Preliminary remarks in favour of integrating prosody into the Meaning-Text Theory

Lorraine Baqué & Marta Estrada

Laboratori f/LexSem – Universitat Autònoma de Barcelona
Dept. de Filologia Francesa i Romànica – 08193 Bellaterra (Spain)
lorraine.baque@uab.cat | marta.estrada@uab.cat

Abstract

This paper presents some of the preliminary work carried out at the f/LexSem (Phonetics, Lexicology and Semantics) Laboratory of the Autonomous University of Barcelona, whose goal is to apply a particular theoretical linguistic model, namely the Meaning <=> Text Theory, to a variety of research integrating oral and written resources. After an introduction, we outline the main theoretical and methodological aspects involved in integrating prosody into MTT and propose some new terminology that we believe is necessary for this purpose. We then deal with the central issue of the paper, which is the role of prosodic elements within this linguistic model and their relationship with its various components. We also illustrate our proposals with several examples from different languages.

Keywords

Prosody, Meaning-Text Theory, Prosomorpheme, Prosodeme, Alloprosode.

1 Introduction

It has been frequently observed that studies of prosody develop concurrently with various linguistic theories without, however, being truly integrated into them. We strongly believe that it is vital nowadays to return prosody its rightful place in linguistic models, with the model of interest in our particular case being the global functional language model. In order to do so, it is essential in the first place to clarify the notion of prosody and define properly its different units while distinguishing clearly between phonic substance and what is properly speaking linguistic, and in the second place, to propose a common theoretical and methodological framework.

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1 This study was partly financed by the project 2005SGR01029 and some preliminary findings were presented at the Semantic Relations in Language and Culture Conference hosted by the University of Bialystok, Poland, in 2005.
Consistent with this goal, the present paper will be structured in two parts. In the first, we will present our approach to prosody, our definition of the units to be considered and the associated terminological aspects. In the second, of more programmatic character, our particular hypothesis concerning prosody’s place in the different components and structures of the Meaning ↔ Text Theory will be discussed.

2 Prosody: units and levels of abstraction

When we attempt to include prosody in a linguistic model, we find ourselves confronted with a double difficulty. On the one hand, we lack a formal and sufficiently comprehensive description of the prosody of any given language, with the many existing studies being fragmentary and often contradictory. And on the other hand, we find a widespread rejection of the “technicism” of acoustic studies by non-specialized linguists. Moreover, if acoustic analysis is essential to any research in prosody, it is important to avoid any confusion between prosodic units and their acoustic parameters.

2.1 Terminological aspects

Let us state at the outset that we do not use the term suprasegmentals, preferring instead the term prosody, understood as a set of features of speech including intonation, stress (and tones in the case of tonal languages) and rhythm (Blanco et al., 2006).

Regarding the units of prosody, we propose not to use the terminology conventionally applied in prosodic studies. Instead, we propose a new set of terms, which we define as follows:

- A prosode is any distinguishable prosodic phenomenon. It is characterized by an acoustic and perceptive reality and has a particular set of features, which are intonation level, melodic or intensity glissando, lengthening, loudness and pause.
- The term prosomorph (inspired by Mel’čuk (1993-2000)’s supramorph) will be used to describe elementary signs whose signifier is of a prosodic nature.
- Prosomorpheme will refer to the set of prosomorphs that all have the same signified.
- Finally, a prosodeme will be the set of prosodic signifiers all associated with the same signified. Any of the signifiers in complementary distribution of a prosodeme will be called an alloprosode.

It is important to note that prosodemes may vary considerably, in both nature and domain. Thus, we find intonative prosodemes (including the expressemes – prosodemes that have expressive signifieds – and the wrongly labelled focalization stress) or stress prosodemes.

2 We should emphasise that our use of the term of prosodeme corresponds neither to the meaning proposed by Trager and Smith (1951), i.e. pitch phoneme, nor to that found in Troubetzkoy’s Principles of phonology.

3 Prosomorphemes largely correspond to the intonative morphemes, and the alloprosodes to the intonemes of Rossi (1999).
Furthermore, at the *etic* level there may appear prosodic elements related to rhythm such as realization of secondary stress and melodic ictus.

