



# The Polarity Parameter for Ellipsis Coherence

Joan Busquets

## ► To cite this version:

Joan Busquets. The Polarity Parameter for Ellipsis Coherence. *Grammars*, 1999, 2 (2), pp.107-125.  
hal-01654335

**HAL Id: hal-01654335**

**<https://hal.science/hal-01654335>**

Submitted on 18 Jan 2018

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

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

# The Polarity Parameter for Ellipsis Coherence

Joan Busquets (busquets@montaigne.u-bordeaux.fr)  
*Sciences du Langage. Université Bordeaux-3, Bordeaux, FRANCE*

**Abstract.** In this paper I argue that Catalan *polarity particles* (PPs) *sí/no*, *també/tampoc*, which one finds in some special realizations of ellipsis in Catalan, impose constraints on Discourse Structure. By virtue of their explicit or implicit markedness with respect to the  $[\pm \text{ neg}]$  feature, I distinguish them as strong/weak PPs. I demonstrate that the polarity carried by these PPs, provides a test-bed for discourse *coherence*, supervising the processing of the preceding discourse in relation to the last state. It is claimed that such PPs inherit in the discourse the locality conditions that are present in the sentence-level in terms of comparison discourse relations like PARALLELISM or SIMILARITY (signalled by *sí/també*) and CONTRAST (signalled by *no/tampoc*). I propose a formalism within a general discourse representation theory known as *Segmented DRT* (Asher, 1993).

**Keywords:** discourse processing, discourse relations, polarity particles, ellipsis

## 1. Introduction

The main objective of this paper is to characterize the role of *polarity* in discourse processing, specifically in those contexts in which the so-called *polarity particles* (Brucart, 1987), *sí*, *no*, *també* and *tampoc*<sup>1</sup> appear in some elliptical structures in Catalan. In elliptical contexts, the *polarity particles* (henceforth PPs) permit the recovery of the missing content in the target by establishing an anaphoric dependency with respect to an antecedent clause or source in the same context. Thus, the interpretation of these constructions depends on the relation between two semantic representations. One corresponding to the target proposition (i.e., the proposition which contains the anaphor), and the other which corresponds to the source proposition (i.e., the proposition expressed by the antecedent). The following examples show some of the uses of these PPs: ( $[e]_i$ , for illustrative purposes, indicates what is missing in the target with respect to the source):

- (1) a. La Maria [no sap anglès]<sub>i</sub>, però un amic meu sí [e]<sub>i</sub>.  
*Maria doesn't know English, but a friend of mine (does) yes.*
- b. La Isabelle [va anar de vacances als USA]<sub>i</sub>, però la seva germana no [e]<sub>i</sub>.  
*Isabelle went on vacation to the USA, but her sister (did) not.*
- c. En Joan [va anar al cinema la nit passada]<sub>i</sub>, i en Pere també [e]<sub>i</sub>.  
*Joan went to the movies last night, and Pere (did) too.*
- d. La Marlena [no va comprar el pollastre]<sub>i</sub>, i en Pau tampoc [e]<sub>i</sub>.  
*Marlena didn't buy the chicken, and Pau (didn't) neither.*

The examples in (1) show that there is obviously some missing material in the second conjunct. In those cases, the null VP must be recovered by means of some kind of identity with an antecedent in the same context. This being the case, in (1) the Tense feature, which is carried by the auxiliary in English, has also been deleted in the missing clause. Because of this, the thesis that some elliptical constructions in Romance languages are a case of TP-deletion or TP-Ellipsis (Laka, 1990), instead of VP-deletion or VPE, has recently been developed. However, even as a TP-deletion, the presence of the PPs in these contexts seems crucial, otherwise the same constructions would become ungrammatical:

- (2) \*La Maria va anar al cinema la nit passada, i en Pere  
*Mary went to the movies last night, and Pere*

Moreover, these PPs may interact with the non-ellided or *deaccented* version of the sentence, as illustrated below:

- (3) a. La Isabelle va anar de vacances als USA, però la seva germana no va anar de vacances als USA.  
*Isabelle went on vacation to the USA, but her sister not went on vacation to the USA.*
- b. En Joan va anar al cinema la nit passada, i en Pere també va anar al cinema la nit passada.  
*Joan went to the movies last night, and Pere too went to the movies last night.*

There are a number of issues to consider here. It has been noted that *també/tampoc* are prime examples of presuppositional “triggers”.

Sometimes these PPs are associated with *focus*. It is clear that every account of these PPs will have to stipulate their special status with respect to presupposition, focus, polarity, or anaphoric dependency. Due to these constraints, it is difficult to see how one can exclude some of these notions without general gaps in unified approach to these expressions. I concentrate here, however, on the relationship between polarity, anaphoric bindings, and discourse processing. I propose an adequate account on the polarity parameter during *text organization* and discourse structure in which the above PPs appear.<sup>2</sup>

Below I outline an appropriate method for understanding the effect of the polarity feature in preserving the coherence of discourse in terms of discourse relations. More precisely, I concentrate on *Parallelism* or *Similarity* and *Contrast* discourse relations. Following Saeboe (1988), I argue that these PPs have the quality of text organization, supervising the processing of the proceeding discourse in relation to the last state. I propose to examine here this relationship within a general theory of discourse structure; specifically, the *Segmented DRT* (or SDRT) framework, developed in Asher (1993), Lascarides & Asher (1993) and Asher et al. (1997).

Before I outline my proposal, a justification of the approach I am undertaking is in order. First, the context in which these PPs appear is sensitive to discourse effects, and constraints on their behaviour derive from formal discourse structure. A formal discourse representation reflects the propositional structure of a text. In order to bind together the different representations of a given text, we need a set of Discourse Relations. These Discourse Relations are present in the discourse and they explain the general structure in terms of *coherence*. As we shall see, these PPs denote discourse relations.<sup>3</sup> Secondly, in what follows I am assuming a surface structure (SS) and a level of semantic interpretation. Concerning the former, I use basic assumptions in GB syntax for the sake of precision. However, the basic insights of this account can be captured as well in other syntactic frameworks. Finally, the level of representation which is interpreted is the translation of syntactic structures into *Discourse Representation Structures* or DRSs, that are model-theoretically interpreted.

The body of this article consists of the following sections. First, I introduce the theoretical background needed to understand the approach I am undertaking. The next three sections give the formal tools concerning DRS translation for PPs, discourse constraints over PPs, and the polarity parameter and discourse attachment. Finally, I analyze some examples with PPs in Catalan, and give empirical evidence in favor of a discourse-based approach. I conclude the paper with some final remarks.

