmental property that can't be the target of assimilation . It

may be helpful to look at some major types in terms of the parameters they can be seen as responding to .

2.2.1 Place

We extend the term 'place' to cover height and backness . Diphthongization can also be assimilatory : in pre-Old English [u] was inserted between a front vowel and certain back consonants ('breaking' in the handbooks) : e .g . /sæx/ 'I saw' becomes [saux] and /selx/ 'seal' becomes [seulx] . This can be seen as the 'protection' of a front vowel from a back environment ; hence the 'transition' vowel [u] is an assimilatory response . Later on these diphthongs underwent an internal height-assimilation : [æu] becomes [æɑ] and [eu] becomes [eo](Roger Las, 1984, p.173) .

2.2.2 Stricture

The commonest type is opening of stricture in response to surrounding opener stricture . So Spanish /bdg/ becomes [βðɣbd] between vowels, Proto-Dravitation */ck/ becomes [sx] intervocalically in Tamil . Assimilation to closer stricture ('strengthening') is also attested, if rarely : in some southern US English dialects, /z/ becomes [d] before /n/ ([bɪdnɪs] 'business', [wʌdnt] 'wasn't'), i .e . a fricative becomes a stop before a nasal stop (Roger Las, 1984, p.174) .

2.2.3 Lip Attitude

The commonest type is rounding (usually anticipatory) of consonants in the vicinity of rounded vowels . Vowel rounding after rounded segments is also common ; in Northumbrain Old English /e/ becomes [ø] after /w/ (Nhb *woesa* 'to be' vs .*wesan* in older dialects) ; and a later revival shows up in those varieties of English with /wɒ/ or /wɔ/ for original /wa/, e .g . *watch, wallet, swallow* (Roger Las, 1984, p.174) .

2.2.4 Glottal State

Assimilatory voicing and devoicing are well attested, the former e. g. in Sanskrit voicing sandhi, latter in the English external sandhi, e .g. [hæftu:] 'have to', [hæstu:] 'has to', [ju :stu:] 'used to' . These are regressive ; progressive voice assimilation occurs in the allomorphy of the English plural, genitive, third person singular present and weak verbal past after obstruents : in /s/ in *hawks, hawk's, walks,* /z/ in *bags, bag's, lags,* /t/ in *walked,* /d/ in *lagged* (Roger Las, 1984, p.175) .

3. METHODOLOGIES

3.1 Subjects

For the purpose of the verifications of assimilation rules in Urdu, a group of five native speakers of Urdu have been surveyed. These five subjects have done all the sound recordings needed for the proof of the correctness of assimilation rules given in this paper.

3.2 Data Recording and Processing

All acoustic analysis of the speakers was carried out on Speech Analyzer Tool v1 .5, a collection of digital Speech-processing tools designed for Windows users . The equipment consisted of a high fidelity 600 ohms moving coil microphone, a Teac integrated stereo amplifier (power output 195 Watts per channel) and two high quality speakers with 8-ohm impedance .

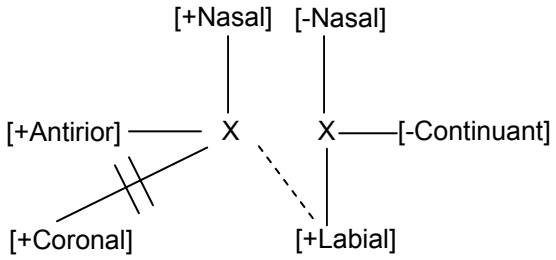
3.3 Experimental Conditions

All subjects were required to speak a list of Urdu words. I have made a list of Urdu words corresponding to each assimilation rule given in this paper that needs to be analysed for the verification of correctness of these rules. These words are carefully selected from the respective tables of the rules, given in Appendix A. Due to the unavailability of a proper recording room; the datum thus collected was vigorously screened for errors .

