Classifying Languages by Dependency Structure

Typologies of Delexicalized Universal Dependency Treebanks

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Xinying Chen
Xi'an Jiaotong University
University of Ostrava

Kim Gerdes
LPP
Sorbonne Nouvelle

Goal

- Recognizing language families based on purely empirical structural data
- Differences become
  - Quantifiable
  - Localizable
- Side effect:
  - Assessing treebank coherence and quality

Method

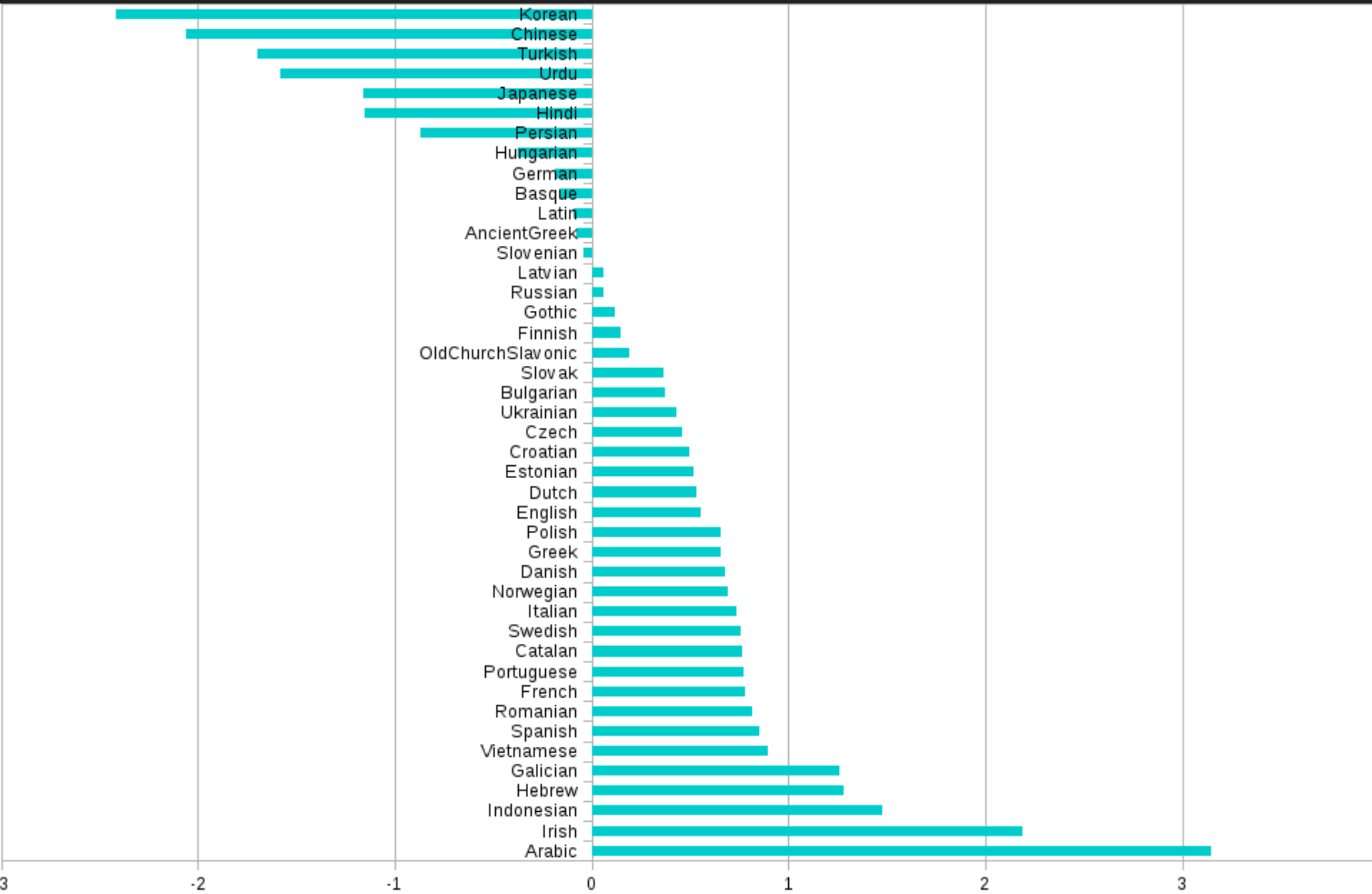
- Delexicalize the UD treebanks
- Compare the remaining structures

