

## Modelling the micro dynamics of cultural traits

JÉRÔME MICHAUD

jerome.michaud84@gmail.com

*Uppsala University*

Cultural traits are very diverse and understanding their evolution is challenging. One possible approach to modelling the dynamics of cultural traits is to take inspiration from evolutionary biology and adapting the models of genetic evolution to cultural evolution. In the context of language evolution and change, such an approach has been taken by Baxter et al. (2006) (see also Blythe & Croft (2012)) when they proposed the utterance selection model (USM) for language change. This model is formally equivalent to the Wright-Fisher model of population genetics, where the analogue of genes are linguistic variables and the analogue of alleles are variants of these variables. This model is an instance of the generalized theory of evolution by Hull (2001), who defined the concepts of replicators (things that are selected) and interactors (actors through which replicators are selected).

One of the drawbacks of the USM is that it predicts very irregular trajectories of change that only fit actual trajectories of language change under specific circumstances. In this talk, we propose an extension of the USM that takes into account the preferences of actors over the different variants (Michaud, 2018). Furthermore, these preferences are allowed to change during the evolution of the model, since the fitness of a variant depends on its use by other members of the community. Using quantitative measures of the trajectories, we show that the trajectories of change predicted by this model are more regular and reproduce the typical S-shaped curves observed in language change (Blythe & Croft, 2012).

This model has only been applied to language change, but it could in principle be applied to any cultural evolutionary system under mild assumptions. We will discuss the requirements that cultural data needs to fulfill for this model to be used.

### References

- Baxter, G. J., Blythe, R. A., Croft, W. & McKane, A. J. (2006). *Utterance selection model of language change*. *Physical Review E*, 73(4), 046118.
- Blythe, R. A. & Croft, W. (2012). *S-curves and the mechanisms of propagation in language change*. *Language*, 88(2), 269–304.
- Hull, D. L. (2001). *Science and selection*. Cambridge Un. Press, Cambridge.
- Michaud, J. (2018). *Dynamical preferences and self-actuated language changes*. In C. Cuskley, M. Flaherty, H. Little, L. McCrohon, A. Ravignani & T. Verhoef, Eds., *The Evolution of Language: Proceedings of the 12th International Conference (EVO LANG XII)*: Online at url <http://evolang.org/torun/proceedings/papertemplate.html?p=93>.