## 2. Discourse Representation Theory and Discourse Relations

I am concerned in this paper with polarity effects within discourse processing. In order to consider such effects, we clearly need to present a general discourse representation theory, and explain how it will treat polarity within that approach. *Segmented DRT* (Asher, 1993) is an extension of Kamp's *Discourse Representation Theory* (DRT), by which formal semantics interact with discourse relations that are established between the propositions in a given context (Hobbs (1985); Mann & Thompson (1987); Polányi (1985); Grosz & Sidner (1986); among others). Within SDRT, constituents are related by discourse relations such as *Elaboration*, *Continuation*, *Parallelism*, *Contrast*, etc., and accordingly, they produce a discourse structure that will be used as a context for the interpretation of the new information that is added to the discourse. Segments that constitute a discourse structure are more complex than structural *Discourse Representation Structures* (DRSs). SDRT represents the discourse structure and semantics of a discourse structure as an *Segmented DRS* or *SDRS*.

Since discourse does not always provides explicit clues that are indicators of the discourse relations, the interpreter must infer them from quite partial and fragmentary information. Inferences about discourse relations are part of the mechanism of discourse attachment. SDRT makes use of nonmonotonic reasoning axioms, known as DICE (*Discourse in Commonsense Entailment*) (Lascarides & Asher, 1993) which establish the discourse relation hold between the constituents (i.e., SDRSs). Concerning anaphoric dependencies, a few words are in order. The linguistic data used in this study have in common the deletion of the VP in the target. According to this, then, it is reasonable to take as a point of departure the basic dynamic assumptions about VPE. That is, there is an identity condition between the target and its source, but the resolution of the target is interpreted relative to its current context. Recall that the main point is how discourse constituents are related in a given context, thus even though I will concentrate on elliptical constructions, the same holds for their non-ellided counterpart.

### 2.1. DISCOURSE ATTACHMENT, ISOMORPHISM, AND ANAPHORIC DEPENDENCIES

Understanding examples in (1) involves an interaction between the semantics of the constituents which are part of PPs contexts, rhetorical relations that are established between the constituents, and the resolution of the content of the incomplete target as a function of discourse

coherence. The meaning of a sentence in a given context depends on which rhetorical relation is implied when the information carried by that sentence must be attached to the global meaning of the discourse.

Describing discourse structure in semantic terms implies that they are relations on semantic objects, and not on syntactic structures. If we return to the examples in (1), we see that there are two discourse relations between the source and the target: *Parallelism* and *Contrast*. Within SDRT *Parallelism* involves a pairing of constituents and their constitutive parts such that each pair contains two semantically and structurally similar objects. On the other hand, *Contrast* also involves structurally similar, but semantically dissimilar objects.<sup>4</sup>

The point we wish to address is the following. The presence of *sí*, *no*, *també* and *tampoc* in Catalan makes it possible to infer the discourse relation (parallelism or contrast) that is established between the source and the target. Moreover, these PPs impose constraints during discourse processing by virtue of their anaphoric properties, and their polarity. I will concentrate here on the specific function of polarity and the requirements that arise from the well-formedness of the discourse.

Within SDRT, some discourse relations between constituents exploit *Embedding Trees*, which make explicit the logical structure of the constituents together with the way these are related. DRS-subordination and the discourse structure are represented by means of the symbol  $\leq$ . In order to show the formal tools I will assume henceforth, I'll take from Asher (1993) the following definitions:

**Definition:** For any constituent  $\alpha$  discourse subordinated ( $\leq$ ) to a constituent  $\beta$  in some SDRS  $K$  the *embedding tree* of  $\beta$  down to  $\alpha$  is the tree  $\langle B, \leq \rangle$ , where  $B = \{x : x \leq \beta \text{ and } \alpha \leq x\}$ , and  $\leq$  is the partial ordering determined by the discourse subordination on  $B$ .

**Definition:** For any constituent  $\alpha$  the *embedding tree* of  $\alpha = \langle A, \leq \rangle$ , where  $A = \{x : x \leq \alpha\}$ , and  $\leq$  is the partial ordering determined by discourse subordination on  $A$ .

**Definition:** Let  $\tau = \langle A, \leq \rangle$  and  $\tau' = \langle A', \leq \rangle$  be two trees.  $\vartheta : \tau \rightarrow \tau'$  is a *tree isomorphism* from  $A$  onto  $A'$  iff  $\vartheta$  is a bijection and  $\forall \alpha, \beta \in A (\alpha \leq \beta \text{ iff } \vartheta(\alpha) \leq \vartheta(\beta))$ .

**Definition:**  $\tau^* = \langle A^*, \leq \rangle$  is a *Modified Embedding Tree* (ME tree) of an embedding tree  $\tau = \langle A, \leq \rangle$  iff

- (i)  $A^* \subseteq A$
- (ii)  $\text{root}(\tau^*) = \text{root}(\tau)$
- (iii)  $\leq_{A^*} \subseteq \leq_A$

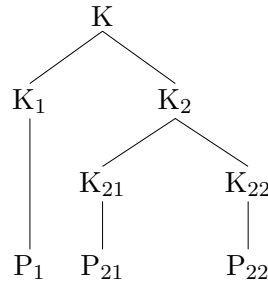
(iv)  $\forall x(x \text{ is a leaf of } \tau^* \text{ iff } x \text{ is a leaf of } \tau)$

For instance, two constituents will stand in a *Parallel* or *Contrast* relation if and only if there is a bijection from the embedding tree of one to the embedding tree of the other, such that the nodes of the tree have the appropriate polarity. Some discourse relations are scalar, which means that some constituents are not completely symmetrical to others, but there are only some part(s) of a segment that are related.

With respect to VP-Ellipsis, the antecedent of the target will be a VP, which within SDRT means a Predicative-DRS<sup>5</sup> derived from the VP that is used as an antecedent. In a DRS construction, a null VP introduces a conceptual discourse referent,  $c$ , for which an available antecedent must be found. The content of  $c$  carries a polarity due to the explicit presence of a PP. If we want to account for the fact that we must recover only a relevant *part-of* the source, we want to simultaneously preserve this part as a potentially anaphoric referent for future bindings. Thus, every constituent derived from a verb(s) in the source, will give us a *theme*.<sup>6</sup> To illustrate this, consider the sentence below, which is ambiguous between *say*  $\varphi$  and  $\varphi$ :

- (4) La Maria [diu que en Joan [menteix] <sub>$i$</sub> ] <sub>$j$</sub> , però la Carme també  
       [e <sub>$i/j$</sub> ]  
       *Maria says that Joan lies, but Carme (does) too*

Very roughly, there are two pairs of themes in this example. That is to say,  $[x \text{ says } \varphi]$ , and  $\varphi$ . Where  $\varphi$  is the property expressed by the complement of *diu* (say). These propositions, then, must be available as potential antecedents during discourse processing. In order to do so, ME trees are extended to include a representation of VP denotation in the source (the so-called *modified extended embedded trees* or MEE trees). This mechanism inserts the appropriate Predicative-DRS in beneath the node of the tree that represents that constituent. This Predicative-DRS will be the propositional representation of the VP.



