Motivation

Languages are an important part of our culturally diverse world, yet many of today’s languages are being useless and less. To find out why, one needs to first understand the dynamics behind this language shift.

Use of the minority language Slovenian in Carinthia, Austria has been steadily declining over the past century. Despite supportive measures, language shift (speakers giving up use of one language for another) is taking place. One way of monitoring this language shift on a large scale is using methods from the natural sciences where dealing with big sets of data is common. We present a microscopic model to follow language shift over time and space in Carinthia based on data from the Austrian census.

The data from the Austrian census

The Austrian census was the primary method for collecting data on language use in Austria between 1880 and 2001. Data is available every ten years between 1880 and 1910 and 1951 to 2001, plus for some years in between the two periods (with varying data quality).

Digitising the data

Carinthia is divided into grid cells, size 1×1 km each.

Our model: a microscopic diffusion approach

To get the number of speakers of a language α in the next year, each grid cell is updated according to the mathematical rule:

\[ n_{\alpha}(r,t+1) = n_{\text{total}}(r,t+1) \cdot n_{\alpha}(r,t) + F_{\alpha}(r,t) \]

what this means: the number of speakers in the next year is proportional to:

1. the number of current speakers
2. the interaction with speakers in other places

Results – an example: 1880–1910

1880 Percentage of Slovenian speakers in Carinthia 2001

Summary

- We have successfully modelled language shift in Carinthia based on principles of physical diffusion.
- All model parameters can be calculated directly from the census data – our model is applicable even in situations where data on other factors influencing language use (e.g. status of a language) is not available or not possible to obtain.
- Interaction with other speakers of the same language is the most important driving factor for language shift. External factors such as school or parish language seem to have only a minor influence.

http://dcs.univie.ac.at/languagediffusion