Using mathematical models to understand language change – 11/13/08

W. Garrett Mitchener

A theory of language change must resolve the paradox that languages are more or less stable on time scales of several decades, but they can change drastically over the course of centuries. Thus, there must be a balance of forces generating linguistic stability against forces creating instability. I will present two mathematical models of language change. The first is based on evolutionary game dynamics and balances the benefits of conformity in a communication game against learning errors by children. The second takes conformity for granted but balances it against the possibility that children are perhaps too good at learning language and base their speech patterns on predictions of the future state of the population's language. Both models exhibit continual language change but through different mechanisms: The first is deterministic and chaotic, while the second is stochastic and periodically experiences large deviations from equilibrium. The first model is appropriate for informed speculation about the early stages of the biological evolution of language, while the second is a better tool for studying language change on historical time scales.