4. RESULTS

4.1 Rule1

Urdu has a property that whenever a Bilabial Stop /p/, /b/, /p^h/ or /b^h/ comes after a Dental Nasal Stop /n/, then the [+Labial] property of these Bilabial Stops Assimilates to the preceding Dental Nasal Stop /n/ . And that Dental Nasal Stop /n/ becomes a Bilabial Nasal Stop /m/ . This rule can be formulated in Geometrical Phonology notation as :



The first time slot from left in the above figure represents Dental Nasal Stop /n/ and here [+Coronal] property is used to make it different from /m/, and [+Antirior] property is used to make it different from /ŋ/ . The second time slot in the above figure represents Bilabial Non-nasal Stops . The data that verifies Rule1 is given in Table A.1 (see appendix below) .

4.1.1 Discussion

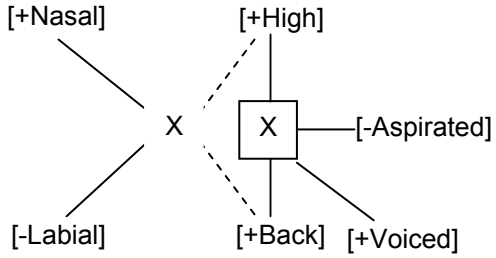
The data given in Table A.1 clearly describes Rule1 but there are some exceptions that should be discussed .

- Many dictionaries were searched for collecting data to support Rule1 . All of the collected data is shown in Table A.1 . This table shows data for /p/, /b/ and /b^h/ but not /p^h/ since no word was found for the latter.

- While collecting the data an exception to Rule1 was encountered . The data point shown in the 31st row of Table A.1 shows a word /b^hɪnb^hɪnɑnɑ/, where [+Labial] property of second /b^h/ does not assimilate to its previous phoneme /n/. As a result of that its phonetic and phonemic transcriptions remain the same . The reason for this blockage may be the reduplication of the same set of phonemes /b^hɪn/ .

4.2 Rule2

Urdu has an assimilation rule that whenever a Dental Nasal Stop /n/ comes before a Voiced Velar Stop /g/ or /g^h/, then the Voiced Velar Stop gets deleted and its places [+Velar] assimilates to the preceding Dental Nasal Stop /n/ . This assimilation of [+Velar] property to the preceding Dental Nasal Stop /n/ makes it Velar Nasal Stop /ŋ/. As in Geometrical Phonology the [+Velar] property can be represented by two features, [+High] and [+Back] so here the [+High] and [+Back] features are shown to be assimilated to the previous /n/ that makes it /ŋ/ . This rule is the combination of the deletion and assimilation, here Voiced Velar Stop gets deleted and [+High] and [+back] property assimilates to the preceding /n/ . This rule can be formulated in the Geometrical Phonology notation as :



The first time slot from left in above figure tend to represent the Dental Nasal Stop /n/ here the [-Labial] property is used to make /n/ different from /m/ and [-High] and [-Back] properties are used to make it distinct from /ŋ/ . In the second time slot [-Aspirated] property is used to make the Voiced Velar Stop /g/ distinct from its aspirated version /g^h/ . The square around the second time slot represents the deletion of that time slot . This rule can be verified by the data given in Table A.2 .

4.2.1 Discussion

The data points given in the Table A.2 provides enough information for the authentication of Rule2 . But there are still some points that should be discussed .

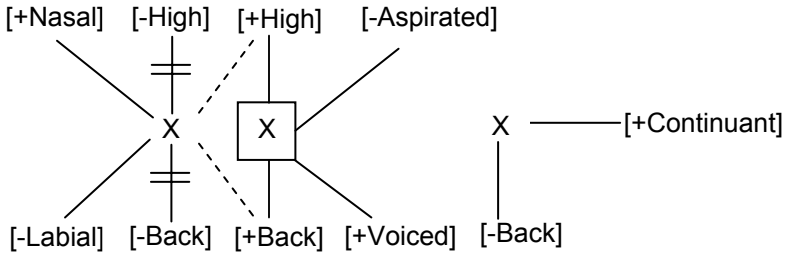
- While analyzing Rule2 it is observed that there is no word having a consonant before the sequence /ŋg/ . That is why it is expected to have a vowel, not a consonant, before the Dental Nasal Stop /n/ .
- Most of the data given in Table A.2 support Rule2 but it also has an exception at 64th row where the phonetic and phonemic transcription of the word (/gʊŋgunɑŋɑ/) is same . In this word, we have a sequence /ŋg/, but here Rule2 does not apply and [+Velar] property of /g/ does not assimilate to the preceding phoneme /n/ . Here again the reduplication causes the blockage in application of rule.

