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MAPPING PROSODY AND SYNTAX AS *DISCOURSE STRATEGIES*: HOW BASIC DISCOURSE UNITS VARY ACROSS GENRES[☆]

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ABSTRACT

The aim of this contribution is to explore the identification of different types of basic discourse units (BDUs), and the role they might fulfil in discourse production and interpretation. A sampled corpus of four discourse genres (political address, radio news, conference talk and conversational narration) was annotated both for syntactic units and for prosodic units. The originality of this contribution lies in the mapping of syntactic dependency clauses and major prosodic units giving rise to four types of BDUs: congruent (one-to-one mapping), syntax-bound (one dependency clause cut off into several major prosodic units), intonation-bound (one major prosodic unit enclosing several dependency clauses) and regulatory (one discourse marker or adjunct with prosodic autonomy). Our corpus analysis revealed that prosodic and syntactic units combine in different ways depending on the genre at stake. We propose that each type of BDU represents a *discourse strategy*. We suggest this segmentation method should be used in the frame of discourse models, in order to provide the researcher with established basic units.

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1. INTRODUCTION

Individuals engaged in discourse are involved in a process of interpreting what they hear. We know, since Grice, that this process of interpretation does not rely solely on literal meaning, but that one also builds inferences on expectations, background knowledge, and all sorts of aspects of the form of the message (Gumperz, 2001). We also know that discourse meaning is not restricted to semantic structure, since speakers express personal stance about the events, ideas or persons they speak about. Discourse meaning thus consists of conceptual structures, contextual information (about speakers' attitudes, the situation etc.) and is linked to the management of the ongoing discourse itself (planning, executing and controlling) (van Dijk, 1997: 193).

Moreover, interpreting discourse is also a dynamic process requiring synchronization between speaker and hearer, as well as a temporal processing of linear structures, displayed and perceived within a temporal frame (Auer *et al.*, 1999; Auchlin, to appear). Discourse meaning is construed in a step-by-step process. The identification of discourse units within the discourse flow is essential for understanding and modelling how interpretation occurs, where and when inferences are made, and how each 'piece' of discourse is related to the others in a (more or less) coherent way.

In this context we seek to define 'basic discourse units' (hence BDUs) and to determine the role they play in discourse comprehension and production. Our contribution should be regarded as taking part in the ongoing debate on the nature and status of discourse units (see, Rossari, 1996; Roulet, 2002; Degand and Simon, 2005; Hannay and Kroon, 2005; Steen, 2005).

In our view BDUs constitute the segments that speakers and hearers use to interpret the discourse they are engaged in. We thus aim for a kind of 'minimal discourse interpretation segment' from which a (coherent) discourse representation can be built. Our starting point is the surface analysis of discourse, that is, the syntactic structure and the prosodic realization with their respective boundaries as key elements in deciding where and when a BDU starts and ends. Thus, a BDU is a text segment with linguistic properties which are used to construe both semantic representations and the text and context models at stake (Degand and Simon, 2009). It follows from this that the BDU should not be restricted to the smallest semantic, syntactic, information or conversational unit, nor to any other type of minimal discourse unit (cf. Chafe's (1994) intonation units, Halliday's (1994) tone units, Selting's (2000) turn constructional units or Mann and Thompson's (1988) clauses). Rather, we consider BDUs as the segments speakers and hearers rely on to construct and interpret the ongoing discourse, viz. segments on the basis of which inferential processes can take place. Thus, in view of its syntactic and prosodic completeness, the BDU would represent an input to the inference process given the specific discourse situation; these segments may be very short, but they may also be fairly long, sometimes comprising internal (local) coherence relations. What is relevant here is that speakers segment their discourse in such a way that it helps hearers build a coherent representation of the discourse situation, and it is these

segments which we would like to uncover. As such, our BDUs come close to Steen's (2005) notion of 'basic discourse act' developed in a discourse cognitive perspective.

In this paper, we would like to develop this thorny issue of identifying BDUs and of determining their function in discourse along two lines. First, we hypothesize that BDUs are formatted differently according to the discourse genre at stake, thus giving information about the strategies speakers use to organize information, put some elements in the foreground or in the background, manifest attitudes etc. Second, BDUs of different types should contribute differently to the construction of discourse meaning (at a propositional, interpersonal and textual level).

Our paper is organized as follows. In Section 2 we summarize the methodology underlying the identification of BDUs. We then turn to the empirical analysis of four genres (political address, radio news, conference talk, conversational narration) in Section 3, and report on similarities and divergences in the distribution of BDUs across our four sub-corpora. In Section 4 we pursue a qualitative analysis of the discourse strategies underlying the different types of BDUs and relate these to the genres they occur in. Section 5 ends with a number of concluding remarks.

2. MAPPING PROSODY AND SYNTAX

Neither the morpho-syntactic structure, nor the prosodic arrangement of spoken speech, is sufficient in itself to provide for an efficient method for segmenting discourse into basic units. A short example, taken from conversational data (from the VALIBEL Database, corpus blaJV11; Dister *et al.*, 2009), will illustrate this point. In this example, square brackets delimit independent syntactic units and angle brackets enclose 'discourse markers', that is, elements that do not enter into a syntactic dependency relation (see Section 2.1). Syntactic segmentation provides six complete units and two interruptions (or self-repair)¹ (*elle* and *elle a sa t/*)

- | | | |
|-----|-------------------------|-----------------------------|
| (1) | [elle est à la masse] | [she's crazy] |
| | [elle m'énerve] | [she gets on my nerves] |
| | < franchement > | < frankly > |
| | [je vois ma grand-mère] | [I see my grandmother] |
| | [elle] | [she] |
| | [elle a mal partout] | [she feels pain everywhere] |
| | < mais > | < but > |
| | [elle a sa t/] | [she has her h/] |

¹ Without access to prosodic information, 'elle' can be interpreted as a duplication and hence focus of the subject (*elle, elle a mal partout*) or as an interruption. The latter is to be retained here, since 'elle' ends with a glottal stop typical for interrupted elements, and is followed by a pause.

<enfin>	<I mean>
[tu vois]	[you see]
[elle est encore juste]	[she's still OK]
<quoi>	<you see>

We will not address the problem of interruptions here. Nevertheless, even syntactically well-formed units cannot be considered to be presented by the speaker as autonomous and self-contained units, capable of entering ‘in their own right’ into a discourse relation. On the other hand, using the prosodic structure of the same fragment yields four major intonation units. In example (2) /// indicates a major prosodic boundary (see Section 2.2).

