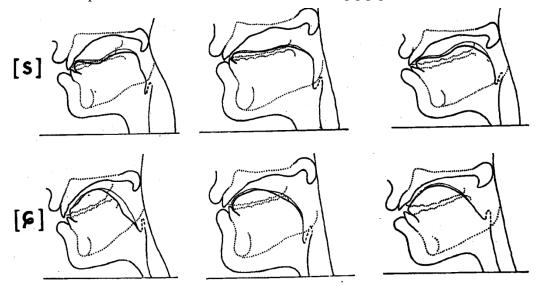# World of Knowledge

Articulatory Adjustment: the Case of Palatalization

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For many students in Taiwan who study English as a foreign language, the different pronunciations between the English letter 'C' and the Chinese word 西 'west' may become obvious at a certain stage. The pronunciations of 'C' and the Chinese word 'west' differ in terms of the position of the front part of the tongue; the apparently minor differences in fact signals the different phonological systems of the two languages. The study of cross-linguistic similarities and differences with respect to whether a certain phonological process applies in a language is an important subject matter in the area of synchronic phonology. In the case of 'C' and Chinese 'west', the latter exhibits the so-called palatalization process while the former does not. This article will address the articulatory adjustment found in the concatenation of speech sounds and discuss its motivations, focusing particularly on palatalization.

The pronunciations of 'C' and Chinese 西 'west' are transcribed, respectively, as [si] and [ɕi] in International Phonetic Alphabet. The two sequences of sounds are the same in terms of the vowel part, but they are different in terms of the initial consonants [s]/[ɕ]. Friction is caused by raising the tongue tip toward the alveolar ridge in the pronunciation of the beginning [s] sound in 'C', but the production of [ɕ] in Chinese 'west' involves the surface area between tongue tip and tongue body, placed under hard palate. The six diagrams below show the midsagittal view of tongue positions in the production of the two sounds by three speakers in X-ray studies (tongue surfaces indicated by the darker lines in the oral cavities). It can been seen that the places of articulation of the two sounds [s]/[ɕ] are different:

(Source: Ladefoged and Wu (1984:269))

The place of articulation of [ɕ] is alveolo-palatal, and it is considered, by some scholars, a variant of /s/ before the vowel /i/ in the phonology of Taiwan Mandarin. This process is called palatalization because the change from alveolar /s/ to [ɕ] is triggered by the /i/ sound produced under hard palate. Although there is no palatalization in English 'C' and 'see,' palatalization can be observed in affixed words such as *face/fac-ial, finance/financ-ial,* and *province/provinc-ial*, or optionally in phrases such as *miss you* in connected speech. The case of English illustrates that the application of the palatalization rule depends upon whether the involved segments are within morphemes, in affixed words, or across word boundaries.

Palatalization in Taiwan Mandarin can also be directly observed in loanword borrowing. When a word is borrowed into a language, transliteration often needs to obey the phonotactic constraints of the recipient language. For example, Mandarin does not allow [si] sequences of sounds, so *Mississippi River* is translated as '密西西比河' and Tennessee as '田納西,' in which English [si] is turned into Chinese '西' [ɕi] (ㄒㄧ). Mandarin does not permit velar /k/ before [i] either, so palatalization is similarly observed in the translation of *Kentucky* as '肯德基,' in which the '基' [tɕi] (ㄐㄧ) corresponds to English [ki] sequence. The patterns in loanword pronunciations suggest that palatalization is an active process in the phonology of Mandarin, which plays a crucial role in determining the actual pronunciation of borrowed words.

Palatalization is commonly found in the world's languages. In some languages, palatalization affects not only the above-mentioned sounds [s] and [k], but also other alveolars such as [z, t, d, ts], velar [g], and even bilabial consonants [p, b]. Cross-linguistic studies show that alveolars are more likely to undergo palatalization than velars and bilabials, and that bilabials are least likely to be affected (Kochetov 2010). Palatalization is often triggered by palatal sounds [i, j], which cause shift in the places of articulation of neighboring consonants.

