An Autosegmental-Metrical grammar of French intonation

Brechtje Post
This talk

speech data

modelling

generalising

What grammar?

What criteria?

Challenges

Post (2000)
Not in this talk

- Alternative approaches:
  - historical perspective: non-AM precursors
  - comparison with other A(M) accounts: Jun & Fougeron, DiCristo & Hirst
  - It’s a grammar, not an annotation system!

- Discussion of why alternative pitch accent and boundary configurations were rejected (i.e. failed the criteria)
  e.g. why %L ... H* is a better generalisation than L+H* for a rising pitch movement at the beginning of an Intonation Phrase

- ‘non-neutral’ intonation (e.g. contrastive focus)

- The mapping between form and meaning
Intonational phonology

• Intonation refers to
  − the use of suprasegmental features
  − to convey sentence-level pragmatic meanings
  − in a linguistically structured way

• In the analysis, distinguish between
  − phonological structure and phonetic implementation
  − identification of distinctive patterns and the phonological organisation of their component units (primitives)

Different theoretical traditions

(Ladd 1996)
What grammar? - Contours (& levels)

Delattre (1966)

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Delattre (1966)
What grammar?

French tonal grammar

\[
\begin{align*}
\{L_I\} & \quad (H^* (L))^n_0 \quad (H+)H^* \quad \{L_I\} \\
H_I & \quad \emptyset 
\end{align*}
\]

Autosegmental approach (AM framework)

The AM framework

- Intonation independently carries linguistic meaning
  - conveyed by abstract phonological (categorical, discrete) elements, which are
  - physically instantiated during phonetic implementation

- Contours are analysed in terms of high and low turning points which align with specific locations in the segmental string: stressed syllables and prosodic boundaries
  - Turning points are represented as tones in the phonology
  - Tones combine in inventory of pitch accents and boundary specifications; only some configurations are contrastive

(Pierrehumbert 1980, Bruce 1977)
Tune-text association: Tonal distribution

• PP is domain of pitch accent distribution: morpho-syntax, metrical structure and constituent length interact to determine pitch accent placement within the PP

• Tonal structure is tightly constrained by phrasing at different levels of Prosodic Hierarchy
  ➢ Location of pitch accents and boundary tones is restricted by mappings between morpho-syntactic, semantic/informational, metrical and intonational structure
  ➢ Choice and realisation of intonation patterns is restricted by resulting prosodic structure
Primitives:

- Underlying pitch accents: H*, H+H*
- Boundary specifications: H, L or 0
- Optional L:

\[
\begin{align*}
H^* & \quad H^* \\
\rightarrow & \\
H^* & \quad L \quad H^*
\end{align*}
\]

Combinatory grammar:

The IP: \( \left\{ \begin{array}{c}
\%L \\
\%H \\
(H^*(L))^n \\
(H+H^*) \\
L\% \\
H\% \\
0\%
\end{array} \right. \)
Grammar sets out to describe: IP-final contrasts

High/Low

Rising: Marianne est venue?

Falling: Marianne est venue.

Falling: (penultimate peak) Marianne est venue.

Rising-falling: (final peak) Marianne est venue!

Mid

Rising: Marianne est venue,...

Falling: Marianne est venue.

Falling: Marianne est venue.

Falling: Marianne est venue.
Grammar sets out to describe: IP-internal contrasts

Marianne est venue?

Marianne est venue?

Tu sais que Marianne est venue.
French tonal grammar

\[
\left\{ \begin{array}{c}
L_I \\
H_I
\end{array} \right\} \quad (H^* (L))^n_{0} \quad (H+)H^* \\
\left\{ \begin{array}{c}
L_I \\
H_I
\end{array} \right\}
\]

An initial High or Low tone can be followed by any number of \(H^*\) accents (optional).

and the IP ends in a High or a Low tone, or there is no specification after \((H+)H^*\)

and an L-tone, but only if it’s preceded by \(H^*\) (also optional).