### 2.2 Theoretical and methodological aspects

Historically, linguists neglected the importance of prosody, making the argument (amongst others) that, in contrast to phonemes, prosodic units were not discrete. Nowadays, it is widely acknowledged that this distinction is due to the fact that prosody was described from the point of view of substance and phonemes from the point of view of form. Nevertheless, in spite of considerable recent efforts (see Rossi), researchers in prosody seem to find it difficult to free themselves from phonic substance, even when they try to describe the linguistic character of prosody. In our view, it is impossible to reintegrate prosody into a linguistic model without drawing a clear distinction, both theoretical and methodological, between these two aspects.

As many of the studies carried out since the 1970s at the Laboratoire Langage et Parole at the Université d’Aix-Marseille (Rossi et al., 1981; Rossi, 1999, etc.) have demonstrated, if the acoustic substance of prosodic phenomena is described/characterized by its values (relative or absolute) of duration, f0 and intensity, this characterisation will describe neither the perceptive reality from the speaker’s point of view (Rossi et al., 1981) nor the linguistic nature of these phenomena. Therefore, it seems logical to postulate that the specific acoustic features of prosody do not intervene until the phonetic level of linguistic representation. Before they reach the phonetic level, prosodic phenomena can be described only in terms of prosomorph(eme)s or, possibly, of prosodes, according to the following definitions:

- **Prosomorph**: a linguistic prosodic sign, i.e. a triplet Y, Z, W where Y is the signified of Z, Z is a prosodic signifier of Y defined as a set of features (Stress, Intonative level, Glissando, Lengthening, Pause) and W is the syntactics of the pair (Y; Z). Two examples for French follow: $\text{prosom}_{\text{neutral question1}} = \langle \text{question}; /CI_1/; \Sigma = \text{without interrogative word}>$, where $\text{CI}_1 = \{\text{Stress; High; Rising; Long; Pause}\}$; $\text{prosom}_{\text{neutral question2}} = \langle \text{question}; /CI_2/; \Sigma = \text{with interrogative word}>$, where alloprosode $\text{CI}_2 = \{\text{Falling ; Long ; Pause}\}$

- **Prosomorpheme**: the set of prosomorphs that all share a single signified. Thus, the prosomorphs $\text{prosom}_{\text{neutral question1}}$ and $\text{prosom}_{\text{neutral question2}}$ are elements of the prosomorpheme $\{\text{PROSOMInterrogation_neut}\}$. The set of signifiers associated with this prosomorpheme would be called prosodeme $\{/\text{CI}/\}$, which includes the alloprosodes $/\text{CI}_1/$ and $/\text{CI}_2/$.

- **Prosode**: any distinguishable prosodic phenomenon. It is defined by an acoustic and perceptive reality and has the following set of features: intonation level, melodic or intensity glissando, lengthening, loudness and pause. Provisionally, we will presuppose that these elements are likely to appear at the higher linguistic level if they are accompanied by a segmental signifier.

Other prosodic units (such as melodic ictus) that are not linguistic signs will appear at the lower levels. In any case, specific acoustic features of prosodic units (i.e. absolute or relative values of duration, fundamental frequency and intensity) will only be established at the last level of representation.
3 The place of prosody in the Meaning <=> Text Theory

It has been several years since various researchers took an interest in the place of prosody within the Meaning <=> Text Theory (see, for example, the works of Gerdes, Kahane or Yoo). Their research highlights the fact that it is essential to introduce prosody at different levels in order to establish a correspondence between meanings and oral “texts”. In general, these researchers postulate the need for a level of topological representation between the surface syntactical and the deep phonological levels. In this paper we endeavour to take a step in that direction, by attempting to determine the place of prosodic units within the structures of the Meaning <=> Text Theory – one of the key goals of our work at the jLexSem laboratory.

As it does not include linguistic signs, the semantic structure cannot include any prosomorphs (and this is also true of the SSem-CommS and RhetS). Thus, no prosodic operation must occur before the transition between semantic and deep-syntactic representations.

3.1 Prosody in the semantic component

In the synthesis direction, our point of departure will be a semantic representation. At this level, the prosodic operation causes prosomorphemes (or prosomorphs) to appear in the deep-syntactic representation, using semantic-prosodic rules that have on the left side a node or configuration of nodes labelled with semantemes and possibly marked for semantic-communicative or rhetoric values. The right side corresponds to a prosomorpheme (or prosomorph) that is part of the deep-syntactic-prosodic structure (DSynt-ProsS) and frames its domain, i.e. the part of deep-syntactic tree affected by this prosomorph(eme).

