

Computational modelling of contact languages: the emergence and spread of creole and its lexical entries on complex language ecology and sociolinguistic context

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The spread, development, diversification, and extinction of the world's languages have been some of the central topics in the field of language evolution and sociolinguistics. Rooted in relatively recent cases of language emergence and language contact, in which the sociohistorical contexts and multilingual ecology are highly complex, the current study employs agent-based models and computational network structures to evaluate the role of non-trivial social structures in language propagation, language death and lexical development.

The study aligns social factors and the developmental trajectory of creole languages as observed empirically. An artificial communication game has been employed to simulate the interaction between agents. Based on previous research (Furman & Nitschke, 2020; Jansson et al., 2015; Tria et al., 2015), complex network structures with various topological features have been incorporated into the simulation, which aims at predicting the emergence and spread of languages in a heteroglossic and multilingual ecology given the proportion of different social groups of a population, as informed by demographic data. The model has expanded the previous models by considering the quantification of different social structures, i.e., the status of internal stratification within a social group based on different socioeconomic status, and the connection of across different social groups/ethnics. The results of the model (Figure 1) supplement the previous studies by offering a plausible explanation as of why previous model may have predicted a high chance for creole emergence when there was none historically, i.e., the degree of segregation between different social groups.

Based on the model described above, a model has been constructed to investigate the relexification process, in which the agents select and discard competing linguistic forms for a particular semantic meaning for a contact language. The model explores how the development of lexicon can be affected by the population dynamics, with a particular reference of the situation of Suriname (Arends, 2001, 2017), in which a large proportion of English native speakers exited the colony at an early stage of the creole development. Furthermore, the mechanism for the genesis of variation continuum, as partially conditioned by the isolation of speech communities, has been explored with the use of artificial network structures under different settings. The study considers the sparse plantations and the stratification of society, which are typical to a lot of colonies. The model has simulated the emergence of lexical items from innovation and adaption from the substrate language or the minority language in a complex social ecology (Figure 2). It reconciles the previous studies in contact language modelling and the studies on the effect of social networks (e.g., Ke et al., 2008; Loureiro-Porto & Miguel, 2017; Raviv, 2020).

The study offers insights into the role of social factors in the evolution of language with reference to the empirical observation from the scholarship of language contact and language evolution. The exploratory model presented in the paper offers a schema for further investigation into how linguistic phenomena can emerge from social interaction in a controlled experiment which would have otherwise been difficult to conduct in real world.

Figures

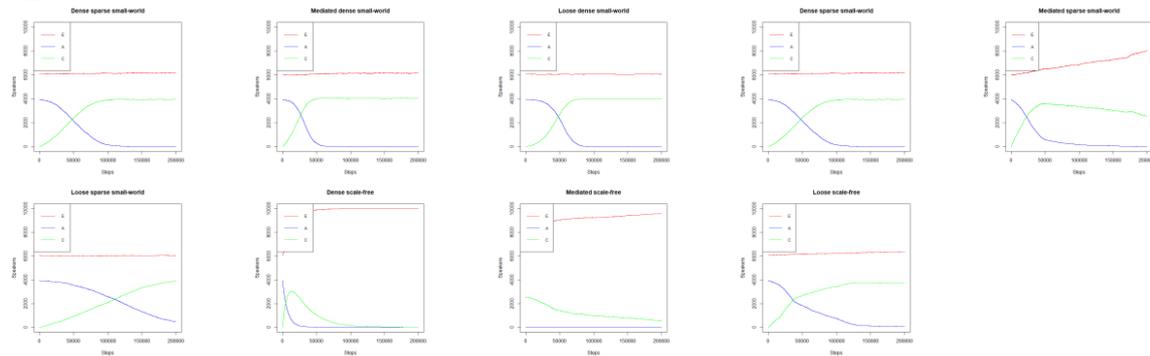


Figure 1: predictions of creole emergence based on the demographic data of one of the historical cases under different connectivity scenarios

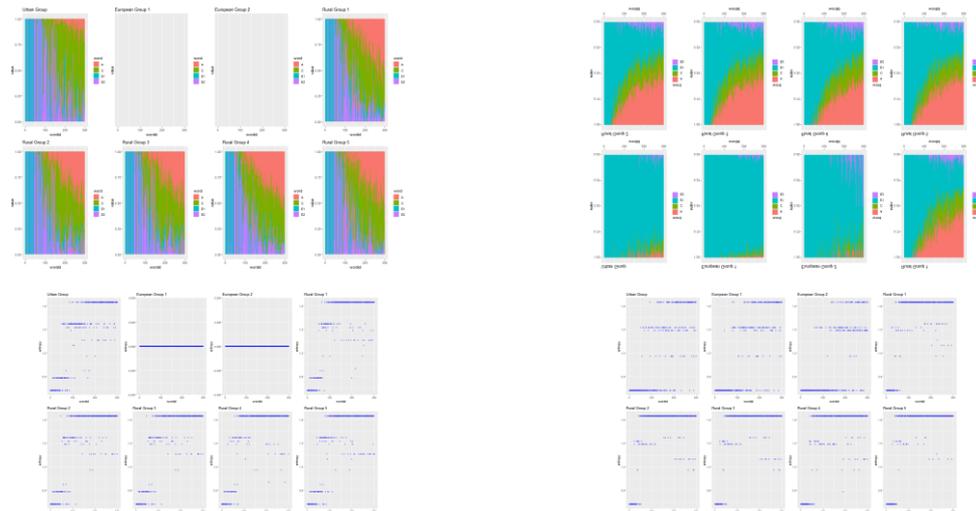


Figure 2: lexical variability as measured by etymological proportion (top) and Shannon's entropy (bottom), under condition with L1 speakers' exodus (left) and without exodus (right), as segregated by 8 different social groups

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