The final pitch accent can be monotonal \(H^*\) or bitonal \(H+H^*\)
IP-final contrasts

• Rise versus rise-fall:

Marianne?
%H (H* (L))
%H%
%H+
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Rise-fall
Final fall (no optional L + downstep)
Downstep: lower $H^*$ after H

- also for non-final $H^*$:

Tu sais que j'ai vu Marianne?

T'as vu Marianne?

- unless $H^*$ is followed by an H tone:

T'as vu Marianne?
IP-final contrasts

- Falls to mid versus falls to low:

\[
\begin{array}{c}
\%H (H^* (L)) & H^* \\
\%L & H+H^* \\
\end{array}
\]

\[
\begin{array}{c}
T'as vu Marianne. \\
\%L & H^* & H^* L% \\
\end{array}
\]

\[
\begin{array}{c}
T'as vu Marianne. \\
\%L & H^* & H^* 0% \\
\end{array}
\]
IP-final contrasts

- Falls to mid versus falls to low from penultimate peak (~cliché mélodique):

  Mais c’est Marianne.

  \[
  \begin{array}{c|c}
  \%L & H + H^* \ L\% \\
  \end{array}
  \]

  Mais c’est Marianne!

  \[
  \begin{array}{c|c}
  \%L & H + H^* \ 0\% \\
  \end{array}
  \]
Summary analysis

• All accented syllables have an H* tone

• H* can be preceded by L: optional L

• H* can be preceded by H: H+H*

• H_H is realised as H_!H

• Categorical differences between rise, rise-fall, falls to mid and falls to low: different T%
What criteria?

- Intonational meaning
  - Semantic and pragmatic effects

- Distribution of patterns
  - Across speakers, varieties, contexts
  - Contrastiveness, Complementary distribution, Gradience (free variation)

- Phonetic realisation
  - E.g. alignment of targets
  - Systematic patterns in implementation

- Analytical coherence (and testability), transparency and economy

Strongly reminiscent of structuralist tradition

- **The concrete / physical approach:** characterised by specific phonetic attributes; externally observable (in phoneme theory Jones 1932, Bloomfield 1933)

- **The structuralist approach:**
  
  feature of language structure; abstraction; contrastive (in phoneme theory e.g. Pike 1944, Hockett 1958, Gimson 1962; also Trubetskoy and Jakobson of Prague School)

Principles underlying the system:

- Opposition / contrast
- Complementary distribution
- Phonetic similarity
- Total accountability
What criteria?

- Intonational meaning
  - Semantic and pragmatic effects
- Distribution of patterns
  - Across speakers, varieties, contexts
  - Contrastiveness, Complementary distribution, Gradience (free variation)
- Phonetic realisation
  - E.g. alignment of targets
  - Systematic patterns in implementation
- Analytical coherence (and testability), transparency and economy
1. Linguistically structured, language-specific meaning
   - arbitrary form-function relations
   - forms composed of ‘meaningful’ (phonological) units
   - No one-to-one mapping between form and function

2. Iconic, paralinguistic meaning
   - Directly rooted in biological codes
   - Universal (usually)

3. Variation in forms is that not meaningful

Gussenhoven (2002, 2004), cf. Hockett’s design features
What criteria?

- Intonational meaning
  - Semantic and pragmatic effects

- Distribution of patterns
  - Across speakers, varieties, contexts
  - Contrastiveness, Complementary distribution, Gradience (free variation)

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  - E.g. alignment of targets
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Criteria: Distribution of patterns

Ma mignonne! Ne partez pas! Je vous en prie!

But: identification of distinctive patterns ≠ phonological organisation of their component tones
What criteria?

• Intonational meaning
  – Semantic and pragmatic effects

• Distribution of patterns
  – Across speakers, varieties, contexts
  – Contrastiveness, Complementary distribution, Gradience (free variation)

• Phonetic realisation
  – E.g. alignment of targets
  – Systematic patterns in implementation

• Analytical coherence (and testability), transparency and economy

Criteria: Phonetic realisation

Ma mignonne! Ne partez pas! Je vous en prie!

(Series of falling patterns)
What criteria?