MEE trees permit isomorphisms between different constituents in the discourse, according to their propositional content. We need to compare *polarities*, and because of this, we must first match the target with the source. If discourse contains more than one elliptical constituent with PPs, then the comparison will be between the last PP, which is already part of the discourse structure or SDRS, and the current PP-clause, and so on. Thus, we are comparing two members or constituents during discourse processing, building up the discourse. Finally, since elliptical constructions shared part(s) of an antecedent, the target and the source maintain an isomorphic relationship with some substituted elements.

## 2.2. DRS REPRESENTATION FOR PPs

The DRSs for a discourse build up in a compositional bottom-up fashion. Lexical entries (terminal nodes of the syntactic tree) are associated with DR-theoretic structures, Predicative or Partial-DRSs, which are combined together in terms of DRS-*Conversion*.<sup>7</sup> I am assuming here that the scope of this PPs is the whole VP. Hence, using the list notation for DRSs (Muskens, 1996), the translation for *també* (too) is the following:

$$\lambda P[ \mid \text{també}(P)]$$

Recall that in the DRS above,  $P$  is a Predicative DRS variable, and the  $\lambda$ -variable indicates an operation of discourse referent abstraction. Assuming that we are working on structures where the VP is missing, we have to recover the content of this VP for the target. There is a general agreement according to which the target in VPE maintains some kind of parallelism with respect to the source in a given context. Syntactic approaches<sup>8</sup> claim that the target is reconstructed by virtue of shared syntactic material, which is accounted for in LF, PF, thematic structure, or some grammatical level, according to the syntactic material in the source. On the other hand, semantic approaches<sup>9</sup> identify a VP meaning with a property that is determined relative to a given context (i.e., relations in discourse contexts). Independently of the framework, it seems that the target respects some kind of identity condition (in a different context) with respect to its antecedent or source. In order to do so,  $P$  in the DRS above has been removed from a DRS (i.e., the semantic content of the lost VP in the target). Now, the missing material in the target must be filled by means of the appropriate event-type in some antecedent in the same context. This means that (if the discourse is coherent) some Predicative DRS is there as a potential antecedent for the target. Hence, we need something with the form:



$$\lambda x \lambda e [c \mid c(x, e), c \approx ?]$$

In the DRS above,  $\approx$  denotes a relation that takes as arguments a discourse referent of some abstract type, and a subDRS or a Predicative DRS.<sup>10</sup> Finally, the variable  $x$  is the discourse referent for the Agent role, which corresponds to the subject argument place at the SS level. As noted above, Predicative or Partial DRSs are combined according to the *DRS-Conversion*, and as result of this application to both DRSs represented above, we get the following representation, where  $\alpha$  denotes the PP *també*, and accordingly, we may extend the same mechanism for the rest of our PPs:

$$\lambda x \lambda e [ \mid \alpha [c \mid c(x, e), c \approx ?]]$$

According to this view, these PPs have the capacity to connect semantically the VP content in the source, and a discourse referent in the target. This suggests that they have scope over the content of the VP in the target. Hence, the VP in the source must be accessible from the structural position of these PPs. In sum, these PPs express a syntactic dependency which form the basis for semantic interpretation of the target. Their semantics involves the identification of the eventuality denoted by the antecedent VP (i.e., determines a property only relative to a given context).

In fact, the above DRS representation provides not only the interpretation of the constituent that contains the PP, when the argument is linguistically realized, but also in elliptical contexts, where we must recover some material from the source. Therefore, the motivation for these PPs to be context sensitive will be the context (linguistically realized or not) that assigns an interpretation to the constituents that contain them. Notice, moreover, that this approach is not incompatible with the presuppositional status of these PPs with respect to some contextual information either cancelled or accommodated. My interest here however is to evaluate if the context satisfies the requirements that these PPs impose in terms of Discourse Relations and Polarity.

### 2.3. DISCOURSE CONSTRAINTS OVER PPs

As it has been noted in (Brucart, 1987) and (Bosque, 1984) two of these PPs are explicitly marked with respect to  $[\pm \text{ neg}]$  feature, and two of them are implicitly marked with respect to the same feature. Because of this, we cannot interchange them in the same context. Since they reflect the appropriate discourse context, essential constraints on polarity are needed. These PPs, in addition to their sensitivity to polarity, and to

the content of the missing material, show a dependency on the type of polarity in the previous context (i.e., *Parallelism* and *Contrast*). Given this necessity, all well-formedness restrictions are based on the following distribution of PPs:

- (a) Contrasting PPs: *sí/no*. Only they are able to license the *Contrast* relation. They neutralize each other (negation/ affirmation), and require a contrast relation between the source and the target, modifying the polarity of their antecedent. Moreover, contrasting PPs leave open the possibility that their respective unmarked PPs (i.e., *també/tampoc* respectively), can be directly added to the context. In addition a parallel relation is involved. Also, in virtue of their explicit markedness with respect to their polarity, they permit cataphoric constructions.<sup>11</sup>

- (5) a. Jo crec que el Jesús [tornarà a Barcelona]<sub>i</sub>, encara que ell digui que no [e]<sub>i</sub>.  
*I think Jesus will come back to Barcelona, although he says (he will) not*
- b. Encara que ell digui que no [e]<sub>i</sub>, jo crec que el Jesús [tornarà a Barcelona]<sub>i</sub>.  
*Although he says (he will) not, I think Jesus will come back to Barcelona*

- (b) Parallel PPs: *també/tampoc*. They introduce the *Parallelism* or *Similarity* relation and reaffirm the polarity of their antecedents. Their appearance in a context is strictly constrained by the obligatory presence of a contrasting PP with the same feature polarity in its immediate antecedent in the context. In such a manner, they are strictly constrained. Because of this, they never support cataphora, as the following examples show:

- (6) a. \*En Jaume també [e]<sub>i</sub>, i la Carme [anirà al cinema]<sub>i</sub>.  
*Jaume (will) too, and Carme will go to the movies*
- b. \*La Maria tampoc [e]<sub>i</sub>, i el Manel [no va anar a París]<sub>i</sub>.  
*Maria (didn't) either, and Manel didn't go to Paris*

The discussion here concerns PPs structural properties with respect to discourse coherence. I will not to describe how these PPs are accommodated or cancelled in the context.<sup>12</sup> My claim is that their appearance is strongly constrained by structural properties of the discourse.

Keeping in mind that a Predicative DRS is a potential antecedent for future bindings in discourse, and the polarity value assigned to the

VPs in a given context, we can express the parallelism and contrast by means of this polarity. The generalization given below captures the way according to which an abstract entity identifies its image under  $\vartheta$ . According to the polarity of the VPs, *Parallelism* or *Contrast* is established.