Steps

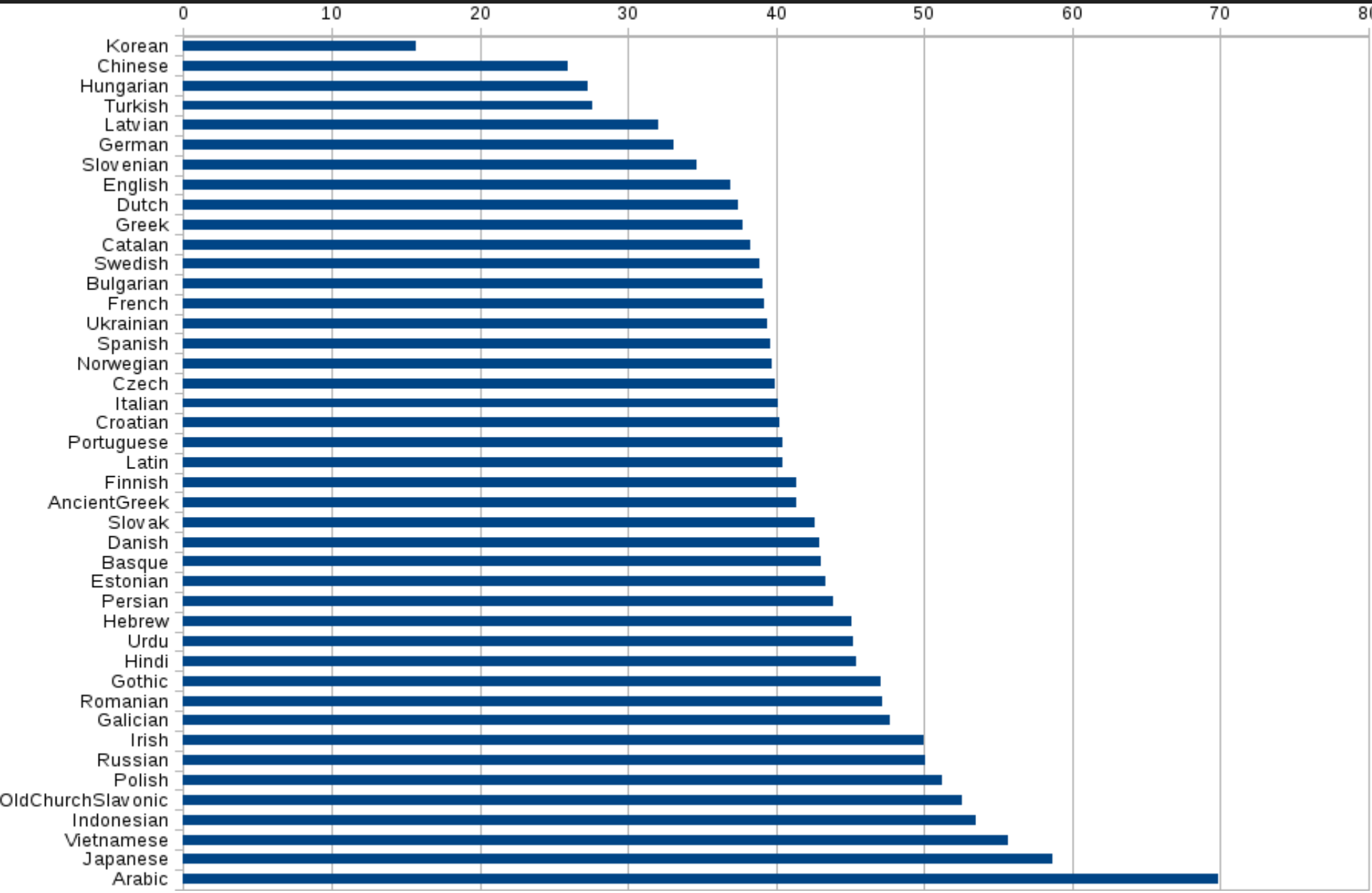
- Keep treebanks >10k tokens
- Keep only core syntagmatic relations:
  - removing *fixed*, *flat*, *conj*, and *root*
- compute
  - relative frequency distributions of dependency functions
  - Directional Dependency Distance
    DDD = dependency distance × direction

