ESSLLI 2005
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Workshop

DISCOURSE DOMAINS
AND
INFORMATION STRUCTURE

Workshop Proceedings

Klaus von Heusinger,
Carla Umbach (eds.)

8th - 12th of August, 2005, Heriot-Watt University, Edinburgh, Scotland

Workshop
DISCOURSE DOMAINS AND INFORMATION STRUCTURE

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organized as part of ESSLLI 2005
8 - 12th of August, 2005

Workshop Purpose:

The workshop will investigate the interaction between discourse domains and information structure. Discourse structure is often represented by a hierarchical structure of different discourse domains: Anaphoric accessibility crucially depends on semantic operators that create new domains (like negation), presuppositions are projected according to properties of the discourse, and the quaestio or q(estion)u(nder)d(iscussion)-approach structures a discourse into a hierarchical tree. Information structure, on the other hand, is commonly assumed to be a flat structure: the partition into backgrounded and focused information or into topic and comment.

Topics:
- Background accessibility in hierachical discourse domains
- Presuppositions as anaphors in a theory of information structure
- Presuppositions, anaphoric relations, and alternative sets
- Focus/background structure and embedded sentences
- Topic/comment and embedding

Invited Speakers:
Bonnie Webber (University of Edinburgh)
Hans Kamp (University of Stuttgart)
Nicholas Asher (University of Texas)

Programme Committee:
Nicholas Asher (University of Texas)
Peter Bosch (University of Osnabrück)
Daniel Büring (UCLA)
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Craige Roberts (Ohio State University)
Bonnie Webber (University of Edinburgh)

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Workshop
DISCOURSE DOMAINS AND INFORMATION STRUCTURE

8 - 12th of August, 2005,   17.30-18.00

Programme

Monday, August 8th

Klaus von Heusinger (U. Stuttgart) **Carla Umbach** (U. Osnabrück)	**Introduction**
Bonnie Webber (University of Edinburgh)	**Adverbials and Information Structure**

Tuesday, August 9th

Aritz Irurtzun (EHU-U. Basque Country & HiTT)	**Structure & Derivation of Split Focalization**
Lucia Tovena (Université Paris 7)	**Discourse and addition**

Wednesday, August 10th

Atle Grønn (University of Oslo)	**Presuppositional variance and aspectual meaning**
Lucie Kučová, Kateřina Veselá, Eva Hajičová, Jiří Havelka (Charles University, Prague)	**Topic-focus articulation and anaphoric relations: A corpus based probe**

Thursday, August 11th

Raquel Fernandez (King's College London)	**The Dynamics of Utterances: Grounding and Update in Type Theory with Records**
Nicholas Asher (University of Texas)	t.b.a.

Friday, August 12th

Norberto Moreno Quibon (Universidad de Castilla - La Mancha)	**Modal Subordination and Intensionality**
Hans Kamp (University of Stuttgart)	**How many topics at once?**

Table of contents

THE DYNAMICS OF UTTERANCES: GROUNDING AND UPDATE IN TYPE THEORY WITH RECORDS

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Abstract

This paper explores a formulation of an approach to the dynamic representation of utterances in dialogue using Type Theory with Records, an extension of constructive type theory with records and record types. The approach we argue for combines a view of grounding that reflects the basic insights of a context-dependent notion of meaning, with a grammar-driven formulation of update processes in a questions-under-discussion model.

1 Introduction

The notion of meaning as a function from context to content introduced by Montague and Kaplan underpins a view of *grounding* as the process of finding values for the contextual parameters of utterances. This is the view adopted by (Ginzburg and Cooper 2004, Purver 2004) in their analysis of clarification requests in dialogue, where these are triggered by failure to ground one or more contextual parameters. The set of contextual parameters of an utterance can also be thought of as encoding its presuppositions, i.e. that information that should hold of the context in order for an utterance to be interpreted appropriately.

The aim of this paper is to explore a way of combining this formulation of grounding, which is based on a *static* notion of meaning, with a *dynamic* representation of utterances. In a dialogue setting, this amounts to providing a characterisation of how the information states of the dialogue participants change on the basis of utterances. We implement this idea by representing utterances as mappings between information state configurations, built up compositionally by a dynamic grammar. The input of such functions encodes the contextual parameters or the presuppositions of an expression, while the output is a representation of the updates it brings about on the information state.

The ideas underlying our approach follow, to some extend, those presented in (Purver and Fernández 2003, Fernández and Purver 2004), where utterances are associated with dynamic logic programs assigned compositionally by a Head-driven Phrase Structure Grammar (HPSG). In this paper we explore an alternative account using Type Theory with Records. The use of this formalism has the advantage of providing us with a formal mechanism that allows for a uniform encoding of linguistic information *à la* HPSG on the one hand, and the contextual dependence and update import of utterances on the other.

2 Type Theory with Records: Basic Notions

Constructive Type Theory is a proof-theoretic framework developed in the seventies by the Swedish logician Per Martin-Löf with the aim to provide a foundation for constructive mathematics. Since the early nineties there has been an interest in using constructive type theory for linguistics, mostly as a framework for natural language semantics,[1] where it has been shown to be an efficient tool to develop accounts of presupposition, quantification and anaphora (e.g. (Krahmer and Piwek 1998, Fernando 2001)), often with strong connections with DRT approaches.[2]

Here we use a particular version of constructive type theory, namely Type Theory with Records (TTR), which is an extension of the original framework with *records* and *records types* due to (Betarte and Tasistro 1998). In particular, we draw extensibly on the approach developed in recent work by Robin Cooper (see e.g. (Cooper 2000, Cooper 2005a)), who deserves a special mention for being the first one in showing the viability—and desirability—of using TTR for linguistic purposes.

The basic idea underlying any type theory is that objects can be classified as being of different types. Thus, one of the most fundamental notions of TTR is the typing judgement $a : T$ classifying an object a as being of type T. In a general, technical sense records are mathematical objects that can be defined as sequences of fields which are pairs of labels and values. Record types are records whose fields correspond to typing judgements. The inhabitants of record types are simply called *records*. These are sequences of fields which are pairs of labels and objects. A record r is of type RT if all the typing constraints imposed by RT are satisfied by r. More precisely,

$$\text{record } r =_{def} \begin{bmatrix} l_1 & = & a_1 \\ \dots & & \\ l_n & = & a_n \end{bmatrix} \text{ is of type } RT =_{def} \begin{bmatrix} l_1 & : & T_1 \\ \dots & & \\ l_n & : & T_n \end{bmatrix} \text{ iff } a_1 : T_1, \dots, a_n : T_n.$$

Note that according to this definition of typehood, record r could have additional fields and still be of type RT. This allows us to define a subtyping relation $\sqsubseteq$ between types as follows: $T_1 \sqsubseteq T_2 \leftrightarrow$ if $a : T_1$ then $a : T_2$. In words, type T_1 is a subtype of type T_2 just in case any object of type T_1 is also of type T_2. All records are of the empty record type [ ], the type which imposes no constraints. Hence it follows that all record types are subtypes of [ ].

Crucially the types in a record type can depend on the values of the preceding fields. For instance, consider the record type in (1-left):

$$(1) \quad \begin{bmatrix} x & : & \text{Ind} \\ y & : & \text{Ind} \\ c & : & \text{loves}(x, y) \end{bmatrix} \quad \begin{bmatrix} x & = & a \\ y & = & b \\ c & = & \text{loves}(a, b) \end{bmatrix}$$

Here labels x and y appear in fields whose values are required to be of type Ind(ividual). Label c should be regarded as a *constraint* or in the original formulation of Martin-Löf type theory as a type of proof (a proof of the truth of the proposition in a model for instance). What makes this record type *dependent* is that the type of the value of c depends on the choice of individuals made. A record of this type would be a record like the one in

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[1] Although see (Ranta 1994) for a formulation that includes other levels of linguistic information.

[2] See for instance (Ahn and Kolb 1990) for a reformulation of early DRT with Constructive Type Theory.

(1-right), where a, b are of type Ind and c is a proof of 'loves(a, b)'.

Record types can be nested, i.e. values in a record type can be record types themselves. We will use the notation $r.l$ to denote the value of label l in record r. To refer to values in nested records we will use sequences of labels or paths $r.l_1.l_2.\ldots.l_n$.

The following are some type constructors that will be used in this paper. More technical details can be found in (Cooper 2005a).

- **Function types** If T_1, T_2 are types, then so is $(T_1 \rightarrow T_2)$, the type of functions whose domain is $\{a \mid a : T_1\}$ and whose range is a subset of $\{a \mid a : T_2\}$.

- **The singleton type** If T is a type and $x : T$, then T_x is a singleton type of x, such that $a : T_x$ iff $a = x$. We will use $[\, l\!=\!a \; : \; T \,]$ to denote $[\, l \; : \; T_a \,]$.

- **The type of lists** If T is a type, then so is $\langle T \rangle$, where $\langle T \rangle$ is the type of lists of elements $a : T$. $L : \langle T \rangle$ iff L is a list and if $a \in L$ then $a : T$.

One of the advantages of TTR is that besides being a formalism equipped with all the tools from the lambda calculus (like function types), the availability of records allows us not only to represent semantics, but also to encode other information in a structured manner. As we will see below, we can include phonological and syntactic properties of utterances in parallel with their semantics in a way similar to how this is done in typed feature structures; and we can also used records to represent the structure of the information state of the dialogue participants.[3]

3 Grounding

In their analysis of clarification ellipsis, Ginzburg and Cooper (Cooper and Ginzburg 2002, Ginzburg and Cooper 2004) propose a highly context-dependent representation of utterances. They view utterance types as λ-abstracts over a set of contextual parameters, thus adopting the Montague-Kaplan view of meaning as a function from context to content. Under this view the grounding process of an utterance involves finding values for these contextual parameters in the current context.

In TTR this can be expressed by a function $\lambda r : T_1(T_2(r))$ of type $(Record \rightarrow RecType)$, which maps records r of type T_1 to record type T_2 (dependent on r). T_1 represents the type of context required to interpret the utterance, and T_2 constitutes the type of the utterance content (resulting from application to the context).

Consider for instance the utterance 'Elies left'. Such an utterance can be represented by the function in (2).

$$(2) \; \lambda r : \begin{bmatrix} \text{x} & : & \text{Ind} \\ \text{c}_1 & : & \text{named(x, Elies)} \\ \text{t}_{\text{ut}} & : & \text{Time} \\ \text{t}_{\text{ev}} & : & \text{Time} \\ \text{c}_2 & : & \text{prec(t}_{\text{ev}}, \text{t}_{\text{ut}}) \end{bmatrix} \left(\begin{bmatrix} \text{phon} & : & \texttt{elies left} \\ \text{cat} & : & \text{S} \\ \text{cont} = Leave(r.\text{x}, r.\text{t}_{\text{ev}}) & : & \text{ProofType} \end{bmatrix} \right)$$

The type of context required to ground this utterance (specified by the domain of the function) includes fields for all those parameters that require values to be found in context:

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[3]For further motivation and advantages of the use of TTR for linguistic purposes, see work by Cooper and colleagues (e.g. (Cooper 2000, Cooper and Ginzburg 2002)).

the individual denoted by the proper name 'Elies', the utterance and the event times, and the constraints that 'x' is named 'Elies' and that the event time precedes the utterance time. The type in the range of the function specifies the type of the utterance resulting from the instantiation of the context type with the current context. Note that the type of the content (the value of label 'cont') is dependent on the choice of objects made in *r*.

Although we will not give a full specification of this here, we assume that these representations are built up by the grammar in a compositional fashion. Just to give a hint of how this may work, consider the example above: Simplifying somehow, the clause type in (2) arises by combining the NP and the VP in (3) and (4), respectively. The contextual type of the sentence is the union of the contextual types of its daughters, while the clausal content arises by applying the function denoted by the VP to the individual denoted by the NP.

$$
(3) \qquad \lambda r : \begin{bmatrix} \text{x} & : & \text{Ind} \\ \text{c}_1 & : & \text{named(x, Elies)} \end{bmatrix} \left(\begin{bmatrix} \text{phon} & : & \texttt{elies} \\ \text{cat} & : & \text{NP} \\ \text{cont} = r.\text{x} : \text{Ind} \end{bmatrix} \right)
$$

$$
(4) \qquad \lambda r : \begin{bmatrix} \text{t}_{\text{ut}} & : & \text{Time} \\ \text{t}_{\text{ev}} & : & \text{Time} \\ \text{c}_2 & : & \text{prec}(\text{t}_{\text{ev}}, \text{t}_{\text{ut}}) \end{bmatrix} \left(\begin{bmatrix} \text{phon} & : & \texttt{left} \\ \text{cat} & : & \text{VP} \\ \text{cont} = \lambda \text{x} : \text{Ind}.\textit{Leave}(\text{x}, r.\text{t}_{\text{ev}}) : \text{FType} \end{bmatrix} \right)
$$

Generally speaking, the type of context encodes the presuppositions of an expression built up compositionally from their sub-components. Thus the NP function in (3) inherits the presupposition of existence of a suitable referent introduced by the proper noun. And the sentence in (2) amalgamates the presuppositions conveyed by both the NP and the VP.

4 Update

One of the basic insights we learn from the dynamic semantics tradition is that utterances not only depend on context, but they also have the ability to *change* it. In a dialogue setting, adding dynamics to the Montague-Kaplan notion of meaning amounts to providing a characterisation of how the information states of the dialogue participants change on the basis of utterances. With this dynamic perspective in mind, our approach will be to view utterances as mappings between information state configurations.

In computational dialogue management (see, e.g.(Larsson 2002)) update processes on information states are usually brought about by a set of *update rules*. Recent work by Robin Cooper (Cooper 2005b) shows that TTR can be used to provide an abstract characterisation of such rules as update functions that map a record r of type T_i (the type of the current information state) to a type T_{i+1} (the type of the next state, dependent on r). Update rules are mainly triggered by the observance of particular dialogue moves (i.e. speech acts). Thus, on this approach, update rules can be thought of as a pragmatic module acting on static grammatical representations.

Instead we explore a grammar-driven characterisation of utterances that makes explicit their update import. The result is a dynamic grammar that generates representations that are akin to update rules.[4]

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[4]We state this equivalence without giving further details here. In any case this is of course not to claim that dynamic utterance representations are the only update rules needed for effective dialogue management.

Following Ginzburg's dialogue gameboard (Ginzburg 1996, Ginzburg forthcoming), we assume information states of the following type:

$$IS =_{def} \begin{bmatrix} \text{bg} & : & \text{RecType} \\ \text{qud} & : & \langle \text{Question} \rangle \\ \text{utt} & : & \text{RecType} \end{bmatrix}$$

Thus a record of type IS will include, at least, a label 'bg' (for background), whose value will be a record type representing the propositional content taken for granted or agreed upon by the dialogue participants; a list of elements of type Question, labelled as 'qud' (questions under discussion); and a label 'utt' (for utterance), that will take as value the linguistic sign representing the last utterance made.[5]

We take both the context with respect to which utterances are interpreted and the context resulting from the updates brought about by utterances to be subtypes of IS. Recall that the actual information states of the dialogue participants, which in our TTR account correspond to records, could have additional information and still be of type IS.

As the static representations of section 3, dynamic utterance functions are of type ($Rec \rightarrow RecType$). They are functions *utt* mapping records r of type T_1 to record types T_2, where T_1 and T_2 are required to be subtypes of type *IS*. Type T_1 specifies the type of the current context. More precisely, it specifies the contextual parameters of the utterance as part of the current information state. The dynamic import of the utterance (i.e. its contextual updates) is then a record type representing the type of the updated information state such that $utt(r) = T_2$. Note that, for simplicity's sake, in the representation of the utterance functions below we will ignore those fields of the information state that are not relevant for current purposes.