In the long run, it will be necessary to establish the prosomorphemes (and their prosomorphs) that exist for this component for each language, then denominate and characterize them. However, for the time being, we will provisionally consider French as having the following prosomorphemes: neutral assertive, neutral question and neutral order, which can combine with a finite number of expressemes (to be defined) in a way that allows us to define prosomorphemes such as surprise-assertive, surprise-question (Estrada, 2003), threat-order, supplication, etc. Despite the fragmentary character of this inventory, our hypothesis postulates that the French semantic prosomorphemes would designate a subset of semantic grammatical signification characterizing the logical status of the utterance (‘declarative’, ‘interrogative’, etc.), the illocutive force (i.e. ‘imperative’ mood, ‘optative’ mood understood as the externalization of a desire of the speaker, etc.), the speaker’s attitude towards the described fact (‘pejorative’ or ‘hypocoristic’ evaluativity), and perhaps also evidentiality, in particular when it refers to ‘quotative’, which signals that someone else is the source of the statement made.

As to the RhetS, many hypotheses must be considered: some of the values may condition particular lexical choices in the DSyntS but they can also result in prosomorphs. In this case, we would speak of rhetorico-prosodic rules. It would appear difficult to anticipate the number of possible rhetoric meanings (i.e. “irony”, “reproach”, etc.), but certainly it seems clear that some rhetoric effects can be conveyed by prosody (Fónagy, 1973). This is the case, for example, of request (Léon, 1993), or irony, which is exclusively realized by the prosomorph prosomIrony, whose signifier is the alloprosode (I↓), characterized by a melodic inversion.
Finally, the Sem-CommS allows the encoding of the meanings of communicative types, which correspond to semantic-communicative categories (Mel’čuk, 2001). This information then passes to the DSynt-CommS by means of semantic-communicative rules. It is never until the syntactic level (whether deep or surface) that prosody appears (see below).

3.2 Prosody in the deep-syntactic component

At the DSynt level, the DSynt-Pros rules will label the SSyntS dependency tree with the same values as at the DSyntS dependency tree, though we must bear in mind, however, that pronominalizations and anaphoric deletions may already have occurred. It will ultimately be necessary to make an inventory of different types of DSynt-Pros labels and, contingent upon the types of DSynt relations they present in their respective application domains, match them up with different SSynt-Pros labels and specify their application domain.

For the time being, pending in-depth studies on the subject, we shall resort to a trivial meta-rule that copies DSynt-Pros labels and assigns to them the SSynt subtree that has just replaced, in the SSyntS, the former subtree associated with the label in the DSyntS.

Nonetheless, some of the syntactic-prosodic rules can now be considered. One of several cases that are certainly worth being studied in-depth is the case of the deep-syntactic relation APPEND, which accounts for parentheticals, interjections, direct addresses and the like. Initially, we will associate the alloprosode /θε/ (which corresponds to a melodic lowering) with the corresponding subtree in the SSyn-ProsS to the deep-syntactic subtree labelled APPEND, in such a way that we can account for the differences existing from the prosodic perspective between explicative and restrictive clauses (see Appendix, Fig. 1). However, let us point out that prosodic operations of this type will need to be combined with those which depend on Synt-Comm rules. Indeed, the role of the latter is to transcode in the SSynt-CommS the communicative oppositions encoded in the DSynt-ProsS. In the same way, locutionality seems to have an important role to play in the prosodic form of the explicative clauses mentioned above (Baqué, 2000) in such a manner that the lowered pitch of /θε/ would only be applied to those elements that are communicatively signalled, while the communicated value would prevent such a lowered form from occurring. Consequently, it would be a matter of attributing the alloprosode /Antiθε/ to the SSynt subtree which corresponds to the communicated value most likely to appear in the DSynt-CommS; and in the same way, the label signaled would correspond to the alloprosode /θε/. This procedure would explain the difference between the two utterances described in Appendix, Fig. 2.

Other syntactic-communicative rules would permit the transcoding in the SSyntS of the communicative values that appear in the corresponding DSyntS. Thus, the rhematization prosomorph, whose alloprosode /CC/ is characterized by the set of prosodic features {Stress, Grave, Long, Pause}, would correspond to the label “rheme”. Likewise, the label “theme” attributed to a DSynt subtree would be replaced by the thematization prosomorpheme prosomThemat (often characterized by the alloprosode /θε/), which is attributed to the corresponding SSynt subtree.