- (2) elle est à la masse elle m'énervé ///
she's crazy she gets on my nerves ///
 franchement je vois ma grand-mère elle ///
frankly I see my grandmother she ///
 elle a mal partout ///
she feels pain everywhere ///
 mais elle a sa t/enfin tu vois elle est encore juste quoi ///
but she has her h/ I mean she's still OK you see ///

This raises the question whether the pronoun *elle* at the end of line 2 should be part of the unit in line 3, since *elle* on line 3 resumes the interruption on line 2 and recycles the pronoun. In that case prosodic segmentation would be closer to what we intuitively consider to be ‘discourse units’ related by coherence relations (consequence, topicalization, contrast etc.). This is not the case when prosody breaks up a cohesive syntactic unit into prosodic chunks, like in example (3) (Simon, 2004):

- (3) et cette connaissance se fait écraser ///
and that acquaintance gets run over ///
par un bus ///
by a bus ///

In this case, *par un bus* will often be described as an ‘increment’ (Schegloff, 1996), and we would argue that there is no discourse relation between the first and the second prosodic unit other than a late addition to be interpreted as belonging to the previous syntactic host (Couper-Kuhlen and Ono, 2007).

These observations lead us to take into account the interplay between syntax and prosody for delimiting BDUs. Other linguists paved the way (see Halford, 1996; Esser, 1998; Selting, 2000). We propose a systematic procedure for mapping prosody and syntax. Our method delimits BDUs and classifies them according to interaction patterns in syntax and prosody. Details about the methodology are given elsewhere (Degand and Simon, 2009; Mertens and Simon, 2009). Here we

will restrict ourselves to an overview of the basic principles. Our method consists in a two-level annotation, in (syntactic) dependency clauses and in (major) prosodic units, and a subsequent mapping between these two levels. The two types of annotation are performed independently.

2.1. Syntactic annotation

The syntactic annotation was entirely manual following the theoretical principles of dependency syntax (for applications to spoken French, see e.g. Blanche-Benveniste *et al.*, 1990; Berrendonner, 1990, 2002; Blanche-Benveniste, 2002a, b; Deulofeu, 2003). Its input is an orthographic transcription of the discourse at stake. Its output is a so-called ‘dependency clause’ which demonstrates maximal syntactic completeness (‘maximalité syntaxique’, cf. Berrendonner, 2002: 24) as its internal structure is built on dependency relations between its parts, and no external relations of the same type. The starting point of the analysis is thus a verbal micro-syntax in which the verb and its governed complements are central. This micro-syntactic analysis results in segmentation into four types of dependency clauses (in square brackets in the examples below): (i) complete dependency clauses (example (4)), (ii) averbal dependency clauses (5), (iii) elliptical dependency clauses (6) and (iv) interrupted dependency clauses (7). The eventual segmentation leaves us with a number of ungoverned segments, which belong to the macro-syntax rather than to the micro-syntax. They comprise so-called ‘associés’ (adjuncts) and discourse markers, which are not governed by the main verb, but are semantically or pragmatically linked to the whole dependency clause² (in angle brackets in the examples below). They have a non-autonomous status in discourse, whilst being syntactically independent (e.g. (8)).

- (4) [l’annonce de la grève a eu pour premier effet d’augmenter encore un peu plus le prix du cuivre sur les marchés]
[the announcement of the strike resulted immediately in a rise of the price of copper on the markets] (radio news)
- (5) [chères et chers compatriotes]
[dear fellow countrymen] (political address)
- (6) <et> [de les féliciter pour cette initiative]
<and> [to congratulate them for this initiative] (political address)
- (7) [on est parti au mois de juillet pendant -]
[we left in the month of July during] (conversational narration)
- (8) <alors euh> [c’était l’été dernier]
[well er it was last summer] (conversational narration)

² Blanche-Benveniste *et al.* (1990) consider those elements as ‘préfixe’ or ‘postfixe’, depending on their front or back position. They establish a pragmatic relationship to the main clause.

A final step in the syntactic annotation process consists in cutting up each dependency clause into so-called ‘functional sequences’, that is, clausal constituents that occupy a main syntactic function like verb, subject, object etc. (Bilger and Campione, 2002: 119). Thus functional sequences correspond either to the arguments of the predicate or to governed elements in the clause, among which we distinguish: verb (SV), subject (SS), object (SO), (weak) governed constituent (SR) and insert. We put them in parentheses in example (9):

- (9) [(au Chili_{SR}) (la plus grande mine de cuivre du monde située dans le nord du pays et appartenant à un consortium anglo-australien_{SS}) (est à l’arrêt_{SV})]
 [(in Chile) (the biggest copper mine of the world located in the North of the country and belonging to an Anglo-Australian consortium) (is at a halt)] (radio news)

The functional sequence annotation is fairly simple, in that it is not in need of complex syntactic annotation, in contrast to traditional grammar where each element needs a specific syntactic tag. The main reason for selecting this type of functional sequencing is that it gives rise to functionally unified sequences for which it is worthwhile to investigate whether they receive their own prosodic contours (cf. *infra*), and whether the position they occupy within the dependency clause influences these prosodic patterns (Degand and Simon, 2008).

2.2. Prosodic annotation

Prosodic annotation is far from being well established. To date there is no consensus on a received prosodic model for French, neither on a set of prosodic tags for coding the main prosodic units in French. An additional difficulty comes from the fact that manual annotation of prosodic contours, variation in tempo or pauses are reputed to be inconsistent and arbitrary when made by different transcribers (Kelly and Local, 1989: 204, cited by Hutchby and Wooffitt, 1998: 77).

Our approach to BDU’s does not hinge on the choice of a particular intonation analysis. For our purpose, a prosodic segmentation procedure should comply with three requirements: (1) prosodic segmentation should be reliable and, therefore, semi-automatic and/or relying on explicit rules and acoustic correlates; (2) prosodic segmentation should be as independent as possible from syntactic analysis; it should not take syntactic constituents or domains as an input for prosodic analysis;³ (3) prosodic segmentation should provide us with major intonation units, that is, units working at the level of discourse production and interpretation (and not, e.g. at the level of words’ recognition).

³ The autosegmental accounts that have been proposed for French could probably be applied with similar success here (Post, 2000; Di Cristo and Hirst, 1996; and perhaps Jun and Fougeron, 2000), lest that these methods partially hinge on syntactic constituency or semantic analysis for interpreting prosody (Delais-Roussarie and Post, 2008).