The distinction between definite and indefinite NPs provides a simple example of the processes of grounding and update. A definite NP like the one in (5) can be grounded if the current information state contains as background information a suitable referent. If this is the case, the sign denoting that individual is integrated into the new information state. On the other hand, indefinite NPs like (6) do not impose restrictions on the current context. Instead they denote existentially quantified individuals that are *introduced* into the updated background.

$$(5) \quad \lambda r : \begin{bmatrix} \text{bg} : \begin{bmatrix} \text{x} & : & \text{Ind} \\ \text{c} & : & \text{table(x)} \\ c_1 & : & \text{unique(x)} \end{bmatrix} \end{bmatrix} \left(\begin{bmatrix} \text{utt} : \begin{bmatrix} \text{phon} & : & \texttt{the table} \\ \text{cat} & : & \text{NP} \\ \text{cont} = r.\text{x} : \text{Ind} \end{bmatrix} \end{bmatrix} \right)$$

$$(6) \quad \lambda r : \begin{bmatrix} \ \end{bmatrix} \left(\begin{bmatrix} \text{utt} & : & \begin{bmatrix} \text{phon} & : & \texttt{a table} \\ \text{cat} & : & \text{NP} \\ \text{cont} & : & \text{Ind} \end{bmatrix} \\ \text{bg} & : & \begin{bmatrix} \text{x} = \text{utt.cont} : \text{Ind} \\ \text{c} & : & \text{table(x)} \end{bmatrix} \end{bmatrix} \right)$$

Such representations could be combined with additional pragmatic information and complemented by other update rules relevant for particular domains.

[5]The value of 'utt' should in fact be $\langle \text{Sing} \rangle$, where Sing should be understood as the record type counterpart of feature structure sings in HPSG.

5 Question projection and the dynamics of QUD

In this section we will give some clues as to how the update of 'qud' may work in the approach presented so far. Our proposal will be that qud-update is to some extent driven by the grammatical specifications of some clausal types. This seems to explicate the resolution constraints of some non-sentential utterances which can be analysed as involving qud-presuppositions.

A word on the representation of questions is in order here. We follow (Ginzburg forthcoming) in taking questions to be propositional abstracts—in TTR functions from records into propositions. Polar questions are formalised using vacuous abstractions, which in TTR corresponds to functions whose domain is the empty record type. Here we will use a simplified representation of such entities, representing the content of *wh*-questions as the lambda abstract in (7-a), and the content of a polar question as the lambda abstract in (7-b).[6]

(7)   a.   Who left? $\rightsquigarrow \lambda x.Leave(x)$
       b.   Did Elies leave? $\rightsquigarrow \lambda[\,].Leave(Elies)$

In the theory of context in dialogue developed by (Ginzburg 1996, Ginzburg forthcoming), the resolution of fragmentary utterances like short answers to queries is tied to the presence of a suitable question under discussion (QUD) in context. Consider for instance a dialogue like the following:

(8)   A: Who left?
       B: Elies.

In the HPSG account of (Ginzburg and Sag 2001) a short answer like B's response above would be analysed as an instance of the construction type *declarative fragment clause*. This clausal type has as its only daughter a phrase—an NP—whose content is revamped to a full propositional content via combination with the content of the maximal question under discussion (here the fist question in the 'qud' list). The function in (9) is a (simplified) TTR version of this construction type (where 'hd_dtr' is short for 'head daughter'):

$$
(9)\quad \lambda r : \left[\; \text{qud} : \langle q_1 \mid \text{Question}\rangle \;\right]\left(\left[\begin{array}{lll} \text{utt} & : & \left[\begin{array}{lll} \text{cat} & : & \text{S} \\ \text{hd\_dtr} & : & \left[\begin{array}{l} \text{cat} : \text{NP} \\ \text{cont} : \text{Ind} \end{array}\right] \\ \text{cont} = r.\text{qud.q}_1@\text{hd\_dtr.cont} : \text{Prop} \end{array}\right] \end{array}\right]\right)
$$

We use @ to represent functional application. The propositional content of the answer

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[6]The abbreviation in (7-a) should not be confused with the denotation of a VP. It is a short hand for the following propositional abstract:

$$
\lambda r : \left[\begin{array}{lll} \text{x} & : & \text{Ind} \\ \text{c} & : & \text{person(x)} \end{array}\right]\left(\left[\begin{array}{lll} \text{sit} & : & r_1 \\ \text{sit\_type} & : & [\, c_1 : Leave(r.\text{x}) \,] \end{array}\right]\right)
$$

Propositions are defined using notions from Situation Semantics. Situations are formalised as records, while infons (situation types) are taken to be record types. A proposition is true just in case the situation record is of the type specified by the situation type.

arises by application of the function denoted by the maximal QUD to the individual denoted by the NP. Thus short answers can be viewed as anaphors/presupposition triggers requiring a particular QUD available in context.[7]

How do questions become available? QUDs can arise by different processes, like accommodation (see e.g. (Larsson 2002)) and coercion operations (Ginzburg and Cooper 2004). However probably the most trivial way of raising QUDs is by actually uttering questions. The perhaps obvious intuition that questions introduce QUDs in the dialogue model can be made explicit by representing the update brought about by interrogative clauses as the projection of their content into 'qud'. The following function is a representation of the type *interrogative clause*:

$$(10) \qquad \lambda r : \Big[\text{ qud} : \langle\text{Question}\rangle \ \Big] \left(\left[\begin{array}{l} \text{utt} : \left[\begin{array}{l} \text{cat} \ : \ \text{S} \\ \text{cont} : \text{Question} \end{array} \right] \\ \text{qud} = \langle \text{utt.cont} \mid r.\text{qud} \rangle : \text{QuestionList} \end{array} \right] \right)$$

The constraint in (10) specifies that interrogative clauses (clauses whose content is of type 'Question') update the dialogue context by introducing their content at the head of the current 'qud' list.

In Ginzburg's account QUDs can also arise by the assertion of a proposition p, the assumption being that asserting p raises the question *whether p* for discussion. Again a version of this can be implemented by associating a qud-update with the type of declarative clauses as follows:

$$(11) \qquad \lambda r : \Big[\text{ qud} : \langle\text{Question}\rangle \ \Big] \left(\left[\begin{array}{l} \text{utt} : \left[\begin{array}{l} \text{cat} \ : \ \text{S} \\ \text{cont} : \text{Prop} \end{array} \right] \\ \text{qud} = \langle \lambda[\,].\text{utt.cont} \mid r.\text{qud} \rangle : \text{QuestionList} \end{array} \right] \right)$$

According to (11), declarative clauses (clauses whose content is of type Proposition) introduce a question on 'qud' created by vacuous abstraction on their propositional content. The projection of such question in context explains the resolution of elliptical propositional lexems like 'Yes/No', which presuppose the presence of a polar question in context:

(12)   A: Elies left. / Did Elies leave?
         B2: Yes (this morning).
         B1: No (I just saw him).

The introduction of constraints (10) and (11) in our dynamic grammar allows us to represent the dialogical update import of interrogative and declarative clauses. Note that, according to these constraints, the projection of questions in the dialogue context is not driven by illocutionary force: Question projection is not triggered by *ask* or *assert* moves, but it is instead linked to the semantic entities denoted by clausal types.

If we assume that the update import of an utterance is compositionally built up by amalgamation of the updates brought about by its components, our content-dependent approach to question projection predicts that all interrogative and declarative clauses (embedded

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[7]In (Ginzburg and Sag 2001) the resolution of short answers is related to another parameter, the salient utterance. We will ignore this in this paper.

and otherwise) project questions under discussion, and that therefore licence elliptical responses. This seems to be correct: the resolution possibilities of B's responses in the examples below seem to indicate that both main and embedded clauses are available for non-sentential utterance resolution and therefore are projected into 'qud'.

(13) a. A: Who will attend the reception?
            (i) $q_1 = \lambda x. attend(x, \text{the reception})$
      b. B1: The Smiths for sure.

(14) a. A: Jo wonders who will attend the reception.
            (i) $q_1 = \lambda[\,].wonder(\text{Jo}, q_2)$
            (ii) $q_2 = \lambda x. attend(x, \text{the reception})$
      b. B1: Yes. (She'd like to know before Saturday.)
          B2: The Smiths for sure.

(15) a. A: Lou wonders why Jo is so worried about who will attend the reception.
            (i) $q_1 = \lambda[\,].wonder(\text{Lou}, q_2)$
            (ii) $q_2 = \lambda x. reason(x, worry(\text{Jo}, q_2))$
            (iii) $q_3 = \lambda x. attend(x, \text{the reception})$
      b. B1: Yes. (But he doesn't want to ask her.)
          B2: Because she'll go only if Mo goes.
          B3: The Smiths for sure. (She shouldn't worry that much.)

6 Conclusions

In this paper we have explored a dynamic approach to utterances formalised in Type Theory with Records. We have represented utterances as mappings between information state configurations built up compositionally by a dynamic grammar. This allows us to combine a view of grounding as the process of finding values for the contextual parameters of utterances, with a grammar-driven formulation of update processes in a questions-under-discussion model.

We have proposed to represent the update import of some clausal types as updates on the list of questions under discussion. Both main and embedded clauses seem to project questions that are available for non-sentential utterance resolution.

Further investigation is needed to establish the restrictions governing the projection of questions. Although for some embedded clauses question-projection seems to take place, it remains to be seen to what extend this holds in a more general fashion. The following example (pointed out by Jonathan Ginzburg) seems to indicate that embedded questions in the consequent of conditionals are not suitable antecedents for non-sentential utterance resolution.

(16) A: If he decides to come, I'll be wondering when.
       B: [?] In September.

We will investigate this and other related issues in future research.

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Presuppositional variance and aspectual meaning

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Abstract

Information[1] structure is normally considered to be orthogonal to the syntax-semantics interface. However, in this paper, I argue that aspectual operators in Russian, notably the imperfective aspect with complete event interpretations, are sensitive to information structure. My goal is to show how the imperfective aspect can be used either to *assert* or *presuppose* the existence of a complete event of the type described by the VP, without positing ambiguity of the aspectual operator. In a compositional framework, this implies that we need something like a <Background, Focus>-partitioning already at the VP-level, which is input to the aspectual operator. I also suggest how this combined approach to aspect and information structure could be extended to account for aspectual usage in non-declarative sentences.

1 Introduction

The grammatical category of aspect in Russian is formally expressed through a systematic opposition between perfective (Pf) and imperfective (Ipf) verb forms. Pf is invariably associated with complete event readings, as in (1) below, where the dining event is included in the interval denoted by the temporal adverbial:

(1) Časov v šest' večera **poobedali**^{pf}. (Internet)

   We **had dinner** around six p.m..

Opposed to this complete event interpretation of Pf is the Hauptbedeutung of Ipf, the progressive incomplete event reading, as in (2):

(2) My **obedali**^{ipf}, kogda u moego druga proizošel^{pf} pristup. (Internet)

   We **were having dinner**, when my friend had a heart attack.

However, the unmarked imperfective is also compatible with complete event interpretations in competition with the perfective. This puzzling use of Ipf is in Slavic linguistics known as *konstatacija fakta* – the 'factual Ipf' – as illustrated in (3):

(3) Ty segodnja **obedal**^{ipf} v restorane! (Internet)

   You **had dinner** in a restaurant today!

Depending on the context, a simple imperfective sentence like (4) is compatible with *at least* three different interpretations, as demonstrated in the English translations:

(4) Ja **obedal**^{ipf}.

   I **was having dinner** *(at some particular time)*;
   I **used to have dinner** *(regularly)*;
   I **have had dinner** *(today)*

In this paper, my focus will be on this last interpretation, the so-called factual Ipf. A standard, compositional DRT-analysis of aspectual operators gives us the following semantics for both Pf and the factual Ipf:

- Pf (or Ipf on its complete event interpretation) $\Rightarrow \lambda P \lambda t[e \mid P(e), e \subseteq t]$

Both Pf and the factual Ipf convey the information that the event *e* described by the VP *P* is included in the assertion time *t*. At the syntax-semantics interface it is assumed that tense has scope over aspect, such that aspects convert predicates of events into predicates of times. Thus, the value of the Reichenbachian assertion time *t* is provided by the 'tense branch', which contains tense proper and temporal adverbials.

Note that Ipf on its progressive, incomplete event interpretation is commonly analyzed as encoding the aspectual configuration $t \subseteq e$. A much discussed issue in this respect is whether the imperfective in Russian is genuinely ambiguous between incomplete ($t \subseteq e$) and complete ($e \subseteq t$) event interpretations, or whether its meaning can somehow be analyzed as underspecified/general/vague.

I will leave this important issue open. Instead, I propose in this paper a more fine-grained analysis of the factual Ipf, which on closer inspection seems to subsume *two* quite different ways of referring to complete events located in the past, and I will offer a new proposal to distinguish between the two uses.

The complete event interpretation which we encountered in (3) above, can be referred to as the *existential Ipf*, inasmuch as the aspectual operator here serves to *assert* the existence of a complete event, notably through declaring the verb's event argument in the universe of the assertoric DRS. In contexts such as (5) and (6), on the other hand, the complete event reading of Ipf has a quite different status:

(5) Krasivo ukrasili^{pf} elku.
   [Kto]$_F$ **ukrašal**^{ipf}? (Israeli 1998, 67)

   They decorated the Christmas tree beautifully.
   [Who]$_F$ **decorated** it?

(6) V ėtoj porternoj ja napisal^{pf} pervoe ljubovnoe pis'mo. **Pisal**^{ipf} [karandašom]$_F$.

   In this tavern, I wrote my first love letter. I **wrote** it [in pencil]$_F$.

I will refer to the use of the factual Ipf in (5) and (6) as the *presuppositional Ipf*. In these cases the verb is typically deaccentuated, representing given material, while the speaker's focus is on some other constituent, as indicated through the F(ocus)-marking. This is to be contrasted with the existential Ipf – as in (3) above – where the main stress of the utterance typically falls on the verb.

The main goal of this paper is to implement this information structure component into a compositional analysis of aspectual operators. As shown in (Grønn 2004), the distinction between the existential Ipf and the presuppositional Ipf is crucial for understanding the aspectual competition between Pf and Ipf, which is a key issue in Russian linguistics. Quite generally, there is a *division of labor* between Pf and Ipf with respect to information structure, which can be formulated informally as follows:

- **The Information Structure Principle of Russian Aspect**
  Pf is drawn toward the *assertoric content* and prefers to see the event argument and aspectual configuration in the assertoric part, while Ipf is *neutral* with respect to the assertion/presupposition division.

The following text illustrates nicely the difference between the assertoric Pf and the (possibly) presuppositional Ipf in reporting complete events:

(7)   Vnezapno ej stalo^{pf} plocho, skazala^{pf}: "Ėto konec." Vyzvali^{pf} neotložnuju, otvezli^{pf} v bol'nicu, no pozdno – umerla^{pf} na drugoj den'. . . . Tut v vospomi-nanijach probel [. . .] Kto **zvonil**^{ipf}, **rasporjažalsja**^{ipf}, **zakazyval**^{ipf} mašinu? Kto ego samogo otvez^{pf} v gorod? Polnaja nejasnost', pamjat' černa. (Uppsala Corpus)

Suddenly she fell ill, and said: "It's the end". Somebody called for an ambulance, they took her to the hospital, but it was too late – she died the next day. . . . Here there was a hole in his memory [. . .] Who **phoned**, **gave orders**, **ordered** the ambulance? Who actually brought him to town? Everything was fuzzy, his memory was muddled.