4.3 Rule 3

As you can see that in the diagram of Rule2 the [-Aspirated] property of Voiced Velar Stop /g/is explicitly mentioned. The reason for this is that the aspirated version of Voiced Velar Stop /g^h/ behaves differently when it comes in place of the phoneme /g/ . Rule 3 represents the behavior of /g^h/ when it comes in place of the phoneme /g/ in Rule 2 .

Rule 3 states that, in Urdu when a Dental Nasal Stop /n/ comes before an Aspirated Voiced Velar Stop /g^h/ then Aspirated Voiced Velar Stop /g^h/ gets deleted and its [+Velar] property assimilates to previous /n/ and it makes it Velar Nasal Stop /ŋ/ . At the same time the Glottal Voices Fricative /h/ is inserted after /ŋ/ .

Rule 3 is the combination of deletion, assimilation and insertion . In this rule time slot for /g^h/ is deleted, its [+Velar] property assimilated to the previous /n/ and a time slot for /h/ is inserted . The formulation of Rule3 in Geometrical Phonology is given just below .



The data points that verify the correctness of Rule3 are given in Table A.3 .

4.3.1 Discussion

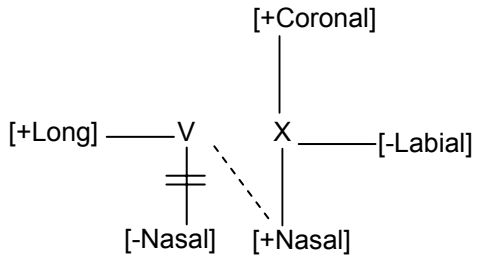
The data given in Table A.3 quite clearly describes the correctness of Rule 3 but there are some exceptions that need to be discussed here .

- While collecting data it was observed that, two data points (11th and 12th row of table A.3) violates the Rule 3 . In these examples /g^həng^{h}or/ and /pəng^{h}əʈ/ a sequence /ng^h/ is present but here Rule 3 does not apply so their phonetic and phonemic transcriptions remain the same . But some native speakers do apply the Rule 3 for these words as well.

4.4 Rule 4

Urdu has another property that whenever a long vowel comes before a Velar Nasal Stop /ŋ/ or a Dental Nasal Stop /n/ then the [+Nasal] property of /ŋ/ or /n/ assimilates to the preceding long vowel and that vowel become nasalized . The Geometrical

Phonology formulation of this rule is given just below .



The data that shows the correctness of Rule4 and on the basis of which I have been able to derive Rule4 is shown in Table A.4 .

4.4.1 Discussion

The points to be discussed in Rule4 are :

- I observed that whenever a sequence /nɡ/ or /nɡ^{h}/ occurs in the phonemic transcription of any word of Urdu then according to Rule2 and Rule3, discussed above, these sequences almost always be converted to /ŋ/ or /ŋh/ respectively (exceptions are discussed above) . So here first the Rule2 or Rule3 is applied then the Rule4 is applied to make the long vowels nasalized. So we determine from here that rule ordering is very important while considering the assimilation .