$$DDD(R) = \frac{\sum_{r \in R} distance(r)}{frequency(R)}$$

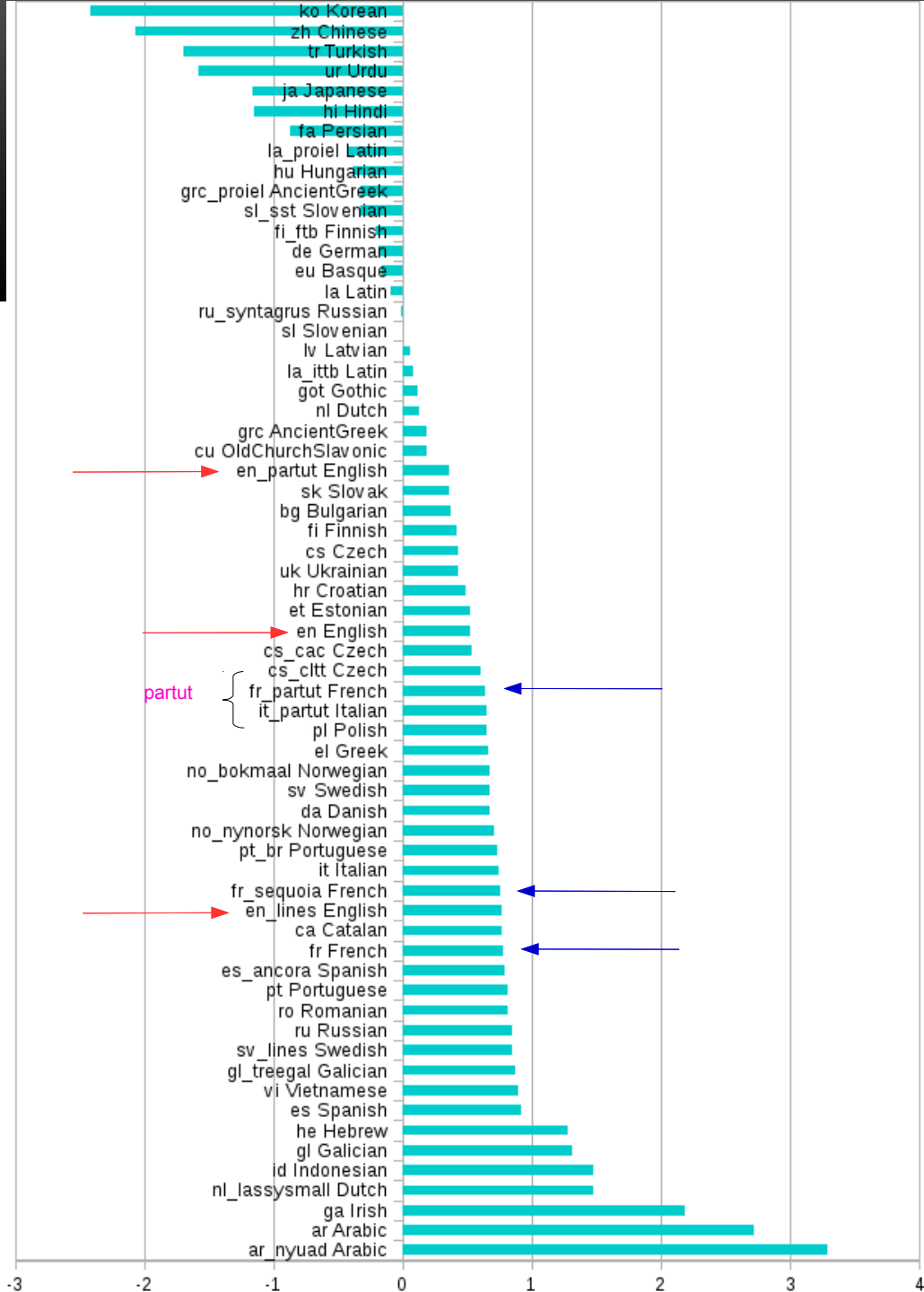
Combined DDD



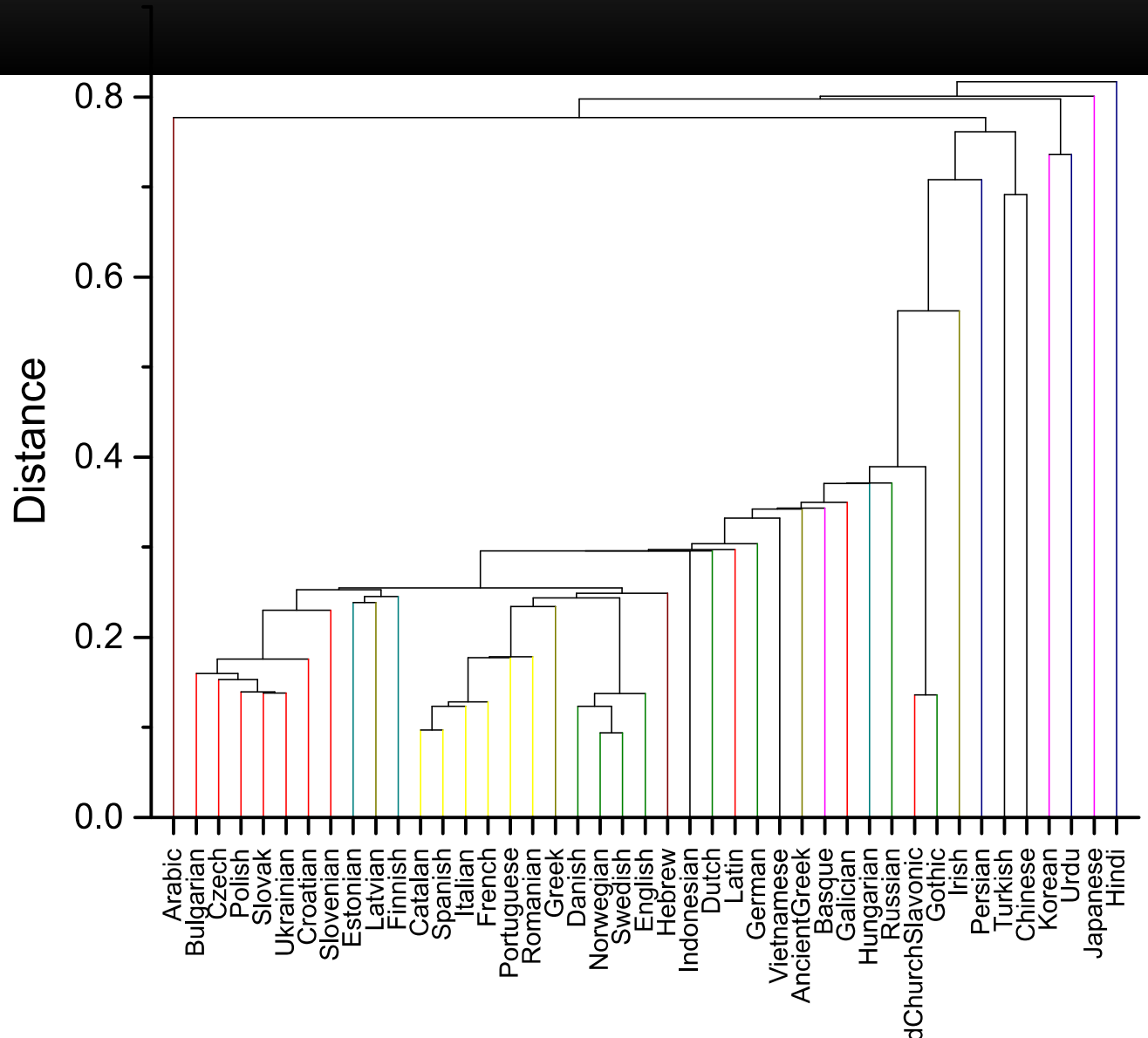