The division of labour between the two aspects emerges clearly in (7): Pf is used at the assertoric level to introduce 'new events' in the story: 'stalo^{pf} plocho – fell ill', 'skazala^{pf} – said', 'vyzvali^{pf} neotložnuju – called the ambulance', 'otvezli^{pf} v bol'nicu – brought to the hospital', 'umerla^{pf} – died'. Then follow three verbs marked with the imperfective aspect having a presuppositional interpretation. The event presuppositions in question are all readily justified in the updated context containing the previous perfective events. Consider for instance the case of 'zakazyval^{ipf} mašinu – ordered a car'. In the input context for this utterance, it has already been established – due to the preceding 'vyzvali^{pf} neotložnuju – called the ambulance' – that an ambulance has been solicited. Hence, the interpreter can straightforwardly resolve the presupposition/anaphora of 'zakazyval^{ipf}'.

Then, finally, after three occurrences of Ipf, Pf is again used: 'otvez^{pf} [ego] v gorod – brought [him] to town'. The reason for this shift in aspect is that 'otvez^{pf}' in fact reports new information. There is nothing in the input context which can act as an antecedent for the event of bringing *him* (i.e. the speaker) to town.

2   An aspectual operator sensitive to the A/P distinction

The factual Ipf locates a complete event into the assertion time either by linking it anaphorically to a given event or by introducing the event. Which of the two options

actually obtains is derived from the focus-background structure of the underlying VP. Note that a VP in my neo-Davidsonian framework contains not only the verb and its internal argument, but also the external argument and possible adjuncts. A VP is therefore reminiscent of a tense- and aspectless 'sentence-radical', located below operators such as aspect, tense, wh-words etc. I introduce a special principle – the bold face convention – to ensure that Ipf operates on the background if the latter is non-empty. Otherwise it operates on the focus. Thus, the information structure of the input determines whether the factual Ipf gets a presuppositional or an assertive (existential) interpretation.

Consider the factual Ipf 'pisal^{ipf} – wrote' in (6) above, which occurs in a context where the instantiation of a complete event of 'writing a letter' ('napisal^{pf} pis'mo – wrote a letter') has been asserted in the preceding utterance. In this setting, the focus of the speaker uttering 'pisal^{ipf}' is not on the culmination of this event, but on the circumstantial factor that the writing was performed with a pencil.

I represent the partitioning of the aspect- and tenseless VP as an ordered pair <B(ackground), F(ocus)> along the lines of the structured meaning approach:

- $< \lambda e[\,|\, \text{write}(e)], \lambda e[x\,|\, \text{Instrument}(e,x), \text{pencil}(x)] >$

In accordance with neo-Davidsonian event semantics, the main event is decomposed into several event predicates (thematic roles) such that the verb's internal and external arguments, and adjuncts as in our case above, are represented as two-place predicates of events and ordinary individuals.

The background part is often considered to contain presupposed material (Geurts and van der Sandt 1997) and (Bende-Farkas et al. 2003). The <B,F>-partition is therefore transformed into a complex DRS as follows, where the subscript DRS represents the presupposed/given material which originated as the 'background':

- $\lambda e[x\,|\, \text{Instrument}(e,x), \text{pencil}(x)]_{[\,|\, \text{write}(e)]}$

This complex DRS is input to the imperfective operator in example (6), following the information structure principle for Russian aspect. In cases of presuppositional Ipf, factors like word order and intonational focusing trigger the appropriate <B,F> configuration at the VP-level. Above, I made the assumption that intonation (and perhaps word order) in (6) licensed the subscript 'F(ocus)' in '[karandašom]$_F$', with the subsequent <B,F> partitioning. Since a <B,F> structure is formed already at the VP-level, we can maintain a uniform treatment of different aspectual operators, which all have the same logical type and convert predicates of events into predicates of times.

Contrary to (6), in example (3) the background part is empty, and we end up with only an assertoric DRS. Ipf is thereby genuinely flexible since the verb and its event argument can either be part of the assertoric content (existential Ipf) or backgrounded/presupposed (presuppositional Ipf).

Because of the dual role of the factual Ipf, subsuming both the existential Ipf and the presuppositional Ipf, it is unreasonable to consider the factual Ipf as a presupposition inducer in itself, but we must still capture the fact that Ipf interacts with the presupposition inherited from a possible background part of a structured VP. The factual Ipf should therefore be treated as a function defined over different cases:

- $\text{Ipf}_{factual} \Rightarrow \lambda P \lambda t [\mathbf{e} \mid P(e), \mathbf{e} \subseteq \mathbf{t}]$

The novelty here lies in the introduction of *bold face* discourse referents and conditions, which only occur in the translation of the operator and disappear at the next stage of the derivation, cf. the following principle:

- **The bold face convention**
  Bold face discourse referents $\mathbf{x} \in U_\alpha$ and conditions $\mathbf{Con} \in \text{Con}_\alpha$ occurring in the translation of an operator $\alpha_{<a,b>}$, are 'rewritten' in the process of applying α to an argument $\beta_{<a>}$. In the resulting DRS $K_{<b>}$,
  (i) if K's presupposition part P is empty, $\mathbf{x}$ and $\mathbf{Con}$ are rewritten as $x \in U_K$ and $Con \in \text{Con}_K$, respectively.
  (ii) if K's presupposition part P is non-empty, $\mathbf{x}$ and $\mathbf{Con}$ are rewritten as $x \in U_P$ and $Con \in \text{Con}_P$, respectively.

The idea is that the bold face discourse referent $\mathbf{e}$ and the bold face aspectual configuration $\mathbf{e} \subseteq \mathbf{t}$ in the translation of Ipf will be drawn to the presuppositional DRS iff the latter is non-empty. In our cases of presuppositional Ipf, the 'bold face convention' ensures that the eventive discourse referent is eventually declared in the presupposition part[2], and that the condition representing the aspectual configuration occurs in the set of conditions of the presupposition as well.

After applying the imperfective (factual Ipf) operator to its argument in (6), we end up with the following complex DRS:

- [AspectP]: $\lambda t [x \mid \text{Instrument}(e, x), \text{pencil}(x)]_{[e \mid \text{write}(e), e \subseteq t]}$

This set of times further combines with a covert, anaphoric temporal adverbial ('then'), which I represent thus: $t_1{}_{[t_1 \mid \,]}$. The result is, through functional application and presupposition composition, a DRS which has the logical type of 'context change potentials':

- [TenseP]: $[x \mid \text{Instrument}(e, x), \text{pencil}(x)]_{[e, t_1 \mid \text{write}(e), e \subseteq t_1]}$

Following (van der Sandt 1992), presuppositions are anaphoric and require an explicit or implicit antecedent in the input context. Suitable antecedents for the variables in the universe of the presupposition part of the DRS above are straightforwardly found in the event and time referents provided by the perfective verb 'napisal^{pf} – wrote' in the preceding utterance.

3   Explaining aspectual choice in Russian

In the traditional literature on Russian aspect it has been noted that a subset of factual Ipf rarely occurs discourse-initially. In the analysis presented here, where the presuppositional Ipf involves *pre*supposed, anaphoric material, the reluctance of this reading to occur in a zero-context gets a principled explanation.

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[2]Since the presuppositional material is processed in the input context *before* the assertoric DRS – given that presuppositions are *pre*supposed – the discourse referent e in our example has to be declared in the presuppositional DRS. Otherwise the event argument would end up free in the condition 'write(e)'.

Furthermore, given DRT's notion of *accessibility*, which constrains the availability of prior discourse referents as antecedents for anaphoric expressions, the present aspectual theory solves some puzzles in the existing literature:

(8) A: Nado vyključit'^{pf} svet.
     B: # Ja ego uže **vyključal**^{ipf}. (Mehlig 1997, 169)

     A: You must turn off the light.
     B: # I **have** already **turned** it off.

Russian aspectologists have not been able to explain why the factual Ipf is ruled out and cannot have an anaphoric reading in such examples.[3] However, the restriction on the presuppositional Ipf in (8) follows straightforwardly from DRT's binding theory of presuppositions inasmuch as the eventive discourse referent of 'vyključit'^{pf} – turn off' is embedded under a modal operator 'nado – must', and is therefore not accessible as an antecedent for cross-sentential anaphora.

Another phenomenon for which this analysis makes the right predictions, is the higher acceptability of the presuppositional Ipf in (9) compared to (10):

(9) Kto **daril**^{ipf} tufli?

     Who **gave** shoes [as a gift]? (Israeli 1998, 56)

(10) Kto $\left\{ \begin{array}{c} \textbf{podaril}^{pf} \\ (\#)\text{daril}^{ipf} \end{array} \right\}$ tebe ėti tufli? (Israeli 1998, 65)

     Who **gave** you these shoes [as a gift]?

Assuming some kind of Gricean pragmatics, one can account for these data reported by Israeli quite straightforwardly. The presuppositional Ipf can be used when the event is given in the context, as we have to assume is the case in (9). However, if the speaker presupposes the existence of an event of offering shoes as a gift, he would certainly in most contexts know the identity of the receiver and the object offered, hence the words 'tebe ėti – you^{dative} these' become redundant. The presence of 'tebe ėti' in (10) therefore suggests that the existence of the event here belongs to the assertoric level, and Pf is accordingly preferred.

Many of the puzzling examples of aspectual competition (Pf vs. Ipf) in Russian can be explained along similar lines, that is, with respect to the Assertion/Presupposition distinction. At the same time, there is a large number of borderline cases where both aspects are felicitous. This is to be expected since the speaker can, in general, choose to reintroduce the event at the assertoric level through a perfective verb, even if the conditions hold which would allow a presupposition to be satisfied.

4 Ipf in embedded sentences and constituent questions

The present compositional, bottom-up approach to aspect and information structure has some non-trivial consequences. An interesting point worth noting is that aspect in

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[3]See (Grønn 2004) for an explanation for why even an existential Ipf interpretation is ruled out in (8). In other words, speaker B has to use the perfective 'vyključil^{pf}'.

embedded sentences depends on the *local* information structure, and not on the information structure of the matrix. Consider for instance the following example:

(11) [Korčnoj] ne upomjanul^{pf} i o tom, čto v svoj poslednij den' na rodine v ijune on **obedal**^{ipf} u menja doma. (Internet)

[Korčnoj] did not even mention that on his last day in his mother country, in June, he **had lunch** at my place.

The negated verb in the matrix seems to induce a factive presupposition, such that the content of the complement is presupposed. However, if we consider the embedded sentence in isolation, there is nothing here which suggests a background/focus partition or otherwise requires a presuppositional Ipf interpretation of 'obedal^{ipf} – had lunch'. Accordingly, the theory outlined in this paper predicts that the factual Ipf in (11) must be of the existential kind, i.e. the existence of the lunching event is part of the assertoric content of the embedded sentence. And indeed, the (neutral) intonational focus of the embedded sentence is on the verb ('obedal^{ipf} – had lunch') itself, favoring an existential Ipf reading.

In simple declarative sentences, intonational and prosodic patterns play an important role in carving out the appropriate <Background, Focus>-partitioning. In constituent questions, on the other hand, intonation does not seem to play the same role, since a certain 'focus' is invariably on the question word. What are the implications of this for our theory, considering that the factual Ipf has been empirically shown, e.g. in (Israeli 1998), to occur particularly frequently in constituent questions?

In fact, although the existential and presuppositional variants are indistinguishable at the surface level when occurring in constituent questions, also for these cases I will argue that the underlying information structure speaks in favor of maintaining the distinction between existential Ipf and presuppositional Ipf. A way to approach the issue of whether we are dealing with the presuppositional or existential Ipf is by looking at the set of possible *congruent answers* (Krifka 2001) to the question in question.

In regard to question-answer pairs, the idea of an event presupposition associated with presuppositional Ipf gives rise to the prediction that answers like 'nikto – nobody' should only be felicitous in reply to a question having an existential Ipf interpretation. This prediction is borne out, as witnessed by the difference in acceptability of the answers in (12) and (13):

(12) A: Kto **otkryval**^{ipf} ėtu butylku šampanskogo? (presuppositional Ipf)
B: (#) Nikto.

A: Who **opened** this bottle of Champagne?
B: (#) Nobody.

(13) A: Kto **čital**^{ipf} 'Vojnu i mir'? (existential Ipf)
B: Nikto.

A: Who **has read** 'War and Peace'?
B: Nobody.

Why is it necessary to draw a distinction between the interpretations of the imperfective aspect in (12) and (13), such that 'čital^{ipf}' is considered a case of existential Ipf

while 'otkryval^{ipf}' is associated with an event presupposition? The motivation behind this analysis is related to an overall understanding of the aspectual system in Russian. As shown in (Grønn 2004), an existential Ipf interpretation with *current target state validity* (i.e. with an interpretation similar to a 'resultative perfect') is ruled out due to the competition with Pf. Thus, if the verb were part of the assertoric content in (12), the speaker would have to use the perfective 'otkryl^{pf}' in a context with an open bottle on the table. On the other hand, the existential Ipf is acceptable in (13), producing an effect comparable to the 'experiential perfect' in Germanic.

Assuming a simplified, standard semantics for questions, we can show why B's answer is ruled out in any plausible model for (12). Given a model containing the three individuals Anja, Leša and Volodja as the only candidates for filling the agent role (the subject slot 'kto – who'), the set of possible answers to the question in (12) corresponds to the partition in table 1.

Open_bottle(Anja)
Open_bottle(Leša)
Open_bottle(Volodja)

Table 1: Partition for the question in (12)

The cells should be thought of as mutually exclusive propositions (sets of possible worlds). The first cell refers to all possible worlds where Anja opened the bottle in question, while the second cell refers to all possible worlds where Leša was the opener, and, finally, the third cell corresponds to the possibility of Volodja being the agent of the opening event. The possible worlds within a single cell may differ in many respects, save they all contain the same agent for the event of opening the specific bottle which stands on the table.

The partition in table 1 gives rise to an *existential presupposition* with respect to the verb's event argument. This follows as a corollary of the fact that none of the cells allow for the possibility that the event in question did not take place. It is a logical necessity that some agent or other performed the action referred to by the verbal predicate. Hence, the use of presuppositional Ipf in the question.

This sketchy analysis of (12) is to be contrasted with the denotation of the question in (13). The normal interpretation in our model of this particular question licenses 2^3 = 8 congruent answers, represented by the partition in table 2.

Read_WP(Anja)
Read_WP(Leša)
Read_WP(Volodja)
Read_WP(Anja) ∧ Read_WP(Leša)
Read_WP(Anja) ∧ Read_WP(Volodja)
Read_WP(Leša) ∧ Read_WP(Volodja)
Read_WP(Anja) ∧ Read_WP(Leša) ∧ Read_WP(Volodja)
∅

Table 2: Partition for the question in (13)

Each of the three individuals in the model has either read or not read 'War and Peace', and it is perfectly conceivable that none of them has read the novel in question. This last possibility corresponds to the last cell in the partition, and *excludes* an existential presupposition induced by the verbal predicate. For this reason, the question in (13) must be interpreted as an instance of existential Ipf.