For these reasons, we adopt a semi-automatic prosodic annotation procedure developed by Mertens and Simon (2009). The annotation procedure goes as follows. The speech signal is first aligned at a segmental level with a phonetic transcription,⁴ and is then syllabified. Nuclei of syllables are identified and the f_0 is stylized, in order to eliminate f_0 jumps or false detection of pitch. Each syllable is then automatically processed⁵ in order to retrieve the following information: the presence of subsequent pauses; the presence of hesitations, pronounced as a half-open mid or front vowel (euh); syllable lengthening, measured as syllable duration prominence in a close context; pitch prominence and intra-syllabic pitch rise (glissando).

A major prosodic boundary (///) is established when one of the following cues is detected on the final syllable of a word:⁶ a subsequent silent pause longer than 250 msec; an extra-lengthening (the syllable is 3 times longer than the syllables in the context); a sharp rise of f_0 (intra-syllabic f_0 rise between 5 and 10 semi-tones), even when f_0 rise does not correlate with the lengthening of the syllable. We manually exclude a boundary which coincides with a hesitation mark ('euh' particle or vowel extra-lengthening with a level contour, and creaky voice), since it has been demonstrated that hesitations are not confounded with prosodic breaks in discourse processing (Duez, 2001).⁷ This automatic annotation procedure was successfully compared to manual annotation and proved to be reliable: 85.5% of the actual major prosodic boundaries were automatically detected (see Mertens and Simon, 2009).

In conclusion, we may say that our major prosodic units roughly correspond to the intonation *période* of Lacheret-Dujour and Victorri (2002). Unlike many authors (Delattre, 1966; Mertens, 1993; Esser, 1998; Rossi, 1999; Moneglia and Cresti, 2005; Delais-Roussarie and Post, 2008), we do not make a distinction between terminal (falling) and non-terminal (rising) contours, although we agree that falling and rising tones cue different syntactic or discourse functions. Taking the type of tone into account would lead us to a finer distinction, which is however not required for our present purposes.⁸

⁴ Alignment is carried out using the script EasyAlign (Goldman, 2008), running into Praat (Boersma and Weenink, 2008).

⁵ Using a Praat script written by P. Mertens (see Mertens and Simon, 2009).

⁶ When the last syllable is a schwa (e.g. *c'est dingue* [sɛ.dɛ̃.g?]), the penultimate syllable is taken into account. The reason is that primary accentuation in French occurs on the last syllable of lexical words (Lacheret-Dujour and Beaugendre, 1999) and is responsible for the perception of prosodic boundaries.

⁷ 'Par exemple, dans une expérience d'écoute et de reproduction de phrases, Martin et Strange (1968a) notent que les auditeurs ont tendance à déplacer aux frontières syntaxiques les hésitations produites par les locuteurs à l'intérieur des syntagmes' (Duez, 2001: 122).

⁸ In some systems (e.g. Rossi, 1999) additional categories exist for minor conclusion and for parenthesis. This is the case for the reference corpus for Romance languages (C-ORAL-ROM) that was manually tagged by discriminating between two hierarchical levels: terminal (/) and non-terminal (/) prosodic breaks; additional symbols were used for false start, interruption or repetition (Moneglia and Cresti, 2005: 25–26). Automatic annotation of intonation by Campione (2001: 181) distinguishes

2.3. Types of basic discourse units

Once the syntactic dependency clauses and the major intonation units are identified, mapping of these two levels can take place. We propose that the BDU results from coinciding syntactic and prosodic boundaries. Thus, a syntactic dependency clause is not a BDU if its boundary does not map onto a prosodic boundary. Similarly, if a major intonation unit boundary does not correspond to a syntactic dependency frontier, it does not give rise to a BDU either. Our definition of BDU is very close to Halford's notion of talk unit:

The talk unit is the maximal unit defined by syntax and intonation. Neither may a single prosodic presentation ever be analysed as more than one talk unit nor may a single self-contained syntagm form the base of more than one talk unit. In other words: several syntactically unrelated phrases can be linked by prosodic features, and two or more independent prosodic presentation units may be linked by virtue of spanning one syntagm. (Halford 1996: 43)

Mapping of the syntactic units and the prosodic units gives rise to four different BDU types.

1. Type 1 is the congruent BDU, or BDU-c (one-to-one mapping): a BDU with congruent mapping between syntax and prosody, in the sense that each syntactic unit (dependency clause) realizes one major prosodic unit (example (10)).
2. Type 2 is the 'syntax-bound' BDU, or BDU-s (one-to-many mapping): a BDU uttered in such a way that the speaker pronounces one syntactic unit into successive prosodic units (example (11)).
3. Type 3 is the 'intonation-bound' BDU, or BDU-i (many-to-one mapping): a BDU uttered in such a way that the speaker groups two or more syntactic units into one prosodic unit (example (12)).
4. Type 4 is the 'adjunct' BDU, or BDU-a: a BDU resulting from the mapping between a major intonation unit and an (isolated) adjunct or discourse marker (example (13)).

- (10) [(Madame Ebadi) (a annoncé) (son intention de contester cette décision)] ///
 [(Mrs Ebadi) (has announced) (her intention to contest the decision)] /// (radio news)
- (11) [(demain davantage qu'aujourd'hui) (je souhaite que) (l'Europe /// soit capable /// d'assurer sa sécurité /// de façon /// autonome)] ///
 [(tomorrow more than today) (I wish that) (Europe /// would be capable /// of assuring its security /// in an autonomous /// way)] /// (political address)

between seven pitch levels, which are not considered as hierarchical levels of boundary, but in need for further interpretation. The inventory of melodic contours proposed by Delais-Roussarie and Post (2008) for Intonation Groups also distinguishes between terminal and non-terminal.

- (12) [(ça m'était jamais arrivé)] [(j'ai commencé à pleurer) (tout de suite)] <quoi> ///
 [(it had never happened to me)] [(I started crying) (immediately)] <you see> ///
 (conversational narration)
- (13) <en fait> ///
 <actually> /// (conference talk)

The BDU segmentation of our data is performed automatically by means of a script running under Praat. It leaves us with a kind of 'left over category' which we did not really expect, and which we have called the 'mixed' BDU, or mix between the intonation-bound and syntax-bound BDU (many-to-many mapping). It results from segments which contain several syntactic units and several prosodic units before reaching completion, that is, a coinciding syntax/prosody boundary (example (14)).

