Consonant place asymmetries of CG combinations in the Dispersion Theory
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Languages exhibit co-occurrence restrictions on syllable onsets, including consonant plus glide combinations (henceforth CG), i.e. CG clusters or secondary-articulated consonants. One asymmetry in the CG distribution is that velar consonants combine with /w/ more often than labials or coronals do: In UPSID (Maddieson and Precoda 1992), 1.33% of the languages have the labialization contrast on labials, 2.66% on coronals, and 15.96% on velars. The combinations of C + /j/ also exhibit asymmetric distribution regarding the consonant places: Takatori (1997) and Kochetov (2002) report that presence of the contrastive palatalization on labial consonants implies that on coronals in Slavic and Celtic languages.

Consonant place asymmetries are also observed in the status of CGs. They behave as secondarily-articulated (labialized or palatalized) consonants in some consonant place, whereas they are consonant clusters in other places: Dan, Tarascan and Fox have the labialization contrast in velars, but other CGs are considered as consonant clusters (Bearth and Zemp 1967, Friedrich 1975, Dahlstrom 1995); Similarly, Ukrainian, Czech and Manx have labial + j clusters (but no palatalized labial), while the palatalization contrast exists in coronal place, though the realization of the palatalized version of coronal stop varies between [tʲ], [c] and [tʃ] (Kochetov 2002: 23). Notice that it is universally favored CGs—k+w and t+j—that surface as secondarily-articulated consonants in these languages.

I propose a Dispersion-Theoretic analysis of the place asymmetries in the distribution of CGs described above. According to the Dispersion Theory of Contrast (Flemming 2002), phoneme inventories and phonotactic restrictions emerge from the Optimality-Theoretic interaction between constraints that represent conflicting functional goals, i.e. *contrast distinctiveness maximization, contrast number maximization,* and *articulatory effort minimization*. In this approach, k+w and t+j are favored in terms of the *contrast distinctiveness,* because the perceptual salience of the glide component is greater in them than in other CGs. The acoustic and perceptual cues for the glide component in CGs reside in formant transition and consonant release noise quality: Glide /w/, or lip rounding and protrusion, increases the size of front cavity, resulting in low F2, whereas the tongue position of /j/ conditions high F2 just like high front vowels; Lip protrusion or tongue blade retraction of the glide articulation may also affect the properties of the stop release burst or frication noise. The salience of the glide component, and consequently that of the perceptual distinctiveness of CG from the plain C counterpart is greater for k+w and t+j than other Cw and Cj combinations, mainly because of their burst noise properties. Velar stop release burst is greatly affected by the tongue position and lip rounding of the following vocoid (Bonneau 2000), unlike coronal or labial stop bursts, providing sufficient cue for the presence of the /w/ component; Coronal stop is naturally accompanied by affrication if it is followed by a palatal release, due to the difficulty in moving back the tongue blade quickly (Ladefoged 1971). This contrasts with labial stop burst, which is not affected by tongue movement.

The relationship between the salience of the C-CG contrasts and universally preferred CGs is expressed by the universal ranking between constraints against each contrast, projected from the perceptual distance scales (1-3): The smaller the perceptual distance between two items is, the higher the constraint against having them in contrast is ranked. In languages with only the k-kʷ contrast, CONTRAST>t/tʷ is ranked above *MERGE (Padgett 2002) (4), a constraint that favors maintaining contrasts (*contrast number maximization*). Likewise, languages with the palatalization contrast only in coronals have the ranking shown in (5).

A remaining question is why the status of CGs varies between consonant places within a language (e.g. Dan or Ukrainian). *Contrast distinctiveness maximization* prefers clusters to secondary articulation, since Δ(C-CG) is greater than Δ(C-C^G) in the formant transition, in both durational and spectral aspects (Kochetov and Goldstein 2006, Ladefoged and Maddieson 1996: 364). The greater formant transition cues for the glide component in tw and pj clusters may compensate for their smaller consonant release cue, and render the salience of the contrasts t-tw and p-pj comparable to that of k-kʷ and t-tʲ, respectively (6). However, the C-CG contrast is less optimal than the C-C^G contrast in terms of *articulatory effort minimization*, since it requires more extensive articulator movement to realize the glide component as a separate segment than as secondary articulation. Thus, the patterns found in Dan and Tarascan (7) and in Ukrainian (8) arise from the ranking in which the articulatory effort minimization constraint (*CG) is dominated by *MERGE.

(1) CONTRAST>A/B (Ito and Mester 2003)

The contrast between two items contrasting only in A vs. B is insufficient.

(2) $\Delta(k\text{-}k^w) > \Delta(t\text{-}t^w)$ → CONTRAST>t/t^w >> CONTRAST>k/k^w

(3) $\Delta(t\text{-}t^j) > \Delta(p\text{-}p^j)$ → CONTRAST>p/p^j >> CONTRAST>t/t^j

(4)

t tW k kW	CONTRAST>t/t^w	*MERGE	CONTRAST>k/k^w
t t^w k k^w	*!		*
☞ t k k^w		*	*

(5)

p pJ t tJ	CONTRAST>p/p^j	*MERGE	CONTRAST>t/t^j
p p^j t t^j	*!		*
☞ p t t^j		*	*

(6) $\Delta(k\text{-}k^w)$, $\Delta(t\text{-}tw) > \Delta(t\text{-}t^w)$ $\Delta(t\text{-}t^j)$, $\Delta(p\text{-}pj) > \Delta(p\text{-}p^j)$

(7) Dan and Tarascan

t tW k kW	CONTRAST>t/t^w	*MERGE	*CG	CONTRAST>k/k^w	CONTRAST>t/tw
t t^w k k^w	*!			*	
☞ t tw k k^w			*	*	*
t k k^w		*!		*	
t tw k kw			**!		*

(8) Ukrainian

p pJ t tJ	CONTRAST>p/p^j	*MERGE	*CG	CONTRAST>t/t^j	CONTRAST>p/pj
p p^j t t^j	*!			*	
☞ p pj t t^j			*	*	*
p t t^j		*!		*	
p pj t tj			**!		*

Selected references

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