In the case of topicalization, defined as a type of thematization with left dislocation, with or without pronominal reinforcement, we would link to it the prosomorph prosomTopR (for referential topic, alloprosode /CTr/) or prosomTopI (for inferential topic, alloprosode /CTi/),
depending on whether it involved a topic whose contextual content was referential (deictic) or inferential (i.e. from which we can deduce that it responds to a previous question).

The label “focalized” of the DSynt-CommS would be transcoded in analogous fashion using the prosomorph \textit{prosomFocal} (corresponding to the alloprosode /AF/, erroneously labelled \textit{focus stress}), defined by the prosodic feature \{High\} on one hand and on the other by a frame of the corresponding SSynt subtree.

### 3.3 Prosody in the Explanatory Combinatorial Dictionary

The nodes of the DSyntR are labels that correspond either to full lexemes or phrasemes, or to the lexical functions. In the former case, they give access to the ECD. Should this occur, the phonologic zone of the dictionary will indicate the existence of phenomena of vocalic quantity, stress, tones, etc.

The Dictionary should likewise indicate if a lexeme or expression presents prosodic characteristics that can help to differentiate it from its paronymes. This may be the case of “accentemes”, in other words, of properties of the inherent lexical stress, which allow us to determine whether they are “intonogenic” or not (marked \('#' \ and \('#'\) respectively in the ECD), and to differentiate, for example, the French phraseme \textit{on ne peut pas se plaindre} ‘I can’t complain’, i.e. everything is fine’ from the free sequence \textit{on ne peut pas se plaindre} ‘complaining is forbidden’ (Mel’čuk et al., 1995), where the contrast is provided by the presence of a single internal intonogenic stress (\textit{plaindre}) in the case of the phraseme, compared with two (\textit{pas} and \textit{plaindre}) in the case of the free sequence (see Appendix, Fig. 3).

It would be desirable to have a more fully developed and formalized prosodic transcription system, comparable to the phonologic and phonetic systems that already exist for the segmental phonic level. Indeed, the majority of existing systems of prosodic transcription (Llisterri, 1994) either are limited in their description – often insufficiently precise, as a matter of fact – of certain acoustic characteristics, or else fail to distinguish clearly enough not only among the prosomorph(eme)s of different linguistic levels themselves but also between prosomorph(eme)s on the one hand and prosodemes or prosodes on the other.

Additionally, the integration of certain prosodic characteristics in the phonic zone of the ECD would be equally important, particularly for speech synthesis applications. Thus, despite the fact that research in the field is still very limited, a coding of stress possibilities, in terms of not only primary but also secondary stress and all the possibilities of stress and destress, could be used to disambiguate homophones (Fónagy, 1980). In French, for example, though the numeral adjective \textit{sept} and the demonstrative adjective \textit{cette} are homophones, in a minimal pair like \textit{Elle a fini par acheter sept épingles} / \textit{Elle a fini par acheter cette épingle}, the former, unlike the latter, is very probably associated with secondary stress. Likewise, in connection with probabilities of destress, the Spanish lexical units \textit{VERDADERO1} and \textit{VERDADERO2} in the two interpretations of the utterance \textit{Mi padre es un verdadero estafador} (‘My father actually is a swindler’ and ‘My father behaves like a real swindler’) could be differentiated by the greater probability of destress in the latter case.

By the same token, some pragmatemes can present encoded prosodies. This can be illustrated by the Spanish utterance \textit{¡Fuego!} When shouted by the commander of a firing squad, it is a synonym for ‘Shoot!’, while \textit{¡Fuegooo!} in another context would mean ‘Help! Fire!’ The
prosomorph associated with each of these utterances is different. In the former case, the ECD should propose the prosomorph of a neutral order, given that it is a pragmateme (which could also be presented as a value of the lexical function Imper applied to disparar ‘to shoot’), while in the latter, prosody is due to the RhetS and can be applied to other wordforms.

Consequently, the ECD should indicate, in the lexical combinatorics zone, whether the value of a lexical function applied to a lexeme has the form of a prosodic type. If this is the case, the node of the DSyntS whose label corresponded to a lexical function would be represented not in the SSyntS but rather in the SSynt-ProsS. Thus, Magn(paciencia) might correspond in SSynt-ProsS to the lemma paciencia ‘patience’ associated with the alloprosode of implication (Delattre, 1966) (see Appendix, Fig. 4).

Thus, as Apresjan (1990) has remarked, it might prove useful to consider numerous prosodic data in lexicography. To avoid any possible confusion, we shall insist that the prosodic data included in the ECD are accessible from DSyntS nodes but are reflected exclusively by labels. The correspondence between the labels and the icons referring more directly to acoustic realities will be ensured later.