Let us finally say a word about how this analysis could be made formally precise. The structured meaning framework, a version of which was adopted in section 2, was originally developed to handle the semantics of questions. Following work by von Stechow and others, Krifka (2001) argues that constituent questions induce a $<$Background$_{quiz}$, Restriction$>$-partitioning, where the restriction can be seen as the set of individuals in the model which could fill the wh-slot. For our purposes, however, it is important to stress that the 'Background$_{quiz}$'-part of this structured meaning does not necessarily trigger an existential presupposition, as in a $<$Background, Focus$>$-partitioning.

It is well-known in the literature that presuppositions can embed other presuppositions. In a similar vein, I propose that structured meanings can occur recursively. The difference between the questions in (12) and (13) is therefore that only the former gives rise to a $<$B,F$>$-partitioning *within* the 'Background$_{quiz}$'-part of the constituent question. Working bottom-up, I assume that the question operator outscopes the rest of the sentence. The question word 'leaves a trace' which becomes bound from outside. For presuppositional Ipf, as in (12), the input to the aspectual operator is the following structured meaning:

- VP: $< \lambda e[\,|\, \text{open\_bottle}(e)], \lambda e[\,|\, Ag(e,x)] >$
  the variable x is bound from outside ($\approx$ 'wh-raising')

Leaving the technical details aside, we end up with the following $<$Background$_{quiz}$, Restriction$>$ after the question operator applies at the last stage of the derivation:

- QuestionP:
  $< \lambda x[\,|\, Ag(e,x)]_{[e,\, t_{context}\,|\, \text{open\_bottle}(e),\, e \subseteq t_{context}]}, \{\text{A*, L*, V*}\} >$

It follows from this representation that presuppositional Ipf is associated with an existential eventive presupposition as usual. Only this time, both the assertoric and presuppositional DRSs are part of 'Background$_{quiz}$'. This is to be contrasted with the following (simplified) representation for the question in (13):

- $< \lambda x[e\,|\, \text{read\_WP}(e), Ag(e,x), e \subseteq t_{all\_past}], \{\text{A*, L*, V*}\ldots\} >$

In this case, all the relevant information belongs to the assertoric level, and we get an existential Ipf reading.[4]

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[4]In the restriction part, one should ideally represent all the 8 congruent answers to this question, but this has not been done since it would involve rather complicated representations of generalized quantifiers.

5 Conclusion

In this paper, I have shown that the imperfective aspect in Russian can be used to refer to complete events in two different ways: either by asserting or by presupposing the existence of the event in question. It is necessary to keep these interpretations of the imperfective apart in order to explain aspectual usage in Russian, including the competition between Pf and Ipf. Given this interaction of aspect and the A/P distinction, I introduce the so-called 'bold face convention' in order to maintain a uniform picture of aspectual operators at the syntax-semantics interface. The analysis proposed here is partly based on the structured meanings approach, and extends quite naturally also to aspect in embedded contexts and constituent questions.

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The Structure & Derivation of Split Focalization

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Abstract

In this paper I propose a minimalist and derivational theory of the Focus Structure that explains in a straightforward way the focal patterns of the answers of multiple-Wh questions as instances of split focus structures.

1 INTRODUCTION[1]

To start, compare the sentences in 1b and 2b, and the questions they answer (1a & 2a respectively):
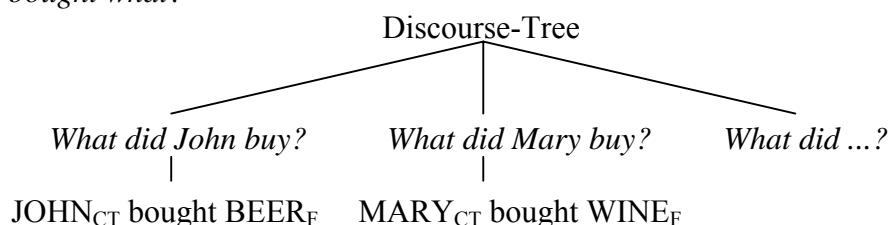
(1a) Who bought beer?   (1b) [John] bought beer.
(2a) Who bought what?   (2b) [John] bought [beer]…

In the question-answer pair in 1, the question asks about the agent of the event of buying beer and the only element that is not given in the question that appears in the answer is the subject 'John', what is traditionally analyzed as being the focus of 1b (*cf. e.g.* Rooth (1985), Herburger (2000) and Krifka (2001)). In 2, on the other hand, we have a multiple-Wh question (2a) and in its answer, two elements that are not expressed in the question; the subject 'John' and the object 'beer'. The question I want to analyze in this paper is the following one: *What is the nature and discourse function of these elements?* To put it in other words: *what is the grammatical encoding of the information-packaging of these constructions?*
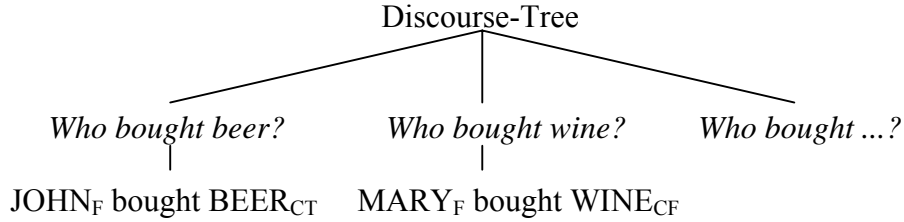
In order to account for these constructions, and assuming that the denotation of a multiple-Wh question is a set of sets of propositions, Büring (2003) proposes an analysis of sentences like (2b) based in the speakers choice of a question-subquestion 'strategy' that can be represented in D(iscourse)-Trees like 3a-b, and analyzing one of the non-given element as a 'contrastive topic' ($_{CT}$) while the other as a 'focus' ($_F$):

(3a) *Who bought what?*

Discourse-Tree

What did John buy?   *What did Mary buy?*   *What did …?*

JOHN$_{CT}$ bought BEER$_F$ MARY$_{CT}$ bought WINE$_F$

(3b) *Who bought what?*

Discourse-Tree

Who bought beer?   *Who bought wine?*   *Who bought ...?*

JOHN$_F$ bought BEER$_{CT}$ MARY$_F$ bought WINE$_{CF}$

Thus, when answering a complex question like 3, a speaker can opt between whether to answer by 'buyers' or by 'buyees' and this, according to Büring, will determine the information-packaging nature of the non-given elements (*cf.* Büring (2003) and section 3.2 of this work).

In this paper, I will be arguing that the semantic representation proposed by Büring (2003) is basically correct but that we can dispense with the theoretical primitive of 'Contrastive Topic' for these constructions. Furthermore, I will argue that it should be better reanalyzed as being focal in nature[2]. In order to do that, I will present in section 2 the derivational approach to the focus structure proposed in Irurtzun (2003b) and the neodavidsonian semantic representation for focus of Herburger (2000) as the theoretical framework in which I will base my analysis. Then, in section 3, I will present the derivation of split focus constructions and review some of their intonational, semantic and morphosyntactic properties of these sentences. A summarizing and concluding chapter follows.

2 FOCUS STRUCTURE & INTERPRETATION

In this section I will present the theoretical framework where I will base my analysis: the derivational approach to the focus structure of Irurtzun (2003b), and the neodavidsonian semantics for focus of Herburger (2000).

According to the minimalist theory of focus structure construction proposed in Irurtzun (2003b), the [+F] feature is an optional formal feature and it is potentially assigned to several tokens of the numeration. The focus structure, instead of being 'projected' at PF, is constructed derivationally by means of Merge in the narrow syntax. That is, when an element α and an element β undergo Merge, both of them bearing the [+F] feature, a new syntactic object will be created that in "Bare Phrase Structure" terms (Chomsky (1994)), will be a set-theoretic object containing only [+F] featured lexical items:

(4) $\{\alpha_F, \{\alpha_F, \beta_F\}\}$

α_F β_F
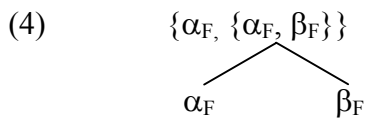
In that way, when a syntactic object/set of [+F] featured lexical items is merged with an

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[2] Obviously, I am not the first one having this idea. Similar points of view with different theoretical points of departure can be found among others in Williams (1997) and Steedman (2000).

element that does not itself bear the [+F] feature, the new syntactic/set-theoretic object will not be a set of [+F] featured elements, as the highest phrase in 5 shows:

(5) $\{\alpha_F, \{\gamma, \{\alpha_F, \{\alpha_F, \beta_F\}\}\}\}$

```
        γ      {αF, {αF, βF}}

              αF         βF
```
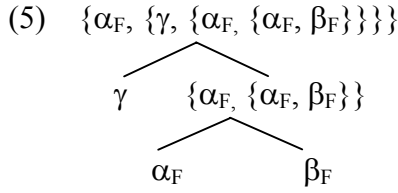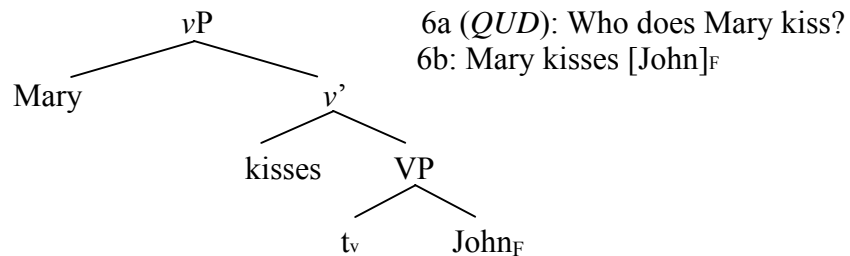
Although the head (and label) of the structure in 5 is marked as [+F], the whole structure won't be a set containing only [+F] featured lexical items, since the element γ (a member of $\{\gamma, \{\alpha_F, \{\alpha_F, \beta_F\}\}\}$) does not bear the [+F] feature itself. Precisely because of the lack of the [+F] feature of γ, in this structure we will have just $\{\alpha_F, \{\alpha_F, \beta_F\}\}$ as focus. Thus, we keep a direct mapping between syntax and semantics and build semantic interpretation in a strict compositional way. Furthermore, with this derivational analysis, we observe one of the core minimalist assumptions; the "Inclusiveness Condition" (Chomsky (1995, p. 228))):

> *"Any structure formed by the computation (in particular, π and λ) is constituted of elements already present in the lexical items selected for N; no new objects are added in the course of computation apart from rearrangements of lexical properties…".*

In order to show how the system works, let us say that we have the simplified numeration in 6, given the *Question Under Discussion (QUD)* in 6a. When the [+F] object (derived as in 4) is merged with the [+F] featureless verb, the new syntactic object (VP) won't be a set containing only [+F] featured lexical items. This will be so because the verb doesn't bear itself the [+F] feature. Such a configuration would end up in a sentence like 6b with [Jon]$_F$ as the only focal element:
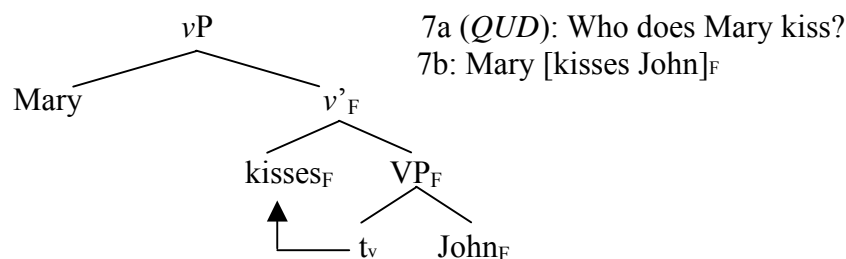
(6): Lexical Array: $\{\{Mary\}, \{John_F\}, \{kiss\}, \{v\}\}$

```
              vP                    6a (QUD): Who does Mary kiss?
                                    6b: Mary kisses [John]F
      Mary          v'

              kisses      VP

                     tv      JohnF
```

Right in the same way, if we have the numeration in 7, when the object bearing a [+F] feature is merged with the verb that itself bears the [+F] feature[3], the new object created (v') will be a set containing only [+F] featured lexical items, as in the sentence in 7b:
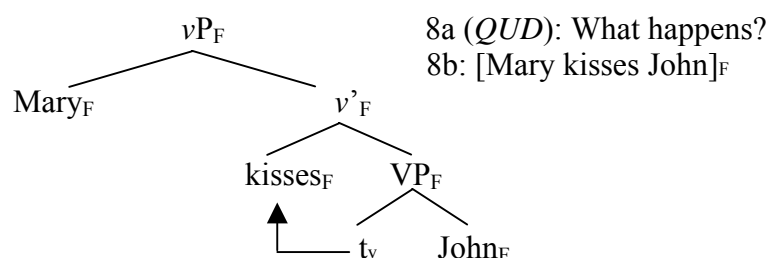
---

[3] For the sake of the argument, let me assume that the light verb itself also bears the [+F] feature.

(7): Lexical Array: {{Mary}, {John$_F$}, {kiss$_F$}, {v_F}}

vP   7a (*QUD*): Who does Mary kiss?
          7b: Mary [kisses John]$_F$

```
                vP                     7a (QUD): Who does Mary kiss?
             /      \                  7b: Mary [kisses John]F
          Mary       v'F
                    /    \
                kissesF    VPF
                   ↑      /    \
                   └── tv      JohnF
```

Instead, if we have the numeration under 8, when the object and the verb are merged, a new syntactic/set theoretic object is created made out of only elements that bear the [+F] feature. Once this object is merged with the light verb, and the new element is merged with the DP subject that itself bears the [+F] feature, we end up with a derivation that is a set containing only [+F] featured lexical items; that is an out-of-the-blue sentence (8b):

(8): Lexical Array: {{Mary$_F$}, {John$_F$ }, {kiss$_F$}, {v_F}}

```
               vPF                      8a (QUD): What happens?
            /       \                   8b: [Mary kisses John]F
         MaryF       v'F
                    /    \
                kissesF    VPF
                   ↑      /    \
                   └── tv      JohnF
```

   Therefore, recall that according to this proposal, for an element to bear the [+F] feature does not mean that it will be the *actual* focus of the sentence but just that it will take part in the composition of the focus structure.

   The system has some welcome predictions, among them, that it allows for the interface components to access the actual focus structure, since it is already set in the narrow syntax. Thus, for instance, the PF component will but sensitive to the already built F-Structure. As a brief example, many of the technical problems of a *Nuclear Stress Rule*-based theory of focus structure (*cf. i.a.* Neeleman & Reinhart (1998)) are avoided if we allow the Nuclear Stress Rule to apply just within the focus structure that we built up derivationally in narrow syntax:

   (9) <u>Nuclear Stress Rule</u>: Assign Nuclear Stress to the element with most grid marks *within the focal structure*.

   This new *NSR*, will predict correctly and without any further stipulation the Nuclear Stress placement (and prosodic phrasing) in different positions, given the different focus structures that derive from different numerations (*cf.* Irurtzun (2003b) for further discussion)[4]:

   (10a) John boiled [WATER]$_F$
   (10b) John [boiled WATER]$_F$

---

[4] Nuclear Stress placement is marked with capital letters.

