

## **Frequency and stability in linguistic rule dynamics**

Christine Cuskley<sup>1</sup>, Francesca Colaiori<sup>2</sup>, Claudio Castellano<sup>2</sup>, Vittorio Loreto<sup>1,2</sup>, Martina Pugliese<sup>2</sup>  
and Francesca Tria<sup>1</sup>

<sup>1</sup>Institute for Scientific Interchange, Social Computation Unit, Turin, Italy

<sup>2</sup>Institute for Complex Systems, ISC-CNR, Rome, Italy

Frequency and stability exhibit an interesting relationship in language: the more frequent a linguistic construction is, the less it tends to change over time. Despite this evident relationship, it is less clear what specific social and cognitive factors cause increased stability in more frequent constructions. This talk presents work which aims to examine the specific factors underlying the frequency-stability relationship using the test case of verb regularity in English: highly frequent verbs are more likely to be irregular, while less frequent verbs tend to destabilise to the regular form.

Evidence from a historical corpus of English shows that vocabulary growth underlies the most marked increases in regularity over time, and verbs transition from irregular to regular and visa versa within a particular frequency band. Irregularity is fairly stable while regularity increases due to growth rather than regularisation. This indicates that expansion of the language contributes most significantly to the growth of regular rules, while irregular forms are surprisingly stable over time.

In another approach to the problem, we use an adaptation of the Naming Game to examine the dynamics of rules and irregular exceptions across a population of interacting agents. We propose two biases among agents that may underlie the frequency-stability relationship: child learning biases and general memory constraints. Results of the models indicate that changes in learner profile (child learners vs adult learners) in the population lead to frequency-stability dynamics reminiscent of corpus results. Likewise, more general memory constraints in agents also create a system resembling empirical results.

Together, these results indicate that individual biases, repeated interaction, and skewed frequency are all major contributors to the pattern of (ir)regularity observed in English. We discuss how English may be anomalous in this regard, how patterns of regularity in other languages can help us to better understand what causes the persistence of 'inelegant' exceptions to regular rules in language more generally, and how sociolinguistic and demographic processes may effect regularity.