- (14) [(minimalement) (on a besoin) (d'un alignement syllabique /// donc basé sur une
 transcription phonétique /// du signal de parole et une stylisation de la F zéro)] [(je vais
 vous donner) (un exemple) (tout à l'heure)] ///
 [(minimally) (one needs) (a syllable alignment /// hence based on a phonetic
 transcription /// of the speech signal and a stylization of F zero)] [(I will give you) (an
 example) (later)] /// (conference talk)

For reasons to be explained later on (Section 4) we will not consider mixed BDUs to be strategic discourse units, but will nevertheless retain them in our data analyses. For now, we will consider them as resulting from production difficulties, rather than from strategic discourse planning. In contrast we assume that the remaining four types of BDUs do play a strategic role in the discourse structure and information flow. At this stage, we would like to hypothesize that the type of BDU varies across genres, obeying a number of pragmatic strategies proper to each type of BDU.

3. BASIC DISCOURSE UNITS ACROSS GENRES

3.1. Data

We conducted a comparative study aiming at describing the types of BDU occurring in four different genres of discourse. Our conception of genre is in keeping with authors (e.g. Miller, 1984; Martin, 1985, 1997; Swales, 1990) who conceptualize genre as goal-directed, linked to a communicative purpose. Following this criterion, we selected four genre samples in the C-PROM corpus (Simon *et al.*, 2008): political address, talk at a conference, radio news and conversational narration. If these discourse samples do indeed belong to four different genres, they should according to Askehave and Swales' (2001) 'text-driven procedure for genre analysis' (p. 207) diverge in their communicative purpose, content, structure and style. It is our aim to show in the

following that the distribution of BDUs in our sample tells us something about the structure and style of our different genres.

Our data comprise 12 recordings, belonging to each of the mentioned genres. Each genre is represented by 3 French-speaking speakers originating from France, Switzerland and Belgium. Political addresses were held by the head of state on an official occasion (e.g. the speech of the French President on the 14th of July in France). Conference talks were recorded at a conference in linguistics and are uttered by researchers giving a talk in a plenary session. Radio news samplings were taken from news broadcasts on national channels. Conversational narrations were produced by young speakers (about 20 years old) in a semi-natural situation: young people were asked by a friend to tell a personal story, leading the discourse situation to be monologue-like even if it took place in a conversational setting. The corpus is 43-min long. Each genre is represented by three samples of minimally 10 min of speech. Table 4.1 reviews the length and number of words per genre.

Applying the methodology described in Section 2, each of the sub-corpora was segmented into BDUs. For each BDU the resulting annotation file gives its internal syntactic and prosodic structure. Taking the different genres into account we will first comment on the syntactic and prosodic structure of these BDUs, and then turn to the distribution of the different types of BDUs (as defined in Section 2.3).

3.2. Syntactic and prosodic description of BDUs

A first observation to be made is that the different genres cut up the discourse in diverging ways (see Table 4.2). Remember that each of the four corpus samples covers approximately 600 sec of speech (10 min). As far as the mean length of syntactic units is concerned, conversational narration takes up a separate position with short dependency clauses (6.2 words per DC), while political address, radio news and conference talk are fairly similar in style with a high number of words per dependency clause (respectively 15.6, 16.7 and 15.1 words per unit).

This similitude between political address, radio news and conference talk disappears when one considers the average number of words in BDUs in the three genres. This means that speakers in the three genres do not combine syntactic units into discourse units in the same way (see

Table 4.1. Length and number of words per sub-corpus

Genre	Political address	Radio news	Conference talk	Conversational narration	Total
Duration (sec.)	636	621	687	622	2566
No. of words	1440	2012	2135	2250	7837
No. of BDUs	85	98	79	145	407

Table 4.2. Mean length of sequences, dependency clauses (DC) and BDUs per genre

Genre	Political address	Radio news	Conference talk	Conversational narration
No. of words/BDU	16.9	20.5	26.7	16.2
	(11.1)	(12.3)	(17.8)	(11.1)
No. of words/DC	15.6	16.7	15.1	6.2
	(11.1)	(11.3)	(13.7)	(6.3)
No. of words/ sequence	6.0	5.6	6.9	3.6
	(7.1)	(6)	(9.3)	(3.2)
No. of DC/BDU	1.1	1.2	1.7	2.4

Note: Standard deviation appears (in italics).

Section 3.2.2). With regard to the number of words per BDU conversational narration (16.2 words/BDU) is closer to political address (16.9 words/BDU), while conference talk demonstrates a very high mean (26.7 words per BDU). Note however that the standard deviation is very high, indicating that conference talks contain BDUs of very varying number of words.

At the prosodic level, we also expect differences between the four samples (Hirschberg, 2000). Interestingly, the mean duration of prosodic units (i.e. major plus intermediate prosodic units) is fairly the same within the four sub-corpora (between 1.8 and 2 sec and between 7.8 and 8.9 syllables per prosodic unit). On the other hand, the duration of major prosodic units is more variable as it ranges from 2.6 to 4.1 sec and from 9 to 20 syllables per unit, political addresses having the shorter units, and conference talks the longer ones.

Table 4.4 shows that BDUs have a mean duration of 4.3 sec in narratives, followed by radio news (6.3 sec) and political addresses (7.5 sec); the longest BDUs (8.9 sec) are found in conference talks.

Combining the information from Table 4.2, Table 4.3 and Table 4.4, we can describe each genre briefly. Political discourse demonstrates the lowest speech rate (3.4 syllables per second) and the lowest articulation ratio, meaning that the heads of state, on official occasions, speak slowly and insert lots of silent pauses, creating formal style (see Simon *et al.*, to appear). Conversational narration has a low speech rate and a low articulation ratio as well, which correlates with the spontaneity of unprepared speech.⁹ This difference in style is confirmed by the

⁹ Conversational narration has 19.2 hesitation marks (like ‘euh’ particles) per minute, while political address has only 0.09 (see Simon *et al.*, to appear).

Table 4.3. Speech rate (number of syllables per second), articulation ratio (proportion of articulated speech vs. silence) and mean length of prosodic units (in seconds and number of syllables)

Genre	Political address	Radio news	Conference talk	Conversational narration
Speech rate (syll./sec.)	3.4	5.0	4.4	4.0
Articulation ratio (%)	68.4	86	81	69.5
No. of major prosodic units	241	210	151	172
No. of intermediate prosodic units	322	374	339	336
Mean duration of major prosodic units (sec.)	2.6	3.3	4.1	3.6
Mean duration of intermediate prosodic units (sec.)	2.0	1.8	1.8	1.9
Mean no. of syllables per major prosodic unit	9.0	14.8	20.0	14.3
Mean no. of syllables per intermediate prosodic unit	6.8	8.3	8.9	7.3

