

Language dynamics within adaptive networks: An agent-based approach of nodes and links coevolution

Christos Charalambous¹, David Sánchez¹, Raúl Toral¹

¹*Institute for Cross-Disciplinary Physics and Complex Systems IFISC (UIB-CSIC),
Campus Universitat Illes Balears, E-07122 Palma de Mallorca, Spain.*

Motivated by the dramatic disappearance of endangered languages observed in recent years, a great deal of attention has been given to the modeling of language competition in order to understand the factors that promote the disappearance of a language and its unfolding dynamics. With this in mind, we build on existing network models of language competition in bilingual societies. These models deal with the interplay between the usage of a language (link state) and the preference or attitude of the speakers towards the language (node state). In this work, we allow for the case where agents have the freedom to adapt their local interactions in accordance with their language preference. This is modeled by introducing a local rewiring mechanism triggered by the dissatisfaction of an agent with its usage of a given language. Our numerical simulations show that permitting this freedom to agents likely results in linguistically segregated communities for small network sizes. However, for networks of sufficiently large size, the extinction of one of the languages is the most probable scenario. Furthermore, we analyze how the fraction of minority speakers changes with the system size and we find that this fraction grows as the total population increases, which is consistent with existing data. Overall, the results of this work help us understand the impact of speakers' preferences and choices in the complex language landscape of bilingual societies.