**Generalization:** Let  $\vartheta : \tau_\beta \rightarrow \tau_\alpha$  be a tree isomorphism, and  $\phi$  denotes *pos/neg* polarity feature. If there are conditions P and c in  $\tau_\alpha$  and  $\tau_\beta$  such that:

- (i) Every theme P of  $\alpha$  has a polarity feature  $\phi$
- (ii) c in  $\beta$  carries a polarity by means a PP and  $\vartheta(P_\beta) = P_\alpha$  then either
  - (a)  $\text{Parallelism}(\alpha, \beta)$  iff  $\phi(P_\alpha) = \phi'(\vartheta(P_\alpha))$
  - (b)  $\text{Contrast}(\alpha, \beta)$  iff  $\phi(P_\alpha) \neq \phi(\vartheta(P_\alpha))$

I introduce here some notational conventions, corresponding to DICE formalism, and which I will use in this paper. Let  $\langle \tau, \alpha, \beta \rangle$  be the update function, where  $\tau$  represents the text,  $\alpha$  is an open node<sup>13</sup>, which is updated with the representation  $\beta$  of the current sentence by means of a discourse relation with  $\alpha$ . Let  $\alpha \prec \beta$  mean the precedence relation between constituents  $\alpha$  and  $\beta$ . And,  $\text{Parallelism}(\alpha, \beta)$  denotes that the discourse relation *Parallelism* holds between constituents  $\alpha$  and  $\beta$ . Finally, the defeasible implication  $>$  where  $\varphi > \psi$  means “if  $\varphi$ , then normally  $\psi$ ” (Lascarides & Asher, 1993). That is to say, if the content of the constituent  $\beta$  must be attached to the constituent  $\alpha$ , where  $\alpha$  is already part of the discourse structure  $\tau$  ( $\langle \tau, \alpha, \beta \rangle$ ), then a rhetorical relation holds between  $\alpha$  and  $\beta$ .

Note that in elliptical constructions  $P_\beta$  will be simply a conceptual discourse referent. Furthermore, assuming that PPs *també/tampoc* (too/either) make evident the intended parallelism, and *sí/no* signal contrast, we may establish the following axioms:

**Axiom on Parallelism for PPs:**

$$\langle \tau, \alpha, \beta \rangle \wedge PP(\beta) \wedge \phi(\alpha) = \phi(\beta) \Rightarrow \text{Parallelism}(\alpha, \beta).$$

**Axiom on Contrast for PPs:**

$$\langle \tau, \alpha, \beta \rangle \wedge PP(\beta) \wedge \phi(\alpha) \neq \phi(\beta) \Rightarrow \text{Contrast}(\alpha, \beta).$$

In words, both axioms establish the following. If  $\beta$  is a constituent which has to be attached to the constituent  $\alpha$  in a context  $\tau$ , and  $\beta$  contains a PP, then either the polarity of both constituents is the same, giving rise a parallel or similar discourse relation, or is different, which in such a case, the relation is a contrasting one.

## 2.4. DISCOURSE STRUCTURE AND PPs ELLIPTICAL CONSTRUCTIONS

In order to clarify the distribution of the different PPs we are considering here, I will use the distinction between *weak* and *strong* ('strict') PPs to denote their implicit or explicit markedness with respect to  $[\pm \text{neg}]$  feature. Hence, I distinguish:

- $\phi_s$  is the polarity value which is linguistically shown by strong or strict PP (i.e., *sí/no*).
- $\phi_w$  is the polarity value which is linguistically shown by weak PP (i.e., *també/tampoc*).

As I already mentioned, every constituent may have one or more *themes*. I assume, then, that every theme has a polarity value. That is to say,

$\phi(P)$  denotes the polarity of P

For every P, there exists a polarity value which depends on the polarity of another constituent. Assuming the observation made in (Saeboe, 1988) that particles as *also/too* are affected by the presuppositional presence of *something in the preceding sentence which shares part of the content of the sentence with these particles*, the dependency of these PPs is established from left-to-right. That is, when a constituent contains an elliptically weak PP, in order to recover the missing material, a preceding constituent which share part of the content with the constituent which contains the PP is needed. In addition, weak PPs are implicitly marked with respect to  $[\pm \text{neg}]$  feature. Hence, they must be discursively licensed by an antecedent with  $[\pm \text{neg}]$  overtly marked. This is not the case for strong PPs, however, which have more freedom with respect to anaphoric links. Now, according to the dependencies which govern these PPs, we may establish the following PPs laws, using the DICE formalism:

**Laws for Polarity Particles (PPs):**

- (i)  $\langle \tau, \alpha, \beta \rangle \& \text{ sí}(P(x))(\beta) > (\exists y)[(\neg P(y))(\alpha) \& x \neq y]$
- (ii)  $\langle \tau, \alpha, \beta \rangle \& \text{ també}(P(x))(\beta) \rightarrow (\exists y)[(P(y))(\alpha) \& x \neq y]$
- (iii)  $\langle \tau, \alpha, \beta \rangle \& \text{ no}(P(x))(\beta) > (\exists y)[(P(y))(\alpha) \& x \neq y]$
- (iv)  $\langle \tau, \alpha, \beta \rangle \& \text{ tampoc}(P(x))(\beta) \rightarrow (\exists y)[(\neg P(y))(\alpha) \& x \neq y]$

In other words, every constituent  $\beta$  that must be attached to a constituent  $\alpha$  in the text so far  $\tau$ , and  $\beta$  contains *també* or *tampoc* (i.e., weak PPs), then there exists a strong entailment ( $\rightarrow$ ) (i.e., weak PPs are always looking backwards to their anaphoric antecedents) according to which the constituent  $\alpha$  shares (part-of) the proposition expressed in  $\beta$ . In contrast, for *sí/no* (i.e., strong PPs), this requirement is less strong, and consequently we use the defeasible implication ( $>$ ).

Furthermore, PPs show a complementary contextual distribution. That is, *també/tampoc* appear in contexts in which *sí/no* cannot. At the same time, positive and negative are not distributional equivalents, and do not share the same contextual domain, although they carry the same polarity. Strong/weak distinction has been a natural consequence of this distribution as well.