Table 4.4. Mean length of BDUs, in seconds and number of syllables

Genre	Political address	Radio news	Conference talk	Conversational narration
Mean duration of BDUs (sec.)	7.5	6.3	8.6	4.3
Mean nb of syllables per BDU	25.6	31.7	38.3	16.9

mean length of dependency clauses in political address (15.6 words) compared to conversational narration (6.2 words), the former demonstrating long and complex syntactic units, the latter short units. One could derive from this that the speaking style in political addresses is slow, segmented in fairly long BDUs (7.5 sec in average), which are pronounced in a unified way (few hesitations). On the other hand, conversational narration has a slow speech rate due to hesitation, and the

resulting BDUs are shorter (4.3 sec in average). Radio news stands out with a high speech rate (5 syllables per second) and articulation ratio (86%). It could thus be very preliminary sketched as rapidly spoken political address! In comparison to the other genres, conference talk is to be characterized by an intermediate speech rate (4.4 syllables by second), the highest mean number of words per BDU (26.7), and the longest BDUs in our data (8.6 sec). Speakers appear to produce their discourse units with higher density and complexity, and this is confirmed when looking at the mean number of words per sequence (6.9). Speakers seem to deliver dense discourse units while taking their time to formulate their ideas.

3.3. Distribution of BDU types across genres

Let us now turn back to the different BDU-types present across our sub-corpora.

Table 4.5 displays an overview of the different types of BDUs encountered across our different sub-corpora. Looking at the figures overall we notice that congruent BDUs are most frequent and cover more than one third of the cases, followed by syntax-bound BDUs in more that one quarter of the BDUs overall, and close to one fifth for the intonation-bound BDUs. These three types may thus be considered as the major BDU-types,¹⁰ at least in terms of frequency. Adjunct BDUs and mixed BDUs, then, are clearly less often used in our corpus (6% and 9%, respectively, of our overall score).

Table 4.5. Distribution of BDU-types across genres ('c' congruent, 's' syntax-bound, 'i' intonation-bound, 'x' mixed and 'a' regulatory)

Genre	Political address	Radio news	Conference talk	Conversational narration	Overall
BDU c	28 (33%)	51 (52%)	26 (33%)	49 (34%)	154 (38%)
BDU s	48 (56%)	26 (27%)	29 (37%)	11 (8%)	114 (28%)
BDU i	3 (4%)	7 (7%)	4 (5%)	62 (43%)	76 (19%)
BDU x	2 (2%)	11 (11%)	16 (20%)	10 (7%)	39 (9%)
BDU a	4 (5%)	3 (3%)	4 (5%)	13 (9%)	24 (6%)
Total	85 (100%)	98 (100%)	79 (100%)	145 (100%)	407 (100%)

¹⁰ Note that in prior work we distinguished only these three types (Degand and Simon 2005, 2008, 2009).

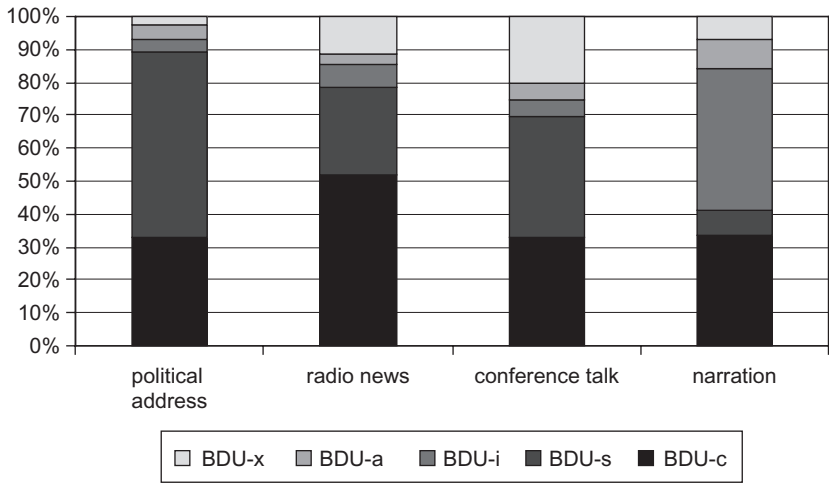


Figure 4.1. Internal distribution of BDU-types across genres.

From a genre-driven perspective, it is more interesting to find out whether the different genres present in our data present divergences with respect to the distribution of the different BDU-types. If this is the case, this would give us additional (linguistic) evidence that we have to do with distinct genres. And indeed, our four genres do privilege different BDU configurations ($\chi^2 = 144.922$ (df = 12), $p < .0001$). The statistic analysis confirms that narration stands out from the other genres. It has significantly less syntax-bound BDUs ($Z = -4.6$),¹¹ and significantly more intonation-bound BDUs ($Z = +6.7$). The other discourse genres also demonstrate a number of peculiarities. Radio news speech is characterized by a significantly higher number of congruent BDUs ($Z = +2.3$), political address has significantly more syntax-bound BDUs ($Z = +5.0$) and significantly less mixed BDUs ($Z = -2.2$), while conference talk shows a high number of mixed BDUs ($Z = +3.1$) (Figure 4.1).

In sum, these results seem to confirm that the different genres in our sample obey to different production rules. Conversational narration is the more informal genre in our comparison, characterized by a lower degree of complexity that results in a low articulation ratio and short syntactic units leading speakers to deliver their message in dense BDUs presenting several syntactic units as one and only one information unit. Political address, on the other hand, demonstrates very formal and well-prepared scripted speech. Here the opposite tendency can be observed. The speakers deliver their message in a solemn way, speaking slowly, and creating the

¹¹ The Z-score gives the probability that a particular score will occur. A Z-score from ± 1.96 is significant at the 0.05 level, ± 2.58 at the 0.01 level and ± 3.29 at the 0.001 level.

possibility to break up their syntactic units into several prosodic units. Radio news speech is a typical written-to-be-spoken type of discourse where we encounter most congruent units, reading being supported by typographic punctuation units. Conferences, then, show a high degree of mixed BDUs, a combination of syntax-bound and intonation-bound units. Our preliminary explanation would be that this results both from the fair complexity of the information to be delivered and from the lack of written support, leading to hesitations, afterthoughts and the like (cf. the low articulation ratio).

Although this preliminary analysis gives us a general overview of the speaking styles present in our genres, they are not very useful when it comes to determine whether these speaking styles are related to specific discourse strategies, viz. whether they can be functionally motivated. In the following section, we remedy to this by giving a qualitative analysis of the different strategies that seem to underlie the use of one type of BDU over another.