• Intonational meaning
  – Semantic and pragmatic effects

• Distribution of patterns
  – Across speakers, varieties, contexts
  – Contrastiveness, Complementary distribution, Gradience (free variation)

• Phonetic realisation
  – E.g. alignment of targets
  – Systematic patterns in implementation

• Analytical coherence (and testability), transparency and economy
Dialect variation:

Alsace: Contrast between L* and H* accents within IP

\( F_0 \) (Hz)

\( /{-}\text{internal L}^* \)

\( /{-}\text{internal H}^* \)

unlike Parisian: low accents in \( /{-}\)-final position only

(Post and Delais-Roussarie 2006)
What criteria: Analytical coherence

- 3-way contrast: L H* L% → H+H* L%
  - fall to low
  - H* L% or L* L% ?

Prefinal peak
Final low accent

Is Parisian the exception? No L*? (Post and Delais-Roussarie 2006)
Advantages of this approach

• All surface forms derived from small set of underlying tones
• Only actual phonetic targets represented in phonology
• Abstracts away from contextual variation (allophonic/segmental/speaker)
• No difference between tonal primitives at level of tonal inventory; contrasts arise when tones associate with text
• Separate tonal specifications for IP-internal and IP-boundary movements naturally accounts for greater number of contrasts in IP-final position than elsewhere
Phonetics vs phonology

Further advantage:
- Strict division of labour between phonetics and phonology forces clear decisions about grammatical status of differences between contours.
- Choice needs to be motivated: testable model.
- However, AM approach relies on clearly separable phonetics and phonology.
- This fits conventional view that variant tokens of pronunciation of a word undergo some sort of normalization to a single, clean, prototypical, usually symbolic/phonemic representation prior to access in speech comprehension.
Challenges: Phonetics vs phonology

• Functional categories and gradient variation are closely intertwined in intonation, since both can be used to signal linguistic as well as paralinguistic variation in meaning (e.g. Crystal 1969, Bolinger 1970).
  – Categorical variation in form can signal paralinguistic meaning (e.g. rise vs rise-fall for surprise)
  – Gradient variation in form can be categorically meaningful (e.g. height of a rise contrasting questions vs. continuations)

• There is no minimal pair test to decide category membership (as for segments, e.g. *tear* vs *beer*)

• We know very little about how acoustic cues interact in signalling different ‘types’ of meaning
  • How do they carve up phonetic dimensions to convey meaning?
What this grammar was not designed to do

• Speaking styles
  – because the grammar shouldn’t change, although distributional properties may do

• Different varieties of French
  – Because they may have a different grammar, e.g. L*

• Paralinguistically relevant intonational variation: phonetics
  – because they are used to reinforce, undermine etc. propositional content, but do not change it
  – although pitch, voice quality, duration and loudness are affected when they are used to express attitude or emotion can be used

• Discourse/information structure
  – because it was designed to account for utterance-level ‘neutral’ intonation
but what it could do

... had I studied it, and found it to be relevant to the phonological structure of intonation:

• Intonational reflexes of discourse and information structure
  – They could be phonological, and part of the intonational grammar, e.g. Focal accents in European Portuguese and Neapolitan Italian are distinct type of pitch accent
  – Or reside in other components of the grammar, and only have a reflex in intonation
  – e.g. Focus realisation in Dutch, which involves gradient variation in peak height rather than a distinct pitch accent
  – e.g. Early focus in French, which probably involve differences in phrasing, entailing the appearance of a nuclear configuration (T*T%), but not a distinct accent category

(As it stands, the grammar assumes they are not)
Conclusion

• Distinguish between different levels of structure in grammar:
  - syntax, metrical structure, semantico-pragmatic structure, discourse and information structure, segmental phonology, intonational phonology (tonal structure, here)

• Together they determine surface realisation of segmental as well as suprasegmental acoustic correlates

• Where mapping relations between the components restrict the possibilities at the phonological as well as phonetic level

• Choice of where particular linguistically relevant distinction resides in the grammar and way in which components interact may vary between languages
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