"Markedness" is an epiphenomenon of phonetically grounded sound change

Ollie Sayeed (Penn) and Andrea Ceolin (Penn)

Introduction. Theoretical phonology has found it useful to describe some segments as more 'marked' than others, referring to a cluster of language-internal and -external properties (Jakobson 1941, Haspelmath 2006): i) Marked segments have low frequency within a language; ii) Marked segments have low frequency across languages; iii) Marked segments have a more restricted distribution within a language. Starting with Trubetzkoy (1939), there has been a tradition of encoding "markedness" in the grammar, from the universal markedness rules of SPE to the markedness constraints of OT and its descendants. A recently popular alternative philosophy, Evolutionary Phonology (EP, Blevins 2004), has argued that the concept of representational markedness is unnecessary (Blevins 2004, Hale and Reiss 2008, Samuels 2017). We argue, using a simple mathematical model based on EP, that markedness is an epiphenomenon of random, phonetically grounded sound change.

Model: random splits and mergers. We propose an abstract model of sound change as a discrete-time stochastic process of random splitting and merging of phonemic categories. Following EP, 'marked' segments are those that have a low probability of being created by sound change and/or a high probability of being lost through sound change. We define 'mergerwise marked' segments as segments with a high probability of being lost by a merger. We simulate a model that randomly applies a split or a merger to an artificial phoneme inventory at each time step, with a diachronic bias against mergerwise marked segments. Since phoneme type and token frequencies in natural languages (Martin 2007) follow a Yule-Simon distribution (Simon 1955, Tambovtsev and Martindale 2007), we want our model to also derive this fact from a stochastic process.

Predictions: within-language and across-language frequency. We ran a simulation of the split-merger process for 100 iterations with 20 segments labelled /a/-/z/. At each iteration, two phonemes are selected at random. Mergers are biased towards /a/ (which never disappears after being selected for merger) and against /b/ (which always disappears after being selected for merger). Both phonemes are unbiased with respect to splits. Fig. 1 shows a typical run, where /a/ has become high frequency and /b/ has fallen out of the language. Fig. 2 shows the average frequencies of /a/ and /b/ across 1000 parallel runs given equal starting frequencies of 0.05; /a/ has median frequency of 0.1, while /b/ disappears in most runs.

Conclusion. Both the power-law frequency distribution of phonemes in a language and the cluster of properties associated with 'markedness' can be thought of as epiphenomena of phonetically grounded sound change. A random split-and-merger model predicts the attested language-internal and typological correlations.

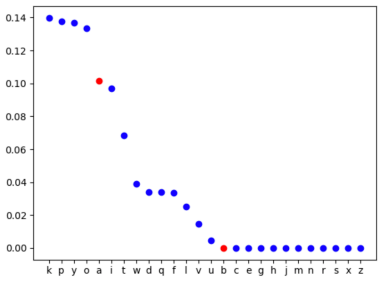

Fig. 1

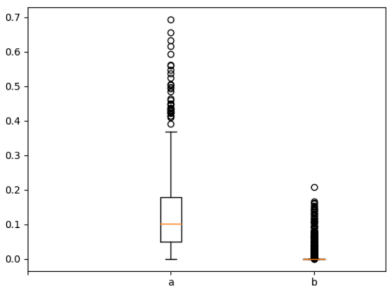

Fig. 2

References. Blevins, J. (2004). Evolutionary phonology: The emergence of sound patterns. **Jakobson, R.** (1941). Child language, aphasia and phonological universals. **Hale, M., & Reiss, C.** (2008). The phonological enterprise. **Haspelmath, M.** (2006). Against markedness (and what to replace it with). **Martin, A. T.** (2007). The evolving lexicon. **Samuels, B.** (ed.) (2017). Beyond markedness in formal phonology. **Simon, H. A.** (1955). On a class of skew distribution functions. **Tambovtsev, Y., & Martindale, C.** (2007). Phoneme frequencies follow a Yule distribution. **Trubetzkoy, N.** (1939) Principles of Phonology.