Studying French mapping of syntax to prosody in natural speech
Fabian Santiago, Camille Dutrey, Martine Adda-Decker

To cite this version:
Fabian Santiago, Camille Dutrey, Martine Adda-Decker. Studying French mapping of syntax to prosody in natural speech. Tones and Intonation in Europe 2016, Sep 2016, Canterbury, United Kingdom. halshs-01440326

HAL Id: halshs-01440326
https://halshs.archives-ouvertes.fr/halshs-01440326
Submitted on 19 Mar 2018

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
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)

Goals
- Studying the syntax to prosody mapping to analyze the formation of APs in French by using large corpora & semi-automatic analysis
- Analyzing whether syntactic information is a good predictor of the AP’s formation
- Analyzing the contribution of:
  - Constituent length (# of syllables / phrase)
  - Constituent type
  - Temporal cues

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 Praats’ 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

General observations
- Identification of 4,415 potential APs:
  ✓ 2,528 Noun Phrases
  ✓ 1,713 Verbal Nuclei
  ✓ 428 Adjectival Phrases
- 43% success rate: relatively weak match of syntactic and prosodic information
- The syntactic-prosodic predictions are less accurate with VN

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

Mapping
- Predictions: Any lexical word and its function word(s) at the left side (in non-final positions) calls for a final prosodic boundary (rising pitch)

References