In Formosan languages (the Austronesian languages spoken by indigenous people of Taiwan), palatalization is often observed in cases involving alveolars, which is consistent with the cross-linguistic tendencies described in the literature. Different dialects of a language may differ with respect to whether an alveolar consonant is palatalized. For example, /si/ undergoes palatalization in all dialects of Atayal and becomes [ɕi], but /ti/ exhibits variations among dialects. The following table shows the patterns of /ti/ palatalization in several Atayal villages. Notice that in dialects where /ti/ is palatalized to [tɕi], the letter *c* is conventionally used to represent the palatalized [tɕi] sound:

	Locations of Villages	'some'	Palatalization of /ti/
1.	Hsinle (Jianshi, Hsinchu)	cikay [tɕikaj]	Yes
2.	Taoshan (Wufeng, Hsinchu)	cikay [tɕikaj]	Yes
3.	Zhulin (Wufeng, Hsinchu)	cikay [tɕikaj]	Yes
4.	Siji (Datung, Yilan)	cikay [tɕikaj]	Yes
5.	Qing'an (Tai'an, Miaoli)	tikay [tikaj]	No
6.	Daxing (Tai'an, Miaoli)	tikay [tikaj]	No
7.	Zhongxing (Tai'an, Miaoli)	tikay [tikaj]	No
8.	Jinshui (Tai'an, Miaoli), Mayrinax	tikay [tikaj]	No

The Atayal language is broadly classified into two dialect groups, Squliq and C'uli' (Li 1980, 1981).   In the above table, the first two belong to Squliq while the remaining six are C'uli' dialects.   The survey shows that palatalization in Squliq affects /ti/ as well as /si/, while in C'uli' dialects /ti/ palatalization is diverse although /si/ uniformly undergoes palatalization.   In Squliq adjacent sounds seem to be more likely to affect each other than in the more conservative C'uli' dialects.

In Bunun, palatalization similarly leads to dialectal differences.   For example, the word 'mother' is *cina* [tɕina] in Isbukun Bunun, but it is pronounced as *tina* [tina] in Takituduh, Takibakha, Takbanuaz, and Takivatan dialects of Bunun.   The palatalization of /ti/ to [tɕi] can be identified by comparing related forms of words in the Isbukun dialect itself.   For example, the word 'to say' in Isbukun is *tupa* [tupa], and palatalization can be seen in the initial /t/ consonant when the vowel /i/ of the infix *<in>* ('realis marker') appears after the /t/ sound, as in *cinupin* /t<in>upa, in/ [tɕinupin].   In many other Formosan languages /ti/ also palatalizes as [tɕi]; Mandarin is quite different in this respect, which /ti/ palatalization does not occur.

The motivation of palatalization is in general considered to be articulatorily motivated.   When speakers are producing the preceding consonant, he or she anticipates the following palatal vowel, so the consonant assimilates to the place of articulation of the vowel.   The result is the change of consonantal place of articulation to palatal region, with the tongue tip down and the constriction area behind the tongue tip rather than using the tongue tip itself.

Although palatalization is naturally motivated by articulation, sometimes the gestural adjustment may be 'blocked' by other more important considerations.   In the Squliq variety spoken in Hsinle Village, Jianshi Township, Hsinchu County, for example, although /ti/ is palatalized to [tɕi] as in *cimu* [tɕimuʔ] 'salt' and *tmucing* [təmutɕiŋ] 'to beat' (corresponding to Mayrinax Atayal *timu* [timuʔ] 'salt' and *tumuting* [tumutiŋ] 'to beat', respectively), the word 'to work' is pronounced as [mətijaw] or [mətəjaw] (or [mətəzjuwaw], and so on), but never [mətɕijaw].   Why does the form [mətijaw] permit the sequence of [ti] exceptionally?   It is proposed

here that the following distinction plays a crucial role in the observed data: the /t/ sound in 'salt' and 'to beat' precedes a real (underlying) /i/ sound, but /t/ in 'to work' precedes an [i] vowel that has come from other vowels (there is a rule changing /ə/ to [i] before [j]).   This example illustrates that many factors, in addition to articulatory adjustment, may influence the surface pronunciation of a language.   It is amazing that phonological rules interact in a principled manner yet speakers might not be consciously aware of their existence.

References

Kochetov, Alexi. 2011. Palatalization. *The Blackwell Companion to Phonology*, ed. by Marc van Oostendorp, Colin J. Ewen, Elizabeth Hume, and Keren Rice, Volume III, *Phonological Processes*, 1666-1690. Malden, Mass.: Wiley-Blackwell.

Ladefoged, Peter and Zhongji Wu. 1984. Places of articulation: an investigation of Pekingese fricatives and affricates. *Journal of Phonetics* 12:267-278.

Li, Paul Jen-kuei. 1980. The phonological rules of Atayal dialects. *Bulletin of the Institute of History and Philology* 51.2:349-405. Taipei: Academia Sinica.

Li, Paul Jen-kuei. 1981. Reconstruction of Proto-Atayalic phonology. *Bulletin of the Institute of History and Philology* 52.2:235-301. Taipei: Academia Sinica.