Before leaving this section, let me return for a moment to the structural distribution of PPs in elliptical constructions. It is a fact that in Catalan, whenever a PP appears, it appears by virtue of another PP that is found in the immediately preceding sentence.<sup>14</sup> Consider the following examples:

- (7) a. La Beatriu [passarà el cap de setmana a Colliure]<sub>i</sub>, i en Jordi també [e]<sub>i</sub>, però jo no [e]<sub>i</sub>, i la Isabelle tampoc, [e]<sub>i</sub> en canvi la Carme sí [e]<sub>i</sub>, i l'Esteve també [e]<sub>i</sub>.  
*Beatriu will spend the weekend in Colliure, and Jordi (will) too, but I (will) not, and Isabelle (won't) either, by contrast Carme (will) yes, and Esteve (will) too.*
- b. \*La Beatriu [passarà el cap de setmana a Colliure]<sub>i</sub>, i en Jordi també [e]<sub>i</sub>, però jo no [e]<sub>i</sub>, i la Isabelle tampoc, [e]<sub>i</sub>, en canvi la Carme també [e]<sub>i</sub>, i l'Esteve tampoc [e]<sub>i</sub>.  
*Beatriu will spend the weekend in Colliure, and Jordi (will) too, but I (won't) not, and Isabelle (won't) either, by contrast Carme (will) too, and Esteve (will) too.*

The sequence of PPs in (7a) is licensed by virtue of the presence of a PP that reaffirms or modifies the polarity of its immediate precedent. By contrast, in (7b), this ordering is violated. The following constraints express the discourse licensing with respect to the polarity ordering for elliptical sequences of PPs:

**Constraint-1:**

$$\langle \tau, \alpha, \beta \rangle \wedge \langle \alpha, PP(\beta_1, \beta_2) \rangle \wedge \dots \wedge PP(\beta_{n-1}, \beta_n) \Rightarrow \phi_s(\alpha) \wedge (\phi_w(\beta_1), \dots, \phi_w(\beta_n))$$

**Constraint-2:**

$$\text{Parallelism}(\alpha, \beta) \wedge \phi_w(\beta) \Rightarrow (\phi_s(\alpha) \vee (\phi_w(\alpha) \wedge \phi_w(\alpha) = \phi_w(\beta)))$$

**Constraint-3:**

$$\langle \tau, \alpha, \beta \rangle \wedge PP(\beta) \wedge \phi(\alpha) \neq \phi(\beta) \Rightarrow \text{Contrast}(\alpha, \beta) \wedge \phi_s(\alpha) \vee \phi_s(\beta)$$

Constraint-1 will ensure well-formedness sequences of elliptical PPs, as we have seen in the discourse above (7).<sup>15</sup> Constraint-2, states: if  $\text{Parallelism}(\alpha, \beta)$  holds and  $\beta$  is a constituent with a weak PP, then either  $\alpha$  is explicitly marked with respect to  $[\pm \text{neg}]$  feature and licenses  $\beta$  or is also a weak PP with the same polarity as  $\alpha$ .<sup>16</sup> Finally Constraint-3 establishes the discourse domain for a licenser in a given context. All these constraints are important for our PPs, because they capture linguistic intuitions about the use of PPs in discourse. Furthermore, these constraints will verify discourse coherence in terms of discourse vicinity, and discourse attachment. Their violation will lead to structural incoherencies. Another way to think about these PPs is to consider the strong presupposition carried by weak PPs, and strong polarity for the strong PPs. This yields the hypothesis according to which presupposition and polarity between PPs are in an inverse relationship. The more presupposition carried by the PP, the less polarity corresponds to it.<sup>17</sup>

### 3. Discourse Coherence and PPs-Elliptical Constructions

#### 3.1. ANAPHORIC LINKS AND PPs IN DISCOURSE

I shall take the basis for a discussion in what follows the most basic constructs of SDRT. We need at least a mechanism of discourse attachment, and constraints on coherence. To introduce and motivate the main proposal, my aim here is to show how PPs elliptical discourses are constructed. One important benefit of staying within a Discourse Theory is the possibility of capturing both the semantic content and discourse relations, by means of the general properties of discourse. First of all, it provides a representational way of discourse attachment, and secondly, it gives us an appropriate means to infer discourse relations using DICE. As I suggested in the preceding sections, new information will be added to the discourse according to certain constraints over discourse relations, and constraints over PPs in a given context. Thus, in order to capture what kind of relation is established between the source and the target, my treatment is as follows:

1. Build the constituent DRS for the current sentence that contains a PP.

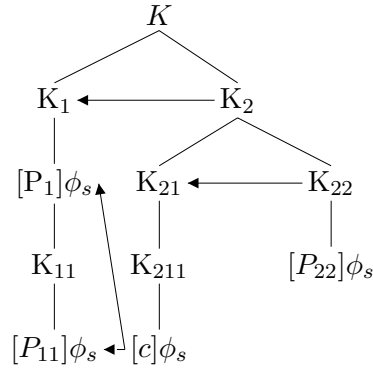
2. Attach to a SDRS  $K$  by means of *Parallelism* or *Contrast* discourse relations, with some constituent that is already part of  $K$ , that either,
  - (i) also contains a PP, or
  - (ii) has a condition P, derived from a verb whose polarity leads to *Parallel* or *Contrast* with the polarity of the clause which contains the PP.
3. The polarity comparison will be according to *sentence pair*. That is, on the one hand, weak PPs need attachment according to the left-to-right anaphoric relation, and the *Parallelism* relation with an explicit antecedent in  $K$ . On the other hand, strong PPs need attachment according to *Contrast* relation to respect an alternative constituent in  $K$  or, alternatively, they generate sequences of weak PPs with the same polarity in  $K$ .
4. SDRS revision and content update after discourse processing.

It is worth observing that these assumptions are compatible with properties of so-called sensitive particles, in addition to sentential negation. That is, parallel and contrast discourse relations have access to the focus feature, or more precisely to the Focus Phrase (i.e., the constituent that contains the expression in focus). Nevertheless, due to limitations of space, this relationship cannot be discussed here.<sup>18</sup> We now examine the predictions of the polarity during text organization, regarding anaphoric orientation according to *Parallel* and *Contrast* relations. Let us consider the following example:

- (8) En Quico [diu que [vindrà a sopar aquesta nit]<sub>i</sub>]<sub>j</sub> però el seu germà no [e]<sub>i/j</sub>, perquè [ha de treballar]<sub>k</sub>, i la Rosa també [e]<sub>i/j/k</sub>.  
*Quico says he'll come to dinner tonight, but his brother (does/will) not, because he must work, and Rosa (does/must) too.*

