

Complexities and diversities in phonological typology

The question of ‘complexity’ in terms of phonological systems has been equated with ‘diversity’, and has been assumed to be represented by counts of total numbers of segments (eg., Atkinson 2011). This talks discusses the measures and distribution of ‘complexity’ in plosive systems.

I argue that using crude totals, such as ‘Total number of vowel qualities’ or ‘Total number of consonants’ (following chapters in Dryer and Haspelmath 2011) is not a useful measure of ‘complexity’, since it conceals so much significant variation (see, eg., Ross and Donohue 2011). Unless it can be shown that ‘Total’ measures correlate strongly with the kinds of variation that can be found at more local levels of the phonology (eg., presence of front rounded vowels; number of contrastive vowel heights; etc.), these measures are not meaningful.

Further, equating the notion of ‘complexity’ with the *size* of a phonological system misses other valid measures of complexity. Illustrating the point with a survey of plosive systems in a large database (Donohue, Hetherington and McElvenny 2012), I will argue for three additional measures of complexity: (1) *dimensionality*, (2) *transparency* and (3) *rarity*. Dimensionality refers to the number of phonological dimensions required to characterise a system; transparency refers to how transparently the attested plosives in a language can be predicted by knowledge of the dimensions and their values; and rarity examines the frequency of the different types of oppositions encountered (globally or locally). These are not wholly independent variables, but neither do they reveal the same. In (1) we can see the three different systems compared have the same number of dimensions, while a. (Vaeakau-Taumako) has more contrastive phonemes. System a. is more transparent than c. (Lokono), and while b. (Amblong) contains the smallest set of phonemes, it consists of more rare phonological oppositions (voicing is three times more common than prenasalisation, and an alveolar affricate series is a third as common as an alveolar stop series).

(1)

a.

p ^h	t ^h	k ^h
p	t	k
b	d	g

b.

p	t	ts	k
mb	nd		

c.

	t ^h	k ^h
p	t	k
b	d	

Total

9

6

7

Dimensions

3 + 3 = 6

4 + 2 = 6

3 + 3 = 6

Transparency

9/9 = 1.0

6/8 = 0.75

7/9 = 0.77

Rarity

0.89 x 0.13 = 0.11

0.22 x 0.18 = 0.04

0.89 x 0.13 = 0.11

(Frequencies: ; Bilabial: 0.99; Alveolar: 0.91; Alveolar affricate: 0.26; Velar: 0.98; Voiceless: 0.995; Voiced: 0.66; Aspirated: 0.20; Prenasalised: 0.18)

Clearly no single metric captures ‘overall complexity’. I offer some exploratory discussion on ‘true’ diversity metrics.

References:

Atkinson, Quentin. 2011. Phonemic Diversity Supports a Serial Founder Effect Model of Language Expansion from Africa. *Science* 332: 346-349.

Donohue, Mark, Rebecca Hetherington, and James McElvenny. 2012. Department of Linguistics, The Australian National University. <http://phonotactics.anu.edu.au>.

Dryer, Matthew S. & Haspelmath, Martin (eds.). 2011. *The World Atlas of Language Structures Online*. Munich: Max Planck Digital Library. Available online at <http://wals.info/>.

Ross, Bill, and Mark Donohue. 2011. The many origins of Diversity and Complexity in phonology. *Linguistic Typology* 15: 251-265.