(10c) [John boiled WATER]$_F$
(10d) [JOHN]$_F$ boiled water
(10e) John [BOILED]$_F$ water

On the other hand, in order to provide a semantic representation for focus constructions at Logical Form, I will adopt the proposal of Herburger (2000). Herburger proposes that, taking sentences to be descriptions of events, at Logical Form the focal material is mapped into the scope of a restricted existential quantification over events[5]. As in 11:

(11)   VP   **LF:**   [$\exists$e [RESTRICTION] [SCOPE]]
      V   DP$_F$ ▲
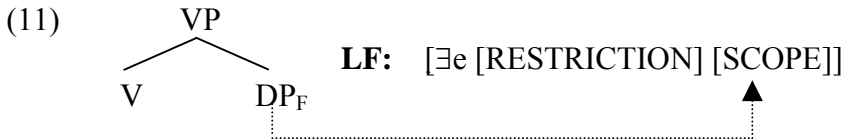
For instance, the sentence in 12a as an answer to the question in 12b will have the Logical Form in 12c, where the non-focused chunk is the restrictor of the existential quantification (*i.e.*, the sentence's 'aboutness') and the focus is in the scope (*cf.* Herburger (2000)):

(12a) Mary bought [BEER]$_F$.
(12b) What did Mary buy?
(12c) [$\exists$e [Agent(e, mary) & Buy(e) & Past(e)] Theme(e, beer) & Agent(e, mary)
     & Buy(e) & Past(e)]

The restriction thus, will give the sentence's 'aboutness' information whereas the nuclear scope will give the propositional content. The focus will be the difference between the restriction and the nuclear scope (*cf.* von Heusinger (1999) for a similar analysis in *DRT* terms). Thus, as argued earlier, to mark an element as [+F] in the numeration doesn't mean that it will be the actual focus of the sentence but rather that it will take part in the syntactic derivation of the focus structure in narrow syntax, and that it will take part in the focus interpretation at Logical Form.

As presented in this section, the derivational analysis of focus structure construction proposed in Irurtzun (2003b) provides a narrow syntax setting of the actual focus structure and allows for its interpretation in both interface levels. At PF we just have to modify the Nuclear Stress Rule to make it focus-sensitive and we get immediately the correct Nuclear Stress placement in every focal structure. At LF, and following Herburger (2000), we will assume that all the focal material is mapped into the scope of an existential quantification over events and that the focus interpretation is obtained by the computation of all the [+F] featured material that does not appear in the restriction of this quantification.
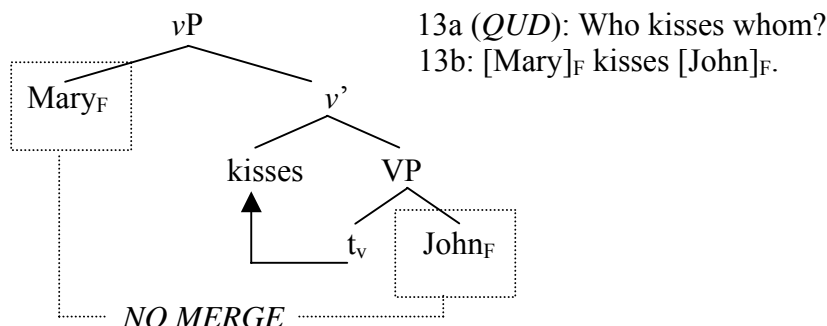
3 SPLIT FOCUS STRUCTURES

In this section I will analyze one of the possibilities that arises with the adoption of the derivational construal of the focus structure just proposed: the split focus structures. Then, I will discuss some of the intonational, semantic and syntactic properties of these constructions and argue that in instances of split focus, we have pairing answers to multiple-Wh questions like those represented with D-Trees in 3.

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[5] Technically, all the material but the focal one is in the restriction and all the material is in the scope, something that I will assume here without discussion (*cf.* Herburger (2000)). See also Irurtzun (2005a) for a derivational analysis of the syntax of the LF just proposed.

As just presented in section 2, I am assuming that the focal structure is built up in the narrow syntax with the dynamics of the derivation: when two focal elements are merged together the new syntactic object created will also be focal. However, such a theory has an interesting prediction: whenever two elements enter the derivation bearing each of them a [+F] feature but they don't merger together, two isolated focus structures will arise. This would be the case when a DP subject and a DP object enter the derivation being [+F] marked but the verb doesn't bear it. Following the examples 6-8, it would be something like 13:

(13): Lexical Array: {{Mary}$_F$, {John}$_F$, {kiss}, {v}}

vP

Mary$_F$ v'

13a (*QUD*): Who kisses whom?
13b: [Mary]$_F$ kisses [John]$_F$.

kisses   VP

t$_v$ John$_F$

NO MERGE

Thus, and following the LF representation proposed by Herburger (2000), at LF, all the [+F] material will be mapped into the scope of a restricted quantification over events:

(14)

vP

DP$_F$ v'

v VP

V   DP$_F$

LF: [∃e [RESTRICTION] [SCOPE]]
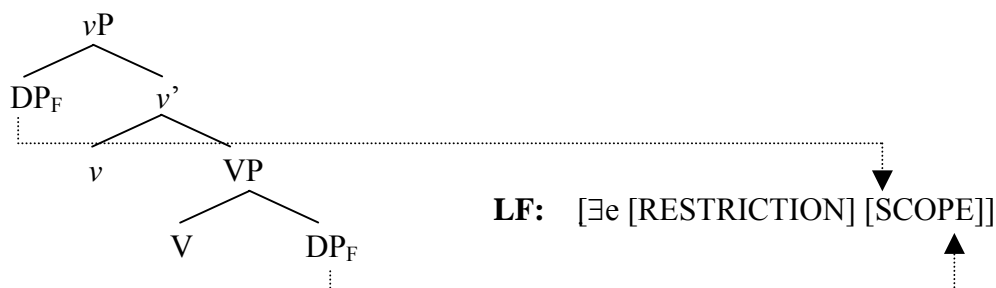
Following this idea, in these constructions we don't have two independent foci (nor a contrastive topic and a focus as I will argue in 3.2) but just one focus that is derivationally split[6]. In fact, as argued in section 2, to be marked [+F] in the numeration doesn't entitle a lexical item to be the actual focus of the utterance, but it just will take part in construing the focus structure, be it in a strict compositional way as in 6-8, or in split focus constructions as in 14.

Having advanced the theoretical argument, let's review some of the properties of these constructions in order to clarify their split focus nature.

3.1 Intonational properties

In many languages, both elements that stand for a Wh-phrase in the question bear a pitch accent (*cf.* Bolinger (1958), Jackendoff (1972), Liberman & Pierrehumbert (1984) and

---

[6] Thus, these constructions are very different from those 'multiple focus' constructions analyzed in Krifka (1991) or Wold (1998). The constructions analyzed by these authors need an much more marked context to be felicitous and one of the foci on them always has an 'echoic' flavor. The analysis of these structures falls out of the scope of the present work.

Büring (2003)) for English, Büring (1999) for German, Godjevać (2000) for Serbo-Croatian and Aske (1997), Elordieta (2001) and specially Irurtzun (2003a) for Basque among many others).

However, even if it is true that each of the elements that stand for a Wh-phrase bear a pitch accent, the tunes associated to each of the elements are different. For instance, Jackendoff (1972) analyzes an answer to a multiple-Wh question as having two different pitch-accents that he calls 'A' and 'B':

(15)

<div align="center">

FRED ate the **BEANS**
   B   A

</div>

The 'B accent' is characterized by a 'fall-rise' contour and the 'A accent' by a simple 'fall'. According to his analysis, the B tune is associated with a "free" variable and the A tune to a "dependent" variable. The identification of the second variable will depend on the identification of the first one. These differences in tune-structure and 'liberty' of the variables have been analyzed as denoting that we're in front of two different informational-packaging primitives: a focus (characterized by the A accent), and a contrastive topic (characterized by the B accent (*cf.* Büring (2003)).

However, having in mind the idiosyncrasies of focus-marking tunes in different languages, there is some regularity in the tunes for 'contrastive topics' across languages: right as with the 'B accents' of English, in other languages like Basque or Serbo-Croatian 'contrastive topics' are characterized by a final pitch rise. For Central Basque, I have analyzed these constructions as involving a tune composed by a H* pitch accent and a H- boundary tone (*cf.* Irurtzun (2003a)). However, in this respect, the most interesting language that I am aware of is Serbo-Croatian as analyzed in Godjevac (2000): in this language, in an answer to a multiple-Wh question each of the elements bears a L*+H pitch accent; and, akin to English or Basque, the 'Contrastive Topic' phrase ends in a H- phrase accent and the 'focus' in a L-. However, there is one additional tonal event involved in these constructions: an initial %H in the 'focus'. This is shown in 16, as answering a question like 'Who gave a lemon to whom?':

(16)

<div align="center">

%L L*+H H-   %H   L*+H L-
 | | | | | |
JE LE NA je MA RI   JI dala.
'[JELENA] gave it [to MARY].

</div>

Recall, that the %H boundary tone of 16 is not derived by the adjacent position of the H- phrase accent of 'Jelena', since, looking at 17 (where this adjacency does not hold), it seems that it is a categorical property of these constructions (since in normal/single focus utterances there is no %H at the left edge of the focus phrase):

(17)

<div align="center">

%L L*+H H-   %H   L*+H   L-
 | | | | | |
JE LE NA je dala ravan MA   RI   JI.
'[JELENA] gave the flat one to [to MARY]'

</div>

I would want to use this evidence to propose that:

> (i) In answers to multiple-Wh questions both elements that stand for a Wh-phrase bear a pitch accent.
>
> (ii) The differences between both elements are phrasal, and there is a striking regularity across languages in that the tunes associated to 'contrastive topics' end in a high tone.
>
> (iii) As seen in Serbo-Croatian, the so-called 'foci' of the answers to multiple-Wh questions are not the same elements as foci that answer single-Wh questions.

Thus, and following the 'isolated focus-constructions' proposal of 14, I would want to suggest that in these constructions we don't have a 'contrastive topic' + a 'focus' (as proposed by Büring (2003)), nor two independent foci, since the intonational patterns associated to them are not the same as those in sentences with a single focus. I would want to propose that in these constructions, what we have is a single focus that is the *pair* of both elements[7].

3.2 Semantic properties

As is widely acknowledged (*cf.* among others Bošković (2002), Büring (2003)), in languages like English (18) or Basque (19) that show overt movement of (one of) the Wh words, sentences like 18b and 19b are *partial* answers of multiple Wh questions like 18a and 19a respectively:

(18a) Who broke what?	(18b) John broke the door… (pair list)
(19a) Zeinek erosi du zer?	(19b) Jonek atea hautsi du… (pair list)
which buy AUX what	Jon door break AUX
"Who bought what?"	*"John broke the door…"*

In fact, in English, a question like 18 in a scenario that demands a single-pair answer is incongruent (see next section).

In one of the most widely accepted analysis of the semantics of questions (*cf. e.g.*, Hamblin (1973)) a question is taken to denote a set of propositions. For instance, the denotation of the question in 20a would be the set of propositions in 20b, where the Wh-phrase in the question has been replaced by different alternative values that are available in the context. Thus, an appropriate answer to the question in 20a will be one of the propositions in this set, 20c:

(20a) Who got the flu?
(20b) [[Who got the flu]]={[[Kepa got the flu]], [[Eider got the flu]], [[Adam got the flu]], [[Ibon got the flu]], …}
(20c) Kepa got the flu.

Extending this analysis, Hagstrom (1998) proposes that a multiple Wh-question like 21a denotes a set of questions, that is, a set of sets of propositions (21b). This question could be answered by the sentence in 21c:

---

[7] The common high phrase accents could be analyzed as grammaticalized 'continuation rise' contours, something that would not be surprising under this analysis, whereby the focus structure is split among both elements bearing the [+F] features.

(21a) Who cooked what?

(21b) [[Who cooked what]]={{[[Adam cooked cod]], [[Adam cooked rice]], [[Adam cooked eggplants]]...}, {[[Julen cooked rice]], [[Julen cooked pasta]], [[Julen cooked tuna]]...} ...}

(21c) Adam cooked eggplants and Julen cooked pasta.

As already advanced in the introduction, this semantics is adopted by Büring in his analysis of the discourse structuration and answerhood, proposing that in an answer to a multiple-Wh question we have different possible answer strategies like those represented in the D-Trees in 3 (in this case, it would be whether to answer by the agents of the event of cooking or by the themes). Thus, he proposes two independent discourse-configurational primitives: the 'contrastive topic' that would indicate a strategy, and the 'focus'. Crucially, both information-packaging elements are analysed as having the very same semantic import: that is, rising alternative values à la Rooth (1985). According Rooth's 'Alternative Semantics' approach, a sentence with focus has two denotations: the 'Ordinary Semantic Value' (OSV), that will be the proposition obtained compositionally by Montagovian function application (this proposition won't be affected by the focus), and the 'Focus Semantic Value' (FSV), a set of propositions obtained by the substitution of the focused phrase with alternatives available in the discourse that match the focus in semantic type (*i.e.*, the semantic value of the question it answers). For instance, in a context where we have 'Susana', 'Urtzi', 'Maia' and 'Kepa' as the relevant individuals, for a sentence like 22a we would have the two denotations in 22b:

(22a) [Susana]$_F$ ordered wine.
(22b) OSV: [[Susana ordered wine]]
     FSV: {[[Urtzi ordered wine]], [[Maia ordered wine]], [[Kepa ordered wine]]}

Starting out from here, Büring proposes an enrichment of the denotation of sentences with 'contrastive topics' by the introduction of a 'Contrastive Topic-value' (basically, a set of questions like that in 21b).

Despite the representational interpretation in Büring (2003) captures in an elegant way the denotation of these constructions, the 'topichood' of these elements is not very well established, after all, both the 'focus' and the 'contrastive topic' are analyzed as having the very same semantic import. Furthermore, as Büring himself notes (Büring (2003, p. 512)), the so-called 'contrastive topic' doesn't behave in some relevant respects like normal topics (for instance, its presence is mandatory and not optional (hence, they cannot be elided), they answer (in part) the question instead of stating necessarily old/given information and so on). Thus, I would want to suggest that we don't need the theoretical primitive of 'contrastive topic' in order to capture the semantics of these sentences[8], and, as said before, in these constructions we have a *pair* of elements as the focus. For instance, in the case of 18, the focal elements can be regarded as taking part in a relation denoted by the verb; the B-accented item is the domain and the 'A-accented' one is the range. Even more, with the adoption of the derivational analysis of the focus construction presented in section 2, the pairing semantics of these constructions will be derivative of their focal status in a straightforward way.

Following Chomsky (1973) and Higginbotham & May (1981), I will assume that at LF, in a multiple-Wh question such as 23, an operator absorption takes place creating a compound operator that quantifies over pairs of variables:

---

[8] Probably something like this will be necessary to analyze the 'additional topic' constructions analyzed in Umbach (2001). See as well the analysis of 'implicit subquestions' in Büring (2003).

(23) Who ate what?
    LF: [WH *x,* WH*y*: person(x) & eatable thing(*y*)] *x* ate *y*

This LF representation for multiple-Wh questions is what will give us the *bijective* interpretation. Thus, the most natural assumption about the answers that these questions demand is to take both elements that stand for the pairs of variables in the question to be focal. The *uniqueness* of focus, the fact that each sentence has just one focus will be trivially accomplished given the LF representation assumed in section 2, whereby all the [+F] material will fall in the scope of an existential quantifier over events. For instance, for the sentence in 24a (as an answer to 23a), we would have the logical form in 24b:

    (24a) John ate pizza.
    (24b) [∃e [Eating(e) & Past(e)][Eating(e) & Past(e) & Agent(e, John) &
        Theme(e, pizza)]

3.3 Some morphosyntactic properties: the 'contrast' particles of Japanese and Korean

Finally, with the analysis just sketched, we can also account for the usage/lack of usage of *contrast* particles of Wh-in-situ languages like Japanese or Korean, where multiple-Wh questions can be answered with either a single-pair or pair-list answer (*cf.* Hagstrom (1998), Bošković (2002)). Bošković (2002) gives the following scenario for triggering single-pair answers: *John is in a store and in the distance sees somebody buying a piece of clothing, but does not see who it is and does not see what the person is buying.* With this scenario, in a 'Wh-moving language' like English, a question like 25 is incoherent, whereas its counterpart in a 'Wh-in-situ language' like Japanese in 26 is fine:

    (25) Who bought what?
    (26) Dare-ga   nani-o   katta   no?
        who-nom   what-acc   bought Q
        'Who bought what?'

