

Evaluating the influence of language contact on lexical changes

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Introduction

This paper focuses on modelization of language contact using language games in a community of spatially distributed agents.

According to Thomason and Kaufman (1988, p. 72), the intensity of contact between two populations has an impact on the amount of borrowing. They define this intensity has a function of three parameters, (1) duration of contact, (2) relative population sizes and (3) social settings.

In this paper, we will present results of experiments testing these parameters.

We developed a special toolkit for our simulations, LEMMING S (Language Evolution Modeling & MonitorING System). This model is inspired from Babel[®] (Sony Computer Science Laboratory) in the way agents interact by playing naming games, (Steels and McIntyre, 1998).

LEMMInS overview

In the LEMMING S environment, we generate several populations of different sizes. Each population is socially stratified and has a special "prestige" value (this notion subsumed cultural prestige as well as military or economical). Aside from belonging to a special social class, an agent is provided with a "communicativity" value which allows it "to choose" his social network of interactions.

LEMMING S also provides population with a specific demographic rate, and allows drawing maps of agent, word and concept spreading. We can measure the coherence of the lexicon per population, the percentage of foreign words of an agent lexicon and the average number of words for a given concept.

Experiments and results

We ran several simulations of contact between two populations. It is a fact that for a given equal prestige (resp. a given equal size of population) the biggest (resp. the most prestigious) population will impose its lexicon to the other. The most interesting point to look at is when these parameters work in opposite direction.

We will show in our presentation the extent to which prestige and size may affect foreign lexicon acquisition both in terms of number of foreign words acquired and of speed of acquisition.

Examples

We present below two simulations illustrating acquisition of foreign lexicon.

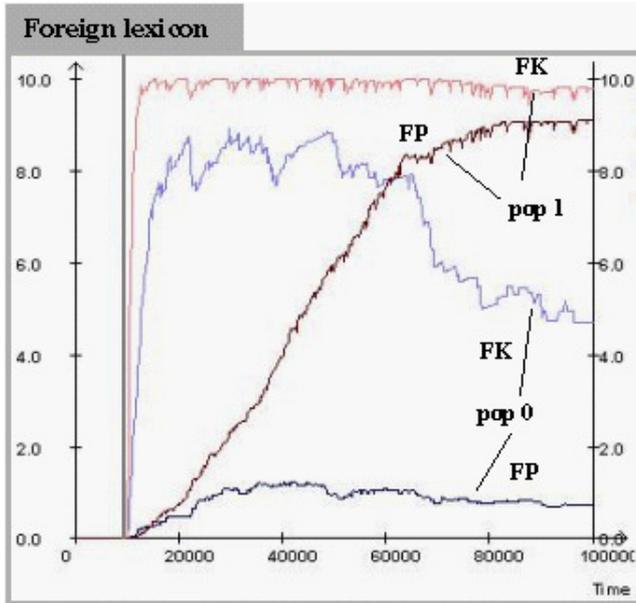
Both figures show the percentage of Foreign Known words (FK) and Foreign Preferred words (FP) of a population. FK are borrowed words that compete with the native words an agent (and thus a population) has for a given meaning. FP are borrowed words that replace the native words.

Prestige range from 0 (strong) to 9 (weak). In both simulations, the number of meaning is equal to 10 and they are shared by the two populations.

Case study 1

Population 0 : size = 20 ; prestige = 0

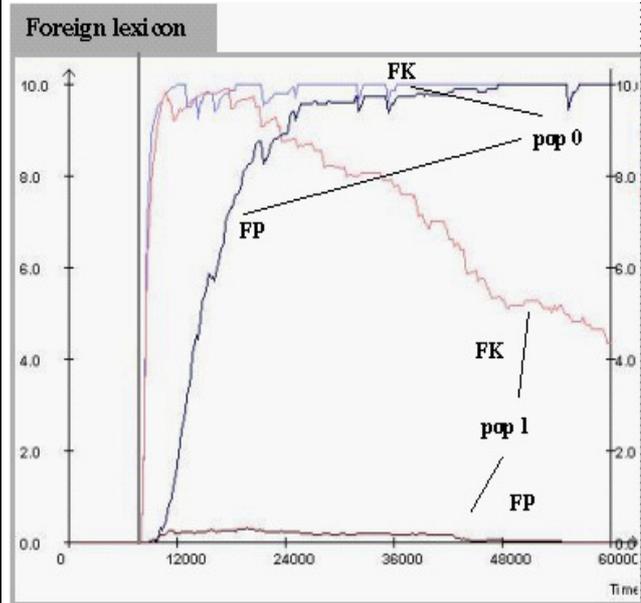
Population 1 : size = 40 ; prestige = 9



Case study 2

Population 0 : size = 20 ; prestige = 0

Population 1 : size = 40 ; prestige = 4



In this case, we can see that the smallest population (pop 0) which has the highest prestige imposes its lexicon on population 1.

Right after the contact (grey vertical line) both populations start knowing foreign words, but the main difference lies in the fact that pop 1 soon acquires preferred words (i.e. words that agents use at first place) whereas pop 0 don't.

Moreover, due to the renewal of agents, pop 0 starts losing its foreign known words as they did not manage to become preferred words (FK-pop 0 decreases). In the same time, pop 1 is renewing its lexicon with almost all the foreign known words becoming preferred.

Here, prestige balances the effect of size.

This graph shows a case where the difference in prestige is too small to counterbalance the effect of size, thus leading the smallest population (pop 0) to change its entire lexicon for the one of the biggest population.

What is really interesting here is the speed at which pop 1 imposes its lexicon.

In case study 1, prestige and size act like competing forces, thus it takes more time to replace a lexicon, whereas in case study 2, the smaller difference in prestige lets size operate alone and faster.