

# Dynamics of disfluencies within Basic Discourse Units

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## Résumé

*Les marques locales de disfluences (répétitions, reformulations, amorces, pauses pleines et silencieuses) participent à la segmentation du flux discursif au sein d'unités syntaxiques et prosodiques. Les points d'interruption du flux verbal, inhérents à la structure des disfluences, constituent un indice précis d'un possible écart de la fluence. L'analyse sur corpus des points d'interruption (frontières droites du reparandum) au sein de six situations de parole révèle que leur distribution est associée aux types d'unités de segmentation du discours. Elle est notamment corrélée à la présence de frontières syntactico-prosodiques non congruentes ou au caractère atypique du type d'unité discursive au sein du genre.*

**Keywords:** *disfluencies, interruption point, discourse unit, spoken French*

## 1. Introduction

This contribution presents an empirical study of distribution of disfluencies within syntactico-prosodic units and their impact on the structure of the verbal flow. Tradition has it that disfluencies in spontaneous speech present a three-region surface structure (Shriberg, 1999, 619) represented in Table 1. All disfluencies share at least one common feature, namely the *interruption point*, placed at the end of the *reparandum* and defined formally in the structure as the first region of the disfluency. Thus, the interruption point can be seen as a precise location indicating the possible departure from fluency.

n	(Prior context)	Reparandum	Editing phase	Repair	(Continuation)
1	je sais pas	c'est .		c'est	parce que je suis comme ça
2	travaillé	pendant .	euh	pendant	un an
3	plus facile	.	ben euh		financièrement
4	parce que j'avais	d/ .		demandé	à mon frère
5	et que on veut faire	de .		du	son

Table 1: *Places of the Interruption Point (".") in the disfluency structure*

Typically, the *repair* region reflects the resumption of fluency (or the beginning of another sequence of self-interruption(s) in case of "complex" disfluencies). Between the *reparandum* and *repair* regions, the *editing phase* may either be empty, contain silent pauses, filled pauses, or editing phrases ("euh", "hum", "enfin je veux dire") (Table 1: 1-2). The disfluency can confine to an editing phase for filled pauses (Table 1: 3),

or to reparandum and repair regions in case of repeated and modified words (Table 1: 4-5).

## 2. Corpus

This study is based on a sample of the *Louvain French Corpus of Annotated Speech* (LOCAS-F) developed by Degand, Martin, and Simon (2014). The data under study include a balanced sample of 20 recordings across six specific speech genres: informal face-to-face and radio interviews, face-to-face conversational narratives and formal surveys, as well as public scientific conferences and radio narratives. The corpus was previously segmented in *Basic Discourse Units* (henceforth BDUs). BDUs can be defined as “the segments that speakers use to build a representation (interpretation) of the discourse, i.e. a kind of ‘minimal discourse interpretation segments’” (Degand & Simon, 2009, 82). These units result from the mapping of syntactic dependency clauses and major intonation units. Depending on how boundaries map together, four different types of discourse units can be identified. Previous studies have shown that the distribution of BDU types varies across genres and may reveal different discursive strategies (Degand & Simon, 2009, 95):

- BDU-C: Congruence of syntactic and prosodic boundaries aim to present information in a relatively direct and neutral manner
- BDU-I: Intonation-based regroupment of syntactic groups allows the creation of an informational macro-unit
- BDU-S: Syntactic unity across several intonative groups portray emphatic or didactic style as a result of a discursive planification
- BDU-X: a category of “mixed” BDUs where a boundary convergence between syntactic and prosodic levels is delayed.

## 3. Annotation of disfluencies

Local marks of disfluencies were automatically detected at word level using DisMo, a morphosyntactic annotator for spoken French (Christodoulides & Grosman, 2012). For the purpose of this analysis, only the interruption point of disfluency sequences (henceforth IP) was considered, as it is present in all disfluency types. In the event of successive disfluencies within utterances, cumulative interruptions were taken into account. Manual verification was performed in order to integrate the following phenomena:

- *Silent and filled pauses*: an interruption of the verbal flow is detected by the absence of audio signal or by a conventional item (hesitational *euh*) for a minimum of 150 ms. Only intra-constituent marking pauses were considered (i.e. within functional sequence and syntactic clause).
- *Lexical and sentence fragments*: the speaker stops halfway through the utterance, leading to an incomplete word (3) or a semantically

and/or syntactically incomplete utterance (4). The truncated utterance can be left incomplete, completed or integrated in a restart sequence.