% of positive links



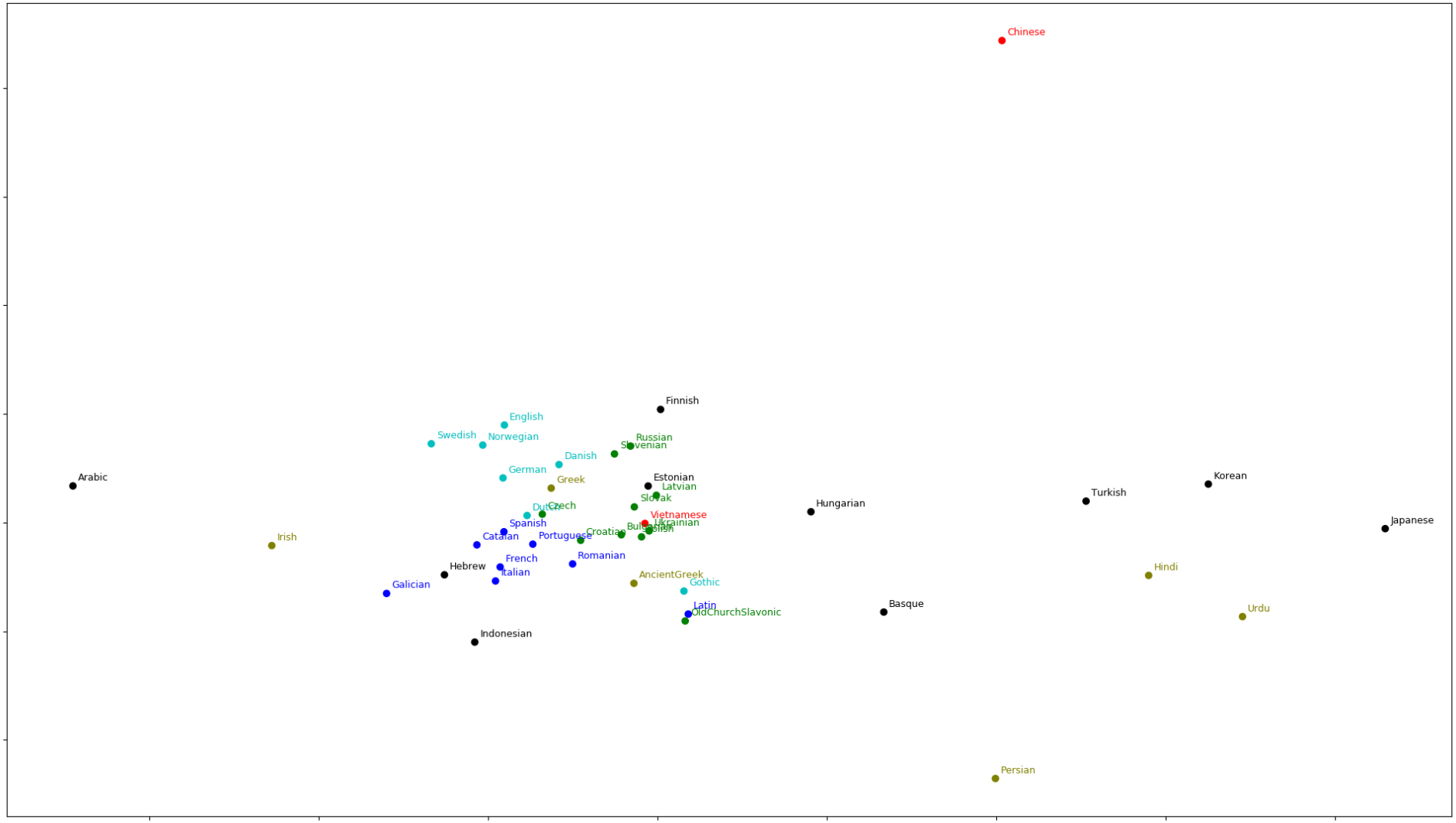
Is UD good enough?