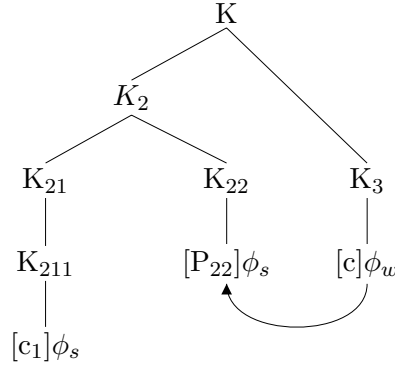
Note that this example is ambiguous between *say*  $\varphi$  and  $\varphi$ . This fact yields two relevant parts or *themes* in the source, say  $K_1$ , for successive bindings in the context. The second constituent is an elliptical clause with an PP as a remnant. Thus, a concept discourse referent  $c$  is introduced in order to resolve its anaphoric dependency. The presence of a strong PP in  $K_2$  with the [+ neg] feature explicitly marked, signals that the constituent supports the *Contrast* relation with some constituent that carries the marked [- neg] feature, either by means of an explicit PP or some condition P, derived from a complete

and saturated proposition, with positive polarity. In this case, positive polarity come from the main clause in the source. Moreover,  $K_2$  is a complex constituent which contains two subDRS, say  $K_{21}$  *el seu germà no* (his brother not), and  $K_{22}$ , *perquè ha de treballar* (because (he) must work). In order to add these constituents in an SDRS  $K$ , a discourse relation is needed. According to DICE axioms, the *Explanation* discourse relation is inferred.<sup>19</sup> Consequently,  $\text{Cause}(K_{21}, K_{22})$  and the coherency of the discourse is preserved. The discourse referent  $c$  in  $K_{22}$  can be interpreted according to the content of  $P_1$  i.e., *diu que  $\varphi$*  (say that  $\varphi$ ), or with the content of  $P_{11}$  i.e.,  $\varphi$ . Both are discursively accessible for the PP *no*. At this point, the relevant constituent graph of the two first sentences looks like the tree below:



The discourse continues, however, with another constituent, say  $K_3$ . As a remnant there is a weak PP, that accordingly, another concept discourse referent is introduced. Following our rules on attachment,  $K_3$  must find in its immediate precedent constituent a PP with [- neg] explicitly marked or, alternately, a complete proposition with positive polarity, in order to license its appearance in the context. The only attachment point for  $K_3$  is  $K_2$ , its immediate precedent in  $K$ . And inside  $K_2$  there is *(ell) ha de treballar* (he must work). Thus the scope of *també* (too) in  $K_3$  is the antecedent  $K_{22}$ , shown by the arrow between  $K_3$  and  $K_{22}$  in the tree depicted below.





This is the only reading available following polarity constraints. The interesting of this example is that there are some restrictions on the available readings when PPs are present. In the example above, the constituent with *també* only has the reading according to which  $K_3$  is interpreted as *La Rosa també ha de treballar* (Rosa also must work), and cannot be interpreted as *La Rosa també diu que  $\varphi$*  (Rosa also says  $\varphi$ ), nor *La Rosa també  $\varphi$*  (Rosa also  $\varphi$ ).

The same results are obtained with the following example:

- (9) La Carme i la seva germana [van anar de vacances a París]<sub>i</sub>,  
 però el Rafel no [e]<sub>i</sub>, perquè [no tenia diners]<sub>j</sub>, i la Maria tampoc  
 [e]<sub>i/j</sub>.  
*Carme and her sister went to Paris on vacation, but Rafel (did)*  
*not, because he had no money, and his sister (did/has) neither.*

Recall that in all these examples, the English versions of them are not multiply ambiguous due to the choice of auxiliary in each case. As I already said, the Tense feature in Catalan constructions with PPs is deleted. For this reason, and according to my view, polarity is a necessary condition in order to preserve coherence. The interpretation of the constituent *La Maria tampoc* (Maria either) in the example (9) is either *no tenia diners* (she had no money either), or *no va anar de vacances a París* (didn't go to Paris on vacation). Both are possible according to the presence of a [+ neg] licenser in the preceding constituent. Notice, once the missing material in the second conjunct is reconstructed, *tampoc* (either) inherits its semantic content. In sum, the interpretation of the context in (9) depends on the scope and degree of the parallelism and contrast discourse relations. The degree may be stronger or weaker depending on the degree imposed by the PPs, which assign an explicit polarity to the various constituents in those contexts.

According to these facts, we are able to establish the appropriate attachment for several constituents involving PPs, in a precise and systematic way.

**Constraint on attachment for PPs in Discourse:** Suppose a constituent  $\alpha$ , DRS, must be attached to the SDRS  $K$ . And suppose with  $\alpha$  a Discourse Relation  $R$  (*Parallelism* or *Contrast*) is associated by virtue of the presence of a PP. Then the other argument in  $K$  for  $R$  must be some constituent  $\beta$ , such that:

- (a)  $\beta$  is open and free in  $K$
- (b) if  $\beta = K$   
then  $\exists \delta \ \delta \leq \beta \wedge \exists P \ (P \text{ is a theme of } \delta) \wedge \text{Parallel}(P_\delta, \beta) \text{ or } \text{Contrast}(P_\delta, \beta)$ .

Consider the following examples:

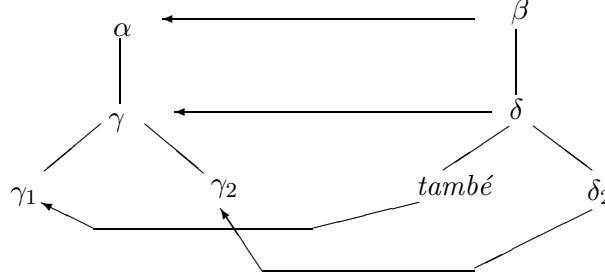
- (10) a. En Pere [assegura que no va agafar els diners]<sub>i</sub>, i la Teresa també [e]<sub>i</sub>.  
*Pere affirms he didn't take the money, and Teresa (does) too*
- b. En Pere assegura que [no va agafar els diners]<sub>i</sub>, i la Teresa tampoc [e]<sub>i</sub>.  
*Pere affirms he didn't take the money, and Teresa (did) neither*

In this context, both weak PPs are possible, due to the fact that both find appropriate polarity licensers in the preceding constituent. With respect to discourse relations, both maintain  $\text{Parallelism}(\alpha, \beta)$ , and we obtain two available readings for both weak PPs. The basic fact of polarity function is the following. The weak PP in example (a) neutralizes anaphoric binding with the Predicative DRS which carries the negative polarity (i.e., #també  $\varphi$ ). By contrast, the weak PP in (b) neutralizes its bijection with the constituent which carries positive polarity (ie. #tampoc assegura  $\varphi$ ).

