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Studying French mapping of syntax to prosody in natural speech

Fabian Santiago, Camille Dutrey & Martine Adda-Decker
{fabian.santiago-vargas, madda, camille.dutrey}@limsi.fr

Background
- Standard definition of the French Accentual Phrase: any lexical word and all dependent words at its left side [3, 5, 7].
- In general, a rising pitch movement (H*) marks its right edge [3, 5, 7].
- Factors contributing to the AP’s formation [6, 8, 2]:
  - # of syllables (3/4 on average)
  - Articulation rate
  - Rhythm (balance of APs in terms of # of syllables)

Corpus
- Subset of French ETAPE corpus [4]
  - 25 speakers
  - 1.5 hours
  - 16,377 words

Grammatical Annotations
- French Spoken Treebank [1]
  - 25 POS labels
  - 12 Constituent labels
  - Several Function labels

Methods

Linguistic Information Extraction
- Focus on the most frequent constituents observed in the corpus:
  - Noun Phrases (NP)
  - Verbal Nuclei (VN)
  - Adjectival Phrases (AdjP)
- Automatic alignment to the signal as Praat’s TextGrids

Prosodic Analysis
- Rising pitch: an AP was marked if its rightmost syllable carries a rising movement >2 st
- Normalization of constituent durations: duration of constituent / number of phones

Results, Analysis and Discussion

Successful predictions across the 3 constituent types

Durations & f0 delta values across the 3 constituent types

Possible Explanations
- 40% -> monosyllabic constituents -> too small for an AP
- Prosodic patterns in VN constituents:
  - Rising pitch movements are less frequent than in the rest of the categories
  - Durations are shorter

Conclusion
- Best match for AdjP: Adj. tend to follow NP
- Worst match for VN: (i) Tend to precede NP & (ii) short durations
- Future: consider phrase merging (NP+AP, VP+AP…) & length conditions

References