- (1) il y avait des manques <(dans ce.)(./)> (dans ce) livre
- (2) on a fini par se forger <(une.)(.euh)(./)(une.)(.euh)> (une) représentation
- (3) il est question de <(d./)> (dénomination) de l'étrange superstition
- (4) <je (euh.)> <(personne.)> oh ben d'ailleurs c'est le même
- (5) on a toujours <(un.)(./)> (une) intention quand même
- (6) oui <(je devrais pas.)> (on devrait jamais) jouer des choses

– *Repetitions*: the speaker repeats immediately and identically some part of an utterance without adding semantic value (1-2). The repetition sequence can include non propositional content between the reparandum and the repair (e.g. *silent and filled pause, fragment, discourse marker*).

– *Reformulations*: the speaker modifies an utterance half through while generally maintaining either the syntactic structure or the semantic content. Reformulations may include cases of partial repetitions (5-6).

#### 4. Interruption points across BDUs

Relative frequency distribution of the 1825 IPs types across 1044 BDUs is significantly different and moderately associated ( $X^2[12]=45.2, p<0.001$ , *Cramer's V=0.181*).

	Congruent		Intonative		Syntactic		Mixed		Sum	
	n	%	n	%	n	%	n	%	n	%
<i>Reformulation</i>	15	13.92	26	23.81	27	24.91	41	37.36	109	100
<i>Repetition</i>	63	16.60	102	26.85	111	29.39	103	27.17	378	100
<i>Fragments</i>	28	14.73	86	44.40	35	18.05	44	22.82	193	100
<i>Filled pauses</i>	104	22.42	105	22.59	123	26.46	133	28.52	466	100
<i>Silent pauses</i>	61	8.95	78	11.43	298	43.88	243	35.75	679	100
<b>Sum</b>	<b>272</b>	<b>14.88</b>	<b>396</b>	<b>21.70</b>	<b>594</b>	<b>32.57</b>	<b>563</b>	<b>30.86</b>	<b>1825</b>	<b>100</b>

Table 2: *Frequencies (per thousand words) of IPs, and proportions across BDUs*

Table 2 reveals that units with congruent syntactico-prosodic boundaries are less likely to host IPs than other units (odds ratio of 14.88%). Syntax-bound units show the highest probability of interruption (32.57%). However, this score is largely due to the strong association with silent pauses. Intonation-bound BDUs are positively connected to the production of fragments (44.4% of all occurrences) as well as the low presence of short pauses inside sequential units. Therefore, interruption points have an impact on boundary marking and thus on the outcome of the discourse units segmentation.

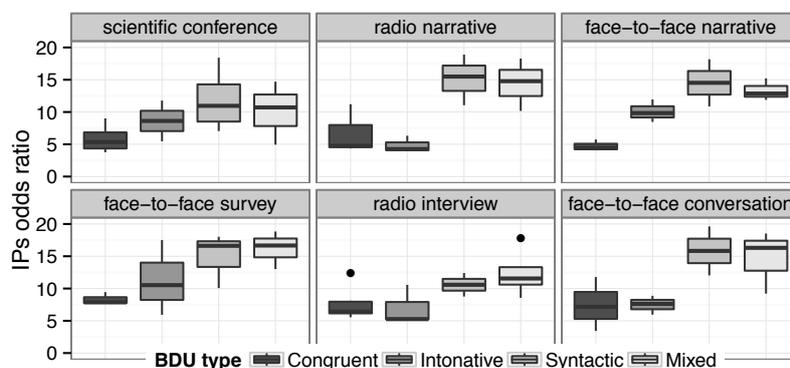


Figure 1: Odds ratio of IPs per BDU type across genres

The highest proportion of IP is to be found in “mixed” BDUs (30.86% of interruption). These units show complex mapping of their boundaries and are neither fully syntactically nor prosodically bound. They are characterized by a high production of reformulations and intra-constituent filled pauses. These results reveal different dynamics within genres, but all go in line with the hypothesis of previous research, arguing that divergences between prosodic and syntactic boundaries are more conducive to the actualization of disfluencies than congruent ones, across all genres (see Selting, 2000, 511 and Degand & Simon, 2009, 89).

