

Phylogenetic ancestral state reconstruction of bilabial trills in the languages of Malekula Island (Vanuatu), and the historical evolution of rare sound changes.

Benedict King, Tihomir Rangelov and Mary Walworth

Department of Linguistic and Cultural Evolution, Max Planck Institute for Evolutionary Anthropology

Bilabial trills are cross-linguistically rare sounds, found in only a few languages in a handful of locations. One such location is Malekula island in Vanuatu, where twenty-three languages exhibit bilabial trills. Rangelov, Walworth & Barbour (2023) offer a summary of their distribution on Malekula, a historical account of their development, and the motivations behind their emergence and persistence. However, critical questions remain: Where can bilabial trills be reconstructed in Malekula's linguistic history? Did bilabial trills emerge simultaneously in these different languages? And, how did they spread through those languages?

In this paper, we adopt a phylogenetic approach to answering these questions. We first constructed a set of phylogenetic trees for 44 Malekula languages, using basic vocabulary data analyzed in the Bayesian phylogenetics software BEAST2.

We examined several concepts in which bilabial trills occur in Malekula languages and collected the corresponding lexical items for all Malekula languages from the Vanuatu Voices database (Shimelman *et al.* 2020) and other sources. We then coded the items for cognacy using the comparative method and according to established sound correspondences, and also coded for the presence and absence of bilabial trills within relevant cognate sets.

The cognate-coded bilabial trills data was annotated onto the full sample of trees of Malekula languages using phylogenetic ancestral state reconstruction methods. These methods tracked possible histories for the cognate sets within a particular meaning category, as well as the presence or absence of trills, along the branches of the tree. We explicitly compared models in which trills are rarely gained but easily lost against models in which trills are gained and lost at equal rates.

We found that bilabial trills were acquired at different times in different languages and concepts. Our ancestral state reconstructions show that this rare sound change filtered through the lexicon in a gradual and piecemeal manner and was subject to rapid losses and regains. Surprisingly, models in which trills are rarely gained and frequently lost are not supported. Rather, our models support frequent gains of bilabial trills on independent branches of the tree, which we interpret as evidence for horizontal transfer of bilabial trills.

Our results provide new insights into the historical pathways of rare sounds. We show here that the appearance of bilabial trills, among the Malekula languages, occurred sporadically and then spread through lexical diffusion. Perhaps most significantly, there is strong evidence for frequent horizontal transfer, showing that (1) rare sounds are subject to contact effects, and (2) that horizontal diffusion can affect unexpected sound changes.