3.4 Prosody in the surface-syntactic component

In the transition from the surface-syntactic representation to the deep-morphological representation, a new prosodization operation occurs. This operation is responsible for the formation of constituents. Provided that at the DMorph level there are neither morphologic-communicative nor morphologic-rhetoric nor morphologic-anaphoric structures, we shall define prosodization operations that allow us to assign the relevant prosomorph(eme)s to all the labels of communicative, rhetoric or anaphoric type that are at the SSynt level and are likely to be realized prosodically. The DMorph-ProsS also integrates prosodes created by the SSynt rules called syntagms. These prosodes form part of the signifier of SSynt signs.

We must stress that it is relatively frequently the case that a prosode itself constitutes the signifier of a linguistic sign conveying a communicative signified (i.e. it is an alloprosode). However, communicative signifieds may also have as signifier the combination of a prosode and linear morphological and surface lexical marks (e.g. presentatives in French).

Moreover, between the SSynt and the DMorph levels, rules are realized whose left side corresponds to a SSynt subtree labelled with a prosodeme, while the right side corresponds to a sequence of indexed morphemes and corresponding alloprosodes⁴. Between these two levels there occur syntactic-topological rules which are highly necessary, at least for free word order languages, because they associate alloprosodes with the corresponding sequences of indexed morphemes.

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⁴ This is the case when the conditions of realisation of a prosomorpheme are related to constraints of linearisation or morpheme order, such as: a) The realization of the alloprosode /θɛç/ as a melodic lowering plus a boundary final tone (/cc/) if /θɛç/ appears after /CC/, or as a melodic lowering plus a boundary final tone (/ct/) if /θɛç/ appears after any of the continuative boundaries; b) The lowering of boundary tones /CT⁻²/ in /AC/ within a nominal syntagm; c) The definition of sequences of topicalization alloprosodes (necessarily decreasing sequences) ; d) The deletion of the alloprosodes /CD/ or /CT/ associated with the subjectal SSynt-Rel when the subject is realized by an unstressed pronoun; etc.
We would like to point out that, for languages where the syntactic and the topological constituents coincide, besides the syntactic-prosodic rules properly speaking, it may be possible to define syntactic-prosodic features associated with various SSynt relations. Thus, in French, we would associate the major continuation prosodeme /CD/ (with its alloprosodes /CD/ and /CT/) with the subjectal relation. Likewise, we would associate the alloprosode /CT-2/, which corresponds to the boundary prosomorph between a predicate and its dependencies or between a nominal governor and its syntactic dependencies, with the direct object, completive, indirect object, etc. relations.

It is important to underline at this point that the prosomorphemes at the phrastic level of the SSyntS are already represented in the DMorph-ProsS by alloprosodes (i.e. by more specific prosodic features), while elements at the morphological level are still encoded by the labels indexed to the lexemes corresponding to prosomorphs.

4 Conclusion

In this paper we have merely presented a preliminary overview of the research that will be carried out at the fLexSem laboratory. It is more a description of our programme than a report of results, particularly regarding the place of different prosodic units in each linguistic component, but the proposal of new definitions for clearly distinguished linguistic units of a prosodic nature is intended as a first step towards a better integration of prosody into MTT. Nonetheless, it stands to reason that in order to succeed with this project, not only will we have to conduct new research in prosody itself (for example, to define and formalize the acoustic characteristics of different prosodic units), but also interdisciplinary and more focused studies involving the participation of specialists in semantics, lexicology and phonetics will have to be carried out.

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Appendix

Figure 1. Oscillogram and melodic modelization of French utterances Les enfants qui ont cassé les carreaux ont été punis 1) with a restrictive clause and 2) with an explicative clause.
Figure 2. Oscillogram and melodic modelization of French utterance *Les enfants, qui ont cassé les carreaux, ont été punis* with explicative clauses 1) signaled and 2) communicated.

Figure 3. Oscillogram and melodic modelization of French minimal pair *À l’armée, on ne peut pas se plaindre* with two readings (1) ‘In the army, complaining is not allowed’ and 2) ‘When you’re in the army, you can’t complain (i.e. things aren’t bad)’.

Figure 4. Oscillogram and melodic modelization of Spanish declarative utterances *Tiene mucha paciencia* ‘He/she is very patient’ (neutral) and *Tiene una paciencia!* (implication).