4. DISCOURSE STRATEGIES UNDERLYING THE USE OF BDUs

A deeper qualitative analysis of our data suggests that each type of BDU is designed to fulfil specific functions in discourse production and interpretation (Table 4.6). Remember that BDUs are conceived of as discourse interpretation segments, viz. the segments the speaker presents to the hearer as relevant for the interpretation process and inference drawing. Each type of BDU has

Table 4.6. Summary of discourse strategies fulfilled by BDUs

Congruent BDUs
Display information in a neutral and straightforward way (unmarked basic discourse unit)
Intonation-bound BDUs
Create a macro information unit
Syntax-bound BDUs
Signal “didactic” style
Signal emphasis
Signal discourse planning
Regulatory BDUs
Focus on the (coherence and/or information) structure of the discourse under construction

been categorized according to one or several strategies attributable to the speaker. They are commented on in the remainder of this section.

4.1. Congruent BDUs

One-to-one BDUs are considered unmarked, because intonation matches syntax in such a way that it produces a neutral piece of discourse. In his predictive approach to the analysis of the intonation in discourse Mertens (2006, 2008) uses speech synthesis in order to produce neutral utterances: each syntactic clause is delimited by a prosodic boundary of which the degree depends on its position in the superordinate sentence, and each sentence is separated from the following by a major prosodic frontier. This type of discourse corresponds exactly to the syntax/prosody mapping criteria leading to the identification of our congruent BDUs (see also Steen's (2005) 'typical' basic discourse acts or Delais-Roussarie and Post's (2008) *Groupe Intonatif GI_{SYNT}* entirely determined by syntax).

In our data, 52% of the BDUs in radio news are congruent BDUs. This is not surprising since radio news is scripted speech, produced at a high speech rate. The other three genres display roughly the same percentage of congruent BDUs (between 33% and 37%). However, the syntactic structure of congruent BDUs differs considerably: while BDUs in political addresses or conference talks (examples (15–16)) mostly contain a noun phrase in subject position (*la question* 'the issue', *de nombreux territoires* 'many territories'), conversational narrations (example (17)) prefer pronominal subjects (*ça* 'it'), with an unaccented pronoun included within the verbal clause.

- (15) [(la question) (est) (exactement la même pour les enseignants de langue)] ///
 [(the issue) (is) (exactly the same for the language teachers)] /// (conference talk)
- (16) [(de nombreux territoires) (sont ravagés) (par des guerres civiles)] ///
 [(many territories) (are devastated) (by civil wars)] /// (political discourse)
- (17) [(ça sera pas moi)] ///
 [(it will not be me)] /// (narrative)

4.2. Intonation-bound BDUs

Several syntactic clauses are grouped together in the so-called intonation-bound BDU. This strategy allows the speaker to create an 'information-driven' macro discourse unit: at least two separate dependency clauses are conveyed in 'one go' as if it were a single information unit. This strategy is seldom found in the more 'formal' genres in our corpus (it ranges from 4% to 7% in political address, conference talk and radio news). A possible explanation for this lack of intonation-bound BDUs in these three genres is that discourse relations are explicitly signalled by the use of discourse markers, and that the discourse progression is transparent and regular.

In conversational narration, on the other hand, no less than 43% of the BDUs are made of independent syntactic clauses grouped by intonation. Following Koch and Oesterreicher (2001: 592) conversational style makes this possible:

La contextualisation multiple et souple de l'immédiat crée une cohérence *sui generis* [...]. Celle-ci n'est pas moins efficace que la cohérence unidimensionnelle et relativement rigide de la distance, où le sujet parlant se voit obligé de produire un texte achevé et bien structuré.

In other words, by using intonation for grouping unrelated syntactic clauses the speaker can signal in an alternative way that a coherence relation should be established between the clauses. Since intonation grouping indicates that several clauses have to be interpreted as one information unit, we would speculate that the underlying coherence relation will not be acting on a global level. It should rather be restricted to the local discourse level, in particular to presentational relations, in the sense of Mann and Thompson (1988), such as elaboration, summary, commentary. Taboada (2006: 589) does indeed suggest that presentation relations are less often signalled than subject matter, i.e. 'content' relations. Disentangling this issue is however beyond the scope of this article. We will simply illustrate our point with a couple of intonation bound BDUs involving a list relation (18) and a comment relation (19).

- (18) [(il pleuvait)] [(je voyais) (rien)] [(c'était) (un une arrivée assez bizarre)] [(je dois dire)] ///
 [(it rained)] [(I didn't see) (anything)] [(it was) (a a fairly strange arrival)] [(I must say)] /// (conversational narration)
- (19) <et> [(la fonction du didactique) (c'est) (une fonction euh extra euh phonologique) (si on veut)] [(puisque elle est destinée à montrer où à faire exister une communauté d'appartenance)] [(j'ai dit) (tout à l'heure) (une profession ou des choses comme ça)] ///
 <and> [(the didactic function) (it is) (a er extra er phonologic function) (if you want)] [(since it is designed to show or to enact a social community)] [(I said) (a few minutes ago) (a profession or things like that)] /// (conference talk)

It is worthwhile mentioning a final observation. In narrations, in particular, reported discourse hardly ever occurs in indirect discourse. It mostly occurs in direct discourse without the subordination marker between the *verbum dicendi* and the reported discourse proper (example (20)). This again leads to the use of the intonation-bound BDUs.

- (20) <puis> [(je crie) (dans toute la maison)] [(il y a euh il y a) (Éric qui va avoir un bébé et tout)] ///
 <then> [(I shout) (through the whole house)] [(it's er) (Éric who is going to have a baby and all that)] /// (conversational narration)

4.3. Syntax-bound BDUs

The third type of BDU is syntax-bound. A single syntactic unit is cut into several major intonation units, resulting in a fragmented discourse unit. We hypothesize this type of BDU conceals three distinct strategies, depending on the syntactic location of the prosodic boundaries (cf. *infra*). Three out of the four genres investigated show regular use of the syntax-bound units (cf. Table 4.5 *supra*), but they make use of them for different communicative purposes. Figure 4.2 shows that the ‘didactic strategy’ is frequent in radio news (66% of the 26 BDU-s) and political address (67% out of 48), while the ‘planning strategy’ is fairly frequent in conference talk (34% out of 29), and is completely absent from political address. The ‘emphatic strategy’ is the least frequent in radio news (21%). It represents about a third of the syntax-bound BDUs in political address and conference talk.

We call ‘**didactic**’ the strategy which consists in prosodically isolating syntactic constituents within a BDU. A typical example is found in political discourse, where the very slow speech rate allows the speaker to distribute silent pauses after each syntactic chunk, like in example (21).

