Genetic biases: the neglected factor in sound change

One potential factor affecting language change and evolution is represented by *genetic biases*, which can act at various stages in the process of language transmission. When influencing speech production and perception, these biases act by affecting sound changes, making some directions of change more probable than others.

Here, I will briefly review the current state of knowledge concerning the action of genetic biases on sound change, including both empirical, computational and evolutionary investigations. Dediu & Ladd (2007) showed that the population frequency of two brain growth and development genes, *ASPM* and *Microcephalin*, are associated with the world-wide distribution of *tone languages*, and proposed that the mechanism responsible is the biasing of the acquisition, production or processing of tone by these two genes. This biasing would affect sound changes in such a way that tonogenesis or tone loss would be favored in languages spoken by populations with differing genetic structures, resulting, across generations, in the observed typological diversity.

In a similar vein, Peter Ladefoged (1984) suggested that the differences between the vowel systems of Yoruba and Italian have a biological component, whereby the structure of the speakers' upper vocal tract biases the vowel system of these languages. There are a number of other such proposals in the literature (e.g., Traunmüller, 2003; Brosnahan, 1961) but most require further investigation, being anecdotal or based on small samples.

Moreover, recent computer models (e.g., Kirby *et al*., 2007; Dediu, 2008) strongly suggest that plausible implementations of genetic biases affecting the transmission of abstract linguistic features do influence the direction of language change. Finally, very recent investigations inspired from evolutionary biology using Bayesian phylogenetic methods (Dediu, 2011; Dediu & Cysouw, *in preparation*) found that certain structural features of language tend to be stable across many language families and geographic areas, pointing towards potential genetic biases “anchoring” them. Interestingly, phonetic and phonological features tend to span the whole range from extremely stable to extremely unstable.

In conclusion, I will argue that genetic biasing might represent an active causal factor in some sound changes, and that a better understanding of the mechanisms involved and the resulting patterns, as well as the identification of such cases, are necessary for a scientifically complete description of the process of sound change.

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