- The data points from row 33 to 52 shown in Table A.4 clearly describes that whenever a short vowel comes before /ŋ/ or /n/ then assimilation does not take place . This thing can also be verified by the acoustic analysis of the short vowels in this context . Figure1 shows the Spectrogram of Urdu word /səŋət̪/ . While analyzing the first two formants of the two /ə/'s in /səŋət̪/ it was observed that intensities of the first two formants were diminishing but the bandwidths were not . In order to be nasalized, The bandwidths of the formants of nasalized vowels should be more than their non-nasal versions implicating that the /ə/ is not nasalized . Furthermore the spectrogram analysis of multiple people revealed that vowel nasalization varies from person to person .

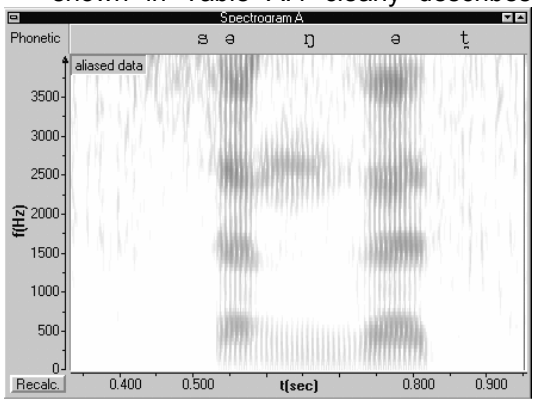


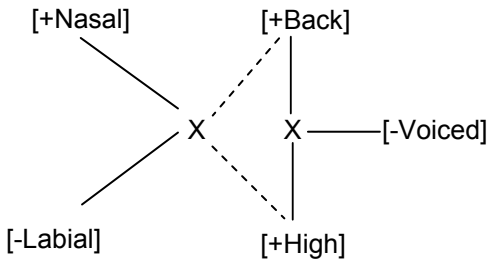
FIGURE1 Spectrogram for [səŋət̪]

TABLE 4 .4 .1 Acoustic Parameters for [səŋət]

	F1	F2	I1	I2	B1	B2
Nasal	416 .9 Hz	1581 .2 Hz	-42 .5 dB	-42 .5 dB	258	301
Non-Nasal	469 Hz	1609 .9 Hz	-33 .1 dB	-37 .5 dB	359	316

4.5 Rule5

Another assimilation rule in Urdu is that whenever a vowel comes before a Dental Nasal Stop /n/ that is following the Voiceless Velar Stop /k/ or /k^{h}/ then the [+Nasal] property of /n/ assimilates to the previous vowel and /n/ gets deleted . The Geometrical Phonology formulation of this rule is given as follows .



The data for this rule is given in Table A.5 .

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Appendix A Data points for Assimilation Rules

TABLE A.1 Data points for the verification of Rule1

No	Phonemic Transcription	Phonetic Transcription	Meaning
1	ʈʰonpnɑ	ʈʰompnɑ	Daub, Plaster, Impute
2	bʰanpnɑ	bʰɑmpnɑ	Guess, Make out, Surmise, Divine
3	gʰonpɑ	gʰompɑ	Plug in, Pierce with
4	konpəl	kompəl	Sprouting leaf
5	tʃʰinpənɑ	tʃʰimpənɑ	Feel Abashed, Be ashamed
6	sɑnp	sɑmp	Snake
7	sonpnɑ	sompnɑ	Entrust, Delivered
8	kɑnpnɑ	kɑmpnɑ	Tremble, Shiver
9	dʒʰonpɽɑ	dʒʰompɽɑ	Hut, Cottage
10	mʊnbɑ	mʊmbɑ	Fountainhead, Source, Origin
11	dʒʊnbiʃ	dʒʊmbiʃ	Movement, Motion, Gesture
12	bʰənbiri	bʰəmbiri	Humming insect constantly dancing on water
13	ʈənbih	ʈəmbih	Warning, Reproof, Admonition, Reprimand
14	ənbɑr	əmbɑr	Heap, Collection, Lot of
15	ɪnbisaʈ	ɪmbisaʈ	Cheerfulness, Merriment
16	ənbiɑ	əmbiɑ	Prophets
17	ɪsʈɪnbaʈ	ɪsʈɪmbaʈ	Deduction, Conclusion
18	dʒʊnbiʃ	dʒʊmbiʃ	Movement, Motion, Gesture
19	ʃənbɑh	ʃəmbɑh	Saturday
20	gʊnbəɖ	gʊmbəɖ	Dome
21	tʃənbeli	tʃəmbeli	Jasmine, Jessamine
22	mɪnbər	mɪmbər	Pulpit
23	dʒənbɑn	dʒəmbɑn	Shaking, Vibrating
24	dʒənbɑh	dʒəmbɑh	Rare (side), Part
25	ɖʊnbɑh	ɖʊmbɑh	Fat tailed ram
26	zənbil	zəmbil	Bag, Haversack
27	zənbur	zəmbur	Wasp, Hornet, Pincers
28	ʈənbur	ʈəmbur	Tambourine, Six strings guitar, Lutes
29	sənbʰalnɑ	səmbʰalnɑ	Support, Hold up, Control, Keep Safe
30	bʰənbʰoɽnɑ	bʰəmbʰoɽnɑ	Gnaw, Devour of gnawing, Mangle
31	bʰinbʰinɑnɑ	bʰinbʰinɑnɑ	Buzz, Hum

