Gradual phonotactics

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Syllable structure is managed not only by sonority, but also by the place of adjacent consonants. It is odd that place sharing is usually, but not always advantageous: while homorganic nasal/liquid+plosive clusters are preferred, heterorganic plosive+plosive clusters may occur without homorganic ones (ie geminates). Besides addressing this asymmetry, we show that phonotactics is more fine grained than what could be captured by a categorical device like syllable structure.

The distribution of consonants is freer before a vowel than before a consonant or word finally. Hooper (1976) and Murray & Vennemann (1983) have examined preferences for CCs occurring where syllables meet. Constraints on preconsonantal Cs have been identified by Itô (1986), Goldsmith (1990), etc. Much work has been done on explaining these preferences in Government Phonology (Kaye & al. 1990, Harris 1990, Charette 1992, Harris 1997, etc), as well as from the viewpoint of perception by, eg, Steriade (1999). (1) shows monomorphemic, intervocalic plosive-final cluster types and their accessibility in languages. CC types can be arranged in an implicational hierarchy, but the accessibility of geminates is independent of the other types (TT = geminate, NT = homorganic nasal + plosive, RT = liquid + plosive, ST = fricative + plosive, PT = heterorganic plosive + plosive, MT = heterorganic nasal + plosive). The generalizations extend to other intervocalic and word-final clusters, (1). There may be great differences between CCs: TT and NT are homorganic, PT and MT are heterorganic, RT and ST may be either. The markedness of CCs depends on homorganicity and the coronals involved (eg, **rt, lt, st** are less marked than **rp, lp, sk**, respectively) and other clusters also often differ in markedness (eg, **pt, mt** are less marked than **tp, np**). Even if a language can access a given cluster type, it may not be able to access all clusters of that type, because of the markedness differences above. In (2), we have counted the ratio of available monomorphemic clusters of all possible clusters in each type in Hungarian (1 = all, 0 = no CCs of the type are well-formed, incomplete types are shaded). The further right a cluster type is in the chart, the smaller the accessibility of the clusters belonging to that type. The greater phonotactic freedom of intervocalic vs word-final clusters, and of nouns vs verbs is also visible.

Our analysis does not presuppose abstract entities (like "syllable" or "coda") or even skeletal positions, consonantal sequence types are described directly. The data in the charts can be interpreted as a complexity hierarchy of the phonological constructions accessible in the given language. Complexity is measured in the amount of independent information in the coda: eg, none in TT (the two Cs are identical), only nasality in NT. Hence the hierarchy does not faithfully follow the sonority hierarchy. Other CC types contain more and more additional information, further place and manner features. Thus homorganic clusters are always less complex than heteroganic clusters within a type. A CC is well-formed in a language if its complexity is between the minimally and the maximally complex constructions. The CC construction of minimal complexity is TT in languages with geminates, NT in others without. "Lower level" (segmental) constructions not available in the language may impose further constraints: Eastern Ojibwe, for example, lacks liquids, hence the RT construction is unavailable, although ST is available and should imply RT. Inclomplete CC types — which lack some of the potential clusters — exhibit subregularities based on homorganicity and coronality. These subregularities may be expressed by similar complexity hierarchies.

Segmental complexity forms a hierarchy very similar to cluster complexity: the availability of a phonemic glottal stop, **h**, or **ə** (segments of minimal complexity) is independent of the availability of other, more complex segments (cf geminates and other CCs). In fact, in the case of some complex segments there is no difference between the two hierarchies: the prenasalised stop $^{\mathbf{n}}$**d** cannot contrast with the **nd** cluster. Likewise falling diphthongs and glide+C clusters (**a**$^{\mathbf{w}}$**t** vs. **awt**) need not be treated separately.

(1)

	TT	NT	RT	ST	PT	MT	example (intervocalically)
0							Hawaii (Maddieson 2013)
1		↔					Manam (Piggott 1999)
1+	←	→					Japanese (Prince 1984), Pali (Zec 1998)
2		←	→				Diola Fogny (Piggott 1999)
2+	←		→				Sidamo (Gouskova 2004)
3		←		→			Basque (Egurtzegi 2013)
3+	←			→			Italian (Krämer 2009)
4		←			→		Spanish (Hualde 2014)
4+	←				→		Hungarian (Siptár & Törkenczy 2000)
5		←				→	Kashmiri (Wali & Koul 1997)
5+	←					→	Hindi (Kachru 2006)

(2)

	TT 6	**NT** 6	**RT** 12	**ST** 24	**PT** 30	**MT** 15	**types** number of all potential CCs in Hungarian		
V_V	1	1	1	.50	.40	0	nouns	voiceless	well-formedness ratios
V_#	1	1	.92	.21	.13	0			
	.17	.17	.17	.08	0	0	verbs		
V_V	1	1	.75	.29	.07	0	nouns	voiced	
V_#	1	.67	.50	.08	.03	0			
	.50	.33	.17	.04	0	0	verbs		

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