Whichever the explanation for the lack of single-pair reading in Wh-movement languages[9], the case is that this reading is available in Wh-in-situ languages. The striking fact here is that in this type of languages, an answer to a multiple-Wh question is different when it is a single-pair or a pair-list answer (an asymmetry that up to my knowledge wasn't attested in the previous literature on the topic). In languages like Japanese or Korean that allow for the single-pair reading, the usage of the some particles ('-wa' for Japanese, '-nun' for Korean) varies with the type of answer; the appearance of those particles is mandatory in the first element when asked for a pair-list answer ((27a) for Japanese or (28a) for Korean) but, remarkably, in both languages, when the question demands a single pair, the answer cannot bear the such a particle (27b-28b):

    (27a) Takako-wa   wain-o   kaimashita... (pair list)
        Takako-WA   wine-ACC bought
        'Takako bought wine…'

---

9 See Bošković (2002) for a possible analysis.

(27b) Takako-ga   wain-o   kaimashita (single pair)
        Takako-GA   wine-ACC bought
        'Takako bought wine…'

(28a) Yenghui-nun   wain-ul   sassta.... (pair list)
        Yenghui-NUN   wine-ACC   bought
         'Yenghui bought wine…'

(28b) Yenghui-ga   wain-ul   sassta. (single pair)
        Yenghui-GA   wine-ACC   bought
         'Yenghui bought wine'

Again, despite these particles have been analyzed as conveying the discursive notion of 'topic', in these cases we cannot talk about a topic, since it answers partially the question and might not be mentioned in the previous discourse. Furthermore, as argued recently by some scholars (*cf.* Munakata (2002), Kuroda (2003), Maruyama (2003)), they should be better reanalyzed as marking 'contrast', one of the core properties of focal elements.

4 SUMMARY & CONCLUSIONS

In this paper, I have analyzed the properties of the answers to multiple-Wh questions. *Pace* Büring (2003), I have argued that in these constructions, we have a split focal structure and that at LF, it will lead towards having a pair of elements as being the actual focus. This analysis provides us with a natural understanding of the question-answer pairings since all the material that stands for a variable in the question is taken to be focal in nature. Furthermore, by dispensing with the theoretical primitive 'contrastive topic' that indicates a strategy and the D-tree, we can understand why the exchange in 29 is fine without alleging to some sort of 'change of strategy':

(29)
        a: Who bought what?
        b: Sergio bought beer, Cristina bought wine, and the water was bought by Angel.

With the view proposed in this paper, simply, there would be nothing to explain since in every sub-answer in 29b, we would have a pair of [+F] marked phrases.

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How many topics at once?

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Abstract

There are a number of related, but distinct notions of 'topic' that have been used in the semantic and pragmatic literature. The distinction between topics as a mode of discourse organisation and topics as elements of information structure is a particularly important one; but it is only one of several that must be drawn.

In the talk I intend to first address this general problem of classifying existing topic notions and explicitly distinguish a few of these, which will be needed in the second (and central) part of the talk. In this second part I mean to show, at the hand of a small set of examples, how different topic notions are often simultaneously needed in the analysis of the meaning of a single bit of discourse.

Topic-focus articulation and anaphoric relations:
A corpus based probe

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1. The objective of the paper is to analyze certain interrelationships between the information structure, i.e. the topic-focus articulation (TFA) of sentences and anaphoric relations, on the material achieved during the annotation of TFA and of coreference in the Prague Dependency Treebank (PDT).

2. Underlying layer of annotation of PDT

2.1 Prague Dependency Treebank (PDT) is conceived of as a collection of 3,168 samples of continuous running Czech texts (taken at random from the Czech National Corpus), annotated – besides a complex scheme of morphemic tags – on two layers of dependency-based sentence structure, the first of which – the analytic one – is considered to be an intermediate step towards the underlying level of annotation, the so-called tectogrammatical tree structures (TGTSs), in which nodes are also reconstructed for items deleted in the surface shape of the sentences. These structures are designed in a way that allows i.a. for an inclusion of information on both intra- and inter-sentential coreference relations.

2.2 In addition to the deep syntactic dependency relations in the tree structure individual nodes are assigned one of the three values of **contextual boundness**: non-contrastive contextually bound "t", contrastive contextually bound "c" and contextually non-bound "f". This information at individual nodes of the dependency tree structure makes it possible to derive the division of the sentence into **topic** (what the sentence is about) and **focus** (what the sentence says about the topic); the basic algorithm for this procedure was formulated by Hajičová and Sgall (see Hajičová and Sgall 1985) and its implementation and testing on PDT is reported in Hajičová, Havelka and Veselá 2005.

2.3 In a separate path through the corpus annotated on this underlying level, basic **coreference relations** are being marked independently of the TFA values. In our project, two types of coreference are distinguished: **grammatical** – with verbs (and also some nouns) of control, with reflexive pronouns, with verbal complements and with relative pronouns – and **textual**, which may cross sentence boundaries. Both endophoric (anaphora) and exophoric (deixis) relations are taken into account as well as cataphora (see Kučová and Hajičová 2004).

For the annotation of grammatical coreference (which has been given a systematic account in the description, see Kučová et al. 2003) a semi-automatic procedure has already been implemented, which is giving rather encouraging results.

The manual annotation of textual coreference is carried out with the use of a user-friendly tool in the TrEd editor used for tree-structure assignment (Kučová et al. 2003). The use of such an original user-friendly software tool results in more accurate and consistent annotations and speeds up the whole process. It also makes it possible to apply annotation on relatively large corpus data (in our case, the procedures described above have already been applied to the whole set of 50,000 sentences annotated on the underlying syntactic level). Some steps already undertaken in this direction (involving only the resolution of textual coreference links „starting" with the tectogrammatical lemma PersPron, which stands for personal and personal possesive pronouns[1]) brought encouraging results – the succes rate is 60.4%.[2]

For the time being, we concentrate on cases of textual coreference in which demonstrative or anaphoric pronouns (also in their zero form in the surface shape of the sentence) are used. The following types of textual links are distinguished:
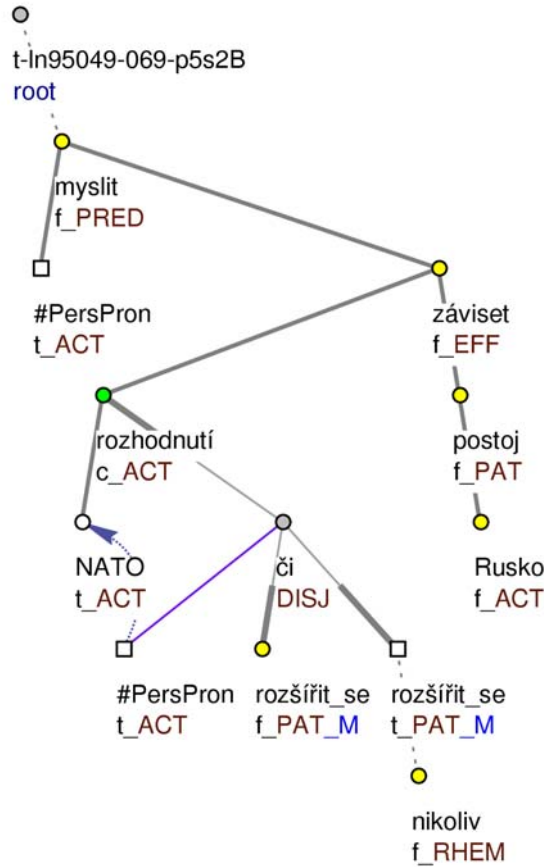
(a) a link to a particular node if this node represents a referent (antecedent) of the anaphor;
(b) a link to the governing node of a subtree if the antecedent is represented by this node plus (some of) its dependents; this is also the way how a link to a previous/following clause or a whole sentence is being established;
(c) a specifically marked link (*Segm* for segment) denoting that the antecedent is a whole segment of (previous) text larger than one sentence or phrase, including also the cases in which the antecedent is understood by inferencing from a broader co-text;
(d) a specifically marked link (*Exoph* for exophor) denoting that the referent is 'out' of the co-text and is known only from the situation.

3. At present, we have at our disposal both the TFA annotation and an indication of the coreference relations (at least for a limited but precisely specified group of anaphors, see above) of 22,889 nodes of tectogrammatical sentence structures. This amount of data allows us to ask several questions on the interrelationships of the two aspects.

3.1 One of the first questions that come to mind is whether it is always so that a contextually bound item refers anaphorically (including the exophoric reference). As at this stage of annotation we annotate only those nodes for textual coreference of personal and possessive pronouns of the 3rd person singular and plural and demonstrative pronouns, including cases where a pronoun of this category is deleted in the surface shape of the sentences, see ex. (1), this is a trivial question and no counterexamples have been found (except for annotators' evident mistakes).

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[1] Be they expressed on the surface or restored during the annotation of the tectogrammatical tree structure.
[2] The resolution system is described in Kučová and Žabokrtský 2005.

t-ln95049-069-p5s2B
root

myslit
f_PRED

#PersPron
t_ACT

záviset
f_EFF

rozhodnutí
c_ACT

postoj
f_PAT

NATO
t_ACT

či
DISJ

Rusko
f_ACT

#PersPron
t_ACT

rozšířit_se
f_PAT_M

rozšířit_se
t_PAT_M

nikoliv
f_RHEM

(1)   *Myslíte, že rozhodnutí <u>NATO</u>, zda se **[ono]** rozšíří, či nikoli, bude záviset na postoji Ruska?*
[Do-you-think that the-decision of-<u>NATO</u> whether Refl. **[it]** will enlarge or not will depend on the-attitude of-Russia?][3]

3.2 It is not surprising that most of the anaphoric links (22,582, i.e. 98.6%, out of which 21,990 refer to a particular node, 494 refer to a segment and 98 are exophoric) lead from nodes annotated as "t" (non-contrastive contextually bound). As noted above, the antecedent may be a single node to which the link points or a whole subtree with a link pointing to the governor of the given subtree (see examples (2) and (3), respectively), a segment (4), or an exophoric reference (5).

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[3] The English versions of the Czech example sentences are just word-for-word translations (the context need not be translated word for word). The anaphoric items relevant for our discussion are printed in bold. The antecedents of the anaphoric items are underlined.
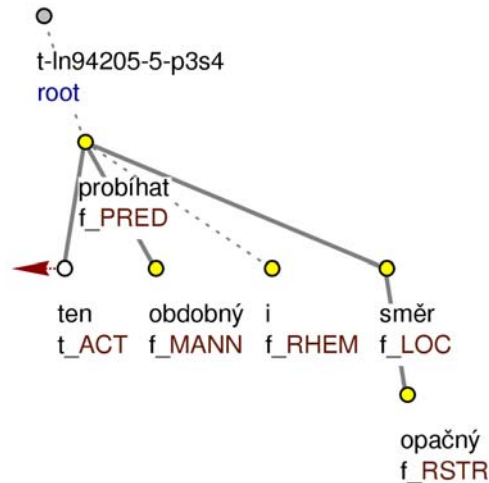
The figures with the tectogrammatical tree structures show the example sentences as they are annotated in PDT 2.0 (but only the relevant part of the whole annotation is shown). For a node, the first line gives its so-called tectogrammatical lemma (there are several special lexical values, e.g. Gen stands for a General Participant). In the second line you can find the value of contextual boundness (t, c, or f), the labels in capital letters are abbreviations for the valency values (functors; ACT stands for Actor, PAT for Patient, etc., RHEM denotes the function of Rhematizer (focalizer)), nodes in coordination are marked by the suffix M. Reconstructed nodes have the shape of a rectangle rather than a circle, the different shapes of edges only help to indicate some aspects of the annotation. (The roots of the trees are auxiliary technical nodes for which the identifiers of the sentences are given.)
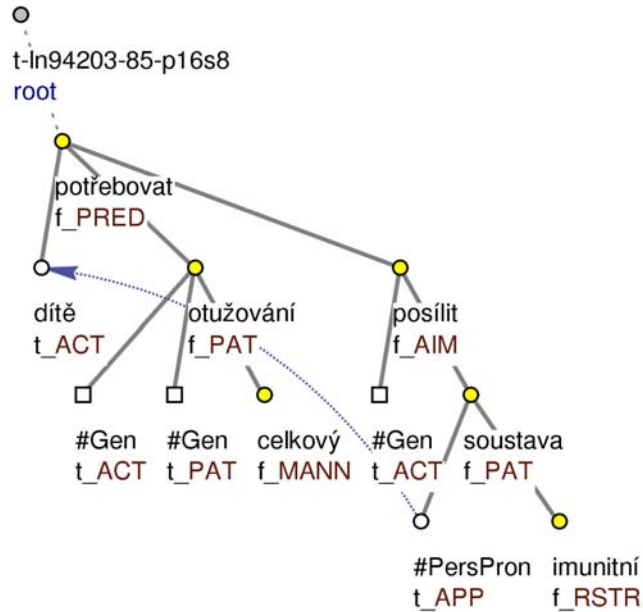
(2)   *Dítě potřebuje otužování, aby byla posílena **jeho** imunitní soustava.*
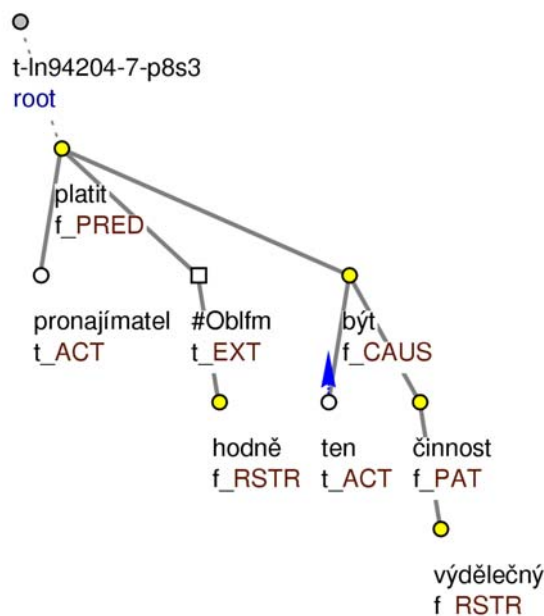   [Child needs hardening so-that was strengthened **its** immunity system.]
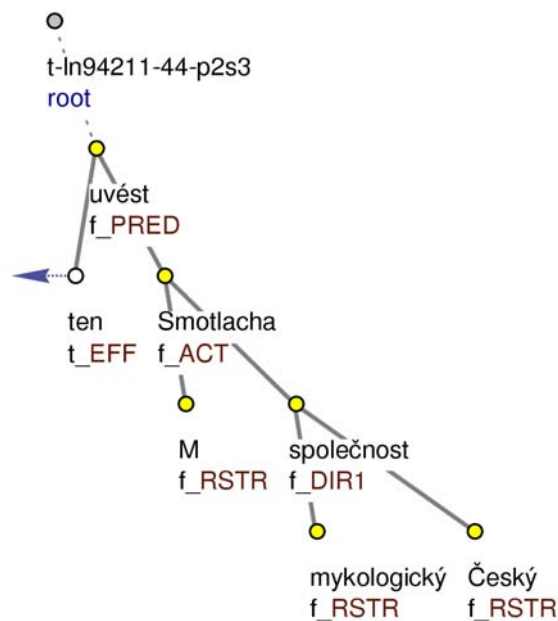
(3)   (*Začaly růst i houby jedovaté.*)
        *Uvedl **to** M. Smotlacha z České mykologické společnosti.*
        [(Also the poisonous mushrooms started to grow.)
        Adduced **that** M. Smotlacha from Czech mycological association.]

t-ln94205-5-p3s4
root

probíhat
f_PRED

ten
t_ACT

obdobný
f_MANN

i
f_RHEM

směr
f_LOC

opačný
f_RSTR

(4)   (*Mascu pro Windows, program liberecké firmy Merz, zvládne každý, kdo (...) ovládá Windows. Za 2200 Kč (bez DPH) získáte již zmíněný program a také kabel pro spojení Casia s PC. Musíte je jen vzájemně propojit, spustit Mascu, označit v diáři to, co si přejete přenést, a po chvíli se vám data objeví v počítači.*)
*Obdobně **to** probíhá i v opačném směru.*
[(Everyone who is good at Windows is able to work with Masca, a program by Merz, a company from Liberec. You can get the referred program and also the cable for a connection of Casio with the PC for 2000 CZK (VAT excluded). You must only interconnect them, initiate Masca, mark what you want to transfer in your diary, and in a while you can see your data in your PC.)
Similarly **that** proceeds also in opposite direction.]

t-ln94204-7-p8s3
root

platit
f_PRED

pronajímatel
t_ACT

#Oblfm
t_EXT

být
f_CAUS

hodně
f_RSTR

ten
t_ACT

činnost
f_PAT

výdělečný
f_RSTR

(5)   *Pronajímatel platí víc, protože **to** je výdělečná činnost.*
[Landlord pays more because **that** is profitable activity.]