TABLE A.2 Data points for the verification of Rule2

No	Phonemic Transcription	Phonetic Transcription	Meaning
1	tangna	tãŋna	Hang up, Implicate
2	mung	mũŋ	King of vetchling
3	d̪ongɾa	d̪õŋɾa	Heavy short-lived shower
4	bengən	bẽŋən	Brinjal
5	ding	ɗiŋ	Boasting, Pride, Vaunting
6	dʰəng	dʰəŋ	Manner
7	səngət̪	səŋət̪	Accompanists
8	əngara	əŋara	Live Coal
9	əngrəkʰa	əŋrəkʰa	Narrow-Sleeved coat with double folds
10	əngɾai	əŋɾai	Yawn, Oscitation
11	ungli	uŋli	Finger
12	əguʈʰa	əŋuʈʰa	Thumb
13	səngt̪ra	səŋt̪ra	Orange
14	səngt̪i	səŋt̪i	Rare
15	səngərna	səŋərna	Be Aborned
16	səngəm	səŋəm	Confluence, Meeting, Union
17	səngvana	səŋvana	Get (things) properly arranged, Get sorted, Take possession of
18	səngin	səŋin	Critical
19	svang	svãŋ	Make false
20	ʃilənga	ʃiləŋa	Tack, Stick on
21	ʃəng	ʃəŋ	Amorously playful
22	ʃəngərf	ʃəŋərf	Cinnabar, Vermilion
23	pənguɾa	pəŋuɾa	Cradle
24	ʈʰingna	ʈʱĩŋna	Dwarfish, Dwarf, Midget
25	t̪əng	t̪əŋ	Narrow, Tight, Strait, Too small, Scanty, Contracted
26	ʈʰungna	ʈʰuŋna	Eat (something) grain by grain
27	dʒəngla	dʒəŋla	Railing, Fence, Enclosure
28	ʈʰunga	ʈʰuŋa	Beak Stroke
29	dʒəng	dʒəŋ	War, Battle, Fight, Conflict
30	dʒʰinga	dʒʱĩŋa	Prawn, Shrimp
31	tʃəngul	tʃəŋul	Claw, Talon, Grip, Grasp
32	tʃɪngari	tʃɪŋari	Spark
33	tʃənger	tʃəŋer	Straw tray (or basket) for bread
34	tʃʰunglia	tʃʰuŋlia	The little finger

