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VOWEL TENSENESS AND ASSIMILATION IN YI: A FEATURE GEOMETRY STUDY

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Chen et al. (1985: 26-27) mention the Nuosu Yi[1] (hereafter Yi) vowel assimilation processes whereby lax vowels become tense: *ɪ* –> *ɪ̱*, *u* –> *u̱*, *i* –> *ɛ*, *o* –> *ɔ*, and *ɯ* –> *a*. They give several examples, listed in (1):

(1)	/ndzɪ̱^{33}/ 'wine'	–>	ndzɪ̱^{44}pe^{33}	'sweet wine'
	/ʑi^{33}/ 'house'	–>	ʑɛ^{44}tshu̱^{33}	'build a house'
	/o^{33}/ 'head'	–>	ɔ^{33}ȵɛ^{33}	'head hairs'
	/ɬɯ^{21}/ 'moon'	–>	ɬa^{21}pha^{33}	'half of a month'

Unfortunately, no detailed discussion is offered regarding how this vowel assimilation process actually works.

Since the introduction of Feature Geometry Theory (Clements 1985), phonologists have applied this theory to various phonological phenomena such as tone dissimilation and vowel assimilation in languages of the world (Clements 1991, Clements et al. 1995, Halle 1995, Halle et al. 2000, Kenstowicz 1994, among others). In this paper, I will address Yi vowel quality and voice quality, and by taking advantage of the insights provided by Feature Geometry, demonstrate that vowel tenseness is directly related to vowel assimilation in Yi, and that such assimilation is mainly the process of spreading the feature [+tense]. This paper shows that feature geometry theory elegantly characterizes the dynamic movement of vowel assimilation in Yi as in Figure 1:

[1] Yi has been traditionally recognized as being composed of 6 dialects: Northern, Southern, Eastern, Western, Southeastern, and Central Yi. Nuosu Yi belongs to the Northern dialect. This dialect is mostly spoken in Sichuan Province, China.

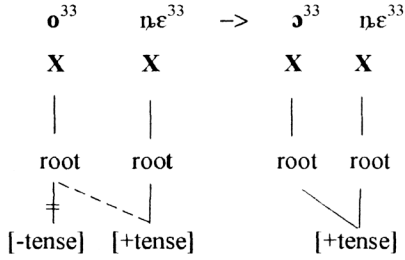

Figure 1. Representation of an instance of feature spreading in Yi vowel assimilation.

Such a solution is better than the representation in (1) because a geometric representation directly captures the dynamic process of vowel assimilation.

The organization of this paper is as follows: § 1 discusses Yi vowel quality and vowel tenseness; § 2 briefly reviews feature geometry theory; § 3 presents the Yi vowel feature specification, § 4 addresses Yi vowel assimilation, and § 5 draws conclusions.

1 YI VOWEL QUALITY AND VOWEL TENSENESS

Yi has 43 consonants, 10 vowels, and 4 tones, as shown in (2). All Yi syllables have a CV structure.

(2) Yi consonants, vowels, and tones (from Chen et al. 1985)

p	**ph**	**b**	**mb**	**m̥**	**m**	**f**	**v**		
t	**th**	**d**	**nd**	**n̥**	**n**	**ɬ**	**l**		
ts	**tsh**	**dz**	**ndz**			**s**	**z**		
tʂ	**tʂh**	**dʐ**	**ndʐ**			**ʂ**	**ʐ**		
tɕ	**tɕh**	**dʑ**	**ndʑ**		**ȵ**	**ɕ**	**ʑ**		
k	**kh**	**g**	**ŋg**		**ŋ**	**x**	**ɣ**	**h**	
i	**e**	**ɯ**	**a**	**o**	**ɔ**	**u**	**u̱**	**ɪ**	**ɪ̱**
˥	˧	˩	˥˧						
55	33	21	44						

1.1 Yi Vowel Quality

The 10 Yi vowels in (1) can be grouped into 5 pairs, with each pair having a tense-lax contrast, as in Table 1[2]:

Lax	i	ə	o	v	z
Tense	ɛ	a	ɔ	v̱	ẕ

Table 1. Yi vowel system (slightly modified from Chen et al. 1985: 10)

Generally speaking, the vowel tense-lax pairs *i~e, ə~a, o~ɔ,* and *v~v̱* can appear after any consonant; *z~ẕ,* which are traditionally called apical vowels, occur only after a coronal affricate or coronal fricative, or after a labial that phonetically bears the fricative *z*. The vowel /z/[3] has three variations: [z], [ʐ], and [ʑ], corresponding to dental, retroflex, and palatal consonants, respectively.