Within genre, syntax-bound BDUs show more IPs in spontaneous interactive genres than in prepared ones where syntactic segmentation is the norm (Figure 1). Spontaneous speech (radio and face-to-face narratives and conversations) has relatively more IPs inside syntactic BDUs than inside intonational ones. Moreover, radio genres, dominated by intonation-bound BDUs, prove to have relatively low disfluency proportion within intonation-bound units.

### 5. BDU and disfluency relative proportions

The following section evaluates the relation between the proportion of interruptions in a BDU-type and the proportion of this BDU-type within a genre<sup>1</sup>. The underlying hypothesis claims that low frequency BDU-types within a genre are more likely to be interrupted than high frequency BDU-types, due to the higher degree of automaticity they imply. Figure 2 reveals the correlations by BDU-types.

<sup>1</sup> Association of the 3 factors were proven significant (Cochran-Mantel-Haenszel test  $M2[24]=512$ ,  $p<0.001$  on discourse segmentation units, genre and disfluency types).

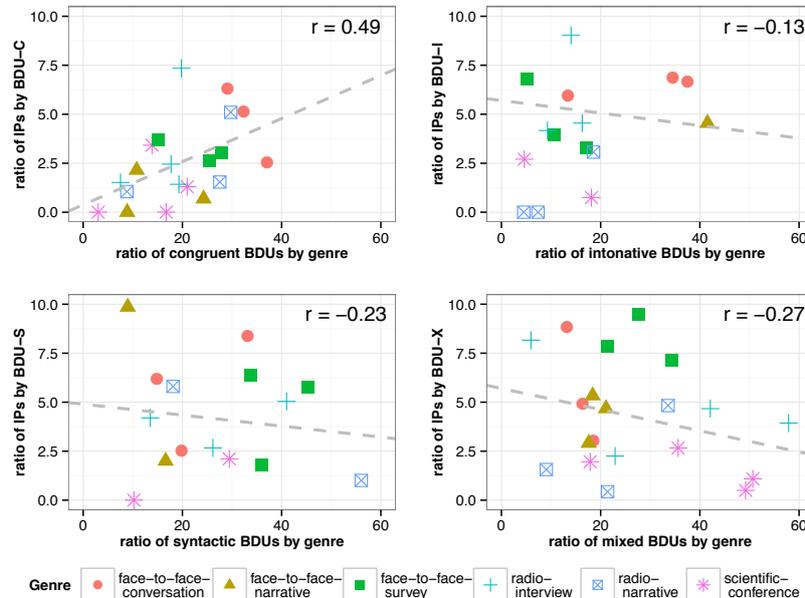


Figure 2: Scatterplot of Interruption odds ratio per BDU type

Overall, the likelihood of IP within a disfluent sequence increases with the infrequency of a BDU-type in a genre for all BDU-types except congruent ones. For instance, the fewer syntactic and mixed BDUs a speech has, the more disfluencies will be produced within them.

## 6. Discussion and conclusion

This pilot study on interruptions across discursive units was designed to be a first step towards a syntactico-prosodic description of (dis)fluency markers. Cross-tables of IPs within BDUs showed that the interruption points of all sequences of disfluencies are more frequent in syntactic and mixed BDUs, especially when these are not part of the norm of the genre. Our analysis showed that the proportion of a specific BDU in a given genre is related to the likelihood of this unit to host an interruption. Interpretation of the role of IPs in boundary marking will gain in finesse by taking into account more data and the relative position of an IP in the BDUs. Following the work of Pallaud, Rauzy, and Blache (2013), further analysis will consider integrating more contextualized knowledge around the morphosyntactic notion of interruption (completion vs abandon of the structure), as well as interjections and prosodically non-integrated discourse markers.

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