

Phonological Process in Naxi Language

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1 Overview

Naxi language is a Sino-Tibetan language spoken by people living in Lijiang City Yulong Naxi Autonomous County in China. There are currently about 310,000 Naxi speakers, distributed across the border of Yunnan and Sichuan. About 100,000 of Naxi speaking people are monolingual speakers, and another 170,000 people speak Chinese, Tibetan or Bai language as a second language (Michaud, 2017). The endangered writing system of Naxi is called Dongba script, which is the only pictographic script still written and used by people today.

The phonetic features of Naxi are as follows: consonants are divided into unvoiced and voiced consonants, as well as nasal crown voiced stops and voiced fricatives; vowels are mainly monophonic, with fewer complex vowels; vowels are not divided into loose vowels or tight vowels. Naxi syllables are mostly composed of vowels and consonants, a few are composed of vowels alone, and each syllable has a fixed tone. For the sake of simplicity in the phonological process analysis, this paper omits the tones features in the Naxi language. Here is a consonants inventory for Naxi language [2]:

	Labial	Dental	Alveolar	Retroflex	Palatal	Velar	Glottal
Stop	p b		t d	ʈ ɖ	c ɟ	k g	ʔ
Nasal	m		n	ɳ	ɲ	ŋ	
Fricative	f v		s z	ʂ ʐ	ç ʝ	x ɣ	
Trill			r				
Approximant	w ɥ		l		j		
Affricate			ts dz	tʂ dʐ	tɕ dʑ		

There are 9 vowels in Naxi, with no distinction of tenseness. Here is a vowels chart with distinct feature notation [2]:

	i	y	e	a	ɑ	o	u	ɯ	ə
high	+	+	-	-	-	-	+	+	-
low	-	-	-	+	+	-	-	-	-
back	-	-	-	-	+	+	+	+	-
round	-	+	-	-	-	+	+	-	+

2 Phonological Processes

To illustrate phonological processes, the following data are collected from A Naxi-Chinese-English Dictionary [3]:

1.	/du/	[d̥u]	‘sit’	/tu/	[t̥u]	‘boil’
	/nu/	[n̥u]	‘few’	/nugu/	[n̥u.gu]	‘you (plural)’
	/ʔatu/	[ʔa.t̥u]	‘male duck’	/datu/	[da.t̥u]	‘nauseated’
	/kumu.u/	[k ^h u.mu.t̥u]	‘heel of the foot’	/bødu/	[bød̥u]	‘honored guest’
	/nuka/	[n̥u.ka]	‘even’	/ʔatuwu/	[ʔa.t̥u.wu]	‘self’
2.	/tsu/	[ts ^h z̥]	‘narrow’	/pejasu/	[pejasz̥]	‘white poplar tree’
	/dudzu/	[d̥u.dzz̥]	‘sit in meditation’	/ʔazuɸa/	[ʔa.zz̥.ɸa]	‘gecko’
3.	/tsatsa/	[ts ^h a.ts ^h a]	‘to stir’	/tsapa/	[ts ^h a.p ^h a]	‘serving platter’
	/tsu/	[ts ^h z̥]	‘narrow’	/ta/	[t ^h a]	‘to trace’
	/pa/	[p ^h a]	‘one’s reputation’	/ku/	[k ^h u]	‘there’
	/tse/	[tse]	‘injection’	/te/	[te]	‘to stare at’
	/kutsa/	[ku.ts ^h a]	‘factory’	/tsutsu/	[tsu.tsu]	‘to connect’

2.1 Apical Consonant Articulations

Data in 1 shows that when alveolar stops [t,d] or alveolar nasal [n] appears before high back vowels [u, u], the consonants realize as apical consonants or retro-flex [t̥,d̥,n̥]. For example, in [d̥u] ‘sit’, /d/ becomes [d̥]. Therefore, one hypothesis to account for apical consonant articulation process is writing a following the phonological rule with distinct feature notations:

