

A model for language dynamics in Carinthia, Austria

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Language shift is a linguistic phenomenon that occurs when people give up use of one language for another [1]. In these situations, use of the dominant language increases while the minority language is used less and less. This development can be described by physical models which apply the concept of physical diffusion (movement of atoms) to linguistics (movement of languages) in order to track language spread over time and space.

We present a spatio-temporal model based on cellular automata [2] to simulate the spread of languages. In our model [3], the surveyed geographic area is divided into lattice cells. For each cell and time-step, the probability p of speaking a language is proportional to the number of speakers present in the preceding time step as well as to the interaction with other speakers of the same language.

We apply this model to the languages spoken in Carinthia, Austria where use of the minority language Slovenian has been steadily declining while use of the dominant language German increases. Using empirical data from the Austrian census (1880–2001) for calibration, the model allows us to follow the evolution of language use over time and space on a very small scale (cell size $1 \text{ km} \times 1 \text{ km}$). Thus, the model offers a large-scale complement to the traditional sociolinguistic smaller-scale study of language shift.

References

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