35	ɖ̤irəng	ɖ̤irəŋ	Delay, Hesitation
36	ʈ̤ərəng	ʈ̤ərəŋ	Caprice, Whim, Fancy, Inebriation, Whiz, Tinkle
37	ɖ̤əngəl	ɖ̤əŋəl	Arena, Amphitheater
38	ɖonga	ɖõŋa	Dish, Mug, Small boat canoe
39	rəng	rəŋ	Color, Pigment, Paint, Dye
40	rongʈa	rõŋʈa	Small hair of body
41	ringna	rĩŋna	Creep, Crawl
42	zəng	zəŋ	Rust
43	zəngula	zəŋula	Small bell
44	sarəngi	sarəŋi	Kind of fiddle or violin
45	fərəng	fərəŋ	The west, Western Countries
46	kəngal	kəŋal	Bankrupt, Poor, Penniless,
47	kangʈi	kãŋʈi	Portable, Kashmir stove, Wicker-work covered chafing bowl
48	kəngən	kəŋən	Bangle, Thick bracelet
49	xing	xĩŋ	White steed, Silver steed
50	gunga	gũŋa	Dumb, Mute
51	gʰungru	gʰuŋru	Small bell protected on all sides, Tinkling ankle (band containing these bells)
52	ləngər	ləŋər	Pendulum, Thick rope
53	ləngʈa	ləŋʈa	Lame, Lumping person
54	ləngoʈ	ləŋoʈ	Loincloth
55	ləngur	ləŋur	Black-faced a species monkey with a very long tail
56	lungi	luŋi	Colored sheet meant to cover the lower part of body
57	long	loŋ	Clover, Nose pin
58	mələng	mələŋ	One of the category of mendicants, Unorthodox mendicants
59	məngeʈ̤ər	məŋeʈ̤ər	Fiancé, Fiancée
60	məngəl	məŋəl	Tuesday
61	nəng	nəŋ	Shame, Nakedness, Shamelessness
62	nəhəng	nəhəŋ	Crocodile, Alligator
63	həngama	həŋama	Uproar, Riot, Disturbance
64	gungunana	guŋgunana	Snuffle, Hum

TABLE A.3 Data points for the verification of Rule3

No	Phonemic Transcription	Phonetic Transcription	Meaning
1	dʒaŋgʰ	dʒãŋh	Thigh, loin
2	uŋgʰna	ũŋhna	Feel drowsy, Doze off
3	sɪŋgʰar	sɪŋhar	Make up
4	sɪŋgʰaɽa	sɪŋhaɽa	Water chestnut
5	sɪŋgʰ	sɪŋh	Lion
6	suŋgʰna	sũŋhna	Smell, Get the scent
7	siŋgʰ	sĩŋh	Horns
8	tʃɪŋgʰaɽna	tʃɪŋhaɽna	Trumpeting (of Elephant)
9	kəŋgʰa	kəŋha	Comb,
10	sɪŋgʰasən	sɪŋhasən	Cause to Smell
11	gʰəŋgʰor	gʰəŋgʰor	Dark
12	pəŋgʰəʈ	pəŋgʰəʈ	Quay for draw water, Community Well

TABLE A.4 Data points for the verification of Rule4

No	Phonemic Transcription	Phonetic Transcription	Meaning
1	taŋgna	tãŋna	Hang up, Implicate
2	muŋ	mũŋ	King of vetchling
3	ḍoŋgɽa	ḍõŋɽa	Heavy short-lived shower
4	beŋgən	bẽŋən	Brinjal
5	diŋ	dĩŋ	Boasting, Pride, Vaunting
6	svaŋ	svãŋ	Make false
7	ʈʰiŋgna	ʈʱĩŋna	Dwarfish, Dwarf, Midget
8	dʒʰiŋga	dʒʱĩŋa	Prawn, Shrimp
9	ɖoŋga	ɖõŋa	Dish, Mug, Small boat canoe
10	roŋgɽa	rõŋɽa	Small hair of body
11	riŋgna	rĩŋna	Creep, Crawl
12	xiŋ	xĩŋ	White steed, Silver steed
13	guŋga	gũŋa	Dumb, Mute
14	loŋ	lõŋ	Clover, Nose pin
15	dʒaŋgʰ	dʒãŋh	Thigh, loin
16	uŋgʰna	ũŋhna	Feel drowsy, Doze off
17	suŋgʰna	sũŋhna	Smell, Get the scent
18	siŋgʰ	sĩŋh	Horns
19	abyaŋa	abyãŋa	Charges for supply of irrigational water
20	dʒaŋa	dʒãŋa	Go, Pass, Set out, Depart,