- (21) [(c’est précieux) /// (parce que cela permet d’apprécier /// la créativité /// de chaque communauté) /// (political discourse)
 [(it is valuable) /// (because it allows to appreciate /// the creativity /// of each community)] (political address)

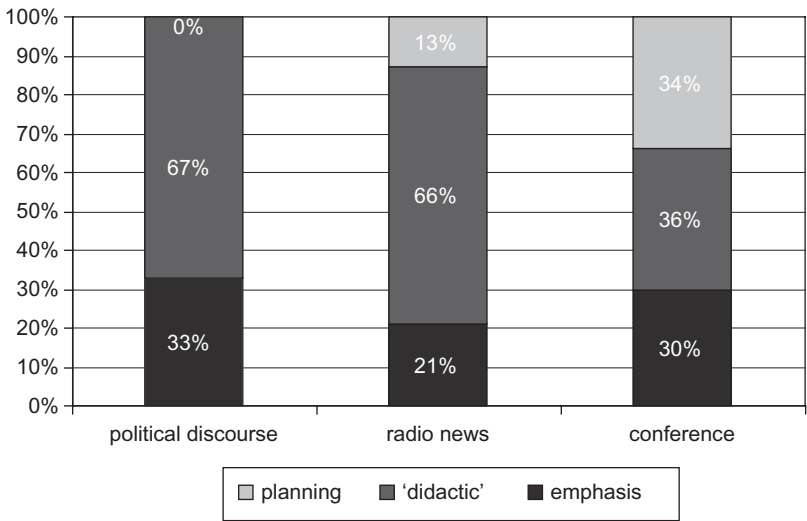


Figure 4.2. Strategies by the syntax-bound BDUs in three genres.

This didactic strategy is also very frequent in radio news. Because of the high density of information in news texts, the didactic style allows the journalist to focus on one piece of information after another (example (22)).

- (22) [(au Chili) (la plus grande mine de cuivre du monde située dans le nord du pays et appartenant /// à un consortium anglo-australien) /// (est à l'arrêt)] ///
 [(in Chile) (the biggest copper mine of the world located in the North of the country and belonging /// to an Anglo-Australian consortium) /// (is at a halt)]

Emphatic style arises when prosodic boundaries are located at an unexpected position, such as within syntactic sequences and between strongly linked constituents, for example between a noun and its apposition (23).

- (23) [(font partie) /// (non seulement de sa formation /// mais aussi /// de sa vie /// en tant que euh homme /// de science du vingt-et-unième siècle)] ///
 [(are part) /// (not only of his education /// but also /// of his life /// as er man /// of science of the twenty first century)] ///

Emphatic style can be used to contextualize the solemnity of political address, to signal a more dramatic excerpt, or to indicate the beginning or the end of a topic in radio news.

The last strategy involving syntax-bound BDUs is connected to **discourse planning**. It should probably not be viewed as a strategy proper, but rather as resulting from processing difficulties. We assigned this style to those syntax-bound BDUs characterized by numerous major unit boundaries that are surrounded by hesitation markers like ‘euh’ particles or reformulations (cf. example (24)). Disfluencies in speech can be viewed as resulting from so-called ‘controlled processing’ (as opposed to ‘automatic processing’ (Shiffrin and Schneider, 1977)), which ‘typically occurs in connection with novel and unfamiliar processing’. (Erman, 2001: 1353).

- (24) <et> [(compte tenu des principes de relation entre la syntaxe et l'accentuation métrique) /// (**en fait**) (les syllabes par exemple pri) (doit être **pro** /// **plus** **proéminente** que la syllabe /// frère)] ///
 <and> [(given the principles of the relation between syntax and metrical structure) ///
 <in fact> (the syllables for example) (must be **pro** /// **more** **prominent** than the sister /// syllable)] (conference talk)

4.4. Regulatory BDU

Our annotation method allows keeping those elements separate that do not enter in any syntactic dependency relation: adjuncts, discourse markers, connectives. In most of the cases, those elements are prosodically grouped together with a fully fledged syntactic unit, creating a ‘macro-syntactic unit’ (Blanche-Benveniste, 2002a). In some cases, however, they are

prosodically autonomous and form, in our view, a BDU in their own right. Following Chafe's typology of intonation units (1994: 63–64), we will call them regulatory units. Chafe defines regulatory units by the absence of predicative semantic content conveying ideas of events, states or referents (1994: 63). Their regulatory function can take several forms:

Some [regulatory units] regulate the development of the discourse [...]. Others have to do with the interaction between the participants [...]. Still others express the speaker's mental processes, or judgment of the validity of the information being conveyed. (1994: 64)

Regulatory units are not very frequent in our data (about 6% overall, varying between 3% and 9%, cf. Table 4.5 *supra*). Nevertheless, they seem to fulfil a range of different functions in discourse. Thus, regulation of the discourse development takes place when a new macro-sequence is introduced (example (25)), a new topic is activated (example (26)), or a discourse fragment is ended (example (27)). In other cases, the speaker's stance may be in focus, thus expressing his/her opinion on what is being expressed (example (28)). In example (25), the speaker has finished a kind of preliminary overview of her talk and uses *donc* 'so' to jump onto the next sequence.

- (25) <et> <euh> [(c'est) (des phrases // qui sont élicitées selon un protocole expérimental // euh assez // rigoureux)] ///
 <and> <er> [(it's) (sentences // which are elicited according to an experimental protocol (that is) // er rather // rigorous)] ///
 <donc> ///
 <so> ///
 [(notre communication)] [(dans un premier temps) (je vais présenter) (assez rapidement) (notre cadre d'analyse /// et principalement ce qu'on entend par profil mélodique et quelle représentation on donne /// de euh l'intonation // ou du profil mélodique associé à l'énoncé)] ///
 [(our contribution)] [(in a first stage) (I will present) (fairly rapidly) (our analysis frame /// and mainly what we mean by melodic profile and which representation we give /// of er the intonation // or melodic profile associated with the utterance)] /// (conference)

In example (26), the head of state uses the isolated adjunct to introduce a new topic in his speech:

- (26) [(cet engagement sur le terrain) (est) (pour vous) (de plus en plus difficile)] /// <et>
 [(de plus en plus dangereux)] ///
 [(this commitment on the field) (is) (for you) (more and more difficult)] /// <and>
 [(more and more dangerous)] ///
 [(l'Afghanistan /// **le Proche-Orient**)] ///
 [(Afghanistan /// **the Near East**)] ///

[(je connais) (la somme de courage et d'abnégation /// que requiert l'accomplissement de vos missions dans un tel /// contexte)] ///
[(I know) (the sum of courage and self-sacrifice /// required by the accomplishment of your mission in such a /// context)] /// (political address)