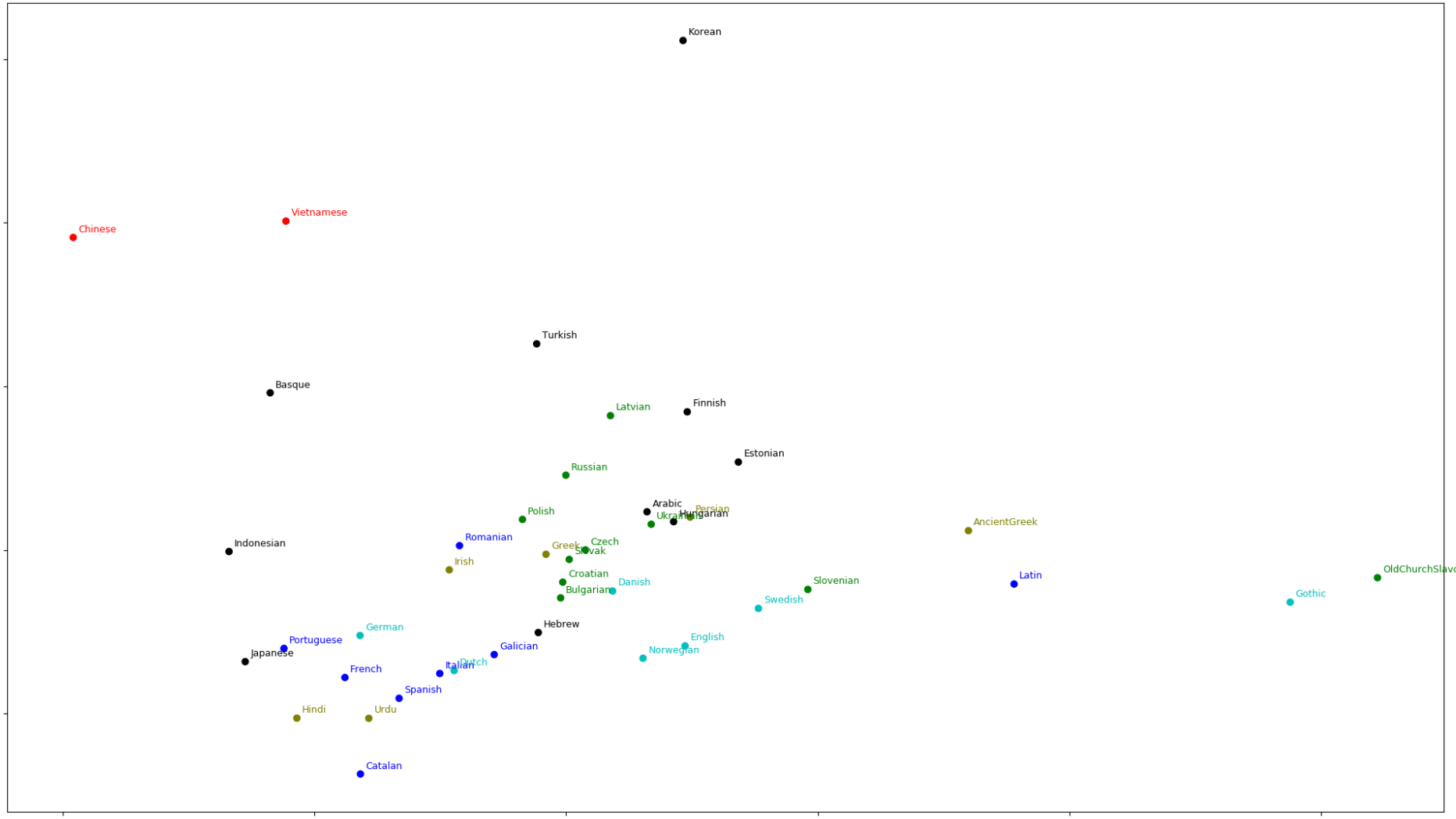
Dendrogram of DDD vectors



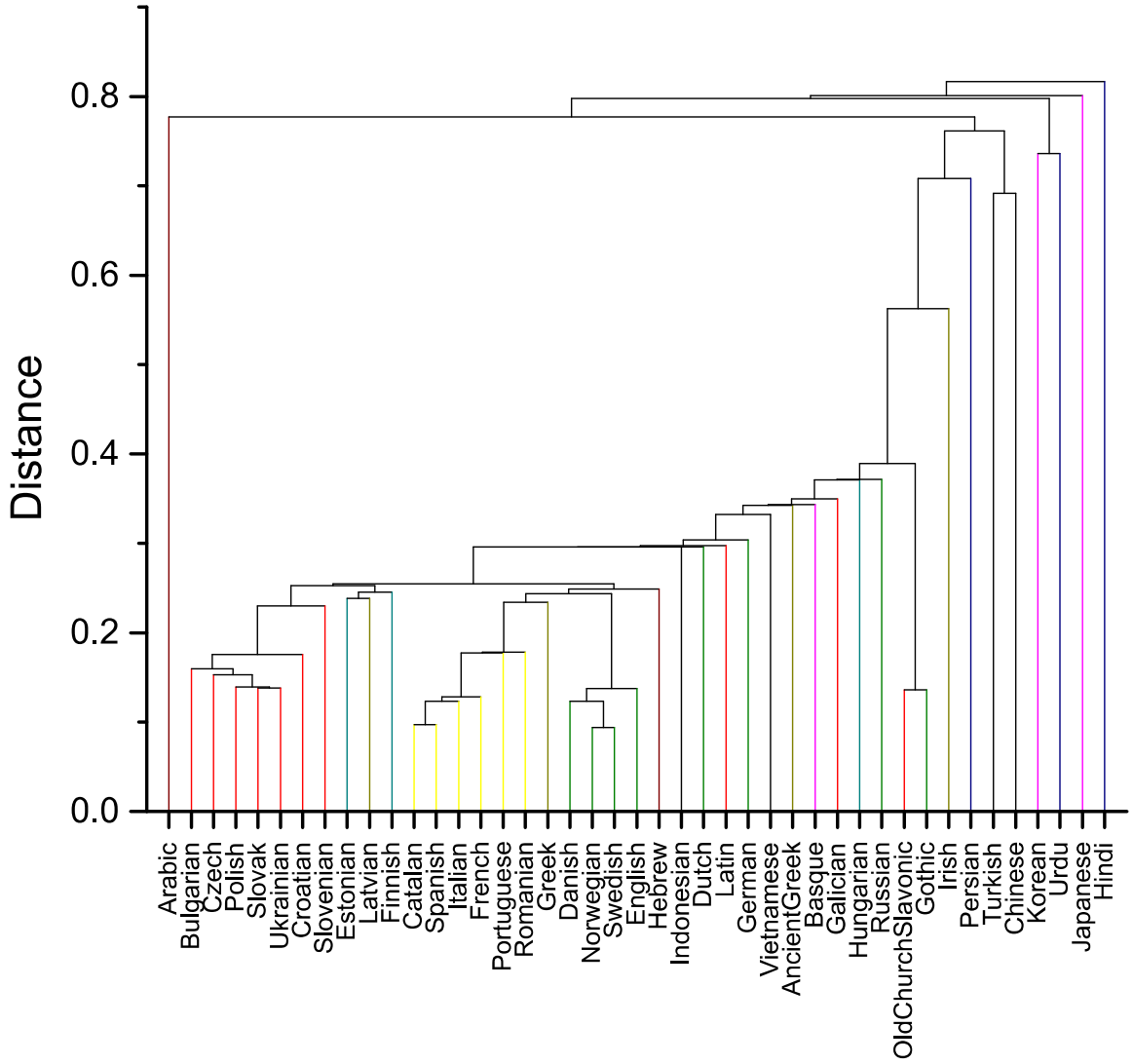
PCA of DDD vectors



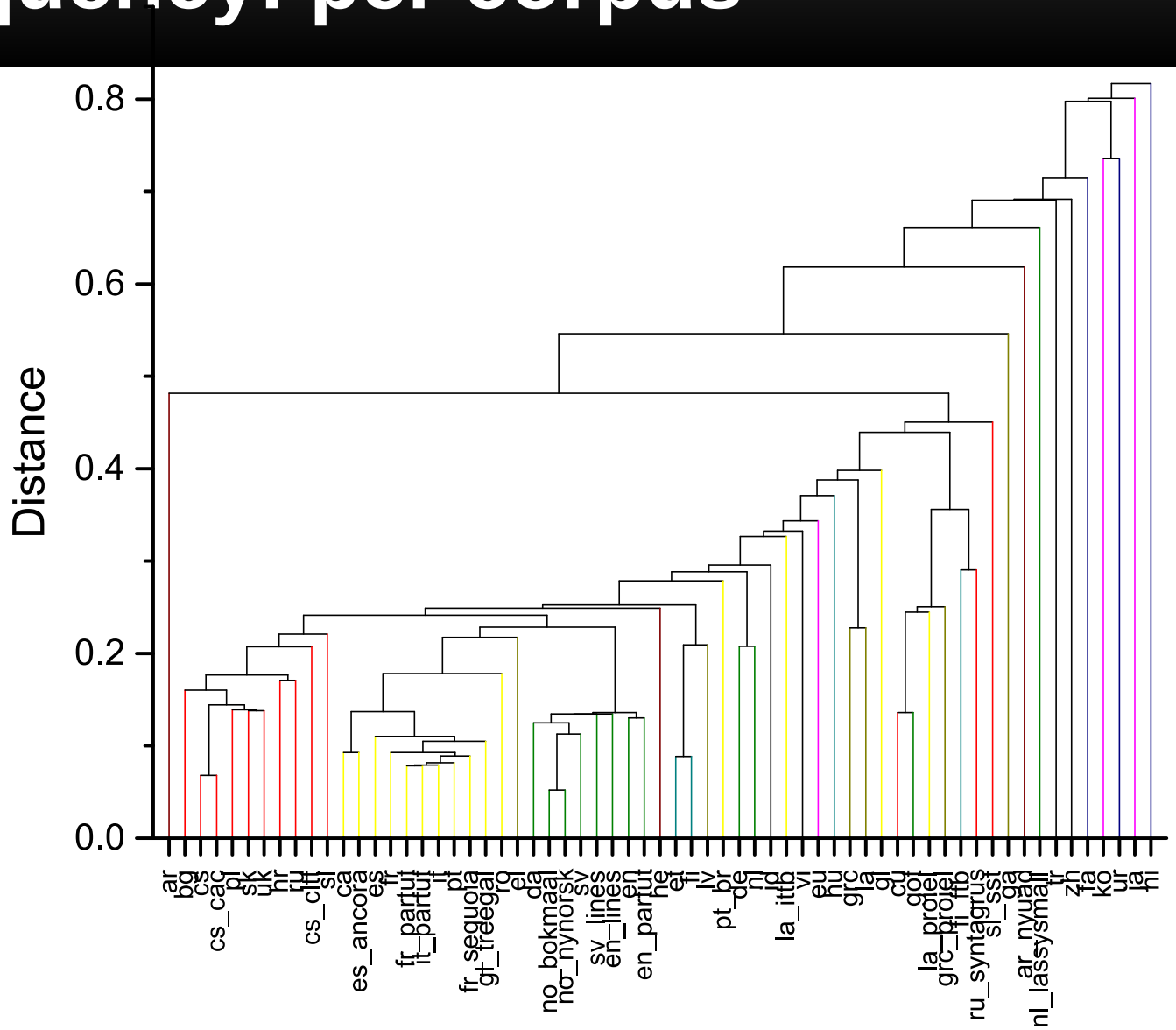
PCA of POS frequencies



Dendrogram of distance × relative frequency: per language



Dendrogram of distance × relative frequency: per corpus



Results

- Good measures can find language groups
  - Also on dirty data
- This makes syntactic typology
  - Empirical
    - *Number vs existence of phenomena*
  - Quantifiable
- Treebank quality assessment:
  - Is it typology?
  - Or simply an error in the annotation scheme?
- Things can only get better as UD improves
  - the quality
  - the scheme
- **Come to see our poster to discuss further!**

Grazie mille!

Goal

UD expects such a schema, as well as the treebank data, would be ‘satisfactory on linguistic analysis for individual languages’, meanwhile, it would also ‘be good for linguistic typology, i.e., providing a suitable basis for bringing out cross-linguistic parallelism across languages and language families’.