			Disappeared, Be lost, Be stolen
21	azmana	azmãna	Test, Try, Prove, Experiment, Scrutinize
22	asan	asãn	Easy, Simple, Convenient
23	asʈin	asʈĩn	Sleeve, Cuff
24	asman	asmãn	Sky, Great Height
25	aʃyanah	aʃyãnah	Nest, Abode Residence
26	alan	alãn	Chain for elephant
27	anʈ	ãnʈ	Intestine, Gut, Entrails
28	antʃ	ãntʃ	Blaze, Flame, Fire, Heat warmth
29	antʃəl	ãntʃəl	Corner of Stole
30	anɖʰi	ãnɖʰi	Dust storm, Strong wind
31	ansu	ãnsu	Tear
32	angən	ãŋən	Courtyard, Yard
33	ahən	ahən	Iron
34	ahəng	ahəŋ	Sound, Music, Melody, Harmony, Purpose, Intention
35	aɪnɖa	aɪnɖa	Next, Future, Coming, Ensuing, Subsequent
36	dʰəng	dʰəŋ	Manner
37	səngəʈ	səŋəʈ	Accompanists
38	əngara	əŋara	Live Coal
39	ʊngli	ʊŋli	Finger
40	ʈʰʊngna	ʈʰʊŋna	Eat (something) grain by grain
41	tʃɪngari	tʃɪŋari	Spark
42	tʃʰʊnglia	tʃʰʊŋlia	The little finger
43	kəngən	kəŋən	Bangle, Thick bracelet
44	gʰʊngru	gʰʊŋru	Small bell protected on all sides, Tinkling ankle (band containing these bells)
45	ləngɽa	ləŋɽa	Lame, Lumping person
46	lʊngi	lʊŋi	Colored sheet meant to cover the lower part of body
47	sɪngʰar	sɪŋhar	Make up
48	sɪngʰaɽa	sɪŋhaɽa	Water chestnut
49	sɪngʰ	sɪŋh	Lion
50	tʃɪngʰaɽna	tʃɪŋhaɽna	Trumpeting (of Elephant)
51	kəngʰa	kəŋha	Comb
52	sɪngʰasən	sɪŋhasən	Cause to Smell

TABLE A.5 Data points for the verification of Rule5

No	Phonemic Transcription	Phonetic Transcription	Meaning
1	ɑnkəɽɑ	ɑ̃kəɽɑ	Hook, Barb, Crook
2	ɑnkɳɑ	ɑ̃kɳɑ	Appraise, Evaluate
3	ɑnkʰ	ɑ̃kʰ	Eye
4	dʒʰɑnkɳɑ	dʒʰɑ̃kɳɑ	Look out of window, Cast sly looks, Look Furtively
5	ɑnkənɑ	ɑ̃kənɑ	Appraise, Evaluate, Measure
6	pʰunkɳɑ	pʰũkɳɑ	Puff, Blow, Blast, Squander breathe
7	tʃunke	tʃũke	Because, Since
8	pʰænkɳɑ	pʰæ̃kɳɑ	Throw away, Spill
9	sænkɽõ	sæ̃kɽõ	Hundred
10	tʃʰinkɳɑ	tʃʰĩkɳɑ	Sneezing
11	bʰonkɑ	bʰõkɑ	Barking
12	sənkʰ	sə̃kʰ	One trillion
13	sənkɳɑ	sə̃kɳɑ	Begin to blow
14	dʒʰonkɳɑ	dʒʰõkɳɑ	Caste (in oven), Set fire to throw (dust), Waste over useless venture