Finally, let us consider the following discourse:

- (11) a. En Pere [va anar a comissaria de policia]<sub>i</sub>
- b. perquè volia un certificat
- c. En Joan també [e]<sub>i</sub>
- d. però ell per renovar el seu DNI  
*Pere went to the police department, because he wanted a certificate. Joan (did) too, in order to validate his ID*

As pointed out in (Prubst et al., 1994), these kinds of examples pose serious problems to sentence-based approaches to VPE. The PP in (c) is only anaphorically linked to the VP content in (a). Thus, anaphoric dependencies for PPs must be discursively determined. In (11) we have two constituents,  $\gamma$  and  $\delta$ , which support the parallel relation. This situation is defined within MEE trees and represented as follows:



The graph above shows an isomorphism between  $\alpha$  and  $\beta$ , and their ordered structure determined by discourse subordination. Polarity constraints over PPs impose that *també* must find its anaphoric antecedent in the preceding constituent with strong polarity (discourse licensing). As we have seen, parallel and contrast exploit the discourse structure, and force a particular kind of updating of the SDRS structure. In (11) one sees the scope and degree of parallelism, which dictates the isomorphism between  $\gamma_1$  and the PP *també* in  $\delta$ . And, as it has been argued in this paper, the scope and degree depend on the constraints imposed by the PPs. The present account offers support for a discourse-based approach concerning the role these PPs play in a given context. The following examples illustrate that these expressions may be associated with a constituent, no matter how deeply embedded it is.

- (12) [En Joan [va veure el robatori del banc]<sub>i</sub>], i [en Carles [diu/creu/sent/està segur/sap [<sub>CP</sub> que [<sub>IP</sub> el seu cosí, el qual passava per allí]]], també [e]<sub>i</sub>  
*Joan saw the bank robbery, and Carles says/believes/regrets/he's sure/knows that his cousin, who was passing by, (did) too*
- (13) [En Pere no [ha estudiat a la Universitat]<sub>i</sub>], però [diu [<sub>CP</sub> que [<sub>IP</sub> no li dóna importància]]]. En canvi, [l'Anna tampoc [e]<sub>i</sub>], però ella sí que n'hi dóna, d'importància  
*Pere has never studied at the University, but he says that doesn't really matter to him. On the other hand, Anna (hasn't) either, but it does really matter to her*

Again, as before, it is hard to see how a sentence-level approach can make the relevant choice for the antecedent in those cases. This lead one to conclude that these expressions are not independent of the discourse structure effects, and they satisfy the discourse requirements for the anaphoric dependencies. The same approach also explains examples of multiple ellipsis (Klein, 1989) as the following:

- (14) a. El jersei que t'he comprat [t'agradarà]<sub>i</sub>. Si no [e]<sub>i</sub>, el pots retornar, però estic convençut que sí [e]<sub>i</sub>  
*The sweater that I have bought will please. If not, you can give it back, but I'm sure you (will) yes*
- b. Si en Pere [em diu que puc venir]<sub>i</sub>, [vindré]<sub>j</sub>, però si no [e]<sub>i</sub>, no [e]<sub>j</sub>  
*If Pere tells me that I can come, I will come, but if he (does) not, I (will) not*

All these examples reveal that discourse structure affects the interpretation of PPs, and constrain their possible antecedents via discourse relations.

#### 4. Final Remarks

The main objective of this paper on an aspect of the PPs, *sí*, *no*, *també*, *tampoc* in Catalan, was to demonstrate that they impose constraints on discourse coherence or text organization, in terms of *Parallelism* and *Contrast*. I have argued that locality conditions for PPs are maintained in the discourse structure as well. These conditions are subsumed under constraints on discourse coherence and discourse attachment. That is to say, PPs are sensitive to discourse structure, and to Discourse Relations that relate constituents in a discourse. Moreover, I suggested without proving it that this point of view may be compatible with both the presuppositional status of these PPs, and with the effect of focus.

An important issue I have defended is that the appropriate interpretative domains for PPs are found where contextually-dependent relations correlate with polarity, which in turn must be discursively controlled. I have argued that the polarity carried by these expressions provides the set of semantically available readings in ambiguous contexts. Moreover, I have shown that the explicit or implicit Polarity of these PPs satisfy well-formedness and structural coherence of the discourse. What counts as anaphoric dependencies (their scope) is determined not by relations on syntactic structures, but rather by relations on semantic objects.

In sum, we may view the polarity function of PPs as properties of elliptical contexts. More specifically, an elliptical discourse with PPs is coherent if and only if we can construct a legitimate context which satisfies those PPs. Within the SDRT framework, to say that an SDRS  $K$  is coherent is to say that the form and the content in terms of polarity of this SDRS must be consistent with the satisfaction of all its polarity constraints.

## Notes

1. *també* and *tampoc* correspond to English *also, too/ either, neither*, and *sí, no*, (*yes/no*) are respectively lexical morphemes for affirmation/negation in Catalan.
2. As far as I know, this interaction has not been made in previous works about the expressions I am focusing on.
3. Saeboe (1988) approach to these particles also paid attention to polarity by means of a function that relates discourse particles to discourse relations (subset of relations set) as its values. However, as I will argue, Catalan PPs cannot be explained with only two values, positive and negative, due to the fact that there is a lack of correspondence between positive and negative values.
4. See (Asher, 1993) and (Kehler, 1993)) for further explanation of this structural properties of parallel and contrast.
5. A Predicative-DRS is a function from discourse referents into a DRSs. It combines two or more discourse referents to yield a DRS.
6. The *theme* of a constituent is the content which is shared by two related constituents. This is known within SDRT as the *most specific common theme* between discourse constituents. See Asher (1993) and Asher et al. (1997) for details of how a theme is constructed.
7. kPartial-DRSs are DRSs with one or more Predicative DRSs abstracted over.
8. Mechanism which combines Partial-DRSs and Predicative-DRSs (i.e., applies a function to an argument).
9. (Fiengo & May, 1994); (Kitagawa, 1991); (Ristad, 1990); (Lappin, 1984); (Fox, 1995), among others.
10. (Klein, 1987); (Dalrymple et al., 1991); (Hardt, 1992); (Asher, 1993); (Prubst et al., 1994) to name a few. among others.
11. The interpretation of  $\approx$  relative to  $c$  is alphabetic variance, which is familiar within VPE's approaches.
12. As pointed out in (Bosque, 1984), some kind of verbs have a blocking effect on such constructions. Factive verbs do not permit cataphoric ellipsis, whereas propositional verbs do:
  - (15) a. \*En Pau sap que no  $[e_i]$ , però jo diria que la Maria  $[va\ visitar\ la\ seva\ mare]_i$   
*Pau knows that (she does) not, but I would say that Maria visited her mother*
  - b. En Pau diu que no  $[e_i]$ , però jo dic que la Maria  $[va\ visitar\ la\ seva\ mare]_i$   
*Pau says that (he did) not, but I say that Maria visited her mother*

This is an observation which has also been in the discussion of NPI-licensing and Association with Focus (AwF). Complements of propositional verbs are transparent to AwF, whereas complements of factive verbs are opaque. I cannot go into a deep analysis on this, but see (Drubig, 1994) for AwF and factive islands interactions.