41

3.3 A less trivial question possibly throwing some light on the not yet fully understood phenomenon of "contrastive topic" is the following: what are the most typical anaphoric links from a node assigned the value "c"?

There are 128 anaphoric links from nodes marked as (a part of) **contrastive topic** (TFA value = c). Most links (121) point to a particular node in the preceding context; it can be well understood that no cases have been found in which the link going from a contrastive item is exophoric, and just 7 lead to a previous segment (cf. ex. (6)).
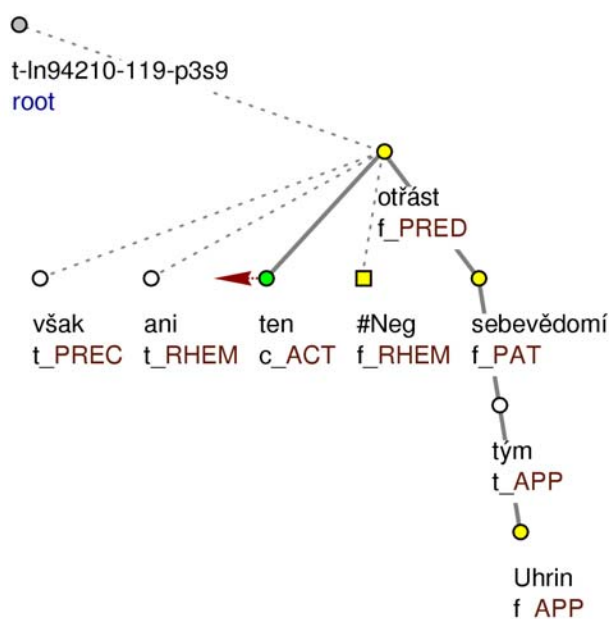
(6)   (*Hosté se dostali do vážnější akce po čtyřiadvaceti minutách.*
        Nedvědovi utekl Vella, odcentroval a Laverla mířil těsně vedle.)
        *Ani **to** však neotřáslo sebevědomím Uhrinova týmu.*
        [(Guests got to a promising action after 24 minutes.
        Vella fled Nedvěd, he passed the ball and Laverla nearly missed.)
        Even **that** however did-not-shake self-consciousness of-Uhrin's team.]

The set of examples in which a coreferential link points to a particular node may be further subdivided into several groups, according to the "scope" of the antecedent: it may be either a single item (ex. (7)), or a whole subtree the governor of which is the node to which the link leads (ex. (8)); the latter case covers also instances where the antecedent is a whole sentence (the link leads to the main verb):

(7)   *Zpravidla jsou na nich novinky a o **ty** právě zákazníci stojí.*
        [As-a-rule are on them hot-news and about **those** exactly customers care.]

(8)   *V parlamentu jsou sice poměrně početné skupiny zaměřené proti vládě a premiérovi,*
        *avšak i **ony** jsou si vědomy toho, že…*
        [In Parliament are though relatively numerous groups directed against government and Prime-Minister, but even **they** are Refl. aware of-the-fact that…]

3.4 Further interesting cases from the point of view of the relationships between topic-focus articulation and coreference are those where the coreferential link leads from a node with the

42

TFA value f (i.e. from a contextually non-bound node). In our corpus, we have found 179 anaphoric links leading from nodes marked as f, with the following distribution: 155 lead to a particular node, 2 refer to a segment, and 22 relations are exophoric. The examples of exophoric relations are rather obscure – there was only one sentence where the exophoric interpretation is clear (ex. (9)):

(9)   *Následuje dramatická pauza a pak již vchází **On** nebo **Ona**.*
   [There-follows dramatic pause and then already enters **He** or **She**.]

Some examples are phraseological constructions, which eventually would be represented as a single node with no anaphoric value (cf. ex. (10)):

(10)   *(…) nemáme dost peněz na **to** či **ono**.*
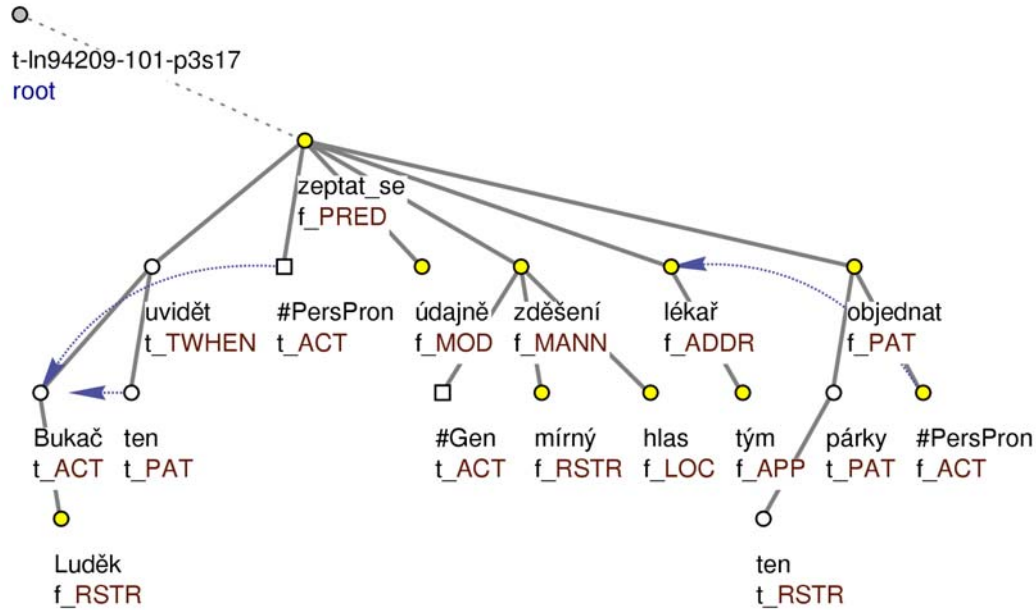   [(…) we-have-not enough money for **this** or **that**.]

As sentence (11) demonstrates, a personal pronoun can be also used as a metalinguistic expression:

(11)   *Připisuje se jakémusi záhadnému **ono**.*
        [It-is-ascribed Refl. to-some mysterious **it**.]

However, cases in which the anaphoric link leads from a contextually non-bound node to an antecedent in the previous context are not rare (be it a single node or a subtree, see (12) and (13), respectively) and their existence confirms that it is not correct to identify the linguistic information structure of the sentence directly with the cognitive given-new distinction.
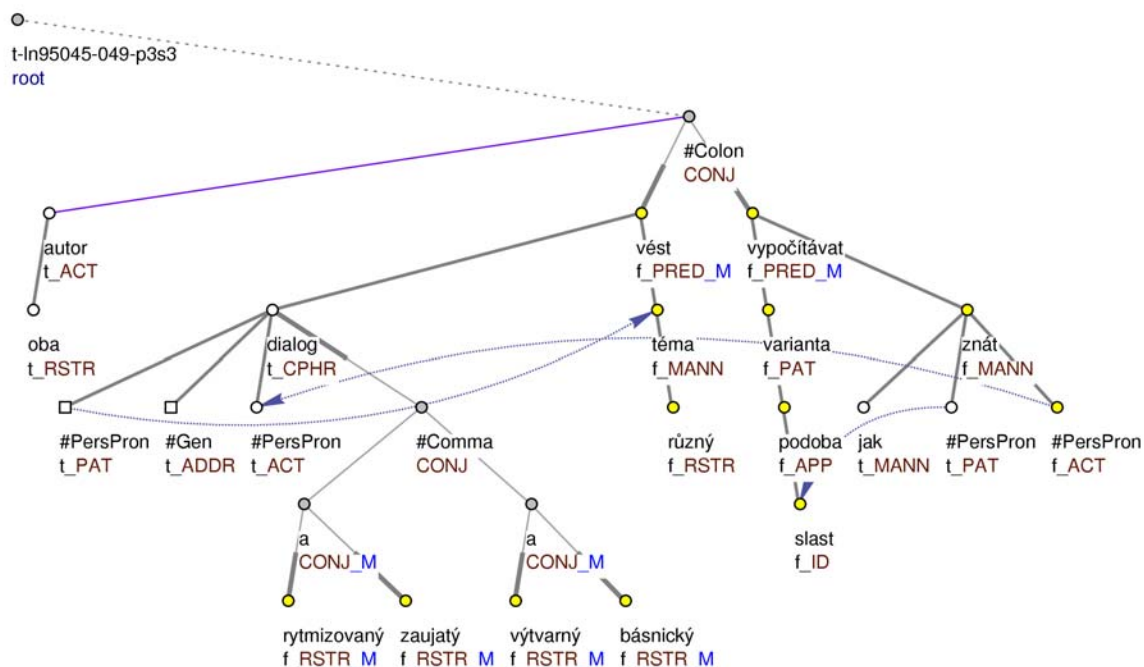
(12)   *Svůj (…) dialog vedou oba autoři na různá témata: [oni] vypočítávají varianty podob slastí tak, jak ji znají **oni**.*
        [Their (…) dialogue lead both authors on various topics: [they] enumerate variants of-forms of-delights so as it know **they**.]

t-ln94209-101-p3s17
root

zeptat_se
f_PRED

uvidět
t_TWHEN

#PersPron
t_ACT

údajně
f_MOD

zděšení
f_MANN

lékař
f_ADDR

objednat
f_PAT

Bukač
t_ACT

ten
t_PAT

#Gen
t_ACT

mírný
f_RSTR

hlas
f_LOC

tým
f_APP

párky
t_PAT

#PersPron
f_ACT

Luděk
f_RSTR

ten
t_RSTR

(13) *(...) zeptal se údajně s mírným zděšením v hlase <u>lékaře týmu</u>, zda ty párky objednal*
on.

[(…) he-asked Refl. allegedly with slight panic in voice <u>doctor of-team</u> whether those sausages ordered **he**.]

3.5 The anaphoric reference to a segment needs some more specific delimitation. It is our future task to examine whether some conditions of such a delimitation can be based on the TFA annotation of the sentences included in the segment referred to.

4. Summary

We are well aware that the data collected up to now as for the two aspects – information structure and coreference – are rather sparse and need a completion and further examination. However, the probe we describe in the paper confirms that if the coreference assignment is not done selectively but if it is an integral part of a large scale annotation of underlying sentence structure (along with the annotation of the information structure of sentences) a corpus annotated in this way prepares solid grounds for further linguistic investigations of discourse patterns.

5. Acknowledgements

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Discourse and addition

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Pure additive and scalar particles have been studied in relation to the inferences they trigger and the felicity constraints they impose on the context. Although several analyses of their functioning are available in the literature, the reasons for their existence are less frequently explored. Sæbø (2004) offers a partial answer in claiming that obligatory occurrences of pure additive particles serve to accumulate topics while parallel information is added in a text. In this paper we consider the Italian negative particle *neppure*, that can be interpreted as pure additive (1) and as scalar (2), and look at the impact it has on the context. Note *in passim* that this combination of readings for a single lexical form is not unusual, cf. (König, 1991). Furthermore, at least in the Italian case, it does not correlate with a difference in distribution, which undermines an approach that would posit lexical ambiguity.

(1)   Non ha mangiato la mela e neppure la pera
        s/he didn't eat the apple, and neither the pear

(2)   Non ha mangiato neppure il caviale
        s/he didn't even eat caviar

We will argue for the following two points. First, the accumulation of information is intentional and aims at constructing a class of homogeneous facts which finds a correspondent in the common notion of set of alternatives associated with items of this type. Hence, the particle has an impact on the conversation insofar as it exposes the intended connection among pieces of information. In the case of *neppure* the facts—i.e. true propositions—must be negative. Second, the particle qualifies the type of information, as it signals that, from the point of view of the speaker, the fact asserted with respect to the associate[1] is necessary and sufficient to reach a certain effect on a given issue with respect to a particular discourse context and the current knowledge status of the speaker.

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[1] The element to which *neppure* associates is called the *associate* following Krifka (1998); Rullmann (2003). The clause that contains it is called the host clause.

1 The existential presupposition

Pure additive and scalar-additive particles share an existential presupposition, cf. the standard additive meaning as described by König (1991) and the existential implicature of *even* posited by Karttunen and Peters (1979). Indeed, in both additive and scalar readings, the associate of *neppure* is understood as a member of a class of individuals or actions containing at least another member, cf. (1) and (2). This core meaning is given in (3).

(3)   a.   neppure $(\lambda x[\alpha]\beta)$

      b. $\alpha(\beta)$ entailment

      c. $\exists y(\lambda x[\alpha]y \wedge y \neq \beta \wedge \alpha(y))$ existential presupposition

On the other hand, these particles differ among them with respect to what is usually called the scalar presupposition. Like *either*, *neppure* in (1) does not impose an order on the set constituted by the associate and its alternatives, whereas in (2), like *even*, it seems to provide ordering instructions, the alternatives being ordered with respect to the associate and possibly among themselves (i.e. total or partial order). As a consequence, the presupposition of existence of a set, common to the two interpretations, may well enter the core meaning of the item as a conventional implicature, but the presupposition concerning the existence of an order on such set should be kept aside, since we aim at a unified analysis.

Although the existential presupposition is shared, we are going to argue that it is this presupposition that somewhat causes the reading variation recorded in (1) and (2). In the literature, additive particles are known not to accommodate their presuppositions (Zeevat, 1992). On the other hand, it is customary to assume that additive scalar items can accommodate their presuppositions, and do so most of the time. In the case of *neppure*, we claim that the lexical entry leaves unspecified the strategy to adopt. The existential presupposition can be satisfied either way, but the choice may result in imposing an order on the class.

