

# MATHEMATICAL AND COMPUTATIONAL LINGUISTICS PROJECT N.4

## SYNTACTIC PHYLOGENETIC TREES

CS101/MA191 CLASS WINTER 2015, MATILDE MARCOLLI

### 1. LINGUISTIC PHYLOGENETIC TREES

The reconstruction of phylogenetic trees of language families is one of the main problems in Historical Linguistics. In recent years, computational methods have been used, mostly borrowed from similar techniques in mathematical biology, see for instance the collection of papers in [1]. Mostly, the computational reconstructions of linguistic phylogenetic trees followed the original method developed in traditional Historical Linguistics, namely using lexical databases and cognate words. However, recently it was shown in [3] that syntactic parameters can also be efficiently used as data on the basis of which to construct phylogenetic trees. A general introduction to mathematical, computational and statistical methods for the construction of phylogenetic trees and graphs can be found in [2].

### 2. PLAN OF THE PROJECT

The results of [3] were limited to a group of languages within the Indo-European family. A database of syntactic parameters of a much larger number of world languages is available at [5]. The plan of this project is to use this database, for languages belonging to given families, and construct phylogenetic trees using as distance function the normalized Hamming distance on the syntactic parameters. Available resources for constructing phylogenetic trees can be found at [4].

### REFERENCES

- [1] P. Forster and C. Renfrew (Eds.), *Phylogenetic methods and the prehistory of language*, McDonald Institute Monographs, 2006.
- [2] D.H. Huson, R. Rupp, C. Scornavacca, *Phylogenetic Networks*, Cambridge University Press, 2011.
- [3] G. Longobardi, C. Guardiano, *Evidence for syntax as a signal of historical relatedness*, *Lingua* 119 (2009) 1679–1706.
- [4] Phylogeny Programs  
<http://evolution.genetics.washington.edu/phylip/software.html>
- [5] SSWL Database of Syntactic Parameters:  
<http://sswl.railsplayground.net/>