In example (27), the exclamatory *et voilà* 'and there you go' closes off one of the story lines before the narration is continued:

- (27) [(moi)] [(c'est) (la fête) (parce que mon parrain c'est comme si c'était mon frère)]
 < euh > < et > [(comme /// c'est un peu) (les seules la seule occasion d'avoir un bébé très proche de moi) // < quoi >] ///
[(for me)] [(it's) (party time) (because my godfather he is like being my brother)]
 < er > < and > [(as /// it's like) (the only the only occasion to have a baby close to me)]
 // < you see >] ///
 [(puisque j'ai pas de frère)] // [(j'aurais jamais eu) (de neveux ou de nièces)] ///
[(since I have no brother)] // [(I would never have had) (nephews or nieces)] ///
[(et) (voilà)] ///
[(and) (there you go)] ///
 < pis > < euh > < bon > [(quelques mois après) < euh > (une une fois que je vais chez eux) (je les entends) /// (en train de discuter)] ///
 < then > < er > < well > [(a few months later) < er > (once once I go to their place) (I hear them) /// (talking)] ///

Finally, in example (28), by isolating and fronting the adverbial *au moins* 'at least' the news reader puts focus on the opinion according to which having 'opponents' talk to one another is in itself an achievement, thereby suggesting that this is probably the only achievement. As it is highly unusual that news readers express their own opinions, this phrase should probably be interpreted as indirect citation of a general opinion or possibly of an utterance coming from the 'Quai-d'Orsay' (French Ministry of Foreign Affairs).

- (28) (...) ///
 < **au moins** > ///
 < **at least** > ///
 [(ils se sont parlés) (dialogue euh inter-Libanais) (durant tout le week end) (en région parisienne) (à l'initiative du Quai-d'Orsay)] ///
[(they talked to one another) (inter Lebanese dialogue) (during the entire week end) (in the Parisian region) (at the initiative of the Quai-d'Orsay)] ///

5. CONCLUSION

We have known for long that syntax and prosody in discourse are not congruent, in the sense that syntactic units do not systematically coincide with prosodic ones (Auchlin and Ferrari, 1994;

Esser, 1998; Shattuck-Hufnagel, 2000; Kawaguchi *et al.*, 2006). Nevertheless we were still unsure of how prosody and syntax work together in the process of building up discourse units of different types and of contributing to discourse structure.

The aim of this contribution has been the identification of different types of discourse units through the mapping of prosody and syntax. A sampled corpus of four discourse genres (political address, radio news, conference talk and conversational narration) was annotated both for syntactic relations, and for prosodic units. The originality of this contribution lies in the mapping of syntactic dependency clauses and prosodic units. Our corpus analysis revealed that prosodic and syntactic units combine in different ways. One-to-one mapping creates congruent BDUs, where one syntactic dependency clause matches one MPU. Syntax-bound BDUs consist of one syntactic unit cut up in several MPUs. On the other hand, intonation-bound BDUs are made of several complete syntactic units grouped together in one prosodic unit. We also observed that some discourse markers and adjunct-like elements do not enter into a syntactic relation, but are pragmatically oriented to syntactic chunks. In most cases, discourse markers and adjuncts are prosodically dependent on a syntactic unit, and uppermost interpreted in relation to it. In several cases, however, discourse markers or adjuncts are given prosodic autonomy, and function as a BDU in their own right, with specific discourse functions.

Our main hypothesis, that BDUs are formatted differently according to the discourse genre at stake, was confirmed both on the level of BDU types and strategies. Depending on the genre, speakers use significantly more congruent BDUs (radio news), syntax-bound BDU (conversational narration) or intonation-bound BDUs (political address). Conference talks use a mix of BDU types, which could be explained by the fact that conferences are at the same time public (and hence quite formal) and unscripted speech. Going into the discourse strategies displayed by the discourse units, we observed that the three genres having syntax-bound BDUs use them differently. Political address and radio news have a majority of 'didactic' BDUs, while conference talks use the three strategies equally (didactic, emphasis and planning). The planning strategy is completely absent from political address, and infrequent in radio news (13%).

Regulatory BDUs are fairly poorly represented in our data but seem to fulfil several discourse functions that are more oriented to the interpersonal level (indicating speaker's attitude) or to the textual level (signalling topic-shift or discourse relations).

A number of issues lie open for further research. First, there is the unexpected outcome of our mapping procedure in the form of mixed BDUs, that is, combining features from both syntax-bound and intonation-bound BDUs. We have treated them here as a 'rest' category, but this is certainly not satisfying; not from a methodological perspective, and even less so from a theoretical one. We suggested that mixed BDUs do not involve a discourse strategy, viz. they do not fulfil an actual discourse-driven function, but that they would result from planning and production difficulties. In other words, they would not really be 'basic' discourse units. If this is the case, we should be able to give support to this idea, for instance by analysing 'processing difficulty signals'

such as hesitation markers, reformulations, self repairs etc. and their effect on discourse structure. In addition we should be able to establish alternative reliable criteria to 'reduce' these mixed units to actual 'basic' discourse units. In addition to this methodological matter (with theoretical implications), there is, in our view, the theoretically important question of how our BDUs fit into a model of discourse coherence. Most of the existing models assume that discourse is hierarchically structured and that (basic) discourse units function as a sort of 'building blocks' that are related to one another in a coherent way (Hobbs, 1985; Grosz and Sidner, 1986; Mann and Thompson, 1988; Polanyi, 1988; Roulet *et al.*, 2001). These coherence relations may be signalled, for example by discourse markers, or left implicit (see, Sanders and Spooren (2007) for an overview). The question arises as to how our BDUs behave with respect to such theories of coherence. Is it the case that all BDUs are related to one another by means of (implicit or explicit) coherence relations? We expect that the answer is yes. Do the coherence relations involved vary according to the BDU type at stake? Insofar as we have shown that BDU types are genre-dependent and assuming that coherence relations are also genre-dependent (Sanders, 1997; Taboada and Mann, 2006), our preliminary answer would be yes.

Finally, there is the thorny issue of (marked and unmarked) coherence relations below the BDU level. We already alluded to the problem of coherence relations between dependency clauses grouped together in a single intonation-bound BDU (Section 4.2). We formulated the hypothesis that coherence relations between BDUs and within an intonation-bound BDU would be of a different nature, the latter, we hypothesized, privileging presentational relations. Further empirical research should then bring us closer to understanding and modelling how discourse interpretation occurs, where and when inferences are made, and how each 'piece' of discourse is related to the others in a (more or less) coherent way.

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