2 Adding negative information

Let us first make a point on the nature of the information that is added. This paper adopts the proposal made in Tovena and Mari (2005) that parallel information of negative nature is conveyed by antecedent/context and host clause. As a consequence, a grammaticalisation of the additive particle as an NC-word is particularly suitable, because this warrants that the host

clause is always negative, since either *neppure* is in the scope of a negative occurring somewhere else in the clause, or it introduces negation itself. However, one could criticise this choice by saying that here syntactic facts are misleadingly reinterpreted under the guise of pragmatics. Although we agree that a characterisation as an NC-word always comes with syntactic requirements on the host sentence, we maintain that other requirements, namely those on the context, do not follow from it, while they can be explained by the hypothesis that *neppure* adds up negative information.

First, support to this hypothesis comes from the contrast between a host clause that must be overtly negative and an antecedent clause where no overt negation is required to occur—as noted by Rullmann (2003) about *either*—although this is possible. This is shown by the *hate/dislike* vs. *not like* contrast in (4).

(4)   a.   Detesta mele e pere. A dire la verità, [non gli piace/*detesta] neppure l'uva
          s/he hates apples and pears. To say it all, s/he does not like grapes either

      b.   Non gli piacciono mele e pere, e (non gli piace) neppure l'uva
          s/he hates apples, pears and grapes too

The constraint bears on compatibility of models, so it suffices that the proposition expressed by the host sentence with an alternative substituted for the associate follows from the context. Hence, the felicity condition that governs the distribution of *neppure* in a discourse, and akin negative additive particles, is a requirement on the type of information that is added and not a question of licensing, which never takes place across a stretch of two or more sentences, whereas the antecedent need not be adjacent to the host clause.

Second, the unacceptability of (5) also follows. *Tutte...tranne...* can be interpreted as a complex generalised quantifier (Keenan and Stavi, 1986). The first clause of (5) is used to provide an argument in favour of her/his having met many people. Although it also conveys the negative piece of information that s/he did not meet Luisa, the latter does not constitute the main communicative goal of the utterance.

(5)   *Ha incontrato tutte le ragazze tranne Luisa e neppure Marco
          S/he met all the girls except Luisa and Marco either

Tutte...tranne... cannot introduce a negative orientation in the argumentation, cf. (Anscombre and Ducrot, 1983; Merin, 2003). Then, the clause that contains *neppure* cannot add up to the main argumentative direction, because i) it can only add negative information and ii) it requires homogeneous argumentative orientation between antecedent and host clauses.

3   The role of the associate

As recalled above, a characteristics of scalar particles that sets them apart from purely additive ones is that the associate is understood as ordered with respect to one alternative at least. The whole set of alternatives may be ordered. In either case, we can ask ourselves what is the role of the associate with respect to the class of alternatives, why is it singled out?

The question is not discussed in the literature on additive particles, to the best of our knowledge. As for scalar items such as *even*, there is no agreement about which position the associate occupies in the ordering and its status of scalar endpoint is debated. According to Kay (1990), there is at least one alternative with respect to which the associate ranks higher; But the associate is not ranked with respect to the whole class. For Barker (1991, 1994) the associate is the strongest element of the universal class to which *even* is said to make implicit reference; The notion of scale is not mentioned and no information is explicitly given about whether the class is totally ordered. Fauconnier (1976) explicitly says that the associate occupies the strongest position on the order under consideration.

An antecedent, when present, provides at least another element in the set besides the associate, hence it satisfies the existential presupposition and it also meets the minimal requirement for a scale. In the case of *neppure*, we observe three situations. First, when the set formed by antecedent and associate is perceived as unordered, the additive reading emerges, cf. (1) above. Second, whenever it is perceived as ordered, e.g. by lexical information (6), the scalar reading emerges. Third, only the scalar interpretation emerges when no antecedent is available (7).

(6)   Non ha studiato questo capitolo, e non l'ha neppure guardato
           He didn't study this chapter and he did not even look at it

(7)   Non ha mangiato neppure la pera
           He didn't eat even the pear
           ~~He didn't eat the pear either~~

Following Tovena and Mari (2005), we propose that in both additive and scalar cases the associate has the role of marking the temporary boundary of the class. Before we develop this point, we discuss the way the class is set up.

4   The scalar presupposition

The class of alternatives is constructed in an extensional way whenever its members are overtly provided by the preceding context and the presupposition of existence can be verified. An order may or may not be present. The scalar interpretation emerges if an order is perceived, and the default reading is the purely additive one.

Alternatives are identified using the associate and the content of the host clause. The presupposition that the property predicated by the associate applies to at least another salient entity is verified if and only if the proposition expressed by the host sentence with an alternative substituted for the associate follows from the context. In this case, the associate stands on an equal footing with respect to the contextual alternatives. No inferences are drawn from ascribing universal force to the position of the associate within the class; hence it is the context that must provide overt information supporting the move from one member to the other required to build a class. Let us call ALT_β the set of alternatives for the associate β. This set can be constructed as indicated in (8), but one could also keep track of the order in which alternatives are retrieved.

(8) $\{x|\lambda P[P(\beta) \wedge (P(\beta) \rightarrow P(x))]\}$

On the contrary, in the absence of overt information on the alternatives, the presupposition triggered by *neppure* that should have been satisfied by the missing antecedent(s) is met by accommodating missing bits of information in the least costly and most effective way. The class is reconstructed on the basis of information coming from the associate. But the only way to control such anoperation, i.e. to license the move from the associate to some alternative, is by invoking the scalar scenario which licenses inferences running down a relevant scale, and allows one to identify the class intensionally. Therefore, the associate comes to play the role of scalar endpoint, even if only temporarily, and the scalar interpretation emerges. Indeed, any salient (i.e. relevant in the context with respect to the associate) suitable (i.e. satisfying the entailment) element can be imagined as member of the class, and more than one class can be put together. In the worst case, the participants in the conversation all think up somewhat different scales, but in all of them the relevant portion has the associate as endpoint.

In short, the price for accommodating the existential presupposition is paid by 'moving' from unordered to ordered sets and 'upgrading' the property predicated by the associate to intensional criterion for membership so that we can identify a relevant scale in context. Under this interpretation, *neppure* plus an NP associate is viewed as a generalised quantifier, cf. (9).

(9) $\lambda P.\exists P', scale_i, ALT_\beta[P(\beta) \land P'(\beta) \land \forall x \in ALT_\beta(P'(x) \land \beta >_{scale_i} x) \land \forall y \forall z(y >_{scale_i} z \to (P(y) \to P(z)))]$

Such generalised quantifier combines with any property P such that first, P corresponds to the host clause minus the associate, second, there exists a type (property) P', a scale $scale_i$ and a set of alternatives ALT_β such that β satisfies P and P', and every member of ALT_β satisfies P' and is less than β with respect to the scale (i.e. on the scale), and third, the scale determines an entailment order with respect to P. The intensional facet of the characterisation comes from the dependency between the scale and the P-relativised entailment.

In this way, we are able to predict the general correlation between overt antecedent and additive interpretation and the mandatory one between no antecedent and scalar interpretation mentioned above.

Our analysis treats the additive reading as the basic one and the scalar reading as derivative. At first sight, this goes against the observation that when *neppure* is looked at in isolation, native speakers interpret it almost exclusively as scalar, and realise that is has an additive interpretation too only when prompted with a suitable context. However, given our hypothesis that *neppure* is underspecified with respect to the strategy to satisfy the existential presupposition, the prediction we make is that in isolation the reading that emerges more easily is the one that imposes less constraints on the context, and this is the scalar one.

5 Reasons for adding

It is a standard assumption that assertions are felicitous only if they add new information to the common ground (Stalnaker, 1979; van der Sandt, 1992). In this respect, sentences containing *neppure*, and additive particles at large for that matter, may stand on an uncomfortable posture. The addition operated by a sentence containing *neppure* cannot always be justified entirely on the basis of the Gricean maxims of quantity and quality. For instance, in a situation where the weather is not nice and this is known to speaker and hearer, a sentence such as (10) can be used felicitously, yet it cannot be said to increase the information on the weather strictly speaking.

(10)   E non fa neppure bello.
        and the weather is not nice either

We claim that for (10) too it holds that the goal of asserting a sentence that contains additive *neppure* is to add information that is not recoverable

on the basis of what is available up to that point in the discourse. What is peculiar to this type of example is that the new information being contributed is limited to the relevance of the weather conditions for establishing an (here unspecified) argumentative goal.

In uttering a sentence containing *neppure*, the speaker chooses to add information and signals that she is not 'obliged' to do it. This is the core component of the particle. But the addition is not gratuitous, recall that an agent undertakes a procedure if this is profitable (Van Rooy, 2004). In this case, the particle marks the fact that adding the piece of information contained in the host clause is going to lead to modifications in the information state that would not occur without such addition. This point can be characterised as a generalised conversational implicature.

The addition is relevant with respect to an implicit goal, for instance being informative but also providing evidence for an intended conclusion, as in the case of (10). The use of the particle signals that the piece of information that is being added has a particular function, therefore it triggers a search for a discourse goal by the hearer. Furthermore, the particle marks the piece of information as precisely the one that was missing to get the intended effect. Hence, it is a sort of endpoint, in terms of utility with respect to the information state and to the intended effect. It is maximally useful for the goal. There is a conclusion that can be reached thanks to the added bit and that could not be reached without it. This can be expressed in terms of deductibility or probability. The additive particle signals that the speaker has chosen to add p and that the preferred interpretation of this operation ADD p in the information state s is as in (11).

(11) $\exists q(s + p \Vdash q \ \& \ s \nVdash q \ \& \ p \neq q)$

q represents the intended effect, and $s \Vdash q$ means that q is true everywhere in s, i.e. in every world of s. Alternatively, we can express it as in (12) that says that the probability of q in $s + p$ is greater than its probability in s.

(12) $\exists q(P_{s+p}(q) > P_s(q))$

In the scalar case it is straightforward to see that the associate has the role of marking the temporary boundary of the class. Furthermore, the fact that the information contributed has to be maximally relevant for a specific goal and not in absolute terms makes it possible to account for cases such as (13) whilst sparing us the need to claim that some scalar particles are specialised for bounded or unbounded scales, as done by Schwenter and Vasishth (2000).

(13)   Non ha vinto neppure la semifinale!
        s/he did not win even the semifinals

Given the physical or mental shape of the athlete, it was possible for her to win the semifinals and possibly the finals. When it comes to evaluating her performance, information that she did not make it to the finals is more relevant than knowing that she didn't win them. Similarly, in the additive case exemplified in (10), for instance, the bad weather is presented as what should tip the balance in favour of dropping a planned outing.

Then, in (14) the goal of using *neppure* seems to be to mark the exhaustiveness of the mentioned options with respect to an understood question.

(14)   Intanto, il supergiudice inquirente del caso, Baltasar Garzon, tace
        come d'abitudine. Nessun commento neppure dal governo di Josè
        Maria Aznar. (1/2/2000LR)
        in the meanwhile, the super state prosecutor concerned, i.e. Baltasar Garzon, keeps silent as usual. No comments from the government of Josè Maria Aznar either

Since the type of effect obtained by adding information may vary from a conversational situation to another, it can best be characterised as a particularised conversational implicature.

6   More on the role of the antecedent(s)

We have assumed that the scalar reading of *neppure* can emerge also in the presence of an overt antecedent, if a relevant order is perceived as in (6). It was said that in this case the two strategies for satisfying the existential presupposition converge. This point may help in understanding Fauconnier's famous example (15) and Rooth's example (16)[2], that have nonscalar readings although scalar-additive French *même* and its English counterpart *even* in general do not have purely additive readings.

(15)   Georges a bu un peu de vin, un peu de cognac, un peu de rhum, un
        peu de calva et même un peu d'armagnac. (Fauconnier, 1976, 17)
        Georges drank a little wine, a little cognac, a little rum, a little
        calvados, and even a little armagnac

---

[2]Rooth uses example (16) to argue against Karttunen and Peters (1979) scope analysis of *even*. Note that the same type of 'missing existential implicature' he uses as evidence for an NPI characterisation of part of the distribution of *even* is also found with positive additive particles, which clearly are not NPIs. Consider (i) as a substitute for the last sentence in (16).

(i) The censorship committee kept John from reading Syntactic structures too.

(16)   Because they had been stolen from the library, John couldn't read 'The logical structure of linguistic theory' or 'Cartesian linguistics'. Because it was always cheked out, John didn't read 'Current issues in linguistic theory'. The censorship committee kept John from reading even Syntactic structures. (Rooth, 1985)

As said, in the literature, it is more or less understood that scalar particles are always willing to accommodate. Let us reword this point and say that particles that always exhibit a scalar interpretation are always willing to accommodate. It is also commonly agreed that additive particles do not accommodate. Now, *even* is an additive scalar particle. The general wisdom seems to be to ignore the constraints coming from a characterisation as additive as far as the order on the class is concerned but also as far as the need of verifying the presuppositions is concerned. In doing so, one wipes out all differences between items that can have a purely scalar reading and additive scalar particles.

On the contrary, we propose that traces of the additive characterisation can be found in the behaviour of additive scalar items. In particular, we claim that when a candidate for the role of antecedent is overtly present, scalar particles try to verify their presuppositions in the context first, before trying to accommodate. As a result, an independent additive reading can emerge. If it is possible to perceive an order, scalar and additive readings can converge. As a last resort, if no salient order is perceived, a scalar reading can be built by exploiting an order based on quantities, since the associate is the last element of a sequence. In short, whenever possible, the implicature computed on the basis of the host clause is verified in the context.

7   Summary and conclusion

Neppure exhibits additive and scalar interpretations. First, we have offered evidence for its characterisation as particle that increases negative information. Second, we have proposed a way to reconcile the apparent contradicting requirements of unordered vs. ordered sets of alternatives associated to these interpretations by drawing a distinction between core constraints and contextual effects. The characterisation is made up of layers of increasingly context sensitive constraints. The assumption behind it is that, on the one hand presupposed information that has to be accommodated is discourse new, hence relatively context 'free' in its content when compared with verified presuppositions, but on the other hand, it must be more tightly constrained in its form if one wants to keep comparable the increase in information resulting from verification and that obtained by accommodation.

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Adverbials and Information Structure

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Abstract

If one takes the interpretation of a clause to be some type of "Abstract Object" [Asher 1993, Webber 1991], one can distinguish sentence-level adverbials by the number of AOs involved in their interpretation. One type, that we call "clausal adverbials" (Example 1), can be interpreted with respect to the single AO from the adverbial's matrix clause, while the other type, which we call "discourse adverbials" (Example 2), must be interpreted with respect to two AOs – one from the adverbial's matrix clause, and the other from the discourse context [Forbes 2003; Forbes-Riley et al 2005].

   (1) Personally, I dislike its combination of ponderousness and timidity, which adds up to an utter lack of drama.

   (2) Accordingly, each research project relates a current or potential clinical intervention to a basic science.

Discourse Structure correlates, in part, with discourse connectives (aka "cue phrases"), among which researchers have included coordinating and subordinating conjunctions (e.g. "and", "but", "because", "when"), other coordinators (e.g., "so that", "in order to", ""), and various sentence-level adverbials [Knott 1996]. Clearly, adverbials cannot function as discourse connectives in the same way as conjunctions or other coordinators, all of which link two explicit clauses. Similarly, clausal adverbials cannot function as discourse connectives in the same way as discourse adverbials can, since their interpretation only involves a single AO. What is going on?

In this talk, I will present an account of discourse connectivity that explains how clausal adverbials can function as discourse connectives (due in part to information structure) and how information structure in turn influences the interpretation of discourse adverbials.

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