Rule A: Apical Consonant

[+ anterior] → [-anterior,-continuant, + coronal,-strident] / _ [+ syllabic, + back, + high]

[+ anterior] → [+ anterior,-continuant, + coronal,-strident] / elsewhere

2.2 Apical Vowel Articulations

When unrounded high back vowel [u] appears after alveolar fricatives or affricates [s,z,ts,dz], the vowel becomes an apical vowel [z̥]. For example, data in 2 shows /dudzu/ becomes [dudzz̥], /pejasu/ becomes [pejasz̥]. The apical vowel [z̥] is a syllabic consonant with weak friction, adding a lowered diacritic under /z/ indicates that the tongue is relaxed enough to unblock the articulation [1]. To account for apical vowel articulation process, we can add another phonological rule:

Rule B: Apical Vowel ¹

[-round, + high, + back] → [z̥] / [+ consonantal,-sonorant, + coronal, + strident] _

[-round, + high, + back] → [-round, + high, + back] / elsewhere

¹There is no enough data to write accurate distinct features for [z̥].

2.3 Aspiration

Data in 3 shows the pattern of aspiration for plosive consonants [k,p,t,ts], which are aspirated before vowels [a,a,u], but not aspirated before [e,u]. By observing the distinct features for [a,a,u], it is noticeable that they are unrounded center or back vowels, so [e,u] belongs to elsewhere. Therefore, we can generate the third phonological rule to account for aspiration process:

Rule C: Aspiration

[-spread glottis] → [+spread glottis, -constricted glottis, +consonant,-sonorant,-voice] / _ [+syllabic,-front,-round]

[-spread glottis] → [-spread glottis, -constricted glottis, +consonant,-sonorant,-voice] / elsewhere

3 Rule Ordering

The data shows the simultaneous application of two or more rules that generated above. For example, /tsu/ → [ts^hz] ‘narrow’ applied both Rule B and Rule C. It is important to analyze if these two types of rules crucially ordered with respect to one another, and what type of rule ordering they instantiates. To illustrate it, we can first provide derivations for the two possible rule orderings for them:

UR	/tsu/	/ku/	/tu/	/dudzu/
Rule A	—	—	t̚u	ɖudzu
Rule B	tsz	—	—	—
Rule C	—	k ^h u	—	ɖudz̥z̥
SR	*[tsz]	[k ^h u]	[t̚u]	[ɖu.dz̥z̥]

UR	/tsu/	/ku/	/tu/	/dudzu/
Rule A	—	—	t̚u	ɖudzu
Rule C	ts ^h u	k ^h u	—	ɖudz̥z̥
Rule B	ts ^h z	—	—	—
SR	[tsz]	[k ^h u]	[t̚u]	[ɖu.dz̥z̥]

According to the derivations, we can observe when Rule B applies before applying Rule C, the SR of /tsu/ is *[tsz] since the output of Rule B removes the environment for it to input Rule C. Therefore, Rule B and Rule C are crucially ordered with respect to one another, and Rule C needs to apply before applying Rule B. In term of type of rule interaction, Rule B bleed Rule C since B removes potential inputs to Rule C.

4 Conclusion

After over-viewing phonetic features of Naxi language, by collecting data from Naxi-Chinese-English Dictionary [3], three phonological processes are identified. They are (Rule A) apical consonant articulation appears before high back vowels, (Rule B) unrounded high back vowel becomes apical vowel before alveolar consonants, and (Rule C) plosive consonants aspiration before unrounded center or back vowels.

Moreover, by analyzing rule ordering using derivations, we found Rule B and Rule C are crucially ordered with respect to one another. Rule C needs to apply before Rule B.

One can achieve UR to SR derivation in either rule ordering by modifying Rule C (by making it take output of Rule B as input). However, it will lose simplicity and be case-specified to account for a bigger framework of phonology analysis.

The strength of rule ordering is its simplicity, extensivity, and universality. However, the weakness is that given small amount of data collected from this paper, there might be counter-examples to prove the inaccuracy of this analysis.

References

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