13. See (Sandt, 1992), or (Sandt & Geurts, 1991), where it is assumed that presupposition is an anaphor with semantic content. The presupposition is *cancelled* when there is an appropriate antecedent in the reader's model of the discourse context, i.e., process as binding of anaphora. On the other hand, when there is no appropriate antecedent in the reader's model of the discourse context, the reader adds the presupposition to the context by means of *accommodation*.
14. Following Polányi (1985), Webber (1985), and Asher (1993), I assume the right frontier of a tree constitutes the active nodes set. These nodes will be potentially available in discourse attachments.
15. Except in those cases where the preceding clause is the source. In such a case, the source contains saturated and complete predicates. Because of this, it can, but not does need carry an explicit PP when it is affirmative.
16. In fact, the polarity of the source is discursively responsible for the sequence of PPs that may appear in successive elliptical constituents with PPs. Hence, we may assume that there is a semantic rule that establishes the (obligatory) substitution of all strong PPs by their respective weak PPs. This seems reasonable, due to the fact that once a licenser, either marked or unmarked with respect to [neg] feature, appears in the context, it permits (a sequence of) unmarked PPs in its discursive domain.
17. Because of this, weak PPs never can support cataphora.
18. It seems reasonable to observe the behaviour of these PPs according to their context dependency. The essential idea is a simple one. PPs presuppose something which is established in the discourse context as a whole, but the recovery of the deleted material is ascribed to a sentence(s). Hence, anaphoric dependencies are established according to discourse vicinity and Discourse Relations. As a result, presupposition and recovered material can, but need not to come from the same source.
19. In a forthcoming paper I will argue for an extension of these assumptions according to the Information-Packaging in Catalan.
20. See (Lascarides & Asher, 1993) for details.

## Acknowledgements

This paper benefitted immensal from comments and suggestions by the following people: Nicholas Asher, Dale A. Koike, Steve Wechsler, Daniel Hardt, Mark Danburg-Wyld, Robert E. Vann, Laure Vieu and Pascal Amsili. I am also indebted to the highly useful comments of two anonymous reviewers for *Grammars*. All remaining errors are of course my own.

## References

- Asher, N.: 1993, *Reference To Abstract Objects in Discourse*, Kluwer Academic Publishers.
- Asher, N., Hardt, D. and Busquets, J.: 1997 ‘Discourse Parallelism, Scope and Ellipsis’, *Proceedings SALT-7*, A. Lawson and E. Cho, editors, Cornell University, CLC Publications.
- Bosque, I.: 1984 ‘Negación y elipsis’, *ELUA* vol 2, pp. 171–199, Alicante.
- Brucart, J.M.: 1987 *La elisión sintáctica en español*, Publicacions dels Departaments de Filologia Catalana i Espanyola, UAB, Barcelona.
- Dalrymple, M., Shieber, S., and Pereira, F.: 1991, ‘Ellipsis and Higher-Order Unification’, *Linguistics & Philosophy* Vol. 14.4, pp. 399–452.
- Drubig, H.B.: 1994, *Island Constraints and the Nature of Focus and Association with Focus*, Arbeitspapiere des Sonderforschungsbereich 340.
- Fiengo, R., and May, R.: 1994, *Indices and Identity*, MIT Press, Cambridge, MA.
- Fox, D.: 1995, ‘Economy and Scope’, *Natural Language Semantics* Vol. 3, pp. 283–341.
- Grosz, B., and Sidner, C.: 1986, ‘Attention, Intentions and the Structure of Discourse’, *Computational Linguistics* Vol. 12, pp. 175–204.
- Hardt, D.: 1992, ‘An Algorithm for VP Ellipsis’, *Proceedings of the 27th Annual Meeting of the ACL*, Newark, DE.
- Hobbs, J.: 1985, *On the Coherence and Structure of Discourse*, Report No. CSLI-85-37 Center for the Study of Language and Information, October, 1985.
- Kamp, H., and Reyle, U.: 1993, *From Discourse to Logic: Introduction to Modeltheoretic Semantics of Natural Language, Formal Logic and Discourse Representation Theory*, Kluwer Academic Publishers.
- Kehler, A.: 1993, ‘The Effect of Establishing Coherence in Ellipsis and Anaphora Resolution’, *Proceedings of the 31st Conference of The ACL*, Columbus, Ohio.
- Kitagawa, Y.: 1991, ‘Copying Identity’, *Natural Language & Linguistic Theory* Vol. 9, pp. 497–536.
- Klein, I.: 1987, ‘VP Ellipsis in DR Theory’, *Studies in Discourse Representation Theory and the Theory of Generalised Quantifiers*, J. Groenendijk, T.Janssen, and M. Stokhof, editors, Dordrecht, pp. 161–187.
- Klein, E., and Stainton-Ellis, K.: 1989, *A Note on Multiple VP Ellipsis*, Research Paper EUCCS/RP 30, Centre for Cognitive Science, University of Edinburgh.
- Laka, I.: 1990, *Negation in Syntax: On Nature of Functional Categories and Projections*, Ph.D. Dissertation, MIT, Cambridge, Massachusetts.
- Lappin, S.: 1984, ‘VP Anaphora, Quantifier Scope, and Logical Form’, *Linguistics & Philosophy* Vol. 13.4, pp. 273–315.
- Lascarides, A. and Asher, N.: 1993, ‘Temporal Interpretation, Discourse Relations and Commonsense Entailment’, *Linguistics and Philosophy* Vol. 16, pp. 437–493.
- Mann, W.C. and Thompson, S.A.: 1987, *Rhetorical Structure Theory: A Theory of Text Organization*, Reprint Series ISI/RS-87-1190, Information Sciences Institute.
- Muskens, R.: 1996, ‘Combining Montague Semantics and Discourse Representation’, *Linguistics and Philosophy* Vol. 19.2, pp. 143–186.
- Polányi, L.: 1985, ‘A Theory of Discourse Structure and Discourse Coherence’, *Papers from the General Session at the Twenty-First Regional Meeting of the Chicago Linguistics Society*, pp. 25–27.

- Prubst, H., Scha, R. and van den Berg, M.: 1994, 'A Discourse Perspective on Verb Phrase Anaphora', *Linguistics & Philosophy* **Vol. 17.3**, pp. 261–327.
- Ristad, E.: 1990, *Computational Structure of Human Language*, Ph.D. thesis, MIT.
- Saeboe, K.J.: 1988, *A Model for Discourse Particles*, Lilog-Report 31, IBM, Tübingen.
- van der Sandt, R.: 1992, 'Presupposition Projection as Anaphora Resolution', *Journal of Semantics* **Vol. 19.4**, pp. 333–377.
- van der Sandt, R. and Geurts, B.: 1991, *Presupposition, Anaphora, and Lexical Content*, IWBS Report, 185, IBM, Stuttgart.
- Webber, B.L.: 1985, 'Discourse Model Synthesis', *Computational Models of Discourse*, R.Berwick and M.Brady, editors, Cambridge, MA, MIT Press, pp. 267–330.



