

# CAN MULTIPLEX SAVE THE LANGUAGES? A NEW INTERPRETATION OF ABRAM-STROGATZ MODEL

R. Amato<sup>1</sup>, N. Kouvadis<sup>1</sup>  
and A. Diaz-Guilera<sup>1</sup>

(1) Departament de Física Fonamental, Universitat de Barcelona

D.M Abram and S.H. Strogatz proposed a model [1] of language competition to explain the decline and the death of some minority languages. The system proposed ends up in a stable state where all the people speaks one of the two languages and the other language dies.

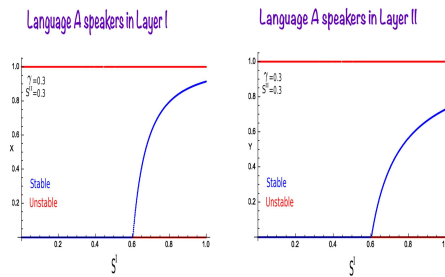
In the 'real world' people interact each others in different situations or environments like work, family, spare time, etc ... And it can happen that a person speaks different languages in different circumstances.

To represent these different social interaction we use multiplex, where each situation (family, work, ...) is a network on a layer, and the layers are connected by connecting a node and his counterpart in the other layer .

The new question we place is: Can the multilayer human interaction affect the two languages competition? Can multilayer human interaction ensure the survival of both languages?

The important result, in contrast with the original one-layer model is that we have a regime where the bilingual state is the stable solution while the full consensus is the unstable ones.

Bifurcation diagram:



[1] D. M. Abrams, S. H. Strogatz, *Linguistics: Modelling the dynamics of language death*, Nature, (2003).