The Yi vowel tense-lax pairs show a symmetric space distribution with regard to vowel height and backness. Qiu (1998) conducted a WinCECIL study on Yi vowel formants. The mean formants are shown in Table 2:

	i	ɛ	z	ẕ	ə	a	v	v̱	o	ɔ
F1	309	536	335	591	380	829	370	524	368	566
F2-F1	1846	1391	915	446	1153	370	569	355	485	332

Table 2. The mean formant values of Yi vowels

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[2] Note that the Yi vowels ə, **v**, v̱, **z**, and ẕ in Table 1 are written as **ɯ**, **u**, u̱, **ɪ**, and ɪ̱, respectively, in Chen et al. 1982 in (1), above. Following traditional Tibeto-Burman linguistics in China, an underline is used here as the marker of a tensed vowel. Thus, all the vowels in the tense row in Table 1 should be marked with an underline. However, considering that these tense vowels also have different vowel qualities from their lax counterparts, it is better to leave them without a marker. On the other hand, the two tense vowels v̱ and ẕ are underlined in Table 1 because they have the same vowel quality as their respective lax counterparts, **v** and **z**. See the detailed discussion about these special vowels in § 1.2.

[3] Note that "**z**" and "**v**" are used as both consonantal and vocalic symbols in the orthography: as consonants when they occur before a vowel, but as vowels when they occur alone in a syllable or after a consonant. [Ed.]

Usually the frequency of the first formant (F1) corresponds to the height of the tongue, whereas the difference between the second and the first formant (F2-F1) reflects the degree of backness (Ladefoged 1993). Figure 2 reflects Yi vowel height and backness based on the vowel formants given in Table 2:

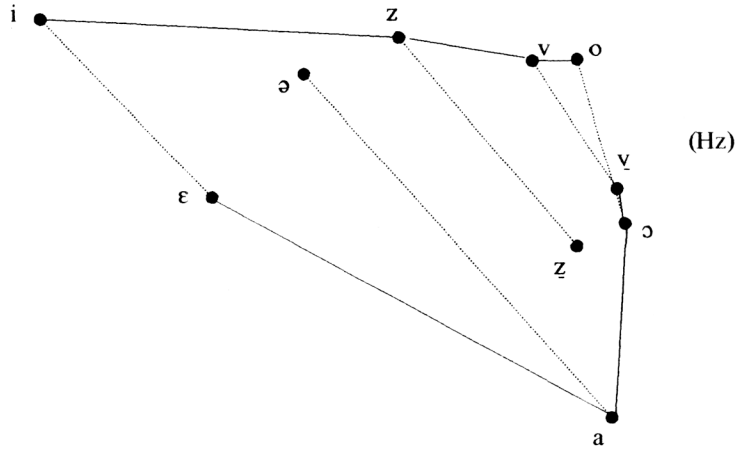

Figure 2. The distribution of Yi vowel space in terms of vowel formants of a native speaker. Tense-lax pairs are connected with dotted lines.

(Note that compared with the lax vowel **ɯ** in Chen et al. 1985, the vowel **ə** in Figure 2 is positioned far away from its originally assumed location. Dantsuji (1982) has a result close to Qiu (1998) in regard to this vowel.) However, Qiu 1998 did not thoroughly research Yi vowel formants. He only measured vowels after /p/, /ph/, /b/, and /s/. His formant measurements based on the Yi vowels appearing after these consonants are not sufficient for determining an exact Yi vowel space chart like the one given in Figure 2. Combining a native speaker's intuition with Qiu 1998 and Dantsuji 1982, I propose Figure 3 as the representation for Yi vowel space relative to tongue position: