

Modeling Information Structure for Computational Discourse Processing

ESSLLI 2004 Course Reader

Ivana Kruijff-Korbayová

korbay@coli.uni-sb.de
<http://www.coli.uni-sb.de/>

Nancy, August 16–20 2004

Contents

1	Introduction	2
1.1	Overview of the Reader	2
1.2	Motivation	3
2	Approaches to IS	5
2.1	Two Dimensions of Information Structure	5
2.2	Information structure in the Prague School	11
2.3	Halliday's Two Dichotomies	16
2.4	Vallduví's Information Packaging	17
2.5	IS in the Generative Grammar Tradition	20
2.6	Steedman's Two Dimensions of IS	21
2.7	IS and Common Ground	23

Chapter 1

Introduction

[the phenomena at issue here] have to do primarily with how the message is sent and only secondarily with the message itself, just as the packaging of toothpaste can affect sales in partial independence of the quality of the toothpaste inside.

– Wallace L. Chafe

1.1 Overview of the Reader

The goal of this ESSLLI 2004 course on *Modeling Information Structure for Computational Discourse Processing* is to help students and researchers to orient themselves in the large amount of literature on information structure, by providing them with a basic understanding of the various approaches and the notions they work with, and by giving a survey of existing attempts at formalizing IS and employing it in computational discourse modeling.

The next section, partially based on (Kruijff-Korbayová and Steedman, 2003), motivates this goal of the course in more depth. Chapter 2 gives a more detailed overview of the field, with many pointers to literature. Section 2.1 provides a high-level overview and comparison of IS terminology. Some parts of the text are reused from (Kruijff-Korbayová and Steedman, 2003); some parts are based on (Kruijff, 2001)[Section 5.1]. In the following sections, a more detailed overview and comparison of some of the main approaches is given. Parts of Sections 2.2, 2.4 and 2.6 are based on (Kruijff, 2001), Sections 5.2, 5.4 and 5.3, respectively. For other overviews and comparisons, see for example (Vallduví, 1990), (Kruijff-Korbayová, 1998) and (Kruijff-Korbayová and Hajičová, 1997).

After this introductory material, the reader contains some background reading material. I decided to include scanned copies of a selection of older articles, which are hard to get unless one has access to a really well stocked library. Works that are available electronically on the internet are not included in this reader. This holds about most recent works, but also about some older ones. For example, thanks to the ACL Anthology project <http://acl1.ldc.upenn.edu>, the ACL Journal, as well as the ACL, COLING and other proceedings are available several decades back. The course webpage course at <http://www.coli.uni-sb.de/~korbay/esslli04/> contains an extensive bibliography list with many pointers to electronically available versions of papers.

1.2 Motivation

Information Structure (IS) concerns utterance-internal structural and semantic properties reflecting the speaker’s/writer’s communicative intentions and the relation of the utterance to the discourse context, in terms of the discourse status of the content, the attentional states of the discourse participants, and the participants’ prior and changing attitudes (knowledge, beliefs, intentions, expectations, etc.) (Kruijff-Korbayová and Steedman, 2003).

Among the dichotomies used by various authors to describe IS at various levels are Theme-Rheme, Topic-Comment or Topic-Focus and Ground-Focus on the one hand, and Given-New, Contextually Bound-Nonbound, Background-Focus or Background-Kontrast on the other hand.

Languages differ in the extent to which they employ various means of IS realization, such as intonation (i.e., accenting, de-accenting, and phrasing), word order, particular syntactic constructions or morphological marking.

For example, (Halliday, 1970) notes a sign in the London Underground with the text “Dogs must be carried”, and observes that this text can be pronounced with different intonation patterns, e.g., (1) vs. (2) reflecting different IS.¹ Thereby, different instructions (here, paraphrased in italics) are conveyed to passengers. One supposes that (2) was not the intention of the London Transport Authority.

- | | | | |
|-----|-------------------------------------|-----|-----------------------|
| (1) | Dogs must be CARRIED. | (2) | DOGS must be carried. |
| | H* LL% | | H* LL% |
| | <i>If there is a dog, carry it.</i> | | <i>Carry a dog.</i> |

The Czech counterparts of (1) and (2), conveying the same instructions to the hearer, are (3) and (4), respectively:

- | | | | |
|-----|--|-----|--|
| (3) | Psa je nutno NĚST. | (4) | Je nutno něst PSA. |
| | Dog _{acc} is necessary carry _{inf} | | Is necessary carry _{inf} dog _{acc} |
| | A dog it is necessary to CARRY. | | It is necessary to carry a DOG. |

Over the past two decades, the understanding of IS within the sentence has been enriched by intensive research in formal semantics, addressing association-with-focus phenomena involved in the the interpretation of focus particles (“only”, “even”, etc.), quantifiers and negation; interpretation of intonation and word order; and reference. It is now widely accepted that IS affects both interpretation and realization, even though there is no uniform account.

Modeling these phenomena and their interaction in the grammar requires understanding IS and its role in discourse. IS is therefore an important aspect of meaning at the interface between utterance and discourse, that computational models of discourse processing should take into account.

Discourse, i.e., a coherent multi-utterance dialogue or monologue text, is more than a sequence of propositions, just as sentences are more than sequences of words. A discourse has rich internal organizational structure, involving informational and intentional relations

¹Throughout this reader, words bearing a pitch accent are printed in SMALL CAPITALS, and intonation is indicated using the ToBI (“Tones, Breaks and Indices”), cf. <http://www.ling.ohio-state.edu/~tobi/> (Pierrehumbert, 1980; ?).

between discourse segments, anaphoric relations, modal subordination, discourse topics, thematic progression, etc. In discourse, both explicit and implicit devices signify links between utterances, between groups of utterances, and between elements within them, and in turn, carry additional elements of discourse semantics. However, much less is known about what, if any, use is made of IS beyond clause and sentence boundaries and how IS interacts with other aspects of discourse structure.

The need to model IS in relation to discourse semantics and vice versa is justified not only on theoretical grounds, but it is also an arising challenge for practical systems: experience with applications such as translating telephony and interactive query-answering, as well as written text analysis and generation, makes it painfully clear that a theory relating IS and discourse is essential for accurate natural language processing. For example, in dialog systems with flexible interaction it becomes important to produce and interpret the contextual aspects of utterance realization, in terms of, e.g., choice of syntactic structure and intonation. The generation of contextually appropriate intonation is an important challenge for systems using synthesized speech, because with dynamically produced output, the same sequence of words may appear in different contexts, possibly needing different intonation. For example, the intonation of an answer needs to correspond to the respective question: whereas in (5S) the nuclear intonation center has a “default” placement, in (6S) it does not.

- | | |
|--|--|
| (5) U: What is the status of the stove?
S: The stove is switched ON.
<div style="text-align: center;">H* LL%</div> | (6) U: Which device is switched on?
S: The STOVE is switched on.
<div style="text-align: center;">H* LL%</div> |
|--|--|

Contextually inappropriate intonation may have negative effect on intelligibility or even lead to confusion; for example, when (5U) is answered with (6S), or (6U) with (5S), a mismatch arises. Similar concerns hold in text processing, especially for languages with higher degree of word order freedom.

Formal accounts addressing various issues involved in modeling IS in relation to discourse structure and semantics have started to emerge, and some have been embodied in computational models of discourse processing involving intonation, e.g., (Hirschberg, 1993; Nakatani et al., 1995; Monaghan, 1994; Prevost, 1995a; Kruijff-Korbayová et al., 2003a), and other aspects of the linguistic realization of IS, such as word order (Hoffman, 1995b) and (Hoffman, 1996), (Komagata, 1999), (Kruijff-Korbayová et al., 2002), as well as non-linguistic reflexes or correlates of IS, e.g., gestures in multimodal conversation (Pelachaud et al., 1998) or turn-taking and gaze behavior (Cassel et al., 1999).

While the phenomena involved in discourse and IS are themselves complex and not yet fully understood, progress in studying their interaction is made even more difficult by proliferating and often under-formalized terminologies, especially in the area of IS. What is needed is further systematization of the diverse terminologies, formalization and computational modelling, and fuller empirical and corpus-based studies.

Chapter 2

Approaches to IS

2.1 Two Dimensions of Information Structure

In general, the purpose of a (declarative) sentence is *to communicate meaning*. As most sentences are uttered in the context of a larger discourse, there is a side-condition on this communication: the sentence’s meaning needs to be *coherent* with the preceding context. Arguably, the claim behind IS as a theoretical construct is that it helps us to explain *how* the meaning a sentence conveys can be coherent with respect to a larger discourse.

Similarities The terminology describing IS partitioning and its semantics is at the same time diverse, and under-formalized. Yet it seems that all definitions have some elements in common. They all draw at least one of these distinctions:

- A “theme/rheme” or “topic/comment” distinction between the part of the utterance that relates it to the discourse purpose, and the part that advances the discourse; this distinction is sometimes characterized as one of *aboutness* between a *Relatum* and an *Attributum*, where the relatum serves to relate the utterance meaning to the discourse context explicitly established or implicitly shared between the speaker and the hearer, and the attributum provides some information *about* the relatum. This information may add to or indicate the need to change or modify, some information that had previously been established in the discourse.
- A “background/kontrast” or “given/new” distinction, between parts of the utterance which contribute to distinguishing its actual content from alternatives the context makes available.

The above use of the terms theme and rheme stems from Firbas and Bolinger, rather than Halliday; the theme/rheme dichotomy in Vallduví and Vílkuna’s, Steedman’s, Firbas’ and Bolinger’s analyses is straightforwardly comparable to the topic/focus dichotomy in the recent Prague School works (Sgall et al., 1986; Hajičová et al., 1998; Kruijff, 2001). The ground/focus dichotomy employed in (Vallduví, 1990) also more or less aligns with theme/rheme and topic/focus. However, Vallduví analyzes IS at the level of surface syntactic constituents, whereas the Prague School exponents and Steedman ascribe IS partitioning at some level of semantic representation, i.e., logical form or linguistic meaning. (For Steedman,

IS is also directly represented at the level of syntactic derivation and, in English, intonation structure.)

The background/kontrast distinction is closely related to the Hallidean given/new dichotomy and the background/focus distinction of (Dahl, 1969). Background/kontrast partitioning can occur within both rheme and theme. Kontrast within rheme corresponds to what the Praguians call “focus proper”, whereas kontrast within theme corresponds to “contrastive Topic” in the most recent Praguian works (Hajičová et al., 1998).¹ In the earlier information packaging terminology of (Vallduví, 1990), kontrast within rheme does not have any particular label, while kontrast within theme is comparable to link as part of ground, and background within theme is comparable to tail as part of ground.

There are further similarities between the various approaches to IS: while some of the theories leave the associated discourse semantics at an intuitive level, the theories which do address formal semantic issues all tend to use some version of “update” semantics of the Kamp-Heimian synthesis (Kamp, 1984; Heim, 1982b) or Alternative Semantics (Rooth, 1985b; Rooth, 1992), further elaborated in (Büring, 1995; Steedman, 2000a), e.g., (Vallduví, 1990; Kruijff-Korbyová, 1998; Hendriks, 1998). For example, (Steedman, 2000a) views context as an updatable database including two Roothian alternative sets, respectively called the “Theme Alternative Set” and the “Rheme Alternative Set” (corresponding also to what is called membership set(s) in (Vallduví and Vilkuna, 1998).

Differences There are differences among the theories of course. Some, like (Halliday, 1967), view the two distinctions as orthogonal, applying at independent levels of structure. Others, both in the Prague School tradition (Mathesius, 1929; Firbas, 1964; Sgall, 1967) and in the Bolingerian tradition (Bolinger, 1965), view them as different aspects of a single level of structure, e.g., (Sgall et al., 1986), (Vallduví, 1990), (Steedman, 2000a). An important issue that further differentiates the Bolingerian theories is that of whether pitch accent corresponds to a single contrastive notion applying to both theme and rheme, i.e., what (Steedman, 1996) calls “focus” and (Vallduví and Vilkuna, 1998) call “kontrast”, or whether “contrastive focus” is a distinct notion, applying to explicitly mentioned entities and associated with topic or theme alone.

Another aspect where theories differ is recursivity of IS partitioning. That is, whether IS is a partitioning at the sentence level, clause level or possibly even lower ranks of syntactic structure.² Various authors allow various degrees of mild recursivity, e.g., for coordinated and some cases of subordinated clauses within complex sentences (Vallduví and Zacharski, 1994; Koktová, 1995; Hajičová et al., 1998; Kruijff-Korbyová and Webber, 2001). But there are also extreme positions, not allowing any recursivity (Vallduví, 1990; Sgall et al., 1986; Steedman, 2000a) or allowing unlimited recursivity (Partee, 1995).

IS Realization An important issue is how a sentence’s surface form realizes the IS of the underlying linguistic meaning. After all, whereas the meaning that is being communicated is by nature *multi-dimensional*,³ wordforms can only be uttered in a *linear order*. Thus, we

¹The Praguian distinction between contextually bound and non-bound elements is not so straightforwardly alignable with background/kontrast, although it is usually, but perhaps inaccurately, also compared with Hallidean given/new.

²Some argue for utterance as the unit of IS. But more research is needed to clarify what structural units can constitute separate utterances.

³In the sense that conceptual structures are not linear.

need to project the complex underlying structures onto a single dimension, and thereby we are constrained by language-specific rules defining grammaticality.

The basic idea is that forms are *iconic* of their informativity - they carry *structural indications of informativity*. It naturally depends on the type of language what means are available to indicate informativity. For example, Slavonic languages like Czech or Russian predominantly use word order, structuring a sentence such that the words realizing the Relatum appear at the beginning, followed by the Attributum - see (7) for some possibilities in Czech, and their English counterparts in (8).

(7) **Czech**

- a. (Včera Elijah četl)_{Theme} (Katce knihu)_{Rheme}.
- b. (Katce Elijah včera četl)_{Theme} (knihu)_{Rheme}.
- c. (Knihu Elijah včera četl)_{Theme} (Katce)_{Rheme}.

“Elijah read a book to Kathy yesterday.”

Thus, even though Slavonic languages have a relatively free word order, that word order is by no means arbitrary: It indicates informativity, and therefore the sentence’s felicity may vary depending on the context.

On the other hand, a language like English uses predominantly other means, in particular tune. The examples below (8) illustrate the use of tune to realize the same ISs as in (7). Pitch accent is indicated by SMALL CAPS.

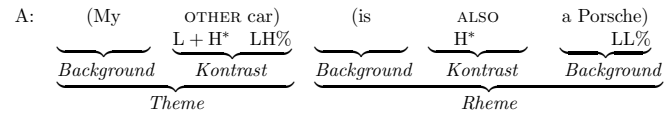
(8) **English**

- a. (Yesterday Elijah read)_{Theme} (A BOOK TO KATHY)_{Rheme}.
- b. (Elijah read)_{Theme} (A BOOK)_{Rheme} (to Kathy yesterday)_{Theme}.
- c. (Yesterday Elijah read the book)_{Theme} (TO KATHY)_{Rheme}.

Intonation has been seen as a reflex of IS since early work of, e.g., (Bolinger, 1965; Jackendoff, 1972b). One of the basic common ideas is that deaccenting is related to givenness (Hirschberg and Pierrehumbert, 1986; Hirschberg, 1993), another is that a marked placement of accent on some word reflects a so-called *narrow focus*, possibly contrast, (as opposed to *broad focus*) (Jackendoff, 1972b). Another (still disputed) issue is whether intonation patterns are related to specific IS-partitioning(s), in particular, whether particular tunes or accent types are used in Theme, and others for Rhemes, e.g., (Steedman, 1996) for English, (Féry, 1993) for German. It is possible that languages differ w.r.t. use and function of different accent types. For more discussion, see, e.g., (Ladd, 1996; Ladd, 2001).

For English, (Steedman, 1996) claims that Information Structure is indicated by Intonation Structure in the following way: the pitch contour described as L+H* LH% in the notation of (Pierrehumbert, 1980) is one of the “theme tunes” that identify an intonational phrase as the topic or theme of this utterance, while H* LL% is a “rheme tune”. Within both the theme and the rheme, the presence of one or more pitch accents identifies words which contribute to distinguishing that theme and/or that rheme from other themes and rhemes that the context affords. The following example illustrates this in detail:

- (9) Q: I know that THIS car is a PORSCHE.
But what is the make of your OTHER car?



Steedman follows (Bolinger, 1965) and (?) in viewing the role of accent in English as a single undifferentiated contrastive meaning applying to both informational components, and captured by the term *kontrast* introduced in (Vallduví and Vilksuna, 1998) to distinguish this narrow accent-related sense of the term from any other.

In (Kruijff-Korbayová and Steedman, 2003), we ventured to suggest that the terminology used in (Vallduví and Vilksuna, 1998), as embodied in the twin dichotomies of *theme/rheme* and *background/kontrast* exemplified above, provides a clear and unambiguous expression of the basic ideas that are common to most approaches to IS.

Finally, there are also languages that have a rich nominal morphology and -hence- a relatively freer word order, which realize IS primarily through affixation. An often-cited example is Japanese, where the *-wa* suffix marks a contextually given item and *-ga* is often associated with newness (though see (Heycock, 1993)). Haiman mentions other languages that have similar constructions (cf. (Croft, 1990), p.10). For example, the Papuan language Hua uses a suffix *-mo* to indicate a sentence's Relatum. Furthermore, although Turkish normally uses word order to indicate IS (Hoffman, 1995b; Hoffman, 1995a) Haiman notes that the *-sA* suffix can mark contrast ("contrastive topic"). Tagalog also uses morphological means to indicate informativity (Kroeger, 1993) (pp.64-69, pp.130-131). Finally, Engdahl and Vallduví mention in (1994) Navajo and Vute, languages in which an Rheme is associated with a particular suffix.

To recapitulate, we see that there is an interesting variety in how languages can *realize* IS, i.e., what types of structural indications of informativity are *predominantly* used, like word order in Czech, tune in English or a dedicated morphological suffix in Japanese. 'Predominantly' should be stressed here, because no language appears to be making *absolute* use of one and only one means.

Nevertheless, many questions concerning the IS partitioning, and its realization in different languages await fuller empirical and corpus based studies.

Question Test Example (9) also illustrates the use of question-answer pairs as a common device to explicitly indicate the intended IS partitioning of an utterance under discussion: the question sets the Theme of the answer-utterance, and the Rheme of the answer-utterance is what answers the question (Sgall et al., 1986; Steedman, 2000a). The question can also establish relevant alternatives, and thereby help to make explicit the intended Background/Focus partitioning (Prevost and Steedman, 1993; Prevost and Steedman, 1994; Prevost, 1995b; Büring, 1995; Steedman, 2000a). Question-answer congruence underlies the *question test* as an operational test of IS (Sgall et al., 1986). The question test relies on the observation that exchanging "sentence-variants" which differ in IS as replies to a given question does not always result in a congruent question-answer pair. The idea of the question test has been used to practically evaluate the appropriateness of the intonation of automatically generated responses in spoken dialogs, cf. (Prevost, 1995b; Kruijff-Korbayová et al., 2003b).

A question-answer pair in the question test is of course something else than a question-answer pair in actual dialogue. However, there is an interesting correlation here with Ginzburg's

approach to dialog modeling in terms of *questions under discussion*: each utterance (not only a question) may push one or more QUDs onto a stack, and when subsequent utterances are interpreted, it is tested whether they resolve or address a QUD. The IS of an utterance can then also be motivated by the current QUD. The QUD-based approach to dialog modeling has been implemented in several dialog systems in the TRINDI and SIRIDUS projects (Traum and Larsson, 2003); (Bos, 1999) and (Kruijff-Korbayová et al., 2003a) present implementations of the generation of dialog system responses with contextually varied IS realized through intonation. In relation to Q-A congruence and QUD modelling, many issues are subject of ongoing research: How do QUDs get established? When do QUDs get resolved? For more discussion see, for example, (Roberts, 1998). (Umbach, 2001) addresses the interaction of QUDs and discourse relations.

The diagram in Figure 2.1 is reproduced from (Kruijff-Korbayová and Steedman, 2003) and summarizes the influences and terminological dependencies in theories of IS and the associated discourse semantics.

2.2 Information structure in the Prague School

Information structure has since long been an essential ingredient of the view on language developed in the Prague School of Linguistics. The concepts of *Thema* and *Rhema* developed here can be traced back to Weil's work in the nineteenth century (Weil, 1844). Weil's work was resumed by several German linguists in the decades around the turn of the last century. Subsequently, the Prague School of Linguistics started paying systematic attention to issues of IS, pioneered by (Mathesius, 1936; Mathesius, 1975). Mathesius studied the *Thema/Rhema* dichotomy and its relation to syntax from the viewpoint of a structural comparison of Czech and English, and recognized that this dichotomy was important to problems ranging from tune to word order (cf. also (Sgall et al., 1986), p.175)). Among Mathesius' followers, Firbas studied further the interplay of syntax and word order, as means to realize the *functional sentence perspective*, and showed that it involves not only a dichotomy, but a whole scale of *communicative dynamism* (cf. (Firbas, 1992) for a comprehensive recent account). Daneš explored the relationships of *Theme* and *Rheme* to word order and intonation as well as to the structure of text, giving a thorough analysis of *thematic progressions*, i.e., the types of relations a Theme bears to the preceding context, and more subtle aspects of text connectedness (Daneš, 1970; Daneš, 1974). (Korbyayová and Kruijff, 1996) adapt Daneš's proposal to define *topic chains* in the FGD-based TFA terms (see below), and (Kruijff-Korbyayová, 1998) spells this proposal out in DRT terms.

Sgall, Hajičová and their collaborators introduced the terms *topic* and *focus*, and incorporated *topic-focus articulation* (TFA) into a formal description of syntax and sentence meaning in the framework of the Functional Generative Description of language (FGD) (Sgall, 1967; Hajičová and Sgall, 1980; Sgall et al., 1986; Petkevič, 1987; Petkevič, 1995). (Hajičová, 1993) gives an informal summary of the various threads of TFA research in FGD, including (Sgall et al., 1973; Sgall et al., 1980; Sgall et al., 1986) and various articles primarily by Sgall and Hajičová. A recent dialogue examining TFA and its relation to formal semantics can be found in Hajičová, Partee, and Sgall (Hajičová et al., 1998).

There are three principal ingredients to the Praguian theory of TFA:

- the *topic* and *focus* dichotomy that divides a sentence's linguistic meaning into a contextually given topic (the Relatum) and a focus that is *about* the topic (the Attributum);
- contextual boundness*, a characterization of an individual head's or dependent's informativity, being either *contextually bound* or contextually nonbound; and,
- communicative dynamism*, which is a relative ordering over the heads and dependents making up a sentence's linguistic meaning indicating how informative they are relative to one another.

An important characteristic of FGD's TFA is that the terms topic and focus are *not* primary notions, like their counterparts in other theories. Rather, topic and focus are based on the structural notion of contextual boundness.⁴ Each dependent and each head in a sentence's linguistic meaning is characterized as being either contextually bound or contextually nonbound. Intuitively, items that have been activated in the preceding discourse may function as contextually bound (CB), whereas non-activated items are always contextually nonbound

⁴To quote Sgall *et al.*: "If the notions of topic and focus (as parts of a tectogrammatical representation) are characterized on the basis of contextual boundness, then we don't have to worry about questions whether topic and focus are a single (deep or surface) constituent [...]." (Sgall et al., 1986)(p.188).

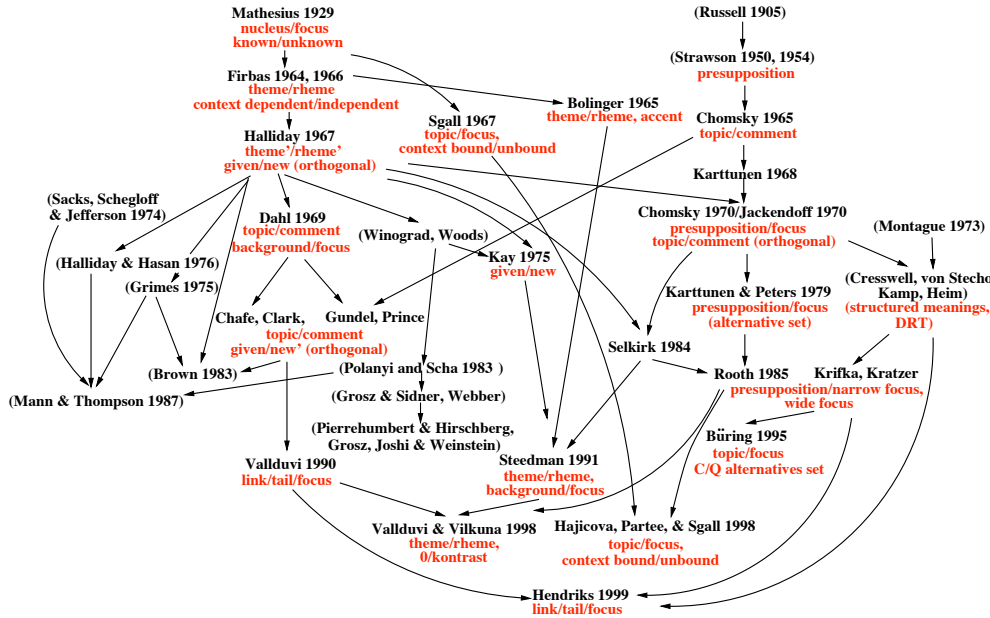


Figure 1. Information Structure Terminologies and their Dependencies

(NB) (Sgall et al., 1986)(p.54ff,p187ff). Mostly, an item is activated by introducing it explicitly into the discourse. Important about contextual boundness is, though, that it is a *linguistic* opposition, reflected in the structuring of linguistic meaning and its realization - it is not precise to equate contextual boundness to the discourse (or cognitive) opposition of given/new. For example, a previously mentioned item (CB) may occur in a contrastive focus, and we can present items as CB if they are activated by the situation of the discourse or can be activated indirectly by for example association (Hajičová et al., 1998)(p.59). In other words, contextual boundness is an issue of linguistic presentation.

More detailed discussion concerning TFA and the CB/NB opposition, and the activation (or *salience*) of items in the *Stock of Shared Knowledge* between the speaker and the hearer can be found in (Hajičová and Vrbová, 1981; Hajičová and Vrbová, 1982; Hajičová, 1993) and in (Hajičová, 2003). Salience-tracking in discourse and its relation to anaphora resolution is discussed in (Hajičová et al., 1990; Hajičová et al., 1992; Hajičová et al., 1995a; Hajičová et al., to appear). For a comparison to Centering Theory see (Kruijff-Korbyová and Hajičová, 1997).

Given the above characterization, and the internal structure of the sentence's linguistic meaning, the TFA can be derived as follows (Sgall et al., 1986, p.216):

Definition 1 (FGD's Topic-Focus Articulation). *Given a tectogrammatical representation of a sentence's linguistic meaning,*

- *the main verb belongs to the focus if it is contextually nonbound, and to the topic if it is contextually bound;*
- *the contextually nonbound nodes depending on the main verb belong to the focus, and so do all nodes (transitively) subordinated to them;*
- *if some of the elements of the tectogrammatical representation belong to its focus according to either of the above points, then every contextually bound daughter of the main verb together with all nodes (transitively) subordinated to it belong to the topic;*
- *if no node of the tectogrammatical representation fulfills the first two points above, then the focus may be more deeply embedded; special rules for the determination of focus are applied in these cases.*

In FGD, the *scale of communicative dynamism* defines a (partial) order over the nodes in a sentence's linguistic meaning, after Firbas's original notion of communicative dynamism (see Firbas (1992) for a recent formulation). If we project the linguistic meaning's tree to a line, then we obtain a reflection of that order. The *topic proper* and the *focus proper* are the least respectively most communicatively dynamic elements in a sentence's linguistic meaning. In the projected (deep) order, the topic proper corresponds to the leftmost item, whereas the focus proper is identified by the the rightmost element.

TFA and word order are discussed in detail in (Hajičová and Sgall, 1987), and more recently in (Hajičová et al., 1998)(p.56ff), Hajičová and Sgall address the strong correspondence between communicative dynamism and word order (and, indirectly, tune). This certainly holds for languages like Czech. Dependents that are contextually nonbound are considered to be communicatively more dynamic, and occur prototypically *after* the head, whereas contextually bound dependents are less dynamic and should occur before the modified head. The mutual ordering of contextually nonbound dependents thereby follows what is called

the *systemic ordering*, the canonical ordering in which complement types occur in a given language (Sgall et al., 1986; Sgall et al., 1995). On the other hand, FGD considers the order of contextually bound complements to be only determined by their mutual communicative dynamism. The examples in (10) give a brief illustration of the above ideas (recall also the earlier (8)).

- (10) a. **Czech**
Co Elijah udělal? (**English** What did Elijah do?)
Elijah koupil knihu.
Elijah-CB bought-NB book-NB.
"Elijah bought a BOOK."
Topic={**Actor**:Elijah}, Focus={buy, **Patient**:book}
- b. **Czech**
Co Elijah koupil? (**English** What did Elijah buy?)
∅ koupil knihu.
he-CB bought-CB book-NB
"He bought a BOOK."
Topic={**Actor**:he, buy}, Focus={**Patient**:book}

An algorithm for TFA identification during parsing, which is based on the Definition 1 is described in (Hajičová et al., 1995b).

Definition 1 also covers cases where the focus is deeper embedded. Thus, the dependent(s) constituting the focus do not modify the main verbal head but (transitively) one of its dependents. In the example in (11), only the dependent realized as *s kapsami* (**English** "with pockets") belongs to the focus, the rest of the sentence's linguistic meaning constitutes the topic. Consider also (12).

- (11) **Czech** Jaké nosí krtek kalhotky?
(**English** "What trousers does the mole wear?")
Krtek nosí kalhotky s kapsami.
mole-CB wears-CB trousers-CB with pockets-NB
"The mole wears trousers WITH POCKETS."
Topic={**Actor**: mole,wear,**Patient**: trousers}, Focus={**GenRel**:pockets}
(Kruijff-Korbyová, 1998)(p.27)
- (12) **English**
(What teacher did you meet yesterday?)
[(Yesterday)_{cb} (I)_{cb} (met)_{cb} (the teacher)_{cb}]_T [(of CHEMISTRY)_{nb}]_F
- cf. (Sgall et al., 1986), (Hajičová et al., 1998)(p.135)

Thus, the primary notions contextually bound and contextually nonbound are *recursive* in the sense that contextually nonbound items can be embedded under contextually bound items and *vice versa*.

In the general case, neither topic nor focus is a single item, as (11) or (13) show.

- (13) **English**
(What happened to Jim?)

A burglar INJURED him.
Topic={Patient:he}, Focus={Actor: burglar, injure} (Hajičová, 1993)

Petkevič notes in (Petkevič, 1987; Petkevič, in prep) that Definition 1 does not cover some special cases of topic-focus articulation that he calls “split semantemes”. The topic-focus articulation of a sentence is represented at the level of linguistic meaning, and at that level we do not have separate nodes for function words or even more local aspects of form, such as tense or modality. A sentence’s linguistic meaning only has nodes that represent what in FGD are called auto-semantic units or semantemes. However, from the viewpoint of a sentence’s topic-focus articulation it is not only the whole semanteme as such that can be determined as either contextually bound or contextually nonbound. Petkevič illustrates the need for a more refined assignment by examples like (14).

- (14) **English**
- a. I SHALL do it, not that I HAVE already done it.
 - b. I saw not only a single mouse there but several MICE.

For example, Petkevič argues that in (14a) the specifications of the verbal Tense of both occurrences of *do* belong to the focus, whereas both occurrences of the head *do* belong to the topic. A similar picture arises from (14b), only then for the specification of number.

Over time, several proposals have been made how to formalize FGD’s theory of TFA. In general, these proposals either focus on the (truth-theoretic) interpretation of a sentence’s topic-focus articulation, or have as their main concern the grammar’s representation of a topic-focus articulation.

Both represent rather long traditions. FGD received its first formalization in Sgall *et al*’s (1969), where the authors were concerned with providing a “mathematically -thus linguistically- interesting description of (linguistic) meaning.”⁵ Sgall (Sgall, 1980) presents the first formalization of FGD’s TFA. Sgall first constructs an automaton (roughly a complex pushdown store automaton) that is able to generate representations of a sentence’s linguistic meaning, including marking of contextual boundness. Subsequently, a transducer is given that completes the representation -as it were- by deriving the sentence’s topic-focus articulation, based on the contextual boundness marking. Petkevič extends this type of description in (Petkevič, 1987; Petkevič, 1995; Petkevič, in prep). Petkevič’s formalization is couched in a larger reformulation of FGD’s generative description of linguistic meaning.

After Sgall *et al* argued the importance of distinguishing a sentence’s topic-focus articulation from the felicity of its linguistic meaning *in a given context*, various attempts have been made towards the clarification of this view in *logical* terms. One group of such contributions was carried out within the framework of an intensional logic, namely Tichý’s transparent intensional logic. The basic issues involved in formulating TFA in transparent intensional logic were discussed by Materna and Sgall (1980) and by Materna, Sgall and Hajičová (1987). Vlk (1988) provided a procedure for translating the tectogrammatical representations generated by FGD into Materna *et al*’s logical representations of transparent intensional logic.

Other, more recent developments are based on Partee’s *tripartite structures* or on a logical dynamic perspective as arising from *dynamic semantics*. (See (Muskens *et al.*, 1996) for

⁵The kind of grammar that Sgall *et al* present in (Sgall *et al.*, 1969) still employs phrase structure-based notions, contrary to the later work (Sgall *et al.*, 1986).

a general description of logical dynamics and its use in describing natural language interpretation.)

Formalizations of TFA in dynamic-semantic terms are proposed in (Peregrin, 1995) and in (Kruijff-Korbayová and Kruijff, 1997; Kruijff-Korbayová, 1998; Kruijff and Kruijff-Korbayová, 2001). Peregrin (1995) is the first attempt to construct a more dynamic account of TFA. Following an approach that essentially goes back to (Jackendoff, 1972b), Peregrin formalizes the intuition that the focus says something *about* the topic as a λ -term. The topic is modeled as an abstraction, to which the focus-term then can be applied.

To provide an account of the semantic effects of IS, Peregrin provides an extensional theory of the truth of a sentence’s topic-focus articulation. In this theory, $\| X \|$ stands for the extension of an expression ‘ X ’, whereby $\| X \|$ is a truth value if ‘ X ’ is a sentence, an individual if ‘ X ’ is a term, and a class of individuals if ‘ X ’ is a unary predicate. Then, a proposition whose extension is denoted by $\| X \|$ is associated with every expression X (understood as a presupposition associated with X) as given in (15).

$$(15) \quad \begin{aligned} \| X \| &= \| X \| && \text{if } X \text{ is a sentence} \\ &= \| \exists y.y = X \| && \text{if } X \text{ is a term} \\ &= \| \exists y.X(y) \| && \text{if } X \text{ is a unary predicate} \end{aligned}$$

The semantics of a formula $F\{T\}$, as the predication of F corresponding to the focus-part over a sentence’s topic-part T , is defined in (16), cf. (Peregrin, 1995)(p.240). Note that $F(T)$ is (the β -normalization of) the standard application of F to T .

$$(16) \quad \begin{aligned} \| F\{T\} \| &= \text{true} && \text{iff } \| T \| = \text{true} \ \& \ \| F(T) \| = \text{true} \\ &= \text{false} && \text{iff } \| T \| = \text{true} \ \& \ \| F(T) \| = \text{false} \\ &= \text{false} && \text{iff } \| T \| = \text{false} \end{aligned}$$

The simple examples in (17) illustrate the basic idea.

- (17) a. John WALKS: **Walk**{ **John** }
b. JOHN walks: $\lambda f.f(\text{John})$ { **Walk** }

Peregrin works out an extensional account of negation, basic quantification, and focus as exhaustive listing. On the basis of the definitions in (15) and (16) Peregrin defines a more dynamic account of $\{\cdot\}$. Dynamically, a predication $P(S)$ is true can be modeled as a statement saying that there exists an assignment of a value to a variable x such that $P(x) \ \& \ x = S$ is true. A similar construction can be defined for Peregrin’s new mode of predication, $\{\cdot\}$. Given a concatenator $\}&$, $T \}& F$ has a truth value if and only if T has a truth value, and it is true if and only $T \ \& \ F$ is true (in the sense of $P\&S$ as above).

Besides a dynamic account, Peregrin also briefly discusses the possibility to model TFA in terms of tripartite structures. The idea of using tripartite structures was first put forward by Partee in (Partee, 1991), and is substantiated to a larger degree in Hajičová *et al*’s (1998). In the latter work, the authors discuss in Chapter 2 how a tripartite structure consisting of an *Operator*, a *Restrictor*, and a *Nuclear Scope* could model a sentence’s IS when it involves a focus-sensitive operator.

As Peregrin observes, the definition he gives for the truth of a statement $T \}& F$ cannot be applied recursively. In (Kruijff-Korbayová, 1998) Peregrin’s proposal has been extended to an

intensional approach by weaving an intensional (typed) theory of TFA into a discourse representation theory to create TF-DRT. The TF-DRT definitions in (Kruijff-Korbayová, 1998) can be applied recursively (see p.78ff).

Finally, (Kruijff, 2001) provides a new formalization of the Praguian notion of linguistic meaning, including TFA, in terms of Dependency Grammar Logic, a categorial-modal logical framework.

For more thorough discussions of TFA see Chapter 3 of (Sgall et al., 1986), and Hajičová *et al's* discussion in (Hajičová et al., 1998). In recent years, the Prague Dependency Tree-bank project (PDT) includes the annotation of TFA as part of the tectogrammatical tree representations (Buráňová et al., 2000; Hajičová and Sgall, 2001). This enables, among other things, the assessment of various hypotheses developed earlier, by considering large corpus data (e.g., (Hajičová et al., 2003)).

2.3 Halliday's Two Dichotomies

Halliday, inspired by the Prague School works, distinguishes between two dimensions of clause organization: one is the Theme/Rheme partitioning he calls *thematic structure*, the other is the Given/New distinction he calls *information structure* (Halliday, 1967; Halliday, 1970; Halliday, 1985).

According to Halliday, the thematic structure and information structure of a clause are closely related but not the same. Halliday's information structure concerns the distinction between the *Given* as "what is presented as being already known to the listener", and the *New* as "what the listener is being invited to attend to as new, or unexpected, or important" (Halliday, 1985)[p.59]. In Halliday's original approach, the root assumption for English is that ordering, when not grammatically constrained, is iconic with respect to "newsworthiness": under the scale from Given to New, the "newer" elements would come towards the end of the information unit; the "newest" element would be the bearer of nuclear stress. This position is indeed very close to that pioneered in the Prague School.

With respect to the thematic structure, Halliday's view differs from streamline current IS research, in that Theme in Halliday's approach has a *textual function*, it is concerned primarily with textual organization. Central to Halliday's approach is the notion that many languages *grammaticize* this particular textual function: that of signposting the intended development or "scaffolding" that a writer employs for structuring an extended text. In the grammar of English this textual function is realized in the first position in the clause and Halliday calls this textual function 'Theme': "The Theme is the element which serves as the point of departure of the message; it is that with which the message is concerned. [...] and the [thematic] structure is expressed by the order - whatever is chosen as the Theme is put first" (Halliday, 1985, p.37).

Halliday's use of the term Theme for a textual notion, which we henceforth refer to as **Theme_{SFG}**, needs to be understood in relation to the thematic structure. The specialized textual role of Theme_{SFG} was originally identified empirically in (Fries, 1981) and has since been applied in many (SFG-based) analyses of extended texts (e.g., (Halliday, 1993; Ventola, 1995; Matthiessen, 1995)). For example, it is a matter of a global text organization strategy that a biography can be organized along the dates when or the places where important events in one's life happened. These dates or places are not "given" information individually, but they are nevertheless broadly "predictable" from the knowledge of the text

type. Such strategies then guide the choice of Theme_{SFG}. This line of research is very similar to the earlier mentioned work of Daneš on "thematic progressions" and other aspects of text connectedness (Daneš, 1970; Daneš, 1974).

Although the claim of this special role for the first position in the clause has been questioned or rejected in various works (Lyons, 1977; Huddleston, 1988; Bolinger, 1989; Steedman, 1996; Steedman, 2000b), these critiques miss the point that it is the larger **textual organization** to which Theme_{SFG} contributes, not the local sentence-by-sentence organization found in dialogue or as highlighted by question tests. Most non-Hallidayan uses of the term Theme refer to properties that have to do with information structure (not thematic structure in Hallidayan sense), and also Halliday attributes them to what he calls information structure.

An approach to word order generation which synthesises a Hallidayan and Praguian perspective is presented in (Kruijff-Korbayová et al., 2002): it combines Halliday's IS/TS dichotomies with the Prague School insights concerning the relationship between communicative dynamism, contextual boundness and word order. This synthesis is motivated by observations of ordering in written instructions for software products, where we encountered regular thematization of (i) the location where actions are performed (19,(ii) the particular action that the user is instructed to perform, or (iii) the goal that the user wants to achieve. For example, consider (19) which demonstrates thematization of action location which appear repeatedly in the English, Czech, Bulgarian and Russian versions of the AutoCAD user guide. This particular occurrence was preceded only by the respective language counterpart of (18).

- (18) First open the Multiline styles dialog box using one of the following methods.
- (19) **Cz** Z menu **Data** vyberte **Multiline Style**.
Ru В меню **Данные** выберите **Multiline Style**
Bu От меню **Данные** выберите **Multiline Style**
En From the **Data** menu choose the **Multiline Style**.

The preceding context does not refer to the **Data** menu or make it salient in any way. Working only with the Praguian notion of information structure discerning CB (Given) and NB (New) elements, one is thus unable to explain the WO. The notion of Theme_{SFG} as a reflex of a global text organization strategy makes such explanation possible.

2.4 Vallduví's Information Packaging

The term information packaging can be traced back to Chafe.⁶ Starting with Vallduví (1990), various researchers have contributed to the *information packaging* perspective on IS, both in its aspects of discourse interpretation and grammatical realization.

Vallduví characterizes information packaging as a division of a sentence's surface form into *Focus* and *Ground*, further subdivided into *Link* and *Tail*. Cross-linguistic justification of this view using examples from various languages is presented in (Vallduví, 1990); (Vallduví and Engdahl, 1996) offer an additional indepth study of how a large number of languages may employ different strategies to realize information packaging, using examples from English, German, Dutch, Swedish, Catalan, Hungarian, Turkish, and Japanese. Consider the following examples for Catalan and English (20)-(22) from (Vallduví and Engdahl, 1996)(p.42), which illustrate the four abstract realizations of IS that Vallduví distinguishes.

⁶Cf. the quote on page 2, which originates from (Chafe, 1976, p.28).

- (20) *Link-focus sentences*: typical topic-comment structures, predicate-focus structures, categorical judgments.
- The president [_F hates CHOCOLATE].
El president₁ [_F odia la XOCOLATA *t*₁].
 - The president [_F CALLED].
El president₁ [_F ha TRUCAT *t*₁].
 - The president₁ [_F (I) wouldn't BOTHER *t*₁].
El president₁ [_F no l'EMPRENYARIA *t*₁ *pro*].
- (21) *All-focus sentences*: (a) neutral descriptions, news sentences, sentence-focus structures,thetic judgments; (b) *there*-sentences; (c) predicate-focus sentences where the locus of update is inherited.
- [_F The PRESIDENT called].
[_F Ha trucat el PRESIDENT].
 - [_F There are protests in the STREETS.]
[_F Hi ha protestes als CARRERS.]
 - [_F (He) HATES (it).]
[_F L₂ 'ODIA *e*₂ *pro*.]
- (22) *Link-focus-tail sentences* and *focus-tail sentences*: narrow focus, constituent focus, typical open-proposition structures.
- The president [_F HATES] chocolate.
El president₁ [_F l₂'ODIA *t*₂ *t*₁,] la xocolata₂
 - The president hates [_F CHOCOLATE].
El president [_F *t*_v la XOCOLATA *t*₁,] odia_v.

Vallduví reflects in Chapter 3 of (Vallduví, 1990) on various approaches to what he calls 'informational articulation'. Vallduví divides these approaches into *topic/comment* approaches and *focus/ground* approaches. Both (types of) approaches split a sentence, or rather its meaning, in two parts. The topic/comment approach splits the meaning into a part that the sentence is about, which is usually realized sentence-initially, and a comment. To follow Halliday, this 'topic' is the point of departure for what the sentence conveys.⁷

According to what Vallduví terms the focus/ground approaches, the sentence is divided into 'focus' and a 'ground', with the 'focus' being the informative part of the sentence's meaning. The ground anchors the sentence's meaning to what the speaker believes the hearer already knows. The 'focus' expresses what the speaker believes to contribute to the hearer's knowledge. The 'ground' is also known as 'presupposition' or 'open proposition' - the latter being explainable, at least formally, by Jackendoff's λ -term representation mentioned earlier.

Vallduví argues that both traditions suffer from various problems. Aside from terminological confusion, both traditions suffer from the fundamental problem (according to Vallduví) that they are incomplete in their empirical coverage, *necessarily so* because "a binomial informational division of the sentence is simply not enough." (Vallduví, 1990)(p.54) For example, consider the example in (23) adapted from Dahl (1974).

- (23) a. What about John? What does he do?

$$\begin{array}{cc} \text{topic} & \text{comment} \\ \underbrace{\text{John}}_{\text{ground}} & \underbrace{\text{drinks beer}}_{\text{focus}} \end{array}$$
- b. What about John? What does he drink?

$$\begin{array}{cc} \text{topic} & \text{comment} \\ \underbrace{\text{John drinks beer}}_{\text{ground}} & \underbrace{\text{beer}}_{\text{focus}} \end{array}$$

The fact that the two perspectives partition (23b) *differently* is taken to show that "neither of them is by itself capable of capturing all the informational distinctions present in the sentence" (Hendriks, 1994)(p.93). Vallduví notices that there is a certain overlap in how the two perspectives divide (23b), and proposes to conflate the two perspectives into a single, hierarchically structured trichotomy of a sentence's surface form, centered around a binary division according to informativity, in the sense of the 'focus/ground' tradition: The *ground* anchors the sentence's meaning into the preceding discourse, and a *focus* that specifies the 'new' information. In addition, the ground is further divided into a *link* and a *tail*. According to Vallduví, the link specifies *where* to anchor the information specified by the focus, and the tail indicates *how* it fits there (Vallduví, 1994)(p.5). Unlike is the case with FGD's contextually bound/contextually nonbound-distinction or Steedman's focus/background, Vallduví's primary notions are not (entirely) recursive.

Originally, Vallduví (1990) proposed to integrate information packaging into a GB-style architecture, with information structure as a *autonomous* stratum, next to deep structure (DS), logical form (LF), phonological form (PF), and surface structure (SS). (Engdahl and Vallduví, 1994; Vallduví and Engdahl, 1996; Engdahl, 1999) elaborate a different approach, making use of HPSG.

Subsequently, Vallduví's theory of information packaging has found its way primarily into HPSG- for example, see (Manandhar, 1994; Kolliakou, 1998; Alexopoulou, 1999). Hendriks proposes in (1994; 1996; 1997) a Lambek-style categorial grammar, based on Moortgat and Morrill's D calculus (Moortgat and Morrill, 1991), in which he tries to capture various insights of information packaging.

In (Vallduví, 1990), the interpretation of a sentence's link, tail, and focus in the larger context of a discourse, is defined as "a small set of instructions with which the hearer is instructed by the speaker to retrieve the information carried by the sentence and enter it into her/his knowledge store." (p.66) Vallduví defines the dynamical potential that the discerned components of a sentence's meaning have in terms of *operations on file cards*, based on Heim's file metaphor from File-Change Semantics (Heim, 1982b). Thus, a link is associated with a GOTO instruction - GOTO(*fc*) specifying "go to the file-card signified by the link's meaning". If a sentence has a tail, then the tail indicates a record on the identified file-card that has to be *modified* by the information specified by the focus. Vallduví associates the instruction UPDATE-REPLACE with a link; if the sentence does not have a tail, then the focus is simply added to the current location, using UPDATE-ADD.

According to Vallduví, there are altogether four possible combinations of link, tail, and focus - the focus being the only obligatory part. These four possible combinations lead to four abstract (in the sense of language-universal) sentence types, (24).

- (24) a. focus

⁷Note that Halliday (1985) calls this 'topic' the Theme, (Halliday, 1985)(p.59).

- b. link-focus
- c. focus-tail
- d. link-focus-tail

The combinations in (24) do not necessarily correspond to continuous segments of a sentence, in the order as given: They may be discontinuous, and depending on the individual language, appear in different orders. The instruction sequences that result from these combinations are given in (25). Here, I_S is the information specified by the sentence's focus.

- (25)
- a. UPDATE-ADD(I_S)
 - b. GOTO(f_c)(UPDATE-ADD(I_S))
 - c. UPDATE-REPLACE(I_S ,RECORD(f_c))
 - d. GOTO(f_c)(UPDATE-REPLACE(I_S ,RECORD(f_c)))

Vallduví's rather literal use of the file metaphor in (Vallduví, 1990; Vallduví, 1994) has been criticized by Dekker and Hendriks in their argument against treating links as ushers to a file-location (Dekker and Hendriks, 1994; Hendriks and Dekker, 1995); see also (Kuboň, 1998).

2.5 IS in the Generative Grammar Tradition

In (Chomsky, 1965) and the subsequent generative grammar works, IS phenomena are pursued in to orthogonal dimensions, namely the *topic-comment* dichotomy and the *background-focus* dichotomy (cf. (Lambrecht, 1994) for a detailed overview). The latter has attracted considerable research interest in formal semantics, starting essentially with (Jackendoff, 1972b), who successfully argued that focus has not only pragmatic import, but also both truth-conditional and semantic import, and laid out a research program for the theory of focus. Various researchers have since then addressed the main two issues pointed out by Jackendoff: Given a prosodically marked element (the prosodic focus), how can the syntactic focus be derived, and given a syntactic focus, how can the semantic and pragmatic import of it be computed? The seminal paper on syntactic focus projection is (Selkirk, 1984). Steedman then advocates a categorial grammar approach, arguing for an isomorphism between intonation, syntactic a semantic structure (Steedman, 2000b). (Engdahl and Vallduví, 1994) show how to model focus projection in HPSG.

The relation between syntactic and semantic focus has been explored to great detail in formal semantics research. The precursors of the current formal accounts of the meaning of IS were, e.g., (Lakoff, 1971; Dretske, 1972). One branch of approaches to the semantics of focus (von Stechow, 1990; Jackendoff, 1990; Krifka, 1992) works with *structured meanings* introduced by (Cresswell, 1985), where sentence meaning is represented by a pair of lambda-terms, one representing the focus and the other the ground. In (Krifka, 1992), this approach is applied to sentences with multiple focussing operators, and shown to preserve compositionality, while dealing with rather complex cases. In (Krifka, 1993), structured meanings are combined with a framework of dynamic interpretation, and a detailed discussion of the relation between focus, anaphora and presupposition is given. In a different vein, (Rooth, 1985b; Rooth, 1992) proposes a *alternative semantics* approach in which each expression has two semantic values: its truth-conditions and its focus value. The notion of alternative set is also

closely related to Hamblin's *set of potential answers* (Hamblin, 1973) and Karttunen's notion of *secondary denotation* (Karttunen and Peters, 1979b). Rooth shows how this focus value can be used to capture various constructs involving focussing, such as contrast, question-answer pairs, implicatures and focussing operators. (Büring, 1995; Büring, 1999) develops the alternative semantics approach further to handle theme-focus. It can be said that Steedman's work discussed below synthesizes both views, by working with IS-partitioned logical forms not unsimilar to the structured meanings, and assigning them interpretations in terms of presupposed alternative sets.

2.6 Steedman's Two Dimensions of IS

Steedman (1996; 2000b; 2000a) develops a theory of grammar in which syntax, information structure, and intonational prosody are integrated into one system. Steedman's main aim is to provide an IS-sensitive compositional analysis of English phrased as a Combinatory Categorical Grammar. In Combinatory Categorical Grammar ((Steedman, 2000a)), Information Structure and the associated structured meanings are associated directly with surface syntactic derivational structure, uniting Information Structure, Intonation Structure, and Surface Syntax in a single module of Grammar.

Steedman recognizes two independent dimensions of IS, both of which are relevant to its realization (Steedman, 2000a)(p.655). The first dimension defines a partitioning into a *Theme* and *Rheme*. This distinction is similar to the one proposed by Mathesius and to the Praguian topic-focus articulation. Steedman's Theme/Rheme indicates how, informally put, the utterance relates to the preceding discourse context.

Steedman also defines a second dimension of IS, the background/focus-partitioning of Themes and Rhemes. This partitioning is related to Halliday's *Given-New* dichotomy (Halliday, 1970; Halliday, 1985). It concerns the distinction between elements in the sentence's meaning which contribute to distinguishing the Theme and the Rheme from other *alternatives* that the context makes available, in the sense of Rooth's alternative sets (Steedman, 2000a)(p.656). The focus of a Rheme is that 'information' that is marked in the surface form, whereas the background of the Rheme is its unmarked part. In English, this corresponds to the focus being marked by a pitch accent, whereas the background is unmarked by either a pitch or a boundary. In a similar move Steedman divides the Theme into a focus and a background, with that difference to the Rheme that the Theme's focus is *optional*. There can, but need not, be a marked element in the Theme's surface realization.

The examples below illustrate Steedman's characterization of IS in more detail. Steedman formalizes the Theme of a sentence as a λ -term involving a functional abstraction, similarly to (Jackendoff, 1990; Krifka, 1993; Peregrin, 1995). The Rheme is a term that can be applied to that abstraction, after which we obtain a proposition. As CCG is a categorial grammar combining a λ -calculus to represent linguistic meaning, this proposition has the same predicate-argument structure as the composition of the canonical sentence would have resulted in. For example, consider the example in (26a) and the representation of its Theme in (26b).

- (26) **English**
- a. (What did Kathy prove?)
(Kathy proved)_{theme}(P=NP)_{rheme}.

b. $\lambda x.\text{prove}'x\text{Kathy}'$

Because the functional abstraction is closely related to the existential operator $\exists$, the context of (26a) could instantiate the existential as in (27).

$$(27) \quad \left\{ \begin{array}{l} \text{prove}' \text{undecidability}' \text{Kathy}', \\ \text{prove}' \text{canonicity}' \text{Kathy}', \\ \text{prove}' \text{infatimability}' \text{Kathy}', \\ \text{prove}' P=NP' \text{Kathy}' \end{array} \right\}$$

The set in (27) is an alternative set, i.e. a set of potential alternative instantiations. Steedman calls it the *rheme alternative set*, and it holds that the Theme *presupposes* the rheme alternative set whereas the Rheme *restricts* it.⁸ The distinction of a focus and a background in the Rheme, and possibly in the Theme, helps to set it apart from other alternatives available in the context. In particular, we have that the focus within the Rheme restricts the Rheme alternative set presupposed by the Theme.

Furthermore, we can consider the situation in which a Theme indeed does have a focus, realized by a marked form. Steedman gives in (Steedman, 2000a)(p.659) the following example, (28).

$$(28) \quad \text{English} \\ \text{(I know that Marcel likes the man who wrote the musical.} \\ \text{But who does he ADMIRE?)}$$

$$\underbrace{(\underbrace{\text{Marcel}}_{\text{background}} \underbrace{\text{ADMIREs}}_{\text{focus}})}_{\text{Theme}} (\underbrace{\text{the woman who}}_{\text{background}} \underbrace{\text{DIRECTED}}_{\text{focus}} \underbrace{\text{the musical}}_{\text{background}})_{\text{Rheme}}$$

Steedman argues that the significance of having a pitch accent on “admire” seems to be in the context offering alternatives that only differ in the relation between Marcel and x . A marked Theme is represented as in (29).

$$(29) \quad \exists x.*\text{admires}' x \text{marcel}'$$

The utterance of (28) would be infelicitous if the context would *not* contain an alternative, like the $\exists x.\text{likes}' x \text{marcel}'$ we have here. The set of alternative Themes provided by the context of (28) is given in (30).

$$(30) \quad \left\{ \begin{array}{l} \exists x.\text{admires}' x \text{marcel}', \\ \exists x.\text{likes}' x \text{marcel}' \end{array} \right\}$$

The kind of alternative set given in (30) is what Steedman calls the *Theme alternative set*. The Theme presupposes also this set, and it is the Theme’s focus that restricts it.

In summary, elaborating on the alternative semantics of focus in (Rooth, 1992) and contrastive themes in (Büring, 1999), Steedman assigns the following semantics to IS (cf. (Steedman, 2000a)):

⁸As Steedman notes himself, for examples in (Steedman, 2000a)(p.10), alternative sets are used for reasons of exposition rather than presenting the only possible means of formalization. For example, it is not difficult to see how alternative sets in a sense ‘extensionalize’ accessibility in a modal logic’s frame.

- Theme presupposes a *Rheme-alternative set* (ρ -AS).
- Focus within Rheme restricts the ρ -AS to the singleton set corresponding to the asserted proposition.
- Theme also presupposes a *Theme-alternative set* (θ -AS).
- Focus within Theme restricts the θ -AS to the singleton set corresponding to Theme.

ρ -AS corresponds to what Rooth calls the *contextual alternative set* (Rooth, 1985b; Rooth, 1992). θ -AS is a set of alternative themes with respect to the context (cf. (Büring, 1995)), corresponding to what Rooth calls the *question alternative set*. ρ -AS is a subset of the propositions supported by the context, whose characteristic function is obtained systematically from the IS-partitioned logical form. As noted in (Steedman, 2000a, p.10), alternative sets may not be exhaustively known to hearers, and in practice one would want to compute with a more abstract form.

Although Steedman does not discuss recursivity of focus and background, they appear to be recursive in the same sense as FGD’s contextually bound/contextually nonbound distinction.

In (Steedman, 1996; Steedman, 2000b) and in (Steedman, 2000a) Steedman elaborates a grammar that shows how the above kinds of IS-enriched representations of a sentence’s linguistic meaning are related to English tune. Hoffman worked out in (Hoffman, 1995b; Hoffman, 1995a) a version of CCG that models Turkish free word order. Hoffman coupled that to a slightly different theory of IS that stands inbetween Steedman’s account and Vallduv’s information packaging. (Kruijff and Baldridge, 2004) present a CCG account of how word order, intonation, and their interaction can help realize information structure, combining the insights from Hoffman and Steedman.

There appear to be various correspondences between Steedman’s approach and FGD regarding IS. Both place it at the level of linguistic meaning. They both employ primitive notions that are recursive (CB/NB, focus/background). Also, they allow for a moderate form of recursivity where it concerns Theme/Rheme or topic/focus: information structure(s) can be embedded when it concerns embedded clauses (Hajičová et al., 1998)(p.160), (Steedman, 2000b)(§5.7.2).⁹ Finally, it seems plausible to consider the contrastive topic marker c (Hajičová et al., 1998) as the counterpart of Steedman’s Theme-focus, and the focusproper as the counterpart of Steedman’s Rheme-focus.

However, Steedman’s approach and FGD differ substantially in their view on the grammar, and in the way they describe IS and its realization. An approach to modeling IS that combines FGD’s view on IS and its realization as an interaction between different means, and the categorial approach to formalizing the relation between surface form and underlying linguistic meaning has been presented in DGL(Kruijff, 2001). This can be argued to combine the best of the two worlds.

2.7 IS and Common Ground

It is clear from the overview in the preceding sections that some notion of “givenness” is involved in most approaches to IS. In the Praguian approach, the dichotomy of *context-*

⁹For an earlier discussion of recursivity of TFA in FGD, see (Sgall et al., 1986)(§3.11).

tual boundness/non-boundness is used as basic (Sgall et al., 1986), and it is seen a linguistic signal of an item being considered activated in the common ground assumed by the speaker to be shared with the hearer; in (Firbas, 1992) *retrievability* is among the factors involved in IS, in Halliday’s approach, the *Given/New* distinction constitutes a separate dimension (Halliday, 1967; Halliday, 1970; Halliday, 1985). The *Background/Focus* distinction in (Steedman, 2000a; Steedman, 2000b), where Focus marks those parts of a Theme/Rheme that distinguish it from alternatives that a context makes available, is also described by Steedman as being close to Halliday’s Given/New. And finally, givenness is commonly appealed to when explaining *deaccenting*, e.g., (Hirschberg and Pierrehumbert, 1986; Hirschberg, 1993).

However, different authors agree that givenness is not as simple as “previous mention”. So, we can ask how to define givenness, and how is it related to linguistic form. These questions have been addressed extensively in the literature, and different authors have proposed various taxonomies of (their notion) “givenness”, also in relation to reflexes is linguistic form. (Prince, 1981) critically reviews several earlier approaches and proposes her taxonomy of *familiarity status*, where the main categories are *new*, *inferable*, *given* (from the hearer’s point of view). Two dimensions of *speaker given/new* vs. *hearer given/new* are discussed in (Prince, 1992). Various authors look in more detail at the discourse-given status, and propose more finegrained distinctions according to different degrees of *activation* that entities may be assumed to have in the hearer’s consciousness (or: in a discourse model), e.g., (Chafe, 1976) (see also (Lambrecht, 1994)[Chapter 3]), (Gundel et al., 1993). Another approach to distinguishing different degrees of activation and linking them to the ways reference is realized linguistically is the Centering Theory (Grosz et al., 1995), which has been also applied computationally in both generation and analysis. What is of interest in the comparison to other approaches to givenness are the *forward-looking centers* and their *ordering*. Various proposals for center ordering have been made for various languages, using e.g., grammatical roles (Grosz et al., 1995), theta-roles (Hoffman, 1998), word order (Rambow, 1993), and Prince’s familiarity status (Strube and Hahn, 1999). See (Grosz et al., 1995) and (Walker et al., 1998) for more details and references. Unlike the works above which use a taxonomy with a small number of givenness categories, Hajičová et al. et al.’s work on tracking salience assumes a continuous scale of activation (Hajičová and Vrbová, 1981; Hajičová and Vrbová, 1982), (Hajičová et al., 1990; Hajičová et al., 1992), (Hajičová et al., 1995a) and with reference to the Prague Dependency Treebank, (Hajičová and Sgall, 2001). Moreover, this is the only approach that takes IS into account, rather than only some of its (more or less direct) surface reflexes. A comparison of Hajičová et al.’s model of tracking salience and the Centering model can be found in (Kruijff-Korbayová and Hajičová, 1997).

References

- Theodora Alexopoulou. 1999. *The Syntax of Discourse Functions in Greek: A Non-Configurational Approach*. Ph.D. thesis, Department of Linguistics, University of Edinburgh, Edinburgh, United Kingdom, March.
- Dwight Bolinger. 1965. *Forms of English*. Harvard University Press, Cambridge, MA.
- Dwight Bolinger. 1989. *Intonation and its Uses*. Stanford University Press.
- Johan Bos. 1999. The treatment of focussing particles in Underspecified Discourse Representations. In Bosch and van der Sandt (Bosch and van der Sandt, 1999), pages 121–141.
- Peter Bosch and Rob van der Sandt, editors. 1999. *Focus: Linguistic, Cognitive and Computational Principles*. Natural Language Processing. Cambridge University Press, Cambridge.
- Gillian Brown. 1983. Prosodic structure and the given/new distinction. In Anne Cutler, D. Robert Ladd, and Gillian Brown, editors, *Prosody: Models and Measurements*, pages 67–77. Springer-Verlag, Berlin.
- Eva Buráňová, Eva Hajičová, and Petr Sgall. 2000. Tagging of very large corpora: Topic-focus articulation. In *Proceedings of COLING’2000*, pages 139–144.
- Daniel Büring. 1995. *The 59th Street Bridge Accent: On the Meaning of Topic and Focus*. Ph.D. thesis, Universität Tübingen. Publ. as (Büring, 1997).
- Daniel Büring. 1997. *The Meaning of Topic and Focus: The 59th Street Bridge Accent*. Routledge, London.
- Daniel Büring. 1999. Topic. In Bosch and van der Sandt (Bosch and van der Sandt, 1999), pages 142–165.
- Justine Cassel, Obed. E. Torres, and Scott Prevost. 1999. Turn taking vs. discourse structure: How best to model multimodal conversation. In Y. Wilks, editor, *Machine Conversations*. Kluwer.
- Wallace Chafe. 1976. Givenness, contrastiveness, definiteness, subjects, topics and points of view. In Charles Li, editor, *Subject and Topic*, pages 25–55. Academic Press, New York.
- Noam Chomsky. 1965. *Aspects of the Theory of Syntax*. MIT Press, Cambridge, MA.
- Noam Chomsky. 1971. Deep structure, surface structure, and semantic interpretation. In Danny Steinberg and Leon Jakobovits, editors, *Semantics*, pages 183–216. Cambridge University Press, Cambridge.
- Herbert Clark and Susan Haviland. 1977. Comprehension and the given-new contract. In R. Freedle, editor, *Discourse Production and Comprehension*, pages 1–40. Ablex, Norwood, NJ.
- M.J. Cresswell. 1973. *Logics and Languages*. Methuen, London.
- M.J. Cresswell. 1985. *Structured Meanings*. MIT Press, Cambridge, MA.
- William Croft. 1990. *Typology and Universals*. Cambridge Textbooks in Linguistics. Cambridge University Press, Cambridge, United Kingdom.
- Östen Dahl. 1969. *Topic and Focus: a Study in Russian and General Transformational Grammar*. Elanders Bottryckeri, Göteborg.
- Östen Dahl. 1974. Topic-comment structure revisited. In Östen Dahl, editor, *Topic and Comment, Contextual Boundedness and Focus*, number 6 in Papers in Text Linguistics. Helmut Buske, Hamburg, Germany.
- František Daneš. 1970. Zur linguistischen [a]nalyse der [t]extstruktur. *Folia Linguistica*, 4:72–78.

František Daneš. 1974. Functional sentence perspective and the organization of the text. In František Daneš, editor, *Papers on functional sentence perspective*, pages 106–208. Academia, Prague, Czech Republic.

Paul Dekker and Herman Hendriks. 1994. Files in focus. In Elisabet Engdahl, editor, *Integrating Information Structure into Constraint-based and Categorical Approaches*, DYANA-2 Deliverable R1.3.B., pages 41–79. Institute for Logic, Language and Computation (ILLC), Amsterdam, The Netherlands.

F. Dretske. 1972. Contrastive statements. *Philosophical Review*, pages 411–437.

Elisabeth Engdahl and Enric Vallduví. 1994. Information packaging and grammar architecture: A constraint-based approach. In Elisabet Engdahl, editor, *Integrating Information Structure into Constraint-based and Categorical Approaches*, DYANA-2 Deliverable R1.3.B., pages 41–79. Institute for Logic, Language and Computation (ILLC), Amsterdam, The Netherlands.

Elisabet Engdahl. 1999. The choice between *bli*-passive and *s*-passive in Danish, Norwegian, and Swedish. NORDSEM project report, Department of Linguistics, Göteborg University, June. Available from <http://www.ling.gu.se/research/projects/nordsem/reports.html>.

Carolín Féry. 1993. *German Intonational Patterns*. Niemeyer, Tübingen.

Jan Firbas. 1964. On defining the theme in functional sentence analysis. *Travaux Linguistiques de Prague*, 1:267–280.

Jan Firbas. 1966. Non-thematic subjects in contemporary english. *Travaux Linguistiques de Prague*, 2:229–236.

Jan Firbas. 1992. *Functional Sentence Perspective in Written and Spoken Communication*. Cambridge University Press, Cambridge, United Kingdom.

Peter H. Fries. 1981. On the status of theme in English: Arguments from discourse. *Forum Linguisticum*, 6(1):1 – 38.

Joseph Grimes. 1975. *The Thread of Discourse*. Mouton.

Barbara Grosz and Candace Sidner. 1986. Attention, intention and the structure of discourse. *Computational Linguistics*, 12:175–204.

Barbara Grosz, Aravind Joshi, and Scott Weinstein. 1995. Centering: a framework for modeling the local coherence of discourse. *Computational linguistics*, 21(2):203–226.

Jeanette Gundel, Nancy Hedberg, and Ron Zacharski. 1993. Cognitive status and the form of referring expressions in discourse. *Language*, (69):274–307.

Janet Gundel. 1974. *The Role of Topic and Comment in Linguistic Theory*. Ph.D. thesis, University of Texas, Austin.

Eva Hajičová and Petr Sgall. 1980. A dependency based specification of topic and focus. *Statistical methods in linguistics*, 1(2):93–140.

Eva Hajičová and Petr Sgall. 1987. The ordering principle. *Journal of Pragmatics*, 11(4):435–454.

Eva Hajičová and Petr Sgall. 2001. Topic-focus and salience. In *Proceedings of the 39th Annual Meeting of the Association for Computational Linguistics*.

Eva Hajičová and Jarka Vrbová. 1981. On the salience of the elements of the stock of shared knowledge. *Folia linguistica*, (15):291–303.

Eva Hajičová and Jarka Vrbová. 1982. On the role of the hierarchy of activation in the process of natural language understanding. In Ján Horecký, editor, *Proceedings of COLING 1982*, pages 107–113, Prague, Czechoslovakia. Academia.

Eva Hajičová, Petr Kuboň, and Vladislav Kuboň. 1990. Hierarchy of salience and discourse analysis and production. pages 144–148.

Eva Hajičová, Vladislav Kuboň, and Petr Kuboň. 1992. Stock of shared knowledge - a tool for solving pronominal anaphora. pages 127–133.

Eva Hajičová, Petr Sgall, and Hana Skoumalová. 1993. Identifying topic and focus by an automatic procedure. In *Proceedings of the conference of the European Association of Computational Linguistics, April 1993, Utrecht, the Netherlands*. ACL.

Eva Hajičová, Tomáš Hoskovec, and Petr Sgall. 1995a. Discourse modelling based on hierarchy of salience. *Prague Bulletin of Mathematical Linguistics*, 64:5–24. Charles University, Prague, Czech Republic.

Eva Hajičová, Petr Sgall, and Hana Skoumalová. 1995b. An automatic procedure for topic-focus identification (a revised version of (Hajičová et al., 1993)). *Computational linguistics*, 21(1):81–94.

Eva Hajičová, Barbara H. Partee, and Petr Sgall. 1998. *Topic-Focus Articulation, Tripartite Structures, and Semantic Context*. Studies in Language and Philosophy. Kluwer Academic Publishers, Dordrecht, Boston, London.

Eva Hajičová, Jiří Havelka, and Petr Sgall. “to appear”. Topic and focus, anaphoric relations and degrees of salience. In *Prague Linguistic Circle Papers 5*. John Benjamins.

Eva Hajičová. 1993. *Issues of sentence structure and discourse patterns*, volume 2 of *Theoretical and computational linguistics*. Charles University, Prague, Czech Republic.

Eva Hajičová. 2003. Aspects of discourse structure. In Wolfgang Menzel and Cristina Vertan, editors, *Natural Language Processing between Linguistic Inquiry and System Engineering*, pages 47 – 54. Editura Universitatii Alexandru Ioan Cuza, Iasi.

Eva Hajičová, Petr Sgall, and Eva Buráňová. 2003. Topic-focus articulation and degrees of salience in the prague dependency treebank. In *Formal Approaches to Function in Grammar. In honor of Eloise Jelinek, Arizona*, pages 165–177. John Benjamins.

Eva Hajičová. 1993. *Issues of sentence structure and discourse patterns*, volume 2 of *Theoretical and Computational Linguistics*. Charles University Press, Prague, Czech Republic.

Michael Halliday and Ruqaiya Hasan. 1976. *Cohesion in English*. Longman.

Michael A. K. Halliday. 1967. Notes on transitivity and theme in English — parts 1 and 2. *Journal of Linguistics*, 3(1 and 2):37–81 and 199–244.

Michael A.K. Halliday. 1970. *A Course in Spoken English: Intonation*. Oxford University Press, Oxford.

Michael A.K. Halliday. 1985. *Introduction to Functional Grammar*. Edward Arnold, London, U.K.

M.A.K. Halliday. 1993. The construction of knowledge and value in the grammar of scientific discourse: Charles Darwin’s *The Origin of the Species*. In M.A.K. Halliday and J.R. Martin, editors, *Writing Science: literacy and discursive power*, pages 86–105. The Falmer Press, London.

C. Hamblin. 1973. Questions in Montague english. *Foundations of Language*, pages 41–53.

Irene Heim. 1982a. *The semantics of definites and indefinite noun phrases in English*. Ph.D. thesis, University of Massachusetts, Amherst.

Irene Roswitha Heim. 1982b. *The Semantics of Definite and Indefinite Noun Phrases*. Ph.D. thesis, Graduate School of the University of Massachusetts, Amherst, Massachusetts.

Herman Hendriks and Paul Dekker. 1995. Links without locations. information packaging and non-monotone anaphora. In Paul Dekker and Martin Stokhof, editors, *Proceedings of the*

10th Amsterdam Colloquium, pages 339–358. Institute of logic, language and computation, Department of Philosophy, Universiteit van Amsterdam.

Herman Hendriks. 1994. Information packaging in a categorial perspective. In Elisabet Engdahl, editor, *Integrating Information Structure into Constraint-based and Categorial Approaches*, DYANA-2 Deliverable R1.3.B., pages 41–79. Institute for Logic, Language and Computation (ILLC), Amsterdam, The Netherlands.

Herman Hendriks. 1996. Intonation, derivation, information. A proof-theoretic framework for the representation of information packaging. In V.M. Abruci and C. Casadio, editors, *Proofs and Linguistic Categories: Applications of Logic to the Analysis and Implementation of Natural Language (Roma 1996 Workshop)*.

Herman Hendriks. 1997. The logic of tune. In Geert-Jan M. Kruijff, Glyn V. Morrill, and Richard T. Oehrle, editors, *Formal Grammar 1997*, Aix en Provence, France, August 9-10.

H. Hendriks. 1998. Links without locations. In F. Hamm and E. Zimmermann, editors, *Linguistische Berichte, Sonderheft 9/1998: SEMANTIK*. Westdeutscher Verlag, Opladen.

Caroline Heycock. 1993. Focus projection in Japanese. In Mercei González, editor, *Proceedings of NELS*, volume 24, pages 159–187.

Julia Hirschberg and Janet Pierrehumbert. 1986. Intonational structuring of discourse. In *Proceedings of the 24th Annual Meeting of the Association for Computational Linguistics, New York*, pages 136–144, San Francisco, CA. Morgan Kaufmann.

Julia Hirschberg. 1993. Pitch accent in context: Predicting intonational prominence from text. *Artificial Intelligence*, (63):305–340.

Beryl Hoffman. 1995a. *Computational Analysis of the Syntax and Interpretation of “Free” Word-Order in Turkish*. Ph.d. thesis, ices report 95-17, University of Pennsylvania.

Beryl Hoffman. 1995b. Integrating “free” word order syntax and information structure. In *Proceedings EACL’95*, Dublin, March.

Beryl Hoffman. 1996. Translating into free word order languages. In *Proceedings of the International Conference on Computational Linguistics (COLING-96)*, Copenhagen, pages 556–561, Copenhagen, Denmark. Center for Sprogteknologi.

Beryl Hoffman. 1998. Word order, information structure, and centering in turkish. In Marilyn Walker, Ellen Prince, and Aravind Joshi, editors, *Centering Theory in Discourse*, pages 253–271. Oxford University Press, Oxford.

R.D. Huddleston. 1988. Constituency, multi-functionality and grammaticalization in Halliday’s Functional Grammar. *Journal of Linguistics*, 24.

Ray Jackendoff. 1972a. *Semantic Interpretation in Generative Grammar*. MIT Press, Cambridge, MA.

Ray Jackendoff. 1972b. *Semantic Interpretation in Generative Grammar*. The MIT Press, Cambridge Massachusetts.

Ray Jackendoff. 1990. *Semantic Structures*. MIT Press, Cambridge.

Hans Kamp. 1984. A theory of truth and semantic representation. In Jeroen Groenendijk, Theo Janssen, and Martin Stokhof, editors, *Truth, Interpretation, and Information*, pages 1–41. Foris, Dordrecht.

Lauri Karttunen and Stanley Peters. 1979a. Conventional implicature. In Choon-Kyu Oh and David Dinneen, editors, *Syntax and Semantics 11: Presupposition*, pages 1–56. Academic Press, New York.

Lauri Karttunen and Stanley Peters. 1979b. Conventional implicature. In Choon-Kyu Oh

and David A. Dinneen, editors, *Syntax and Semantics: Presupposition*, volume 11, pages 1–56. Academic Press.

Lauri Karttunen. 1968. What makes definite noun phrases definite? Technical report, Rand Corporation.

Martin Kay. 1975. Syntactic processing and functional sentence perspective. In Roger Schank and Bonnie Nash-Webber, editors, *Theoretical Issues in Natural Language Processing, (Supplement)*, pages 12–15, MIT, June.

Eva Koktová. 1995. Wh-extraction and the topic-focus articulation of the sentence. In Barbara H. Partee and Petr Sgall, editors, *Discourse and Meaning: Papers in Honor of Eva Hajičová*, pages 255–271. John Benjamins, Amsterdam, The Netherlands.

Dimitra Kolliakou. 1998. Linkhood and multiple definite marking. In Gosse Bouma, Geert-Jan M. Kruijff, and Richard T. Oehrle, editors, *Proceedings Joint Conf. on Formal Grammar, HPSG and CG*, pages 14–24, Saarbrücken, Germany, August. DFKI.

Nobo Komagata. 1999. *Information Structure in Texts: A Computational Analysis of Contextual Appropriateness in English and Japanese*. Ph.D. thesis, University of Pennsylvania.

Ivana Korbayová and Geert-Jan Kruijff. 1996. Identification of topic-focus chains. In S. Botley, Glass J., T. McEnery, and A. Wilson, editors, *Approaches to Discourse Anaphora: Proceedings of the Discourse Anaphora and Anaphora Resolution Colloquium (DAARC96)*, number 8 in Technical papers, pages 165–179, Lancaster, U.K., jul. University Centre for Computer Corpus Research on Language, University of Lancaster.

Angelika Kratzer. 1991. The representation of focus. In Arnim von Stechow and Dieter Wunderlich, editors, *Semantics: An International Handbook of Contemporary Research*, pages 825–834. de Gruyter, Berlin.

Manfred Krifka. 1991. A compositional semantics for multiple focus constructions. *Cornell Working Papers in Linguistics*, 10:127–158.

Manfred Krifka. 1992. A compositional semantics for multiple focus constructions. In J. Jacobs, editor, *Informationsstruktur und Grammatik*, Linguistische Berichte, Sonderheft 4, pages 17–53.

Manfred Krifka. 1993. Focus and presupposition in dynamic semantics. *Theoretical Linguistics*, 19:269–300.

Paul Kroeger. 1993. *Phrase Structure and Grammatical Relations in Tagalog*. Dissertations in Linguistics. CSLI Press, Stanford, CA.

Geert-Jan M. Kruijff and Jason M. Baldridge. 2004. Generalizing dimensionality in combinatory categorial grammar. In *Proceedings of COLING’2004*.

Geert-Jan Kruijff and Ivana Kruijff-Korbayová. 2001. A hybrid logis formalization of information structure sensitive discourse interpretation. In Václav Matoušek, Pavel Mautner, Roman Mouček, and Karel Taušer, editors, *Proceedings of the Conference on Text, Speech and Dialogue (TSD’01)*, Železná Ruda, Czech Republic, September 11-13 2001, Lecture Notes in Computer Science, pages 31–38. Springer-Verlag. <http://www.coli.uni-sb.de/~korbay/Publications/tsd01.ps.gz>.

Ivana Kruijff-Korbayová and Eva Hajičová. 1997. Topics and centers: a comparison of the salience-based approach and the centering theory. *Prague Bulletin of Mathematical Linguistics*, (67):25–50. url.

Ivana Kruijff-Korbayová and Geert-Jan Kruijff. 1997. TFA in SDRT. In Paul Dekker, Martin Stokhof, and Yde Venema, editors, *Proceedings of the 11th Amsterdam Colloquium*,

- pages 43–48. Institute of logic, language and computation, Department of Philosophy, Universiteit van Amsterdam.
- Ivana Kruijff-Korbayová and Mark Steedman. 2003. Discourse and information structure. *Journal of Logic, Language and Information: Special Issue on Discourse and Information Structure*, 12(3):249–259.
- Ivana Kruijff-Korbayová and Bonnie Webber. 2001. Concession, implicature, and alternative sets. In Harry Bunt, editor, *Proceedings of the International Workshop on Computational Semantics IWCS-4*, pages 227–248, Tilburg, the Netherlands, January 10–12. <http://www.coli.uni-sb.de/~korbay/Publications/iwcs-2001.ps.gz>.
- Ivana Kruijff-Korbayová, John Bateman, and Geert-Jan M. Kruijff. 2002. Generation of contextually appropriate word order. In Kees van Deemter and Rodger Kibble, editors, *Information Sharing*, Lecture Notes, pages 193–222. CSLI. <http://www.coli.uni-sb.de/publikationen/softcopies/Kruijff-Korbayova:1999:GCA.pdf> <http://www.coli.uni-sb.de/publikationen/softcopies/Kruijff-Korbayova:1999:GCA.ps>.
- Ivana Kruijff-Korbayová, Stina Ericsson, Kepa Joseba Rodríguez, and Elena Karagjosova. 2003a. Producing contextually appropriate intonation is an information-state based dialogue system. In *Proceedings of the 10th Conference of the European Chapter of the Association for Computational Linguistics (EACL)*, pages 227–234. ACL.
- Ivana Kruijff-Korbayová, Stina Ericsson, Kepa Joseba Rodríguez, and Elena Karagjosova. 2003b. Producing contextually appropriate intonation is an information-state based dialogue system. In *Proceedings of the 10th Conference of the European Chapter of the Association for Computational Linguistics (EACL)*, page to appear, Budapest, Hungary, April 12–17. ACL.
- Ivana Kruijff-Korbayová. 1998. *The Dynamic Potential of Topic and Focus: A Praguian Discourse Representation Theory*. unpublished Ph.D. thesis, Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic.
- Geert-Jan M. Kruijff. 2001. *A Categorical-Modal Logical Architecture of Informativity: Dependency Grammar Logic and Information Structure*. Ph.d. dissertation, Institute of Formal and Applied Linguistics (ÚFAL), Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic.
- Petr Kuboň. 1998. Information repackaging. In Gosse Bouma, Geert-Jan M. Kruijff, and Richard T. Oehrle, editors, *Proceedings of the Joint Conference on Formal Grammar, Head-Driven Phrase Structure Grammar, and Categorical Grammar*, Saarbrücken, August.
- D. Robert Ladd. 1996. *Intonational Phonology*. Cambridge University Press, Cambridge.
- D. Robert Ladd. 2001. Intonational universals and intonational typology. In Martin Hapsel-math, Ekkehard König, Wulf Oesterreicher, and Wolfgang Raible, editors, *Handbook on Language Typology and Language Universals*. De Gruyter, Berlin.
- Robin Lakoff. 1971. The role of deduction in grammar. In Charles J. Fillmore and D. Terence Langedoen, editors, *Studies in Linguistic Semantics*, pages 62–70. Holt, Rinehart and Winston, Inc.
- Knud Lambrecht. 1994. *Information Structure and Sentence Form*. Cambridge University Press, Cambridge, U.K.
- John Lyons. 1977. *Semantics*, volume II. Cambridge University Press.
- Suresh Manandhar. 1994. Encoding information packaging information in HPSG. In Elisabet Engdahl, editor, *Integrating Information Structure into Constraint-based and Categorical Approaches*, DYANA-2 Deliverable R1.3.B., pages 83–87. Institute for Logic, Language and Computation (ILLC), Amsterdam, The Netherlands.
- William Mann and Sandra Thompson. 1987. Rhetorical structure theory: A framework for the analysis of texts. Technical Report RS-87-185, Information Science Institute, Marina del Rey, CA.
- Pavel Materna and Petr Sgall. 1980. Functional sentence perspective, the question test, and intensional semantics. *SMIL-Journal of Linguistic Calculus*, (1-2):141–160.
- Pavel Materna, Eva Hajičová, and Petr Sgall. 1987. Redundant answers and topic-focus articulation. *Linguistics and Philosophy*, 10:101–113.
- Vilem Mathesius. 1929. Functional linguistics. In Josef Vachek, editor, *Praguiana: Some Basic and Less Well-known Aspects of the Prague Linguistics School*, pages 121–142. John Benjamins, Amsterdam. publ. 1983.
- Vilém Mathesius. 1936. On some problems of the systematic analysis of grammar. In *Travaux du Cercle Linguistique de Prague*, volume VI, pages 95–107. Reprinted in (Vachek, 1964), pp.306–319.
- Vilém Mathesius. 1975. On information bearing structure of the sentence. In S. Kuno, editor, *Harvard Studies in Syntax and Semantics*. Harvard University Press, Cambridge, Massachusetts.
- Christian M.I.M. Matthiessen. 1995. Theme as an enabling resource in ideational ‘knowledge’ construction. In M. Ghadessy, editor, *Thematic development in English texts*, pages 20–54. Pinter Publishers, London.
- Alex Monaghan. 1994. Intonation accent placement in a concept-to-dialogue system. In *Proceedings of the Second ESCA/IEEE Workshop on Speech Synthesis*, pages 171–174, New Paltz, NY, September.
- Richard Montague. 1973. The proper treatment of quantification in ordinary english. In Jaakko Hintikka, J. M. E. Moravcsik, and Patrick Suppes, editors, *Approaches to Natural Language: Proceedings of the 1970 Stanford Workshop on Grammar and Semantics*, pages 221–242. Reidel, Dordrecht. Reprinted in Montague 1974, 247–279.
- Michael Moortgat and Glyn Morrill. 1991. Heads and phrases: Type calculus for dependency and constituent structure. Unpublished manuscript. Available from <http://www-lsi.upc.es/~morrill/>.
- Reinhard Muskens, Johan van Benthem, and Albert Visser. 1996. Dynamics. In Johan van Benthem and Alice ter Meulen, editors, *Handbook of Logic and Language*. Elsevier Science B.V., Amsterdam New York etc.
- Christine H. Nakatani, Julia Hirschberg, and Barbara Grosz. 1995. Discourse structure in spoken language: Studies on speech corpora. In *Working notes of AAAI-95 Spring Symposium on Empirical Methods in Discourse Interpretation*, Palo Alto, CA.
- Barbara H. Partee and Petr Sgall, editors. 1995. *Discourse and Meaning*. John Benjamins Publishing Company.
- Barbara H. Partee, Eva Hajičová, and Petr Sgall. 1998. *Topic-Focus Articulation, Tripartite Structures, and Semantic Content*. Kluwer, Amsterdam.
- Barbara H. Partee. 1991. Topic, focus and quantification. In S. Moore and A. Wyner, editors, *Proceedings from Semantics and Linguistic Theory I*, pages 257–280, Ithaca NY. Cornell University.
- Barbara Partee. 1995. Allegation and local accommodation. In Partee and Sgall (Partee and Sgall, 1995), pages 65–86.

Catherine Pelachaud, Justine Cassel, Norman Badler, Mark Steedman, Scott Prevost, and Mathew Stone. 1998. Synthesizing cooperative conversation. In Harry Bunt and R. J. Beun, editors, *Multimodal Human-Computer Communication - Systems, Techniques and Experiments*, Springer Notes in Artificial Intelligence 1374, pages 68–88. Springer Verlag.

Jaroslav Peregrin. 1995. Topic and focus in a formal framework. In Partee and Sgall (Partee and Sgall, 1995), pages 235–254.

Vladimír Petkevič. 1987. A new dependency based specification of underlying representations of sentences. *Theoretical linguistics*, 14:143–172. Walter de Gruyter, Berlin, Germany.

Vladimír Petkevič. 1995. A new formal specification of underlying structures. *Theoretical linguistics*, 21(1):7–61. Walter de Gruyter, Berlin, Germany.

Vladimír Petkevič. in prep. *Underlying Structure of Sentence Based on Dependency*. Charles University, Prague.

Janet Pierrehumbert and Julia Hirschberg. 1990. The meaning of intonational contours in the interpretation of discourse. In Philip Cohen, Jerry Morgan, and Martha Pollack, editors, *Intentions in Communication*, pages 271–312. MIT Press, Cambridge, MA.

Janet Pierrehumbert. 1980. *The Phonology and Phonetics of English Intonation*. Ph.D. thesis, MIT. Distributed by Indiana University Linguistics Club, Bloomington.

Livia Polanyi and Remko Scha. 1983. The syntax of discourse. *Text*, 3:261–270.

Scott Prevost and Mark Steedman. 1993. Generating contextually appropriate intonation. In *Proceedings of the Sixth Conference of the European Chapter of the Association for Computational Linguistics, Utrecht*, pages 332–340, San Francisco, CA. Morgan Kaufmann.

Scott Prevost and Mark Steedman. 1994. Specifying intonation from context for speech synthesis. *Speech Communication*, 15:139–153.

Scott Prevost. 1995a. *A Semantics of Contrast and Information Structure for Specifying Intonation in Spoken Language Generation*. Ph.D. thesis, University of Pennsylvania.

Scott Prevost. 1995b. *A Semantics of Contrast and Information Structure for Specifying Intonation in Spoken Language Generation*. Ph.D. dissertation, IRCS TR 96-01, University of Pennsylvania, Philadelphia.

Ellen Prince. 1981. Toward a taxonomy of given-new information. In Peter Cole, editor, *Radical Pragmatics*, pages 223–256. Academic Press.

Ellen Prince. 1992. The ZPG letter: subjects, definiteness, and information status. In Sandra Thompson and William Mann, editors, *Discourse Description: diverse analyses of a fund raising text*, pages 295–325. John Benjamins.

Owen Rambow. 1993. Pragmatic aspects of scrambling and topicalization in German: A centering approach.

Craige Roberts. 1998. Focus, information flow, and universal grammar. In Peter Culicover and Louise McNally, editors, *Syntax and Semantics, Vol. 29: The Limits of Syntax*, pages 109–160. Academic Press, San Diego, CA.

Mats Rooth. 1985a. *Association with Focus*. Ph.D. thesis, University of Massachusetts, Amherst.

Mats Rooth. 1985b. *A Theory of Focus Interpretation*. Ph.D. thesis, Graduate School of the University of Massachusetts, Amherst, Massachusetts.

Mats Rooth. 1992. A theory of focus interpretation. *Natural Language Semantics*, 1:75–116.

Bertrand Russell. 1905. On denoting. *Mind*, 14:479–493.

Harvey Sacks, Emanuel Schegloff, and Gail Jefferson. 1974. A simplest semantics for the organization of turn-taking for conversation. *Language*, 50:696–735.

Elisabeth Selkirk. 1984. *Phonology and Syntax*. MIT Press, Cambridge, MA.

Petr Sgall, Ladislav Nebeský, Alla Goralčíková, and Eva Hajičová. 1969. *A Functional Approach to Syntax In Generative Description of Language*. Elsevier Science B.V., Amsterdam New York etc.

Petr Sgall, Eva Hajičová, and Eva Benešová. 1973. *Topic, Focus, and Generative Semantics*. Kronberg/Taunus.

Petr Sgall, Eva Hajičová, and Eva Buráňová. 1980. *Aktuální členění věty v češtině [Topic/Focus Articulation of the Czech Sentence]*. Academia, Prague, Czechoslovakia.

Petr Sgall, Eva Hajičová, and Jarmila Panevová. 1986. *The meaning of the sentence in its semantic and pragmatic aspects*. Reidel, Dordrecht, The Netherlands.

Petr Sgall, Oskar E. Pfeiffer, Wolfgang U. Dressler, and M. Půček. 1995. Experimental research on systemic ordering. *Theoretical Linguistics*, 21:197–239.

Petr Sgall. 1967. Functional sentence perspective in a generative description. *Prague studies in mathematical linguistics*, 2:203–225. Prague, Czechoslovakia.

Petr Sgall. 1980. A dependency based specification of topic and focus II. *SMIL-Journal of Linguistic Calculus*, (1-2):110–140.

Mark Steedman. 1991. Structure and intonation. *Language*, 67:262–296.

Mark Steedman. 1996. *Surface Structure and Interpretation*. The MIT Press, Cambridge Massachusetts.

Mark Steedman. 2000a. Information structure and the syntax-phonology interface. *Linguistic Inquiry*, 31(4):649–689.

Mark Steedman. 2000b. *The Syntactic Process*. M.I.T. Press, Cambridge, MA.

Peter Strawson. 1950. On referring. *Mind*, 59:320–344.

Peter Strawson. 1954. A reply to mr. sellars. *Philosophical Review*, 63:216–231.

Michael Strube and Udo Hahn. 1999. Functional centering: Grounding referential coherence in information structure. *Computational Linguistics*. url.

David R. Traum and Staffan Larsson. 2003. The information state approach to dialog management. In *Current and New Directions in Discourse and Dialog*. Kluwer.

Carla Umbach. 2001. Contrast and contrastive topic. In Ivana Kruijff-Korabayová and Mark Steedman, editors, *Information Structure, Discourse Structure and Discourse Semantics, ESSLLI2001 Workshop Proceedings*, Helsinki, Finland, August 20-24. European Summer School in Logic, Language and Information (ESSLLI), The University of Helsinki. url.

Josef Vachek. 1964. *A Prague School Reader in Linguistics*. Indiana University Press, Bloomington, IN.

Enric Vallduví and Elisabet Engdahl. 1996. The linguistic realization of information packaging. *Linguistics*, 34:459–519.

Enric Vallduví and Maria Vilks. 1998. On rheme and kontrast. In Peter Culicover and Louise McNally, editors, *Syntax and Semantics, Vol. 29: The Limits of Syntax*, pages 79–108. Academic Press, San Diego, CA.

Enric Vallduví and Ron Zacharski. 1994. Accenting phenomena, association with focus, and the recursiveness of focus-ground. In Paul Dekker and Martin Stokhof, editors, *Proceedings of the Ninth Amsterdam Colloquium*, pages 683–702, Amsterdam, The Netherlands. Universiteit van Amsterdam.

Enric Vallduví. 1990. *The Information Component*. Ph.D. thesis, University of Pennsylvania.

Enric Vallduví. 1994. The dynamics of information packaging. In Elisabet Engdahl, editor, *Integrating Information Structure into Constraint-based and Categorial Approaches*,

- DYANA-2 Deliverable R1.3.B. Institute for Logic, Language and Computation (ILLC), Amsterdam, The Netherlands.
- Eija Ventola. 1995. Thematic development and translation. In M. Ghadessy, editor, *Thematic development in English texts*, pages 85–104. Pinter Publishers, London.
- Tomáš Vlk. 1988. Towards a transduction of underlying structures into intensional logic. *Prague Bulletin of Mathematical Linguistics*, (50):35–70.
- Arnim von Stechow. 1990. Categorical grammar and linguistic theory. *Studies in Language*, 14:433–478.
- Arnim von Stechow. 1991. Focusing and backgrounding operators. In Werner Abraham, editor, *Discourse Particles: Descriptive and Theoretical Investigations on the Logical, Syntactic and Pragmatic Properties of Discourse Particles in German*, pages 37–84. John Benjamins, Amsterdam.
- Marilyn Walker, Aravind K. Joshi, and Ellen F. Prince, editors. 1998. *Centering Theory in Discourse*. Oxford University Press.
- Bonnie Webber. 1988. Tense as discourse anaphor. *Computational Linguistics*, 14:61–73.
- Henri Weil. 1844. *The Order of Words in the Ancient Languages compared with that of the Modern Languages*. John Benjamins, Amsterdam, The Netherlands. Second edition 1884; French original 1844, English translation by Charles W. Super.
- Terry Winograd. 1972. *Understanding Natural Language*. Edinburgh University Press, Edinburgh.

FUNCTIONAL SENTENCE PERSPECTIVE AND THE ORGANIZATION OF THE TEXT

František Daneš (Prague)

The relevance of functional sentence perspective for the organization of discourse (or text) is beyond doubt. We do not claim that the whole linguistic theory or "grammar" of texts should be reduced to FSP (cf. SKALIČKA 1960), but Halliday's statement that "given the clause as domain, ... theme [= FSP] is the grammar of discourse" (HALLIDAY 1967) holds good, with certain modifications, beyond the domain of the clause as well.

I

In the works dealing with FSP three aspects of the phenomenon under discussion have been pointed out by various authors: (1) known (given) information — new information; (2) theme (T) — rheme (R); (3) different degrees of communicative dynamism (CD). As I have pointed out elsewhere (cf. DANEŠ 1964) the distinctions (1) and (2) go back to V. MATHESIUS. In his wellknown paper from 1939 he defines the "starting point of the utterance (východisko)" as "that which is known or at least obvious in the given situation and from which the speaker proceeds", whereas "the core of the utterance (jádro)" is "what the speaker states about, or in regard to, the starting point of the utterance". The same author defines (in 1942) "the foundation (or the theme) of the utterance (základ, téma)" as something "that is being spoken about in the sentence", and "the core (jádro)" as what the speaker says about this theme. — Distinction (3) has been introduced by J. FIRBAS. By CD he means "the extent to which the sentence element contributes to the de-

velopment of the communication" (1964, 270) and at the same time he states that T is constituted "by the sentence element(s) carrying the lowest degree(s) of CD within the sentence" (ibid., 272). T "need not necessarily convey known information or such as can be gathered from the verbal and situational context" (ibid.). This third aspect of FSP may be viewed as a refined analysis of aspect (2). (In fact, the different degrees of the thematic and rhematic character of sentence elements were mentioned even by Mathesius.) Instead of a strict bipartition of the "information-bearing structure" of the sentence (to use P. Garvin's rendition of Mathesius's Czech term "aktuální členění") we arrive at an uneven distribution of CD over the sentence, assigning various degrees of thematicity, or rhematicity to different sentence elements.

The two basic aspects of FSP, i.e., the contextual and the thematic ones, have been pointed out by other linguists as well, e.g. E. BENEŠ (1959, 1968), M. A. K. HALLIDAY (1967), P. SGALL (1969), F. DANEŠ (1964, 1970). Most distinctly and consequently this distinction has been pursued by Halliday: in the broad area of "Theme" he distinguishes two simultaneous structures of text: (1) "information focus" (given — new), and (2) "thematization" (T — R). The former determines the organization of text into discourse units, the latter frames each clause into the form of a message about one of its constituents.¹

It should be noted, however, that the said distinction is an incomplete dichotomy: the differentiation concerns the first members of the two pairs only (i.e., the known (given) piece of information vs. theme), while the second members are identical, viz. the core of the utterance or the rheme (what the speaker says about the

¹ HALLIDAY (1967) summarizes this distinction in the following way: "...while 'given' means 'what you were talking about' (or 'what I was talking about before'), 'theme' means 'what I am talking about' (or 'what I am talking about now')". He calls the theme also "the point of departure"; this term (Czech "východisko") was used by Mathesius in connection with "known information", however.

known information, or what he says about the theme).² After all, what makes the investigators differentiate between "known" and "theme" is the fact that there exist cases where T does not convey known information (cf. FIRBAS 1964) or where the ranges of both do not fully coincide. It is true that such cases remain in the minority (cf. Mathesius's statement (1939) that the "starting point" (defined as known information) very often represents the theme of the utterance) and are experienced as special or marked (cf. HALLIDAY, 1967, 17: "there is in the unmarked case ... and association of the theme with the given"). Nevertheless their existence undoubtedly calls for, and justifies, the said distinction.

This being so, we may assume that the connexion of FSP with the text structure proceeds along two lines. The first line, i.e., the opposition between known (given) and new information, clearly involves the textual and situational environment. Halliday (op. cit.) states that it is "closely bound up with the cohesive patterns such as those of substitution and reference" (17) and "does contribute in large measure to the organization of discourse" (16). (The close relationship of the phenomena of anaphora with FSP has been pointed out by B. PALEK, 1968.)³

From Halliday's statement that "thematization is independent

² The position of HALLIDAY (1967) is somewhat different, and not quite clear. He defines the rheme in English clauses very indistinctly and indirectly ("the theme is assigned initial position in the clause, and all that follows is the rheme" 17) and his discussion of the T — R structure is concentrated on the choice of T; only from the example on p. 22 may we guess that focus and theme principally do not coincide. Cf. also his statement on p. 8: "...in the unmarked case the focus of information will fall on something other than the theme; it will fall at least within the rheme, though not necessarily extending over the whole of it." Roughly speaking, the most discussed problems are the focus (new information) and the theme (what is being talked about), while the other two functions stand rather in background.

³ PALEK (1968) has also suggested a useful distinction of the contextual and the textual approach: the former proceeds from the sentence and takes into account those features of it that are due to its cohesion with neighbouring sentences, while the latter takes as its point of departure the discourse and looks for the network of relations linking together its elements.

of what has gone before" (ibid., 17), i.e., of the preceding context, it might follow that this second aspect of FSP is irrelevant in respect to the organization of text. But such a conclusion appears very doubtful in the light of the fact that the choice of the themes of particular utterances can hardly be fortuitous, unmotivated, and without any structural connexion to the text. In fact, even a superficial observation of texts shows that the choice and distribution of themes in the text reveal a certain patterning; this statement also corresponds to our intuitive expectations that the progression of the presentation of subject-matter must necessarily be governed by some regularities, must be patterned.

In order to throw more light upon the relationship of the notions "known (given) information" and "theme", let us analyse more deeply the former notion.

It is evident that the notion "given (known)" is relative and very broad (if not vague):

(1) Given or known is that information which is derivable or recoverable (to use Halliday's wording) from the context, situation and the common knowledge of the speaker and listener. Certainly, there exist individual divergencies between the two, due to differences in their experience, memory, attention, etc. But after all, it is the speaker's evaluation that is the determining factor; this does not exclude, of course, that the speaker takes, more or less, into account the presupposed position of the listener.

(2) The communicative feature of "givenness", assigned to particular sentence elements, is a graded property.

(3) "Givenness" depends on the length of the portion of preceding text in relation to which the evaluation is being carried out. The upper limit of such a portion should be empirically ascertained. We may tentatively assume, that these portions or "intervals" are in a way correlated with the segmentation of text into paragraphs, groups of paragraphs, chapters, etc. We may even expect a kind of hierarchy or stratification of the feature "given": taking for granted that not only particular utterances but also the sections of text, as paragraphs, etc., and the whole text have "themes" of their own ("hyperthemes"), we can expect that, e.g., the theme of

a chapter will be evaluated as "given" throughout the chapter, so that the "interval of givenness" in respect to the information carried by this "hypertheme" will be the whole chapter.

(4) The contextual determination of givenness is far from being a simple phenomenon. We might tentatively suggest that as "contextually given" may be regarded such semantic information that has been somehow mentioned in a qualified portion (interval) of the preceding text. It can be mentioned directly, or indirectly. In the first case, it can be mentioned not only with the identical wording, but also with a synonymous expression, or with a paraphrase (cf. Pike's "hypermeaning" or "verbalized concept"). The indirect mentioning is based on semantic inference (or semantic implication, if viewed from the opposite point). Thus, e.g., the expression "illness", occurring in an utterance, might be experienced as conveying a known piece of information if in a preceding sentence (belonging to the same text interval) "health" has been somehow mentioned. The notion of semantic inference (implication) needs a more exact elaboration in terms of distinctive semantic features and their sets. It is clear that, in principle, such semantic relations are involved as those obtaining between a term and its generic terms (hyponymy and hyperonymy), "associative" relations, exemplified by such as "restaurant" — "lunch"; "summer" — "vacations"; "science" — "investigator", etc.

(5) The evaluation of (the degree of) contextual givenness depends also on the delicacy (determined by various factors, partly objective — e.g., stylistic — partly subjective) with which the speaker (and listener) evaluates a given expression as semantically implied in a certain preceding expression.

(6) Last but not least let us point out the very important fact that the relative character concerns the notion of "new" information as well. Halliday has pointed out that the new piece of information is "new" not in the sense that "it has not been previously mentioned although it is often the case that it has not been, but in the sense that the speaker presents it as not being recoverable from the preceding discourse" (1967, 7/8). The first part of this exposition is obviously true, but the final statement is somewhat obscure, since

the author does not explain by what kind of procedure the speaker gets the listener to interpret what, in fact, is recoverable from context, as not being recoverable from it, as being "new". There must exist some objective principle underlying the possibility of presenting something that has been previously mentioned as a "new" piece of information.

Let us examine the following example:

Sedimentary rocks. (1) Most of historical geology has to do with sedimentary rocks and their contained organic remains. (2) This is accounted for by the fact that events in earth history are recorded mainly in terms of differing kinds of sedimentation...

It is obvious that "sedimentation", representing an essential part of the new information of sentence (2), is fully recoverable from the preceding sentence (in respect to the expression "sedimentary rocks"). But what is new is the connexion of "sediment-" into which it has been put. By "connexion" I mean here not only the rather trivial fact that a word may occur in different collocations or other phrases (i.e., in different multiverbal denominating units), but also, and foremost, the position (or function) of the given element in the communicative structure of the utterance.

In other words: the property of being new has two, independent, aspects: (1) "new" in the sense of "not mentioned in the preceding context", (2) in the sense "related as Rheme to a Theme to which it has not yet been related". In the former case, the property "new" is assigned to the expression itself, while in the latter it is the T — R nexus that appears as new.

This interpretation is justified by the following facts: First, in all cases the new element functions as R (as we have mentioned above, Mathesius did not make a distinction between "new piece of information" and R, and also HALLIDAY (1967, 8) states that new information "will fall at least within the rheme"). Second, it is not R alone, but its connexion with the given T that is communicatively relevant (cf. E. BENEŠ 1968, 271). — Thus we may conclude that the information accumulated, at a certain point of a text (or, within a text interval), comprises two kinds of elements (appearing as "known"): denominating units, and T — R nexuses.

The amount (or the potential) of successively accumulated information is mostly so extensive that the speaker, carrying on the discourse, must necessarily make a choice from this mass. And we may rightly assume that he selects the utterance theme from it (unless he has some special reason to choose something that is not comprised in it). In any case, the portions (elements) of "known" information occurring in an utterance are exactly those elements that are closely connected with the selected T (and indirectly with R). Our conception of the utterance theme stands near to E. Beneš's characterization of the "point of departure" (Cz. "východisko", G. "Basis") as "the opening element of the sentence" that "links up the utterance with the context and the situation, selecting from several possible connexions one that becomes the starting point, from which the entire further utterance unfolds and in regard to which it is oriented" (1959, 216).⁴

To put it differently: it is evidently necessary to distinguish between the mass of information accumulated up to a certain point of text, and the portion of this mass contained (occurring) in the particular utterance following this point. This distinction involves a selection from the mass of known information for every utterance. We assume that this selection is determined, directly or indirectly, by the choice of the utterance theme. Thus we must not be content with a statement that certain sentence elements convey the known information (in contrast to others, conveying the new one), but we ought to find out the principles exactly according to which this and not another portion of the mass of known information has been selected. In other words, we have to inquire into the principles underlying thematic choice and thematic progression.

Note:

In his stimulating article K. HAUSENBLAS (1969) defines the theme as "what has been posited to the fore, into the focus of the field of vision and, at the same time, what presents a foundation to be developed (elaborated) in the

⁴ BENEŠ (1959) distinguishes between this "point of departure", and what he calls "foundation (základ)" of the utterance. Cf. p. 221 of the present volume.

subsequent discourse" (7). From this statement two functions of the theme may be deduced: (1) the perspective function, consisting in hierarchical graduation of thematic text components (and involving a static point of view, regarding the text as a completed whole), (2) the prospective function, in which the theme serves as a point of departure for the further development of the semantic progression and, at the same time, as a prospect or plan of this development (in which case, the dynamic aspect of the progressive realization of the text is accounted for).

The pointing out of the dynamic aspect of text construction is new and undoubtedly deserves further attention. Unfortunately, from Hausenblas's brief exposition it is not easy to get a clear-cut picture what this aspect really consists in and where to draw the line between the two aspects. Generally speaking, these difficulties probably arise from the lack of an exact model of the dynamic structure of objects, realized in time (real or fictitious); such a model, taking into account their progressive growth, would involve a progressive nexus (relative to the "future" functions of components in the subsequent portion of the text and in the resulting whole), a regressive nexus (relative to possible modifications and transformations of components arising from the backward effect of subsequent components), and a continuous process of cumulation. It might be interesting to reinterpret our notion of "thematic progression" in terms of the two aspects.

It is obviously not by chance that the studies of FSP predominantly concern the problems of theme (and not those of rheme — cf. the frequent term "thematization" and the rarely used term "rhematization"), in spite of the fact that it is just the rheme that represents the core of the utterance (the message proper) and "pushes the communication forward" (FIRBAS): from the point of view of text organization, it is the theme that plays an important constructional role. The rheme shows its significance as the conveyor of the "new", actual information, while the theme, being informatively insignificant, will be employed as a relevant means of the construction. (The relation between the rheme and the text will be touched upon in section III of our paper.)

The inquiry into the thematic organization of the text is closely connected with the investigation of the so-called "text coherence" or "text connexity". Some scholars even define the text in terms of this property. (Cf., e.g., H. ISENBERG, 1970, 1: "Wir verstehen unter einem "Text" eine kohärente Folge von Sätzen..."). Nevertheless, as was duly pointed out by K. HAUSENBLAS (1964),

P. TROST (1962) and others, coherence (connexity, continuity) is not a necessary property of texts: they not only display this property to a very uneven degree, but some of them may be characterized exactly as "discontinuous" (HAUSENBLAS, op. cit., 79f.); and TROST (op. cit., 268) calls attention to the very old distinction between the "connected style", tending towards a very close linking up of the sentence with the text (*harmonia glaphyra*), and the disconnected one (*harmonia austera*), which tends towards a clean-cut independence of each sentence. In other words, when analysing text coherence (connexity), we should employ the term "coherence" in the neutral (unmarked) sense.

The following exposition will be devoted to the way in which FSP contributes to the inner connexity of texts. (It is based on an investigation discussed in DANEŠ 1968, 1970, 1970a.)

II

Our basic assumption is that text connexity is represented, *inter alia*, by thematic progression (TP). By this term we mean the choice and ordering of utterance themes, their mutual concatenation and hierarchy, as well as their relationship to the hyperthemes of the superior text units (such as the paragraph, chapter, ...), to the whole text, and to the situation. Thematic progression might be viewed as the skeleton of the plot.

For our purposes it is necessary to discover an objective criterion for ascertaining the theme (T) of a given utterance. The detailed analysis done by Firbas and others, ascertaining the distribution of different degrees of the communicative dynamism over sentence elements, establishes the communicative microstructure of the utterance. We may content ourselves with establishing the macrostructure, i.e., with a rough determination of the thematic and the rhematic part of the utterance, without specifying the central, peripheral and transitional elements.

To this aim we employ a procedure using *wh*-questions, prompted by the given context and situation, for eliciting the rheme (R) of a given utterance (R-questions). Generally speaking, we assume that

it is possible to assign to any sentence (taken as a grammatical unit) a set of *wh*-questions, representing all possible types of context in which the given sentence is applicable, and consequently, revealing all possible FSP-structures which it can acquire. In this way we are also able to find out, indirectly, the theme of the given utterance. This procedure seems workable, since it is objective, purely linguistic, and involves both the contextual and the thematic aspect of FSP.

Before starting with the classification of TP's, let us state that between a simple utterance (i.e., a sentence containing only one T — R nexus, with simple T and R) and a textual concatenation of grammatically independent sentences, a transitional zone exists, comprising cases of sentence units that reveal a more complicated (condensed or composed) T — R structure, i.e., units that, from the point of view of FSP, reveal a textual character, which, however, represent a single grammatical unit, one sentence only. Such sentences are now usually described by grammarians as transforms of a combination of two (or more) underlying simple sentences (different linguists will use different ways of description, but this is irrelevant for our discussion). A similar approach might be employed for the description of the FSP-structure of non-simple utterances as well.

The English sentence (describing Wöhler's well known discovery from 1828) (1) *Wöhler heated ammonium cyanate and found that it was thereby converted into urea, previously known only as a product of living organisms*, evidently revealing a complicated FSP-structure, may be reduced on the following sequence of three sentences (a), (b), (c), each of them having a simple T — R structure:

(2) (a) Wöhler heated some ammonium cyanate.

(b) He found that it was thereby converted into urea.

(c) This substance had been previously known only as a product of living organisms.

A comparison of (2) with (1) shows the following transformational processes on the level of FSP leading from (2) to (1):

1. (b) has lost its independent status and has been, without the loss of its explicit T — R structure, combined with (a) into a multiple

utterance, composed of two complete T – R nexuses; the connexion between (a) and (b) is supplied by the identity of T_a and T_b .

2. (c) has lost its independent utterance status, and its T – R structure as well; it has been restricted to its rhematic elements and fused with R_b into a single complex $R_{(b,c)}$; or briefly, it has been rhematized. The fusion has been allowed due to the fact that T_c is a paraphrase of R_b and thus it may be omitted.

Thus the FSP-structure of (1) might be symbolized as $T_a \rightarrow R_a + T_b (= T_a) \rightarrow R_{(b,c)}$ and described as a multiple utterance with the complex second R. (The grammatical aspect of these processes will not be discussed here.)

Generally speaking: In respect to their T – R structure, utterances (U's) may be divided into simple U's, composed U's, and condensed U's. — The composed U's result from composition, by which two (or more) simple utterances are combined in a single sentence frame; if the T's, or R's of the two utterances are the same (from the semantic point of view), they will be mentioned only once. — The condensed U's are based on fusion: If two subsequent simple U_1 and U_2 share a common FSP-element, they may be fused into a single condensed U, either by way of thematization, or rhematization of one of the utterances. The two possibilities depend on the type of the thematic interrelations obtaining between U_1 and U_2 :

(1) If $T_2 = R_1$, principally both possibilities are available: (a) T_2 will be deleted, and R_2 fused with R_1 into a complex R^* (rhematization of U_2). (b) $T \rightarrow R_1$ will be fused into a complex T^* (thematization of U_1), T_2 deleted, and R_2 linked with T^* as R^* of the resulting condensed U^* . The choice between (a) and (b) depends on the proportion between respective communicative relevance of R_1 and R_2 : if, in the given context, R_1 appears more relevant than R_2 , then U_2 will be rhematized (i.e., deprived of its utterance status, and thus backgrounded); in the inverse case, R_2 will be brought to the fore by means of thematization of U_1 .

(2) If $T_2 = T_1$, then T_2 will be deleted and R_1 fused with T_1

into complex T^* (i.e., R_1 will be thematized), to which R_2 will function as R^* of the resulting condensed U^* .

Schematically:

1. Composed U's:

- multiple U: "Goethe wrote the second part of Faust after eighty, and V. Hugo astounded the world with Torquemada at eighty."
- U with a multiple T: "The melting of solid ice and the formation from ice of liquid water exemplify physical changes."
- U with a multiple R: "It is further postulated that the activated amino acids are joined together... and that the long chains are molded in a specific manner..."

2. Condensed U's:

- U with a complex T: "This dark-coloured liquid, known as crude petroleum or crude oil, is obtained from wells of different depth."
- U with a complex R: "The amino acids are required for making proteins, consisting of long chains of these units."

From these elementary types various combinations may be produced (cf., e.g., the above adduced compound sentence (1)). These may be called "complicated" utterances.

Note:

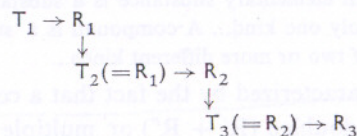
The processes of composition and fusion on the level of FSP (on the utterance level) are manifested by means of different grammatical devices on the level of the sentence, such as coordination, apposition, some nominalizations, some relative transformations, etc. (This does not mean, however, that the said processes are the only functions of these grammatical means.) Some functions described here in terms of FSP are sometimes referred to as "backgrounding", "complex condensation", etc. (cf., e.g., WEINREICH 1963, VACHEK 1955). But it seems to me that the explanation having recourse to FSP may supply a more exact structural explanation of these somewhat impressionistic notions of a semantic and stylistic character.

The grammatical descriptions, especially the transformational ones, have ascertained many synonymous, or nearly synonymous relationships between syntactic constructions. But they tell us nothing or very little about functional differences between such constructions, in spite of the fact that only certain differences in the functional employment of apparent synonymous linguistic means of expression are able to account for their existence in the given language. Assuming that the level of FSP, lying above the other syntactic levels (i.e., the grammatical and the semantic one), represents the domain of the functional employment of sentences, we may try to find out the motivation

for the choice between different (semantically) synonymous syntactic forms and transforms exactly in the communicative needs of FSP, to associate different syntactic options with the alternatives of the distribution of the communicative dynamism.

Our analysis of Czech scientific and other professional texts, as well as some tentative soundings in the area of German and English language materials has ascertained the following three main types of TP:

(1) Simple linear TP (or TP with linear thematization of rhemes):



Examples:

Cz.: V oboru izolátorů se věnuje velká pozornost tzv. feroelektrikům. Tyto látky mají schopnost měnit energii elektrickou v mechanickou a naopak.

G.: Eine besondere Klasse stellen tragbare Geräte dar. Diese werden besonders zur Ueberwachung von Strahlungsfeldern verwendet.

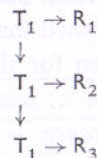
E.: (a) The first of the antibiotics was discovered by Sir Alexander Fleming in 1928. He was busy at the time investigating a certain species of germ which is responsible for boils and other troubles.

(b) The chief organic compound obtained from natural gas is saturated methane. Small quantities of other volatile hydrocarbons are associated with methane.

Type (1) represents the most elementary, basic TP. Briefly, R_i of the utterance U_i appears in the next U_{i+1} as its T_{i+1} , or, in other words, each R becomes the T of the next utterance.

[In the formulae the horizontal arrow $\rightarrow$ indicates the T — R nexus within an utterance, while the vertical one $\downarrow$ indicates the contextual connection of U's. — In the formula $T \rightarrow R$ the order of symbols does not necessarily correspond to the sequence of expressions in a particular sentential utterance based on this formula, since this sequence depends on the interplay of language means employed in FSP.]

(2) TP with a continuous (constant) theme:



Examples:

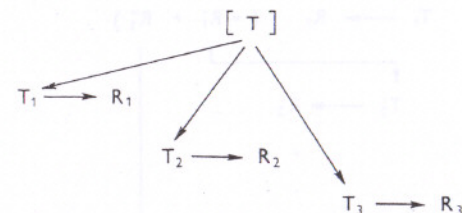
Cz.: [Mezi tzv. ovládací zařízení patří i většina automatických výrobních linek.] Tyto linky a jim podobná zařízení vykonávají samočinně všechny operace nutné k zhotovení výrobku. Tato zařízení však nemohou kontrolovat průběh a výsledky své činnosti. Nejsou také schopna přizpůsobit se změnám vnějších podmínek...

G.: ["Goethes Erbe in unserer Zeit".] Goethe war überzeugt von dem Fortschritt der menschlichen Entwicklung. Er trat für die Erreichung des Menschengeschlechtes zur friedlicher Entwicklung... Goethes Humanismus ging aus von dem Glauben an das Gute im Menschen... Goethe nannte sich "ein Kind des Friedens".

E.: The Rousseauist especially feels an inner kinship with Prometheus and other Titans. He is fascinated by any form of insurgency... He must show an elementary energy in his explosion against the established order and at the same time a boundless sympathy for the victims of it... Further the Rousseauist is ever ready to discover beauty of soul in anyone who is under the reprobation of society.

In this type one and the same T appears in a series of utterances (to be sure, in not fully identical wording), to which different R's are linked up. (There are several ways of introducing T_1 in the utterance, but this is irrelevant here.)

(3) TP with derived T's:



Examples:

Cz.: Záškrt (diptheria) je infekční onemocnění. Působí je corynebacterium diptheriae. Šíří se kapénkovou infekcí přímým stykem s nemocným, častěji však bacilonosičem, nebo nepřímo předměty potřísněnými hlenem. Inkubační doba je 2 až 5 dnů.

G.: Die sozialistische Republik Rumänien liegt am Schnittpunkt des 45. Breitenkreises mit 25. Längengrad. Die Bodenfläche des Landes beträgt 235 000 Quadratkilometer; seine Bevölkerungszahl ist 19 Millionen Einwohner. Die Staatsgrenze hat eine Gesamtlänge von... Kilometern.

etc., are often used in connexion with type (4). Every text (mainly in scientific or technical prose) is interwoven with expressions signalling significant points of TP of the text. The distribution of such expressions in a particular text might be termed its network of orientation. The ascertaining of the set of these devices for each language, and their functional classification seems to be an important as well as interesting task. (Cf. now GÜLICH, 1970.)

The study and knowledge of the thematic organization of texts have some practical applications as well, namely in practical stylistics and computational linguistics, especially in information retrieval. As for the former, the central question is how to construct and present (express) the thematic progression. As for the latter, we have to find out how to discover it, and how to make the concept of FSP and TP workable in the non-human conditions of a computer. But considerations of this kind are beyond the frame of the present paper. (Some suggestions will be found in DANEŠ, 1970.)

At the end of section II let us try to find out the systemic correlations existing between the basic types of TP's and the basic types of multiple and condensed utterances (treated as transforms of the former).

(1) Simple linear TP involves the following relevant relations: $R_1 = T_2$, $T_1 \neq T_2$, $R_1 \neq R_2$; therefore it yields utterances with a complex T, or R;

(2) TP with a constant T involves the following relevant relations: $T_1 = T_2$, $R_1 \neq T_2$, $R_1 \neq R_2$; therefore it yields multiple utterances, utterances with a multiple R and utterances with a complex T as well.

(3) TP with derived T's involves the following relevant relations: $T_1 \neq T_2$, $R_1 \neq T_2$; therefore it yields multiple utterances. — Utterances with a multiple T are derivable only from a progression based on the schema $T_1 \rightarrow R_1 + T_2 \rightarrow R_1$, in which R's of U_1 and U_2 are identical; such a progression may be considered a very rare modification of (3).

Schematically:

Types of TP's	multiple U's	U's with a multiple T	U's with a multiple R	U's with a complex T	U's with a complex R
$T_1 \rightarrow R_1 + T_2 (= R_1) \rightarrow R_2$	—	—	—	+	+
$T_1 \rightarrow R_1 + T_2 (= T_1) \rightarrow R_2$	+	—	+	+	—
$T_1 \rightarrow R_1 + T_2 \rightarrow R_2$ ($T_1 \rightarrow R_1 + T_2 \rightarrow R_1$)	+	(+)	—	—	—

III

Linguists pursuing the analysis of intersentential relations in the text mostly interpret these relations in semantic terms, disregarding FSP. (One of the rare exceptions is K. E. HEIDOLPH (1966), whose approach implies FSP, without mentioning it.) Now a query arises whether or how the said semantic relations bear upon FSP. We shall content ourselves with raising some questions without trying to supply satisfactory answers.

To start with, it will be useful to find out connexions between FSP and the semantic structure of the sentence. In my paper at the Tenth International Congress of Linguists in Bucharest 1967 (cf. DANEŠ 1970b, 409) I suggested that the different semantic relations between R and T might supply a criterion for a linguistically relevant classification of utterances. A similar idea has been proposed by E. BENEŠ (1968): "This relationship of the rheme to the theme can be regarded as the constituent act of utterance, just as the relationship of subject and predicate as the constituent act of a sentence" (271). He exemplifies his thought by the following utterances: the actual communicative aim or sense of the utterance *Prague is the*

capital of ČSSR is the assignment of a particular quality to its bearer, while the sense of the other utterance (revealing the same grammatical as well as semantic structure, and the identic lexical filling), *The capital of ČSSR is Prague*, may be described as the assignment of a bearer to a quality.

Following this line we might dare propose a further generalization: Any T – R nexus actualizes a particular semantic relation contained in the semantic (propositional) structure of the underlying sentence, so that the communicative sense of an utterance (CUS) may be defined in terms of the semantic function of R-portion in relation to T-portion of the underlying sentence.⁵

A German example:

- (1a) *Unsere Mutter schreibt ihre Briefe mit der Feder*
 Semantic sentence structure: Ag-Act-Res-Instr
 Phonological shape: unmarked, centre of intonation (CI) on the terminal word (stress-group) *Feder*
 Diagnostic R-question: "Womit schreibt unsere Mutter ihre Briefe?"
 R: *mit der Feder*
 CUS: the assignment of an instrument to an agentive resultative action (or, more generally: indication of instrument)
- (1b) *Mit der Feder schreibt ihre Briefe unsere Mutter*
 Semantic sentence structure: the same as in (1a)
 Phonological shape: unmarked, CI on the terminal word *Mutter*
 Diagnostic R-question: "Wer schreibt seine Briefe mit der Feder?"
 R: *unsere Mutter*
 CUS: the assignment of an agent (to an instrument used in a resultative action)
- (1c) *Mit der Feder schreibt unsere Mutter ihre Briefe*
 Semantic sentence structure: the same as in (1a)
 Phonological shape: unmarked CI on the terminal word *Briefe*
 Diagnostic R-question: "Was schreibt unsere Mutter mit der Feder?"
 R: *ihre Briefe*
 CUS: the assignment of result (achieved with an instrument in an agentive action)

Note:

It is evident that the adaptation of a sentence to different contexts (resulting

⁵ An interesting attempt at a semantic classification of statements conveyed by different sentences has been made by GARVIN, BREWER, and MATHIOT (1967).

in different utterances with different CUS) merely by means of word order variations and/or of changes in the position of CI is possible in some languages only, and even there this possibility is not without restrictions. But I will not recapitulate here what is known from analyses done by Firbas and others, namely that the means for signalling FSP are various and numerous, word order and sentence intonation being only the most elementary of them (cf. DANEŠ 1967).

It is evident that CUS, being defined as a function of R, plays no part in building up thematic progressions. But this does not mean, of course, that CUS plays no part in constructing texts. We may reasonably ask, e.g., what kinds of relations hold between the rhemes of concatenated sentences in a text.

Thus in the following sequence of German sentences

- (2) (a) Dieser Brief kommt nicht von meiner Mutter her.
 (b) Meine Mutter schreibt ihre Briefe immer nur mit der Feder.
 CUS of (a) is the contradiction of a presupposed originator (source), and that of (b) is the assignment of an instrument. The sequence is based on a simple linear TP, schematically $T_a \rightarrow R_a + T_b (=R_a) \rightarrow R_b$. The semantic relation of R_b to R_a is inexplicit, but since (b) may be considered an answer to the question (a') "Warum kommt dieser Brief nicht von meiner Mutter her?" (cf. the possibility of complementing (b) with the particle *nämlich*, stating the relation explicitly), we may identify it as the relation of "reason". Schematically:

$$T_a \rightarrow R_a + R_b (=R_a) \rightarrow R_b.$$

↑
reason

In terms of CUS we may state that the indication of an instrument (CUS_b) supplies the reason for the contradiction of a presupposed originator (CUS_a).

(It may be noticed as well that the semantic sentence function of R_a ("originator") switches, when this item becomes T_b (its new function being "agent"). But such a functional semantic switch has no structural relevance for the text; it is conditioned by the choice of the grammatical construction.)

This being so, we may conclude (1) that (at least some) semantic relationships between concatenated sentences in a text (regarded by

many linguists as the text constituting relations — cf. Isenberg's notion of "Vertextungstypen") do not hold, in fact, between the whole sentences,⁶ but only between their R's, and (2) that these semantic relations (or "semantic text functions") are of another kind than those involved by CUS (i.e., the intersentential semantic relations): the former necessarily belong to a higher level of abstraction, since they appear as functional implementations of the latter (i.e., CUS's are employed as means of expression of intersentential textual relations).

But by far not all intersentential relationships belong to the same type as "reason" does, i.e., to the type of "causal" or "logical" relations (such as cause, consequence, concession, ...). Another type is represented by the temporal and local relations; to another kind of abstraction belong such notions as "explication", "enumeration, or again, "adversative relation", "gradation", "confrontation", etc. (cf., e.g., SKALIČKA 1960, BEČKA 1960).

Unfortunately, the classifications done by various investigators of text structure often fail to differentiate systematically the different types and levels of semantic abstraction (they often content themselves with semantic relations used by "traditional" as well as "modern" grammarians for the classification of clauses within compound and complex sentences, of adverbials, etc.), and what they offer seems to be an (unexhaustive) list of heterogeneous relations, lacking theoretical justification, a hierarchical order and objective classificatory criteria.

Another analytical problem is prompted by the fundamental distinction of the "semantics of reference", and the "semantics of meaning" (Quine): It is necessary to differentiate the multiple factual extralinguistic relations existing between the denotata (i.e., objects or events) of concatenated sentential utterances, from that

⁶ Our interpretation is backed by the fact that in some languages particles and conjunctions explicitly expressing the given relation may be shifted from the beginning of the sentence and placed exactly before R (or R proper). Cf. the Czech version of (3) with the particle *totiž* (equivalent to G. *nämlich*): "Tento dopis není od mé matky. Moje maminka píše dopisy totiž vždy jen perm."

(those) relation(s) which the speaker has selected for his message and which he is now conveying by means of the specific linguistic meanings (lexical and syntactic) of language units he has chosen to this aim from the overall inventory of the given language system. Especially when the intersentential relation is not explicitly expressed, all the linguist may do is to find out all linguistically possible interpretations, i.e., interpretations prompted (allowed for) by the semantic context (lexical and syntactic meanings) in question.

To sum up: In respect to FSP, the generalized structure of a coherent text may be described in terms of an underlying thematic progression (representing the most abstract thematic relationships of several types) and a rhematic sequence of semantic relations obtaining between the particular rhemes. (It is not yet clear whether there exist standardized types of rhematic sequences as well, i.e., whether the rhematic sequences reveal an underlying pattern, as TP's do.)

REFERENCES

- BEČKA, J. V., Základy kompozice jazykových projevů (Fundamentals of stylistic composition). *Acta Universitatis Palackianae Olomucensis, Philologica III*, Praha 1960.
- BENEŠ, E., Začátek německé věty z hlediska aktuálního členění větného [with a German Summary "Der Satzbeginn im Deutschen, von der Mitteilungsperspektive her betrachtet"], *ČMF* 41, 1959, 205—217.
- BENEŠ, E., On two aspects of functional sentence perspective, *TLP* 3, 1968, 267—274.
- DANĚŠ, F., Téma //(základ)// východisko výpovědi [Theme //(Foundation)// Starting point of the utterance], *SaS* 25, 1964, 148f.
- DANĚŠ, F., Order of elements and sentence intonation. In: *To Honor Roman Jakobson I*, The Hague 1967, 499—512.
- DANĚŠ, F., One instance of Prague School methodology: Functional analysis of utterance and text. In: *Theory and method in linguistics* (P. Garvin, ed.), The Hague 1970, 132—146.
- DANĚŠ, F., Zur linguistischen Analyse der Textstruktur, *Folia Linguistica* 4, 1970a, 72—78.

- DANEŠ, F., Semantic considerations in syntax. In: *Actes du Xe Congress international des linguistes II.*, Bucarest 1970b, 407—413.
- FIRBAS, J., On defining the theme in functional sentence analysis, *TLP* 1, 1964, 267—280.
- GARVIN, P. - BREWER, J. - MATHIOT, M., Predication-Typing. A pilot study in semantic analysis. *Language Monograph* 27, Washington 1967.
- GÜLICH, E., *Gliederungssignale in der Makrosyntax des gesprochenen Französisch*. München 1970.
- HALLIDAY, M. A. K., Notes on transitivity and theme in English. Part II, *JL* 3, 1967, 199—247.
- HAUSENBLAS, K., On characterization and classification of discourses, *TLP* 1, 1964, 67—84.
- HAUSENBLAS, K., Krátká úvaha na téma "téma" [A short paper on the theme "theme"], *ČL* 17, 1969, 3—10.
- HEIDOLPH, K. E., Kontextbeziehungen zwischen Sätzen in einer generativen Grammatik, *Kybernetika* 2, 1968, 274—281.
- ISENBERG, H., Ueberlegungen zur Texttheorie, *ASG-Bericht* Nr. 2, Berlin 1968. (Multiplicated.)
- ISENBERG, H., Der Begriff "Text" in der Sprachtheorie, *ASG-Bericht* Nr. 8, Berlin 1970. (Multiplicated.)
- KLEMENSIEWICZ, Z., O syntaktycznym stosunku nawiązania, *Slavia* 19, 1949, 13—27.
- MATHESIUS, V., O tak zvaném aktuálním členění větném [On the so-called actual bipartition of the sentence], *SaS* 5, 1939, 171—174.
- MATHESIUS, V., Řeč a sloh [Language and style]. In: *Čtení o jazyce a poezii*, Praha 1942, 13—102.
- PALEK, B., Cross-Reference. A study from hyper-syntax. *AUC, Monographia* 21. Praha 1968.
- SGALL, P., L'ordre des mots et la sémantique. In: *Studies in syntax and semantics* (F. Kiefer, ed.), Dordrecht 1969, 231—240.
- SKALIČKA, V., Syntax promluvy (enunciace) [Syntax of the enunciation], *SaS* 21, 1960, 241—249.
- TROST, P., Subjekt a predikát [Subject and Predicate], *Slavica Pragensia* 4, 1962, 267—270.
- VACHEK, J., Some thoughts on the so-called complex condensation in modern English, *SPFFBU*, 1955, A3, 63—77.
- WEINREICH, U., On the semantic structure of language. In: *Universals of language* (J. H. Greenberg, ed.), Cambridge 1963, 114—171.

ZUR FRAGE DER FUNKTIONALEN SATZPERSPEKTIVE IM DRAMATISCHEN TEXT

Josef Filipec (Prag)

1. Bei der Analyse der Texte der schönen Literatur darf die Thema-Rhema-Gliederung keineswegs vernachlässigt werden. Natürlich sind die Verhältnisse hier komplizierter als in rein kommunikativen Texten und Fachtexten. Das bedeutet aber nicht, daß man die schwierige Arbeit nicht unternehmen sollte.

Ich habe zum Objekt meiner Untersuchung den dramatischen Text (DT) des heutigen tschechischen Prosaschriftstellers und Dramatikers Bohuslav Březovský, *Nebezpečný věk* (*Das gefährliche Menschenalter*, Praha 1962) gemacht, der trotz aller Stilisierung den mündlichen Charakter der natürlichen Rede aufweist. Das Drama stellt den Kampf der jungen Leute und ihrer Eltern für die Wahrheit ihres Lebens und ihrer gemeinsamen Beziehungen gegen die bürgerlichen Konventionen dar.

Die Eigentümlichkeit des mündlichen Textes äußert sich darin, daß dieser situationsgebunden ist. Unter Situation eines DT verstehe ich spezifische Beziehungen der Gegenstände einer Handlung (Personen, Ort, Zeit, Requisiten, Stimmung), also z. B. eine Liebesszene. Diese Situation des Textes verweist auf eine Situation des realen Lebens und kann mit ihr konfrontiert werden. Derjenige, der einen DT wahrnimmt, bewegt sich also in drei Ebenen: Textebene, Szeneebene (charakterisiert durch szenische Anmerkungen) und Ebene der außerhalb des Textes stehenden Realität. Wichtig ist z. B. der Unterschied der realen, szenischen und der dramatischen Zeit: was sich zwischen zwei Personen früher ereignet hat, kann im Text erst nachher angeführt sein und der Leser oder Zuschauer erfährt es erst im Verlauf der Handlung.

representation is connected with the value of Actor, with that of Objective, of Addressee, or, perhaps, with that of another complementation.

If it is possible in such a way to restrict the framework to a single level of syntax, this level could be one of those the specific status of which has been recently claimed by Chomsky within his minimalist program, viz. one of the 'interface' levels, the necessity of which is beyond doubt. Certainly, the differences between this syntactic level and Chomsky's logical form should then be discussed as interesting issues of a more or less technical character.

2 SENTENCE STRUCTURE AND COMMUNICATION: FOCUS, NEGATION AND PRESUPPOSITION

The aim of this part of the book is to point out that the patterning of the sentence connected with its use in communication, i.e. its articulation into topic ("given", contextually bound part) and focus ("new", contextually non-bound part), requires either a significant enrichment and modification of the theory of principles and parameters (Section 2.1), or an approach based on valency (dependency), rather than on constituents (Sect. 2.2). We then proceed to show how the scope of negation is co-determined by the topic-focus articulation (Sect. 2.3), and how the articulation also is relevant for presuppositions (Sect. 2.4).

Since the topic-focus articulation (TFA) is patterned by grammatical means, it is appropriate to understand it as constituting one of the basic hierarchies of the underlying structure of the sentence. Therefore, in a formal framework of a generative description, the articulation has to be included, and the task is to find a relatively economical way in which the core of such a framework could be formulated. In Section 2.5 it is pointed out how this can be done in the shape of a few general principles referring to data from lexical entries (especially to valency grids).

2.1 Principles-and-Parameters Theory and the Underlying Order of Constituents

After an introductory remark (2.1.1) and a short formulation of the task of this Section (2.1.2), we present a set of initial assumptions (2.1.3), a discussion of a possible location of the order of constituents in the given framework (2.1.4) and a formulation of three principles concerning the order of constituents and its relationships to the topic-focus articulation (2.1.5), which is then substantiated by an illustration (2.1.6).

2.1.1 From a certain point of view some of the basic aspects of the order of major constituents seem still to lie beyond the main concerns of most

generative grammarians, though this issue played a highly important role in the split of the transformational grammar in the late sixties into interpretative and generative semantics (cf. Chomsky, 1968; Lakoff, 1969) and though also in the recent development of Chomskyan Principles-and-Parameters, or Government-Binding theory (GB) it cannot be left out without mentioning (cf. Chomsky, 1982: 8, 27f, 31, 34, 39, 93ff, 121, 128, 133, to quote only the most relevant places).

The efforts towards a systematic description of TFA within GB have culminated in Rochemont (1986), who, as pointed out by Koktová (1988), comes close to the dependency approach by accounting for accent and focus in terms of argument structure; however, even in his approach the constituency based treatment of focus inheritance is not sufficient for such sentences as *Laurie follows one of her schoolmates into the garden*. We assume that this sentence can be used as a (full, i.e. redundant) answer to (i) What does Laurie do?, (ii) Where does Laurie follow one of her schoolmates?, (iii) Where does Laurie follow whom?, (iv) What does Laurie do with (regard to) one of her schoolmates? In case (i) the focus of the example sentence is its VP, and with (ii) it consists of its Directional; these are the two cases Rochemont can account for. However, in case (iii) Directional and Objective belong both to the focus (the verb being a part of the topic, as the question indicates), and with (iv) only the verb and the Directional are in the focus; while the latter two cases resist a constituency-based account, they can be described without any additional means within the dependency-based approach we characterize below.

Before passing to this approach, let us first propose an account of a collection of empirical phenomena closely related to the order of constituents within the rule system and the subsystems of principles as advocated by GB. This does not mean to make any claims of changing the core of the theory as such.

2.1.2 Taking for granted, for the purpose of our present discussion, that

- (i) universal grammar consists of interacting subsystems, which, from one point of view, are the various components of the rule system of grammar, and, from another, the subsystems of principles (Chomsky, 1982:5),
 - (ii) the components of the rule system are the base, a transformational component (transforming D-structures into S-structures), a LF-component (deriving logical forms from S-structures) and a PF-component (transforming S-structures into phonetic forms of sentences),
- our task can be formulated as follows:

- (1) to summarize first the hypotheses that we have found to be relevant for the order of constituents;
- (2) to propose at which level of the general scheme of the system the order of constituents should be assigned;
- (3) to look for a possible "division of labour" between the rule system and the subsystems of principles to account in an adequate way for the issues connected with the order of constituents.

2.1.3 A long-term empirical investigation by linguists of most different orientations in general and the Praguian efforts to arrive at a systematic account of the issues under discussion within FGD as a specific framework of generative description of language in particular have led to the following substantial assumptions (see Sgall et al., 1986, esp. Chapter 3):

(a) There is an intrinsic (basic) ordering of the types of complementations of verbs (theta-roles, in a broader sense of the term, or arguments and adjuncts, see below), given by the grammar of a particular language, which is observed in the underlying structure in the unmarked case, i.e. in case the given complementations convey contextually non-bound information (they belong to the focus of the sentence); in the sequel, we will refer to this basic ordering by the term *systemic ordering* (SO); as for its specification, see Sect. 2.2 below.

(b) For each sentence there is an underlying order of its constituents that corresponds to the degrees of *communicative dynamism* (CD); as mentioned in (a), CD coincides with SO in the focus part of the sentence, while in the topic part (contextually bound items; roughly speaking, that part that renders what the sentence is about), CD is given by the degrees of salience of the items referred to and by other factors concerning the structure of the discourse; CD is semantically relevant (cf. the distinction in truth conditions between (1) and (2)) and in the surface shape of the sentence the same CD may be rendered by various means, cf. (3)(a) through (c) for the CD *Mary - flower - John*, which differs in its presuppositions from e.g. *John gave Mary a FLOWER* in that (3) presupposes that Mary was given a flower by someone, whereas in the just quoted sentence it is presupposed that John gave something to Mary (without discussing less probable readings). Here, as well as in the sequel, the capitals denote the bearer of the intonation centre.

These sentences thus differ in a similar way as *One of the boys came LATE* differs from *(It was) One of the BOYS (who) came late*. The CD in (4)(a) through (c) is again identical, differing from that of (5) and (6) in an analogous way.

- (1) Everybody in this room speaks two LANGUAGES.
- (2) Two languages are spoken by everybody in this ROOM.
- (3)(a) Mary was given a flower by JOHN.
- (b) It was JOHN who gave Mary a flower.
- (c) JOHN gave Mary a flower.
- (4)(a) Last year John came to Stanford from CAMBRIDGE.
- (b) Last year John came from CAMBRIDGE to Stanford.
- (c) John came from CAMBRIDGE to Stanford last year.
- (5) Last year John came from Cambridge to STANFORD
- (6) John came from Cambridge to Stanford last YEAR.

In addition to the difference in presuppositions it should be recalled that these sentences differ in their potential to answer particular questions. This concerns also sentences with which a difference in presupposition is absent (or covert); thus the set of possible contexts may be used as a criterion for distinguishing between topics and focus. The three sentences in (4) all can answer the question *From where did John come to Stanford last year?*, whereas (5) is rather a full (redundant) answer to *Where did John come from Cambridge last year?* and (6) can answer *When did John come from Cambridge to Stanford?* (Similarly, the three sentences in (3) all can answer a question for the Actor, in contrast to *John gave Mary a FLOWER*, which answers a question for the Objective).

(c) Every sentence splits into its *topic* (conveying the contextually bound or "given" information, specifying those items that the speaker mentions as belonging to the foreground so that the hearer may identify them in his stock of knowledge to be able to modify them) and its *focus*;¹⁴ the dichotomy of topic and focus is relevant for the assignment of the semantic scope of negation. In other words, the dichotomy is responsible for some of the presuppositions of the sentence (in the given reading).¹⁵

¹⁴ We leave aside for the purpose of this discussion the embedded elements, which can belong to the topic even if contextually non-bound, and to the focus, even if contextually bound, cf., e.g., *best* and *your*, respectively in *The dress I like best was made by your mother*. It should also be noted that there are sentences lacking a topic (e.g. starting a narrative text: *A boy walked through a large forest*).

¹⁵ As for the placement of the boundary between topic and focus, most of our examples are ambiguous, especially the verb belongs to the topic in some of the readings and to the focus in others.

2.1.4 When we try to locate the account of the order of constituents in a specific place of the rule system and the system of principles, we must emphasize one point: Since the underlying (deep) order, which may differ from the word order of the phonetic form, has its consequences for the semantic interpretation of the sentence, it follows that this order should be at the disposal of the LF-component; at the same time, as we have illustrated by (3), the phonemic component (now called by Chomsky the phonetic form component) may assign a given order of constituents different phonetic forms (differing in the surface order of constituents, in a combination of some of these with specific function words, or in the placement of the intonation centre). Thus the points in the rule system that are possible candidates for the representation of the order of constituents are the D-structure and the S-structure.

There are two alternatives:

(i) Taking into account the assumptions (a) and (b) in Sect. 2.1.3 above, we can say that SO should be represented in the D-structure, while CD should belong to the S-structure. Since SO is specified in terms of types of complementations of verbs, which more or less correspond to theta-roles, the D-structure seems to be an appropriate place for accounting for (a). D-structures are mapped to S-structures by the rule "Move-alpha"; perhaps this rule could be formulated in such a way that it would rearrange the constituents according to their degrees of CD; the traces left behind the shifted constituents would not then be assigned any position in the hierarchy of CD.

(ii) An alternative solution would be to let the base generate directly the order of constituents coinciding with the CD of the constituents of the sentence generated. When characterizing the D-structures, Chomsky (1982:39) states that it is the representation of theta-roles assignment and has also the properties that follow from X-bar theory and from parameters of the base in a particular language among which he mentions also the ordering of major constituents. Under this approach, the role of the "Move alpha" rule would be considerably reduced in comparison with the role this rule would play in alternative (i).

As example (4) above illustrates, the rule "Move-alpha" should be adjusted in order to be applicable to one or more elements of the topic (contextually bound items) to transfer them to the end of the sentence, to the right of the intonation centre. While in (4)(a) this optional rule is not applied (CD coincides with the surface word order), in (b) it is applied to *to Stanford*, and in (c) first to *to Stanford* and then to *last year*. The moved items do not acquire additional stress, the intonation centre is assigned (by phonemic rules) to the item that is marked as most dynamic (i.e., with alternative (ii), occupies

the rightmost position in the D-structure). It is an open question whether with this approach also the three variants of (3) can be handled by rules deriving S-structures from D-structures.

2.1.5 If we accept the position (ii), taking D-structures as the direct representation of CD, it remains to examine the assumptions (a) to (c) from the viewpoint of the interplay of principles, rules, and lexical conditioning.

It seems possible to add to the theory the following subsystem of principles:

(A) The basic (unmarked) ordering of theta-roles (SO) can be determined by lexical means, in a way similar to what Chomsky calls "projection principle": in the lexical entries of the base component not only the theta-roles possible (optional) and necessary (obligatory) as complementations of the given lexical item are specified, but also their SO. If the hypothesis that SO is identical for different grids or "frames" (subcategorization properties of different lexical items) concerning the same word class is found to be plausible for the given language, then the "frames" can contain just the numerical values which can be assigned to theta-roles according to their position under SO. This approach has been formally elaborated in Hajičová and Sgall (1980) and Plátek et al. (1984); in the latter paper a framework is presented that covers also the main features of the interplay of the theta-role assignment and the syntactic relations of coordination and apposition; now see also Petkevič (1987).

(B) A second principle can state that whenever a D-structure contains two items A and B, where SO(A,B), but CD(B,A), then B is contextually bound, i.e. belongs to the topic (here X(Y,Z) is read "Y precedes Z under X").

Recalling our examples from Sect. 2.1.3, *John* in (3)(a) through (c) is assigned the theta-role Actor, *Mary* is assigned the role Addressee; in the SO of English Actor precedes Addressee, while in the CD in (3)(a) through (c) Addressee precedes Actor. Thus, the sentences say something about the Addressee as (a part of) the topic; *Mary* is a contextually bound element of the sentence referring to a person who belongs (at the time point of utterance of the sentence) to the activated part of the stock of knowledge (information) shared by the speaker and by the hearer.¹⁶

¹⁶ For the notion of the stock of shared knowledge and the hierarchy of activation of its elements, see Section 3.1 below.

(C) In a similar vein, on the basis of SO and CD one can specify what is the topic and what is the focus of the given D-structure; for the tectogrammatical (underlying) representations as defined in FGD (based on oriented rooted trees) this was done by Sgall (1979). The corresponding principle can be so formulated that at least one element of the highest subtree is contextually non-bound, where 'highest subtree' is the subset consisting of the verb¹⁷ and the constituents assigned the theta-roles determined by the verb according to (A), as well as the adverbials of all kinds belonging to the projection of the verb. The contextually non-bound elements of the mentioned set constitute the focus of the sentence (together with the embedded items belonging to them). Thus every sentence contains a focus, whereas the presence of a topic is optional; in the prototypical case the thetic judgements correspond to topicless D-structures. (Let us note that this principle allows for exceptions, in which the focus is more deeply embedded, see, e.g., example (8) below.)

2.1.6 The importance of the inclusion of a description of such phenomena as listed above into general linguistic theory can be now illustrated more explicitly, e.g. on the difference in the meaning of (7)(a) and (7)(b), capitals again denoting the intonation centre.

(7)(a) Staff is allowed behind this COUNTER.

(7)(b) STAFF is allowed behind this counter.

In (7)(a) one speaks about the staff, or, perhaps more probably, about the rights of the staff, and states that (one of) the right(s) is to be behind the particular counter; more technically speaking, *staff*, and, on a preferred reading, also the verb belong to the topic, whereas the adverbial constitutes the focus.¹⁸ In contrast, (7)(b) speaks about that particular counter (topic) and states that the persons who are allowed to step there are the staff. Note that the two sentences differ (at least on their preferred readings) in the truth conditions: If I am a member of the staff, I should be behind the counter

¹⁷ Auxiliary verbs as well as prepositions and conjunctions are assigned no theta-roles and no positions in CD, since their underlying counterparts are indices of complex labels, rather than nodes.

¹⁸ Another issue then is whether the syntactic relation expressed by *behind* belongs to the focus or not.

(rather than somewhere else), if I receive and accept the message expressed by (7)(a), which is not the case with (7)(b).

As for the theta-roles in both (a) and (b), *staff* is assigned the role of Objective, *behind the counter* the role of Location (it is not decisive for our point whether there is no Actor role assigned, or whether the role of a General Actor is assumed to be present). In the SO of English, Objective precedes Locative; (7)(a) and (b) differ in their CD, which in (a) is in accordance with SO, while in (b) the CD is Locative - Objective. Thus for (7)(b), there is only one relevant reading, namely that having the Locative (and the verb) as contextually bound. In (7)(a), the Locative is the last (most dynamic) item of the D-structure and thus is contextually non-bound according to the principle (C) (i.e. under the natural assumption that there must be at least one non-bound item, if the sentence is to bring some "new" information); the Objective is contextually bound, and so is the verb, in one of the D-structures; an ambiguity of the appurtenance of the verb to the topic or to the focus is a common phenomenon.

2.2 Prague School Approach to Topic and Focus

The aim of the present section is to give a brief survey of the theory of topic and focus as developed within the framework of FGD. To make this sketch easy to survey, considerations about the background motivations are left aside here; for a more detailed treatment see Sgall, Hajičová and Panevová (1986), Sgall and Hajičová (1977), Sgall, Hajičová and Benešová (1973), Sgall, Hajičová and Buráňová (1980); a formal treatment can be found in Hajičová and Sgall (1980a), more recently and in much more detail see Petkevič (1987).

2.2.1 The theory of TFA in the framework of FGD stems from the research on this phenomenon undertaken within the Prague School of Linguistics since V. Mathesius. One of the principles this school has always proclaimed and observed is not to ignore anything that was published on the issues one studies. So let me start by mentioning that the importance of the phenomena now often subsumed under the headings of theme/rheme, topic/comment, presupposition/focus, etc. etc., was known at least since the middle of the 19th century, first in France and then in Germany, where the terms *Thema* and *Rhema* were introduced.

This reference to studies by other than Czech authors (whose contributions have been specified in Sgall et al., 1986, Chapter 3) by no means weakens the pioneering contribution of Vilem Mathesius (1915, 1924, 1929, 1936), who introduced these notions into the Prague School of Linguistics and studied the dichotomy from the viewpoint of the structural comparison of Czech and English. More than that, it was Mathesius and his followers who paid systematic attention to the interplay between syntax proper and TFA, and who were aware of the importance of the latter for language as a means of communication. Of Mathesius' observations at least one should be mentioned in this connection, since it belongs to the items still very topical and important: Mathesius (1915) noticed that English passive and active constructions serve as one of the most important means of TFA, namely they make possible for the speaker to start the sentence (in the unmarked case) with "what he wants to speak about" (topic, roughly speaking) and to add then "what is to be said about this topic" (focus, in our terms). Thus the inversion of word order that is connected in English with passivization serves the same purpose as the so-called free word order in many other languages. Mathesius also was well aware that the topic as well as the focus often consist of more than one sentence part (or constituent), and he discussed such cases with deep understanding.

Among Mathesius' followers, Firbas (1957, 1966, 1975) analyzed the interplay of this "functional sentence perspective", the syntactic structure of the sentence and word order, showing that not only a dichotomy, but a whole scale or hierarchy of "communicative dynamism" is concerned. Daneš (1957, 1970) explored in a systematic way the relationships of "theme" and "rheme" to word order and intonation as well as to the structure of text. He gave a thorough analysis of the "thematic progressions" and distinguished more subtle cases of connectedness between utterances. Sgall (1967, 1979), Sgall et al. (1973, 1980), Sgall and Hajičová (1977), Hajičová and Sgall (1980) introduce TFA into the formal description of syntax and of the meaning of the sentence.

After Halliday (1967) brought theme and rheme nearer to the centre of interest of British and American linguists, Chomsky (1968) included these questions among the central issues of syntax and semantics. However, there still is the open question: Is it a realistic task to construct a procedure assigning a sentence a set of representations indicating all appropriate assignments of its words and phrases to its topic and focus? Certain issues substantiate our conviction that this task is feasible.

2.2.2 Let us first characterize briefly the empirical background and the theoretical framework of our approach.

In uttering a declarative sentence, the speaker specifies the items of information s/he considers to be easily accessible in the hearer's memory. Further, s/he specifies what properties should be assigned to them by the hearer, into what relationships with what other items they should be brought, or what other modifications they should undergo. Natural languages use various surface means to convey this distinction: word order plays the main role in inflectional languages, specific morphemes are present in several languages of Eastern Asia, e.g. in Japanese, and intonation seems to be important everywhere, especially in the analytic languages of Western Europe; German combines in various respects the properties of the latter with those of inflectional languages.

The recursive properties of language call for a more differentiated approach than a simple dichotomy. Let us examine an example which, incidentally, instantiates the exception from principle (C), mentioned in Section 2.1.5 above.

(8) John came to the house which he wanted to BUY.

In (8) - if taken as a possible answer to *Which house did John come to?* - there are unstressed pronominal elements in the focus part of the sentence, which denote items readily accessible in the hearer's memory (*which* and *he* are coreferential with nouns occurring in the preceding part of the sentence). This points to the necessity of distinguishing between the main division of the sentence into the topic and focus and what we call the *contextually bound* and *non-bound* character of the occurrences of lexical units. This necessity is evidently connected with the recursive properties of the structure of the sentence.

It may be useful to recall that in a theoretical description of language one has to account jointly for three layers of phenomena belonging to the same domain, namely:

(i) the individual lexical items occurring in the sentence as *contextually bound* or as *non-bound*, the former use being possible only with items the speaker assumes to be easily accessible in the hearer's memory, i.e. salient, activated over a certain threshold in the stock of shared knowledge (as for the degrees of activation and for their change during the discourse, see Section 3.2 below);

(ii) the division of the underlying (tectogrammatical) representation of the sentence into its *topic* and its *focus*;

(iii) the hierarchy of *communicative dynamism* (CD; "deep word order"), rendered by the left-to-right ordering of the nodes of this representation.

Informally, the *focus* of a tectogrammatical (underlying) representation (TR) of a sentence, treated as a dependency tree, can be specified as follows:

if the main verb or some of the nodes which directly depend on it (i.e. some of the "deep cases" and other modifications) are contextually non-bound, then these nodes belong to the focus of the TR;

if a node other than the root of the tree belongs to the focus, then also all nodes subordinated to it belong to the focus;

if the root and also all its daughter nodes are contextually bound (cf. (8) above), then it is necessary to specify the rightmost of the daughter nodes of the root and ask whether some of its own daughter node(s) is (are) non-bound; if so, then these nodes belong to the focus; if not, we again specify the rightmost of the last set of sister nodes and ask whether some of its daughter nodes are non-bound, etc.

We work with two rather strong hypotheses. The first of them claims that the boundary between topic and focus is always placed so that there is a node A such that every node that is less dynamic than A belongs to the topic, and that which is more dynamic, to the focus. The other hypothesis says - cf. (a) in 2.1.3 above - that the hierarchy of CD within focus is determined by what we call systemic ordering, i.e. an ordering of the types of dependency relation which is given by the grammar; on the other hand, within the topic, permutations of the participants and of the free modifications are possible.

An examination of Czech in comparison with English and several other languages has led to the conclusion that the systemic ordering of some of the main participants is identical for many languages, having the form: Actor - Addressee - Objective. As for Instrument, Origin, and Locative, it seems that English differs from Czech in that these three participants follow Objective in English, though they precede it in Czech.

Let us remark that such notions as "fixed" and "free" word order should not be taken as absolute notions, characterizing languages as wholes. As was stressed by Hajičová (1991), each language exhibits a certain freedom and, at the same time, certain regularities in its word order; e.g. in English not only such phenomena as topicalization or left dislocation, but also many kinds of adverbials display possible variation in word order (*from Cambridge to Oxford - to Oxford from Cambridge, by car with a friend - with a friend by car*). The "free" word order is not actually free; primarily, it is determined by the scale of communicative dynamism.

Various questions of TFA are still open for a more detailed and systematic investigation, but a framework has been already built that allows for an explicit description of many of these phenomena. The relevance of TFA for semantics is illustrated in the next two Sections on the examples of presupposition and negation. Here we would like to recall that the semantic relevance of TFA is corroborated by examples of sentences with overt or covert quantification (cf. (9) through (11)):

- (9) (a) John talked to few girls about many PROBLEMS.
- (b) John talked about many problems to few GIRLS.
- (10)(a) English is spoken in the SHETLANDS.
- (b) ENGLISH is spoken in the Shetlands.
- (11)(a) One smokes in the HALLWAY.
- (b) In the hallway one SMOKES.

The scope of operators (quantifiers, negation), which is derived by the interpretation procedure, is thus influenced by TFA so that, e.g., in (9)(a) *few* has the wider scope, whereas in (b) its scope is narrow.

2.2.3 It is the intention of Prague School methodology to look for *operational criteria* that help to decide whether in the given case a token of the defined class is present or not; we are convinced that also for TFA there exist tests that enable us to identify the different phenomena from this domain with a degree of certainty and preciseness similar to that gained e.g. for the identification of the syntactic sentence parts. One of these tests, indicated by Hatcher (1956) and further elaborated especially by Daneš (1970), is based on the assumption that for every sentence the intuitions of the speakers of the given language determine a set of *wh*-questions that can be appropriately answered by the given sentence in different contexts. Thus (with the intonation centre on *a problem*), (12) can answer (13)(a) to (d), while it cannot answer (13)(e) or (f); for the given illustration we disregard such differences as that between (13)(c) and "What did John speak about to that tall girl who sat beside him yesterday?", and also the different possible positions of the intonation centre in the questions.

- (12) John talked to his neighbour about a PROBLEM.
- (13)(a) What did John do?
- (b) What did John talk about to whom?
- (c) What did John talk about to his neighbour?
- (d) What was John's attitude towards his neighbour?

- (e) Who talked to his neighbour about a problem?
- (f) To whom did John talk about a problem?

Beside the intuitive consensus concerning the set of questions for which a given sentence can serve as an appropriate answer, it is also necessary to exclude questions that do not fully represent the relevant features of the context in which the given sentence can be appropriately used. Thus, e.g., if (12) is used in a dialogue as an answer to (14), then either the answer (i) brings more information than was required by the question (if *his neighbour* was not activated above the threshold and belongs to the focus of the answer), or (ii) a part of the activated (salient) information was not mentioned in the question since recalling it would be superfluous, but in the answer the words *his neighbour* refer (in a redundant way) to this piece of information (they belong to the topic of the answer).

- (14) What did John talk about yesterday?

This answer may appear quite useful in the given point of the dialogue, but it is not an immediate answer fully fitting the given question. The usefulness of such an answer is due to the pragmatic conditions and the flexibility of a dialogue, rather than to the linguistic properties of the two sentences involved.

It is possible to object that in fluent dialogues the exchange of 'full' questions and 'immediate' answers is rather rare. However, we are not analyzing the structure of the dialogue now; we are just looking for a testable criterion that could help us to identify the boundary between topic and focus (and, as far as this is possible, also the degrees of CD). If the intuition of the speakers coincides as to the properties of such questions and answers, then the test can be used with good results.

The following rules understood as the basis of the question test may be restated here:

- (a) if the set of all those questions for which the given sentence can serve as an 'immediate' answer (called "the set of relevant questions" in the following) fulfills the condition, for some phrases A and B included in the given sentence, that (the referent of) A is (referred to by a phrase) included in every question from the set in which B is included, and also in such a question (from the set) that does not include B, then in (all TR's of) the given sentence the (source of the) phrase A is less dynamic than (the source of the) phrase B;

(b) if A (from the given sentence) occurs in no element of the set of relevant questions, it is the focus proper of the given sentence;

(c) if A (from the given sentence) occurs in every element of the set of relevant questions, then it belongs to the topic of the given sentence;

(d) if (a) is met by A and B, but either A or B breaks (b) and also (c), then the sentence is ambiguous in that the phrase breaking these two conditions belongs to its topic in some of its TR's and to its focus in some other;

(e) if there is a pair of phrases, A, B, in the given sentence such that A and B break (a) and neither A nor B meets (c), then the sentence is ambiguous not only with respect to the position of the boundary between topic and focus - cf. (d) and Chomsky's "range of permissible focus" - but also in that A is less dynamic than B in some of its TR's, being more dynamic than B in some other; at most in one of these two cases both A and B belong to the focus.

If these conditions are applied to our example (12) above, (a) is fulfilled by the pairs *John* and *talked*, *John* and *(to his) neighbour*, since *(about a) problem* is not included in any relevant question; (a) is also fulfilled by every pair containing *problem* as B and any other constituent (the verb or one of its participants) as A; thus, in the scale (or linear ordering) of CD of all TR's of (12) *John* precedes *talk* as well as *neighbour*, while each of the three precedes *problem*. The condition of (b) is met by *problem*, which is the focus proper of all TR's of (12), while *John* belongs to the topic in all TR's since it fulfills (c). Since the condition of (d) is met by the pairs in which A and B are assigned the values of *John* and *neighbour*, respectively, or *John* and *talk* (and, trivially, also *neighbour* and *problem*, as well as *talk* and *problem*), we may state that there are TR's corresponding to (12) in which

- (i) *talk* belongs to the topic,
- (ii) *talk* belongs to the focus,
- (iii) *neighbour* belongs to the topic,
- (iv) *neighbour* belongs to the focus.

If *talk* is substituted for A and *neighbour* for B (or vice versa), point (e) is fulfilled, so that there are such TR's in which *neighbour* is more dynamic than *talk* as well as others in which *neighbour* is less dynamic, whereas only in the former case may both the phrases belong to focus.

This shows that to a certain degree the question test is useful not only for drawing the boundary between topic and focus (or, more exactly, between the contextually bound and non-bound parts of the upper bundle of a TR of a given sentence, see below), but also for identifying the degrees of CD; the elements that belong to the topic only in some of the TR's of the sentence are

more dynamic than those belonging to the topic in all TR's, but less dynamic than the (single, as the examination of hundreds of examples from different European languages suggests) element that in all TR's belongs to the focus (and thus constitutes the focus proper).

The operative use of the question test gives definite results; in those cases in which it yields more than one possible topic/focus structure for a single sentence, the sentence is ambiguous, so that the test should yield all the resulting TR's, and this is precisely what the question test does. The solution of the ambiguities is a quite different task, which requires the knowledge of the relevant points of the situation in which the ambiguous sentence was used; for "human" application this knowledge may be reduced to the choice of one of the "relevant questions", but this, of course, does not help in the case of an automatic analysis.

The question test appears to give results very similar to the scale called 'range of permissible focus' by Chomsky (1968); some of the drawbacks of his formulations were discussed by Sgall and Hajičová (1977). Certainly the question test is also connected with certain difficulties. First of all, it cannot be applied directly to sentences other than positive declarative ones; negative, interrogative and other sentences have to be analyzed as parallel to their positive declarative counterparts, which is relatively easy with negative sentences, though not with questions (see Hajičová, 1976, and Section 2.4.1 below). Second, it is not always possible to apply the test to embedded elements in the analyzed sentence.

It is not quite certain whether, e.g., (15) is an immediate answer (in the above sense) to (16), and not only to (17):

- (15) His house has been destroyed by a TORNADO.
- (16) What happened to John?
- (17) What happened to John's house?

2.3 Focus and Presupposition

Though the fashionable wave of using (and misusing) the notion of *presupposition* in linguistic writings has crested in the beginning of the seventies (see Karttunen and Peters, 1977), the notion still remains one of the widely discussed issues in present-day linguistic writings. In this Section I would like to return to my older investigations which led me to introduce the

trichotomy of 'meaning proper', presupposition and allegation (Section 2.3.1), and re-examine the appropriateness of the notion of allegation from the point of view of several, more recent writings on presupposition (Section 2.3.2), adding then further remarks on the relevant issues.

2.3.1 First, the fundamental assumptions should be briefly summarized (cf. already Hajičová, 1971): three kinds of entailment should be distinguished, which can be specified for declarative sentences in the following way:

(i) meaning proper: A is a (part of the) meaning proper of B, if B entails A and not-B entails not-A;¹⁹

(ii) presupposition: A is a presupposition of B, if B entails A and not-B entails A;

(iii) allegation: A is an allegation of B, if B entails A and not-B entails neither A nor not-A.

The three notions can be preliminarily exemplified by the sentences (18) to (24).

(18) Since John was ill, we won the MATCH.

(19) Since John was ill, we didn't win the MATCH.

(20) Harry caused our VICTORY.

(21) Harry didn't cause our VICTORY.

(22) We won the MATCH.

(23) We didn't win the MATCH.

(24) John was ILL.

(25) ... He tried hard, but it was Johnny who took over all the initiative, was the best player of the team and helped most of all to get back the Cup.

(26) ... This time, unfortunately, we lost the game.

The assertion (22) is a part of the *meaning proper* of (18), since it is entailed by (18) and (23) is entailed by (19); (24) is a *presupposition* of (18), since it

¹⁹ Our understanding of not-A and not-B, i.e. the linguistic negation, is discussed in 2.4.1. It is not identical with the logicians' formulation "it is not true that...", since we are convinced that the latter formulation disguises the linguistic structuring of negative sentences, esp. the distinction between sentences with and without a topic (categorical andthetic judgements). Moreover, it also disguises the difference between falsity and inappropriate use: A sentence S can be used, in general, as true, false, or in an inappropriate way: thus, *The sentence S is not true as well as It is not true that S* both just state that S is not true in the given context; they both may hold if its use with respect to the given world and reference assignment was false or inappropriate.

is entailed both by (18) and by (19); (22) is an *allegation* of (20), because it is entailed by (20) and neither entailed nor denied by (21), as the two possible continuations of (21) show, which we exemplify here by (25) and (26). This is to say that in the case of allegation, what is entailed by the affirmative sentence may, but need not take place if the corresponding negative sentence is true.

Also some of the verbs often characterized as connected with presuppositions appear not to display such properties. Thus, *to open* seems to be connected with an allegation rather than with a genuine presupposition: *John didn't open the door* can be followed by *It was already open when he came*; similarly, *John doesn't accuse Paul of the delay in the publication of the paper* can be followed by *In fact John doesn't regard the delay as bad, because now there is still time to make corrections*, and such a sentence as *John doesn't criticize Paul for the delay in the publication of the paper* can be followed by *He doesn't regard Paul as responsible for the delay*. This shows that *accuse* and *criticize* too can be characterized as determining allegations, contrary to Fillmore's (1969) assumption that these verbs are connected with presuppositions.²⁰

2.3.2 A closer look at the examples analyzed reveals interesting relationships between the classification of entailment and TFA. If the NP *our victory* is (a part of) the topic with such a verb as *cause*, then it does trigger a presupposition: (22) is a presupposition of (27), since it is entailed both by (27) and by (28); (28) can be followed by (25), not by (26).

(27) Our victory was caused by HARRY.

(28) Our victory wasn't caused by HARRY.

We have offered an explanation in terms of the scope of negation: as our investigations in the framework of FGD have shown (Hajičová, 1973), in the unmarked case the scope of negation is identical with the focus of the sentence²¹ and no presupposition is triggered by *our victory*, in such a

²⁰ Fillmore and others who distinguish only 'meaning proper' ('assertion') and presupposition do not have any possibility to discuss more articulated questions than whether a given verb triggers a certain presupposition.

²¹ Our understanding of 'scope of negation' differs from Kempson's (1977:133f), discussing the relationships between the component parts of a single lexical item. While it is possible to agree with her that, e.g., *It wasn't a woman that came to the door* is indistinct, rather than ambiguous, as far as the negated part of the meaning of *woman* is concerned, nothing follows from this for the

position. Thus in (20) the noun group is connected just with an allegation; see also a logical approach to allegation in Materna (1978).

2.3.3 Evidently, the current understanding of the notion of presupposition covers a heterogeneous collection of phenomena. Attempts to apply the negation test consistently, and to subject the examples of 'obvious' presupposition-carrying structures to a detailed empirical analysis have caused serious doubts about the appropriateness of introducing presuppositions into linguistic (as well as logical) theory. Several ways out have been suggested: on the one hand, it was proposed to recognize a certain 'gradience' in entailment (Bolinger, 1976), and on the other hand, to broaden the notion of presupposition to cover all presupposition-like phenomena even if they do not comply with current definitions (Cooper, 1974). It was shown, however, that this collection should be divided into categories one of which at least, since belonging to conventional implicature, can meet the original, strict requirements (Karttunen and Peters, 1977, 1979).

Others proposed an entailment analysis within a pragmatic theory of preferred interpretations (Wilson, 1975), or refused to include the concept of presupposition in the semantics of natural language, accounting instead for the phenomena in question with a Gricean pragmatic framework (Kempson, 1975). In his revealing review of Kempson (1975), Cresswell (1978) points out that the problem of presupposition can be transposed to that of the scope of negation. But this does not solve the problem in its entirety: as Hausser (1976) correctly has pointed out, a Russellian analysis (assuming the ambiguity of *The present king of France is not bald* on the narrow scope and wide scope negation readings) runs into difficulties for two reasons:

(a) the above sentence is intuitively unambiguous;

and

(b) the analysis cannot be extended to other instances of presuppositions.

As for (a), a topic-focus analysis of the sentence offers a suitable explanation; in its highly preferred reading, this sentence is not without a topic (since the subject position is occupied by a definite NP); as for (b) it seems that these other instances would include, e.g., factives.

We have followed a similar line of thinking when arguing for the necessity of the recognition of allegation in our papers mentioned above; in addition, we attempted there to specify the scope of negation in its close relation to topic-focus articulation as briefly outlined above. In our

scope of negation in the usual sense (with respect to the structure of the sentence).

formulations, not-S refers to the negation of the sentence S in the sense of the negation of the focus of S. With sentences having a topic, this can be compared with what logicians call 'internal negation', viz. negation of merely some part of the sentence. In terms of our understanding of the relation between topic and focus on the one hand and of the scope of negation on the other, external negation is the case of negation of a sentence without topic. Informally speaking, sentences without a topic may answer a very general question such as *What's the matter?*, *What has happened?*, *What's the case?*, and they lack an indexical or other lexical item referring broadly to the given situation (setting). Thus, *No RAIN is falling* and *A stranger fell DOWN* lack a topic, while *Yesterday it RAINED* and *There was a STRANGER here* have one (*yesterday* and *here*, respectively).

In the discussion of presupposition, the question of ambiguity vs. non-ambiguity of negative sentences has emerged. Kempson (1979) does not recognize any empirical or methodological basis for the ambiguity thesis, while Katz (1979) assumes that negative sentences are inherently ambiguous between a presuppositional and a non-presuppositional reading. Dinsmore (1981:339), criticizing Atlas (1979), who postulates a more abstract entity for the meaning of negation becoming external negation in some contexts and internal negation in others, duly remarks that people "most always mean what they say". This, however, should be extended in the sense that people also mean to negate what they negate, thus corroborating the ambiguity thesis (cf. Section 2.4 below).

Interestingly, many of the writings quoted above hint at the necessity to recognize a concept similar to that of allegation. Many such insights can be found especially in Wilson (1975), who speaks about 'alleged presuppositions' (p. 25) and analyzes such examples as *I didn't clean the bathroom. I cleaned the kitchen* as neither suggesting that the bathroom was dirty (usually considered as the proper analysis of the presuppositions of 'clean'), nor explicitly stating that it was not (Wilson, 1975:84, ex. (41)). In addition, some studies take the close connection between the kind of entailment and the articulation of the sentence into topic and focus into account. Thus, it is by now widely accepted (and our own conclusions in Hajičová, 1971, should be amended accordingly) that in the case of definite NPs, the failure of the 'existential' (in our terms, referential) entailment carried by such a definite element makes the statement meaningless (i.e., it causes a truth value gap, it constitutes a presupposition failure) if the NP in question is in the topic part of the sentence. Note that those who rely on English only and take it as a prototype of natural language, speak mistakenly about the subject position of the NP.

On the other hand, if the definite NP is a part of the focus, the failure of the entailment leads to the falsity of the whole statement (see, e.g., Cooper's, 1974:37, example *He spent the morning interviewing the king of France*; cf. also Keenan, 1976:318; Lyons, 1977:601; Sgall, 1980, and Fodor's, 1979, discussion of the pair *The king of France visited the exhibition* and *The exhibition was visited by the king of France*). Also Wilson and Sperber's (1979) "ordered entailments" come rather close to our suggestion to study presupposition in close connection with the topic-focus articulation (especially with the hierarchy of communicative dynamism). In his discussion of Wilson and Sperber's examples, Dinsmore (1981:346) seems to be mistaken when he assumes that sentence stress (i.e. the position of the intonation centre) is not decisive: *Susan REGRETS that she left* presupposes *Susan left*, but when the intonation centre is shifted to the final element (*Susan regrets that she LEFT*) this entailment becomes an allegation (the negative counterpart *Susan does not regret that she LEFT* may but need not imply that Susan left). In effect, Dinsmore's own claim that presupposition ties in with given information (1981:361) as well as Kuroda's (1979) definition of presuppositions by means of 'old or given information' both point to the necessity of studying presuppositions in a close relationship with the issues of topic and focus.

2.3.4 One of the first to make a distinction between 'logical' and 'pragmatic' presuppositions was Keenan (1971), who takes the latter to be determined by culturally defined conditions of the context, having nothing to do with the speaker's beliefs about the truth or falsity of the entailed expression(s). In fact, it may have been misleading to call them 'presuppositions' in the first place. Thus we disagree with Stalnaker (1974), who claims that "the semantic and pragmatic notions of presupposition provide two alternative accounts of the same linguistic phenomenon".²² Rather, we are dealing with two different, though overlapping sets of phenomena, one having an immediate impact on linguistic meaning, the other having more in common with Gricean conversational principles and implicatures.²³ As

²² The former are defined in terms of van Fraassen's (1968) definition, the latter by means of conversational acceptability of the utterance P, when the speaker of P assumes Q and believes his or her audience to assume Q as well (Stalnaker, 1974:222-223; cf. Schwarz, 1977:247). Groenendijk and Stokhof (1978) work with a modified definition of pragmatic presuppositions (the speaker's belief being a necessary feature) and conclude that every semantic presupposition has its pragmatic counterpart, though the inverse does not always hold.

²³ See Sgall's (1975) discussion of Keenan's pragmatic presuppositions.

Verschueren (1978) notes, there are pragmatic "presuppositions" that "disappear" under negation; cf. also Schwarz (1979). A plausible explanation concerning this point is offered by Hausser (1976:258), who argues that it is *sentences* which have presuppositions (although in this case we would prefer 'sense of a sentence', i.e. an underlying representation plus the specification of the reference, to 'sentence'). While speakers and hearers both may have their own assumptions, speakers must reckon with the semantic properties of the sentence (including its semantic presuppositions) if they want to use a sentence successfully, and they must take the hearer's assumptions into account as well.

Let us only note in this connection that probably every genuine presupposition (i.e., 'logical' or 'semantic') has also its pragmatic aspects, representing necessary conditions on smooth linguistic performance (cf. Verschueren, 1978:109). Other phenomena, such as the distinction between *tu* and *vous* in French, may show similar pragmatic aspects. However, the latter seem to belong to the domain of conversational implicatures, felicity conditions, and similar regularities of communicative competence, rather than to linguistic competence itself. The pragmatic aspects of 'logical' or 'semantic' presuppositions both derive from the fact that it is the *sense of a sentence* (see Section 1.2.3 above) that is connected with a certain presupposition. In other words, it is necessary to know the reference assignment of a given occurrence of the sentence to be able to check whether or not its presuppositions are met.

2.3.5 Even if it can be shown that many assumed instances of presuppositions can be explained either by appealing to the scope of negation as not including the topic of the sentence, or to the Gricean pragmatic framework, there still remain presuppositions that are carried by the complements of factive verbs (e.g. *I know that...*), and which admittedly are connected with a kind of entailment that is different from that of 'meaning proper' and allegation.

Careful investigations of the so-called factive verbs and of the entailments connected with their complements in the position in the topic and in the focus of the sentence point to a set of factive verbs that probably is smaller than formerly assumed. In the case of *to regret*, *to be glad*, for instance, the changing around of topic and focus reveals their object clauses to be presupposed only when in the topic, whereas in the focus position they are connected with allegations.

(29) He regretted that his friends came to SEE him.

(30) He didn't regret that his friends came to SEE him.

- (31) That his friends came to see him he didn't REGRET.
 (32) You're mistaken; his friends didn't come.
 (33) His bad mood was due to the fact that the weather didn't allow him to plan a skiing weekend this time. As for his friends, they all came for the party and it was a nice party, you can believe me.
 (34) His bad mood was due to the fact that the weather didn't allow him to plan a skiing weekend this time. As for his friends, they had to stay at home since they had a sick child.

If the 'fact' that the friends came to see him were presupposed, then reaction (32) would be appropriate for all the sentences (29) to (31), since it would point to a presupposition failure. However, in the case of (30), such a reaction makes the dialogue incoherent, whereas (30) can be coherently followed both by (33) and by (34).

Cresswell's doubts about the feasibility to subsume the problem of factives under the analysis of the anaphorical use of the definite article (as proposed by Kempson, 1975) are thus more than justified (1978:443). He discusses cases similar to (35):

- (35) John doesn't know (the fact) that he lost a sixpence.

It would be rather difficult to show that the definite article in '*the fact that ...*' really plays the anaphoric role that Kempson assigns to it as a key feature in her analysis. Rather, *the fact* refers to the following *that*-clause and this clause belongs primarily to the focus of the sentence in question. The object of such verbs as *to know* belongs to the topic only in specific contexts, such as, e.g., *John lost a whole fortune but he does not KNOW yet that his financial situation has become that bad.*

2.3.6 We are convinced that the above lends support to the necessity to consider presupposition as a specific type of entailment. A number of authors speak of entailment as such, implying that there is no need to differentiate between its different kinds. However, even if - for the sake of the argument - we accept the analysis of a sentence as a conjunction of propositions, we cannot overlook the fact that the different elements in such a conjunction have a different status. Thus, for example, if we take (36) as a conjunction of several propositions, among others of (37)(a) and (b), the respective negative reactions (38)(a) and (b) differ from each other.

- (36) John knows that Jane married Jim.

- (37)(a) John knows the fact.
 (b) Jane married Jim.
 (38)(a) No, he doesn't know.
 (b) Oh, no, you are wrong, she didn't.

Replies such as (38)(b), or those starting with *Oh no, you see, ... How could it be so?* indicate that there is a certain discontinuity in the dialogue. The speaker makes clear that one of the tacit assumptions made by the other participant does not hold in the given situation. It is, of course, also possible to just say *No, she did not*, but such a simple continuation is by far not as natural as (38)(b). Thus, such replies as (38)(b) can be regarded as typical for the case of presupposition failure, i.e. where a conventional implicature is not met at the given point of discourse. More precisely, a presupposition failure obtains in those cases in which such a reply may follow either the affirmative sentence or its negation. On the other hand, when only the affirmative sentence allows for this continuation, we may be faced with an allegation.

Similar consideration may hold for Kempson's (1975) example, here (39), with a reply such as (39)(a), which evidently is different from (39)(b): only the latter entails the truth of the fact that Edward had been unfaithful to Margaret.

- (39) Sue didn't realize that Edward had been unfaithful to Margaret.
 (39)(a) You must be wrong. How could she have! I know Edward never has been unfaithful to her!
 (39)(b) Oh no, on the contrary, she did realize it!

While (39)(a) suggests a presupposition failure, (39)(b) indicates the negative truth value for (39). For the latter, the initial *On the contrary* may be taken as a test confirming this. For sentences conveying partially true information (e.g., *The French flag is red and blue*) falsifying reactions such as *But not only!* are typical.

2.3.7 The need to distinguish presupposition from other kinds of entailment is thus confirmed by:

- (i) distinguishing allegation from presupposition,
 and
 (ii) working in a systematic way with the topic-focus articulation.

It should be recalled that in cases such as *to open*, or *to accuse* vs. *to criticize* an allegation rather than a presupposition is at stake, while, on the other hand, such semantic units as *to cause*, *to regret*, or definite NPs are

connected with presuppositions only if the 'triggering' elements belong to the topic (belonging to the focus, they 'trigger' an allegation only; cf. (20) vs. (27), (30) vs. (31) above, and so on). Only if these cases are duly distinguished, it is possible to conclude in a convincing way that there exists a class of genuine presuppositions (i.e., conventional implicatures meeting the conditions of the definition reproduced as (ii) in Section 2.3.1). It is, then, not surprising that this class does not include all the cases originally subsumed under that heading; even more relevant, the class is not empty.

As we have seen above, definite NPs (or at least some of them) are connected with referential presuppositions if they belong to the topic rather than to the focus. It remains to be tested empirically whether also NPs with the delimiting feature 'Specific' do not likewise trigger a presupposition, if they belong to the topic. Such examples as (40) seem to corroborate this view:

(40) It was PAUL who saw a white crow yesterday.

(41) Paul saw a white CROW yesterday.

Contrary to (41), which contains the relevant NP in the focus, (40) mentions it as contextually bound, as if white crows were 'given' by the preceding context or situation, i.e., as one of the salient items in the stock of shared knowledge.²⁴ We assume that (42) is natural if it follows (40), while (43) is a smooth continuation of (41) but not vice versa. It follows then that the topic position is a condition for a presupposition to be present also in the case of at least some specifying NPs; not only definite NPs are concerned.

(42) Oh no, you are wrong, no one has ever seen a white crow.

(43) No, on the contrary, he saw only black ones.

Also, the fact that such words as *even* or *also* are connected with genuine presuppositions (Karttunen and Peters, 1977) seems to indicate the specific function of those adverbs in the topic-focus articulation. In *They saw even JANE* or *They met also PAUL*, these adverbs mark the following nouns as being the only items included in the focus, with the verbs and their subjects then belonging to the topic, so that such sentences can be used appropriately

²⁴ Even in examples such as these, what is presupposed here is not exactly the existence of white crows in (our image of) the actual world. Thus, sentence (40) may be preceded, e.g., by *Two of the patients had dreams about fantastic creatures during the last few days*, and followed by *A flying horse was seen by JIM this time*.

only in those contexts where one of the salient items is that 'they' saw (met) someone.

As for proper names, however, it seems that even if included in the focus they are connected with a genuine referential presupposition: both *John has (not) met MARILYN* and *John has (not) MET Marilyn*, entail that there is a person (in the relevant part of the universe of discourse, not necessarily in the real world) who is referred to as Marilyn. A continuation such as *I don't know who you mean by Marilyn* can be understood as an instance of presupposition failure.

Returning back to such adverbs as *even* or *also*, it should be noted that they, similarly as negation and as sentence adverbials, behave as 'focalizers' (see Koktová, 1986; Hajičová and Sgall, 1991, and the writings quoted there, esp. Jacobs, 1983, and his 'Gradpartikeln'). Focalizers, which have foci of their own, often occupy a boundary position between topic and focus, but also can be included in the topic or constitute the single element of the focus, in which case their scope coincides with the rest of the sentence (with the topic). If the boundary position is not occupied by an overt focalizer, then it is possible to accept the presence of the affirmative modality as a virtual focalizer (cf. Zemb, 1987). Two approaches may be formulated as more or less equivalent:

(i) a sentence without a focalizer can be taken as the basic (prototypical) case, and the position on the boundary between topic and focus can be regarded as the primary position of a focalizer; the other possible positions of focalizers can then be described as specific secondary cases (the syntactic conditions and the semantic interpretation of which have to be specified along the lines discussed recently by M. Rooth, M. Krifka, and others); these secondary cases probably occur only in rather limited classes of contexts;

(ii) the description can start from the general case (taking into account the different positions of focalizers) and a sentence without any overt focalizers can be handled then as displaying a 'zero' focalizer, i.e. the assertive modality of the verb; however, it would then be necessary to admit the existence of such a zero focalizer also in such sentences where an overt focalizer is included in the topic part of the sentence, e.g. (*Who did only John see?*) *Only John saw MARY*; it would not be quite clear in such a case whether a zero focalizer is not present when a focalizer occupies the position of the boundary between topic and focus (why should not the affirmative modality play the role of a focalizer in *Jack readily helped his FATHER*, if it plays this role in *Jack helped his FATHER*? However, in *Jack helped even his FATHER* the modality, together with the lexical meaning of the verb, is included in the topic.).

Since the focalizer can belong either to the topic or to the focus, it seems preferable to understand its primary position (on the boundary) as that of the least dynamic element of the focus, rather than as a third part of the sentence (between its topic and focus). This should not be understood as contradicting the semantic analysis using tripartite structures (as currently applied by B. Partee and her school); with this analysis, the operator can be included in a noun group. Furthermore, the difference between the linguistic structure of the sentence as the input of semantic interpretation and the output (or some intermediate stages) of the interpretation should not be neglected.

2.4 Focus and Negation

After a discussion of different shapes of the scope of negation (2.4.1) and of the alleged vagueness of this operator (2.4.2 and 2.4.3), we present an analysis of the issue of presuppositions of questions (2.4.4 and 2.4.5).

2.4.1 In the stimulative analysis of negation by Vachek (1947), we can find several pioneering observations concerning the relationship between the meaning of negative sentences and functional sentence perspective (topic-focus articulation, TFA, in our terminology). Vachek's analysis, supported by some more recent treatments of negation, led us to examine systematically the relevance of TFA for the interpretation of the scope of negation in Czech and English sentences, with the conclusion (Hajičová, 1973) that linguistic negation can be understood as an operator the scope of which should be analyzed as follows:²⁵

(a) in the primary case the scope of negation is identical with the focus; two situations can be distinguished then:

(aa) the verb belongs to the focus and is negated, as in the primary reading of (44), where only the subject (functioning as topic) is outside the scope of negation;

(ab) the verb belongs to the topic, so that it is not negated, see (45);

(b) in the secondary case a verb in the topic constitutes itself the scope of negation, see (46).

²⁵ These three readings might be completed by a fourth one, namely that in which the negative polarity would be the only element in focus (see Koktová, 1990); in our approach here this case is considered to be a special instance of (aa) with (negated) verb being the only element in the focus part of the sentence.

- (44) Harry didn't bring any new BOOKS. (He stayed home tonight).
- (45) Harry didn't bring any new BOOKS. (...He brought only a couple of journals).
- (46) Harry didn't bring any new books since he was ILL (when answering e.g. "Why didn't Harry bring any new books?")

2.4.2 It should be noted that only case (a) can be understood as a negated sentence, i.e. as not-A in the sense of Section 2.3.1 above, since case (b) comes closer to lexical than to sentential negation. Our analysis of negation has led us to claim that a sentence the topic-focus structure of which allows for several different positions of the operator of negation (and thus for the assignment of different scopes) is an ambiguous sentence with as many meanings as many scopes can be assigned to it. We are not alone in regarding negative sentences as ambiguous; a number of arguments have been represented by several linguists supporting this claim (see, e.g., Chomsky, 1968; Lakoff, 1970; Jackendoff, 1972; for more recent treatments, cf., e.g., Jacobs, 1982; Lieb, 1983; Sgall, Hajičová and Panevová, 1986).

Contrary to these views, Kempson (1975, 1977) argues that negative sentences are unambiguous. She supports her claim by the verb phrase pro-form test. This test is based on the assumption that the use of a verb phrase pro-form expression (such as *do so*, *so did*, or *did/had/will/is too*), referring anaphorically back to the action that has already been specified, demands identity of meaning. Thus, e.g., (47) is predicted to be two-ways ambiguous, since the expression *did so too* must refer either to a situation that Bill saw the duck which belonged to her (i.e. one possible reading of the first sentence in the conjunction), or to a situation that Bill saw her quickly lower her head (i.e. another possible reading of the first clause).

- (47) Johnny saw her duck and Bill did so too.

On the other hand, the same test shows that the distinction between an intentional action of rolling down a hill and an unintentional one (e.g., if somebody is pushed and he then rolls down) is not a distinction between two meanings of the first sentence in (48), see Sgall, Hajičová and Panevová (1986, Ch.2).

- (48) Mike was rolling down the hill, and so was Bob.

The speaker can use (48) with no contradiction involved in case when Bob rolled down for fun and some other boy pushed Bill so that Bill fell down and rolled down the hill unintentionally.

Applying this test to negative sentences (49) and (50) in the context (49)(a) and (50)(a), respectively, Kempson (1977:134, ex.(10) and (11)) concludes that "at least in general, negative sentences are not ambiguous with respect to variations in the scope of negation".

(49) The professor didn't accuse her of taking drugs.

(49)(a) The professor didn't accuse her of taking drugs and her tutor didn't do so either. The professor didn't say anything at all because he didn't think she was taking them and her tutor, who also takes them, merely suggested that she should be more careful about it in future.

(50) The chairman didn't sell any shares to the new firm.

(50)(a) The chairman didn't sell any shares to the new firm and the secretary didn't do so either. I know the chairman didn't because he specifically told me that he had given them some as a free gift, and the secretary didn't because he didn't have any to sell.

According to Kempson, the interpretation of (49) varies across two entailments; (i) the referent of the subject of *accuse* assumes that the action involved was bad, and (ii) the referent of the subject of *accuse* states that the person accused was responsible for the action in question. In a similar vein, the denial of the selling of shares in (50) may imply either (i) that no transaction of money took place (it was a gift), or (ii) that there was no exchange of any sort (either of good or money). The fact that in the continuation of both (49) and (50) the pro-form can refer to both (i) and (ii) interpretations simultaneously, is taken as a confirmation of postulating a single semantic representation for such sentences as (49) and (50), i.e. of regarding them as unambiguous (although indistinct, vague).

2.4.3 Let us take a closer look at Kempson's examples through the perspective of our treatment of negation as summarized in Sect. 2.4.1 above. In (49), the "natural continuation" as exemplified by the context following this sentence indicates that (on this reading at least) *the professor* and *her* belongs to the topic and the rest of the sentence to the focus, so that the scope of negation ranges over the verb and the cause of accusation (see the case (a) in Sect. 2.4.1). As for the decomposition of the lexical meaning of *accuse* (in which Kempson follows Fillmore, 1969), a detailed analysis of this and similar

examples in Hajičová (1971) led us to introduce - besides meaning proper and presupposition - a third type of entailment, namely *allegation* as recalled in Section 2.3 above, where we concluded that the component of the lexical meaning of *accuse* denoted above as (i) does not belong to the presuppositions of *accuse*, quoting (52) as a possible continuation of (51):

(51) John does not accuse Paul of the delay in the publication of his paper.

(52) In fact, John does not regard the delay as bad, because now there is still time to make corrections.

The entailment "John regards the delay as bad" is thus an allegation, which leaves open both possibilities under negation (the negation of *accuse* in (51) entails neither that John regarded nor that he did not regard the delay as bad).

As for (50), the situation is similar, but a little more complicated by the fact that in the reading documented by the context in (50)(a) the sentence should probably be pronounced with the intonation centre on *shares* rather than on *firm*. Thus the Addressee *to the new firm* as well as the Actor *the chairman* belong both to the topic of this sentence, the focus (as well as the scope of negation) ranging over the verb and the Objective: *sell shares*. Again, the entailments triggered by this part of the sentence represent an allegation, so that the two continuations in (50)(a) do not lead to contradiction.

Let us now look at example (53):

(53) Tom doesn't sleep because he is tired.

(54) Tom doesn't sleep because he is tired.

(After: Why doesn't Jane's son sleep?)

(55) Tom doesn't sleep because he is tired, but because he likes to take a nap every afternoon (= he sleeps).

(56) Tom doesn't sleep because he is tired and so doesn't do Jane.

(57) Tom doesn't because he cannot sleep when he is too tired, and Jane doesn't because she likes to take a nap every afternoon.

(58) Tom doesn't because he cannot sleep when he is too tired, and Jane *does* (sic!) because she likes to take a nap every afternoon.

Assuming that in the relevant readings of (53) the verb can either be in the focus or not, then the scope of negation ranges over the whole focus (the case (aa) in Sect 2.4.1), and if the verb is in the topic, it is out of the scope of negation (case (ab) and ex. (55)), or both the negation and the verb are in

the topic and the rightmost-side boundary of the scope coincides with the boundary between topic and focus (case (b) and ex. (54)).

As the impossibility of (57) following (56) shows, the pro-verb *do so* cannot be used to refer to the situation identified by (54) and simultaneously to that identified by (55). On the other hand, (58) reflects the difference in scope, which is rendered by the use of "doesn't" and "does" for the (b) and (ab) readings, respectively; however, (58) contradicts the second conjunct of (56). It follows that in (56) the two readings cannot be combined; they constitute two different underlying structures.

The consequence should be drawn from this observation that either the *do so* test is not an appropriate vehicle for testing ambiguity, or that negated sentences cannot be in general interpreted as unambiguous. We subscribe to the latter view, which also makes it possible to state generalizations for the interpretation of affirmative and negative sentences in relation to their topic-focus articulation. However, as we have seen, ambiguity is not brought in with negation; it is proper already to the positive counterparts: it is the ambiguity of the boundary between topic and focus, which in positive sentences is responsible for differences concerning presuppositions.

2.4.4 To specify what is a presupposition of a question (or, to be more precise, of an interrogative sentence) is a difficult problem because the test of negation cannot be used directly for this purpose. Let us first discuss from this point of view some aspects of *wh*-questions.

An integrated formal analysis taking into account both logical and linguistic aspects of *wh*-questions was given by Keenan and Hull (1973), who define presuppositions of questions as logical consequences of every pair of the given question and one of its logical answers. According to their definition an L-sentence (i.e. roughly a logical form of a sentence) *S* "is a logical presupposition of a question *Q* just in case, for every answer *A* to *Q*, *S* is a logical consequence of the pair (*Q*, *A*)", where *A* is the phrase which with other approaches would be considered the (non-omissible) focus of the answer.

With such a specification of a presupposition of a question based on the logical answers to the question it is not quite clear whether a negative pronoun might be considered a logical answer to a *wh*-question: If one supposes that *nobody* is a possible answer to (59) then using the above mentioned framework we see that (60) is not presupposed by the given question, since (60) is not a logical consequence of the pair (*Who came? Nobody.*); only if one assumes a priori that *nobody* does not belong to appropriate answers to the given question, then (60) is presupposed by the question.

(59) Who came?

(60) Somebody came.

The view that (60) is a presupposition of (59) is shared by many of those who discuss this problem (see Katz and Postal, 1964; Karttunen, 1978; Bolinger, 1978a, 1978b; Hintikka, 1978, but cf. below).

A more differentiated view is held by Kiefer (1977); he makes a distinction between a presupposition of a question (which must be shared by the answer) and a background assumption (which may but need not be shared by the answer). He exemplifies this distinction on (61) to (63).

(61) Who has studied water pollution?

(62) There is no water pollution.

(63) Nobody.

(62) is a negation of (one of) the presupposition(s) of the question (61) (one can speak here about "presupposition failure": the response might have started with the words "You're mistaken, there is no water pollution"). On the other hand, (63) only indicates that the hearer does not share the background assumption of the speaker ("somebody has studied water pollution").

Joshi (in his lecture in Prague, 1979) proposed to make an interesting distinction between presuppositions and presumptions of a question: *P* is a presupposition of *Q*, if for all direct answers *A_i* of *Q*, *A_i* → *P* and ¬*A_i* → *P*. *P* is a presumption of *Q*, if for all direct answers *A_i* except one, say *A_j*, *A_i* → *P*, ¬*A_i* → *P*, *i* ≠ *j*. This is to say that in case *P* is a presupposition of *Q*, then one cannot answer *Q* by a negative pronoun; see (64) and (65).

(64) When did John take CSE 110?

(65) John took CSE 110. (= presupposition)

If, on the other hand, *P* is just a presumption of *Q*, such an answer is possible; see (66) to (68).

(66) Which faculty members teach CSE?

(67) Faculty members teach CSE. (= presumption)

(68) Noone.

In the latter case Joshi states the questioner may add "if any", which admits the negative answer (68).

We tried to show (Hajičová, 1976) that the intuitive acceptability of a negative answer such as (71) to *wh*-questions depends on the way in which the question is pronounced: if the intonation centre is on the *wh*-element (as in (70)), then (71) is highly inappropriate, and almost breaks down the dialogue (the speaker might have added "You're mistaken, noone came there"), while if the intonation centre is at the end of the question (as in (69)), such an answer is quite acceptable, cf. Stechow (1980).

(69) Who came to the MEETING?

(70) WHO came to the meeting? (= WHO was it who came to the meeting?)

(71) Nobody.

With (70) one expects to be given a non-empty list of persons who attended the meeting, which is not the case with (69).

If these intuitions are true, then again the presuppositions of questions must be studied in close connection with the topic-focus articulation of questions. The intonation centre on the *wh*-element shows that the rest of the question belongs to the topic part; if the intonation centre lies on the last element of the question, then (at least) this element belongs to the focus (see Hajičová, 1976, for the topic-focus distinction in questions).

It should be mentioned in this connection that Bolinger's (1978b) analysis of the *wh*-questions is based on very similar considerations; if the *wh*-element is in the final position, then only the *wh*-element is assumed to be in the comment (focus), the whole rest of the question belonging to the topic, as in (72).

(72)(a) You gave the book to WHOM?

(b) WHOM did you give the book to?

In this particular paper, Bolinger does not take into consideration the possibility of the front position of the *wh*-word with the shift of the intonation centre on it, thus marking it also as the comment (focus) cf. (72)(b), although, e.g., in Bolinger (1972) the relevance of intonation is duly stressed.

When examining the way how the distinction between presupposition and presumption (as defined by Joshi) is determined by the structure of the interrogative sentence, one easily finds that the difference between the placement of intonation centre on the *wh*-element and on some other element of the question is only one of the relevant factors: While this criterion is sufficient for such examples as (73) or (74) (where a negative answer is

acceptable only for the (a) variants, so that (c) is a presumption of (a) and a presupposition of (b)), in other examples, such as (75), (c) belongs to the presuppositions of both (a) and (b).

(73)(a) Who came LATE?

(b) WHO came late?

(c) Someone came late.

(74)(a) What did you buy for him for a Christmas PRESENT?

(b) WHAT did you buy him for a Christmas present?

(c) You bought him something for a Christmas present.

(75)(a) Why did you come so LATE?

(b) WHY did you come so late?

(c) I came late for some reason.

These considerations led us first to a preliminary hypothesis that this distinction is connected with that between inner participants (theta-roles, cases) and free modifications (adjuncts). It soon turned out, however, that the facts are not so simple. There are examples in which an interrogative sentence with a *wh*-element in the syntactic position of a free modification is connected with the presupposition (c) only in its (b) variant; this is the case in Joshi's example (66) above, as well as in (76), and probably also (77). On the other hand, there are examples of interrogative sentences which include a *wh*-element in the position of an inner participant, but are connected with a respective presupposition in both variants (cf. (78), where (c) is a presupposition of both (a) and (b)).

(76)(a) How many people DIED?

(b) HOW MANY people died?

(c) Some people died.

(77)(a) When did you visit ITALY?

(b) WHEN did you visit Italy?

(c) You visited Italy at some time.

(78)(a) To whom did Mary give the BOOK?

(b) To WHOM did Mary give the book?

(c) Mary gave the book to someone.

Also (79), quoted by Bierwisch in the discussion at the conference on question-answering at Visegrad, May 1980, behaves similarly as (78) above, i.e. the answer "Nobody" is inappropriate; it is connected with a presupposition failure.

(79) Who took my COFFEE?

The position of the intonation centre is connected (as we have already remarked) with the topic-focus articulation of the sentence; if the bearer of the intonation centre is the *wh*-element, all other elements of the interrogative sentence belong to the topic of the sentence. It is quite natural that, if the verb is included in the topic, the event (action) identified by such a verb is assumed to be "given" and the answer to the question by a negative pronoun renders a presupposition failure, as in (73)(b) above. However, even this is not a fully reliable criterion: compare (80), in which all elements except the attribute *French* belong to the topic, and yet a negative answer (b) is fully appropriate.

(80)(a) Where is there a FRENCH film on?

(b) I'm sorry there is no French film on this week.

Also other examples have been found where the situation is not quite clear: as for *how many*, an explanation offers itself that in interrogative sentences standing close to mathematical formulations (see, e.g., (81)) also the variant (b) may have the negative pronoun as an appropriate answer.

(81)(a) How many points with the mentioned properties lie inside the triangle as specified ABOVE?

(b) HOW MANY points with the mentioned properties lie inside the triangle as specified above?

Our discussion indicates that a further empirical investigation of some larger corpus is necessary, because also some contextual features seem to be at stake here, which have not yet been systematically studied.

Joshi made an analogy between his concept of a presumption (mentioned above) and the notion of allegation of a declarative sentence. I am convinced that his analogy is corroborated by the following argument:

If the interrogative sentence is understood as a request having the form of a declarative sentence, then e.g. (82) differs from (83) just in topic-focus articulation; the question word is the only element of the focus of (83), so that *somebody coming late* is included in the topic (it is not in the scope of the negation) and it belongs to the presuppositions of (83). In (82) *coming late* belongs to the focus of the question and is connected with an allegation: (84) may be followed by (85) as well as by (86).

(82) I request you to tell me who came LATE.

(83) I request you to tell me WHO came late. (=...WHO it was who came late).

(84) I don't request you to tell me who came LATE.

(85) I know all were there in time.

(86) I know that John did.

However, as we have remarked, *why*-questions (and perhaps others) seem never to allow for an answer with a negative pronoun, i.e. they are connected with presuppositions even if the "inducer" of the presupposition belongs to their focus: in this they behave similarly as sentences with factive verbs and (simple) proper nouns.

It should be emphasized that we do not claim that presuppositions and "inclusion in the topic" are the same phenomenon; the inclusion in the topic of the sentence is only one of the factors that lead to presuppositions, the other being the syntactic structure of the sentence (factive verbs with their complements), proper names, questioned modifications such as *why*, and perhaps others. Thus inside a topic, there may be elements with "multiple" or "strengthened" presuppositions, cf., e.g., (87) and (88).

(87) Why did John marry JOAN?

(88) Why did JOHN marry Joan? (= Why it was JOHN who married Joan?)

In (87) the presupposition that Joan is married is based on the fact that (87) is a *why*-question, while in (88) the placement of the intonation centre on John (as well as the cleft construction in the equivalent structure) "strengthens" the said presupposition, since in (88) the fact of Joan being married is stated in the topic of the question (as "given" and recoverable information).

In this connection, Hintikka's (1978) modification of his original proposal for a formal treatment of questions is worth mentioning. He distinguished within a question two ingredients, namely the optative (or imperative) operator and the desideratum; the presupposition of a question then equals to the desideratum of the question minus its initial epistemic operators. Thus (89) would entail that the speaker wants it to be made true that (90), which arguably implies (91). As Hintikka (1978:286, ex. 25 to 27) says, this would lead to a mistaken implication: "part of the force of the question would be to try to marry Mary off". Therefore he modifies the optative operator and changes the original formula into (92).

- (89) Who is Mary married to?
 (90) (Ex) K_1 Mary is married to x .
 (91) (Ex) Mary is married to x .
 (92) Assuming that (Ex) $F(x)$ bring it about that (Ex) $K_1 F(x)$.

The motivation of the change seems to be clear; the consequences of its acceptance are somewhat dubious. What happens if the assumption (evidently of the questioner) is not fulfilled (i.e. there does not exist any x such that $F(x)$)? Tichý (1978) would say that such a question "does not arise", but it does arise, as is exemplified by (89).

2.4.5 Passing to the *yes/no* questions, we can take Kiefer's (1980) considerations as the point of departure. He uses again the notion of background assumptions (a proposition that is formed by substituting a Proelement such as *somebody*, *sometime*, etc., for the focused element in the question) and for that purpose he distinguishes a focused part of the question (*tomorrow* in (93)). If there is such a focused part present in a question, then the speaker takes the background assumption for granted and asks, in fact, for a more specific modification.

- (93) Is John leaving for Stockholm TOMORROW?
 (94) WHEN is John leaving for Stockholm?

Thus (93) should be interpreted by the hearer similarly as (94); if the hearer answers by a simple *No*, then the answer is not complete from the point of view of the questioner.

On the other hand, if (in Kiefer's terms) there is no focused element in the question (as in (95)), then the speaker wants to know whether his assumption is right or wrong:

- (95) IS John leaving for Stockholm tomorrow?

In this case, the answer *No* is a complete answer.

Two remarks should be added. First, it is true that with a question such as (93) the negative answer *No* may mean that the speaker admits that John is leaving for Stockholm, but that it is not tomorrow, while in (95) - with the intonation centre on the verb - this cannot be the case. In our approach to topic-focus articulation every sentence (including interrogative sentences) - has a focus. In (93), the focus is the time adverbial *tomorrow*; in (95) only the verb belongs to the focus. In case the verb belongs to the topic, the action

(event) identified by the verb is assumed as "given" and a negative answer to the question has in the scope of negation only the focused part of the sentence (e.g. "he leaves for Stockholm, (but) not tomorrow").

Also other examples show that *yes/no* questions are sensitive to topic-focus articulation in the same manner as declarative sentences are, and that in *yes/no* questions the type of presuppositions connected with the inclusion of an element into the topic of the sentence is also present. If the speaker asks (96), then in one of the readings of the question only *Stockholm* belongs to the focus, i.e. this reading is connected with the presupposition that John is leaving tomorrow for some place.

- (96) Is John leaving for STOCKHOLM tomorrow?

The hearer can state that this presupposition is not fulfilled (as, e.g., in (97)).

- (97) Oh, you are mistaken, John is not leaving tomorrow.

The "markedness" Kiefer ascribes to some of his examples is not surprising if we accept that there exists a systemic ordering of complementations of verbs observed in the focus part of the sentence; every sentence the complementations in which are not ordered in accordance with this systemic ordering has some feature of markedness in Kiefer's sense. Thus (98) - his (37)(b) - has the order *direction* - *means* (manner), which is not in accordance with the systemic order of these complementations (*I'm going by train to STOCKHOLM* rather than *I'm going to Stockholm by TRAIN* is a most natural answer to *What are you doing TOMORROW?*). In such a case the phrase *by TRAIN* is (as Kiefer says) almost exclusively determined as the focus of the question (*to Stockholm* belongs to the topic if it is moved to the left of *by TRAIN*).

- (98) Are you going to Stockholm by TRAIN?

The same holds true when the intonation centre is placed on an element in some other position than the final one: this has the consequence that all modifications (participants and/or adjuncts) following the bearer of the intonation centre are in the topic. Our explanation of the "marked character" of (99) - Kiefer's example (38) - consists in the fact that the marked intonation of (99) is combined with a marked word order, differing from the systemic ordering.

(99) Are you going to STOCKHOLM by train?

The non-marked counterpart of (99) is (100), with the order means - direction.

(100) Are you going by train to STOCKHOLM?

Here, it is not quite clear where the boundary between topic and focus lies: not only the verb, but also the phrase *by train* can belong to the topic (if they are contextually bound), as well as to the focus (if it is non-bound).

This example illustrates the interplay of word order, intonation, communicative dynamism and contextual boundness in yes/no questions and suggests a possibility how to account for this interplay by means of a framework which has been found to give valuable results for declarative sentences.

2.5 Principles for a Specification of Underlying Representations

The valency-based approach to syntax, which allows for a description of the topic-focus articulation and of the scope of negation integrated in the underlying structure of the sentence, makes it also possible to formulate the description of sentence structure in the shape of a very restricted set of general principles. This might be helpful in the sense of delimitation of innate properties restricting the child's choice in the acquisition of her/his mother tongue, as postulated by Chomsky.

The principles enumerated below can also be understood as fundamental ingredients of a model of what V. Mathesius (1936) called denomination and bringing into relation, and what was more amply characterized by G. Guillaume (1964, 1984) as "the act of language," i.e. the procedure of formulating a sentence, consisting of a set of mental operations carried out by the speaker.

The speaker's repertoire of means of expression is constituted by the lexicon and the grammar of the language used. While languages grossly differ in what concerns the relationships between underlying and surface (or, more precisely, morphemic and phonemic) structures, they share the basic organization of their underlying structures (at least this seems to be valid for classical and modern languages of Europe and of a large part of Asia).

In the underlying layer of language structure, i.e. in the layer of tectogrammatical representations (TR's), the speaker has at her/his disposal (a) the lexical entries, including their valency grids, and (b) a basically simple procedure of the choice of a word token within the formulation of (the underlying shape of) an utterance (understood here as an occurrence of a sentence).

In point (1) below we specify the shape of a lexical entry (general conditions it has to meet), and points (2)-(6) characterize the specification of the class of TR's in the form of a generative procedure restricted by certain further conditions. It seems to be possible without any problems of principle to formulate a corresponding declarative specification.

Principles of the generation procedure for underlying dependency trees:

(1) The *lexical entry* contains:

(a) a *lexical unit* (i.e. a representation of its meaning) with its underlying word class,

(b) a specification of its possible *grammateme* values (definite, plural, future, etc.),²⁶

(c) its *frame* or grid (i.e. the list of its possible complementations, such as Actor, Addressee, Objective, Locative, Instrument, etc., ordered in accordance with the systemic ordering), in which *inner* participants (occurring at most once with a head node) and *obligatory* adverbial ('free') complementations are marked,²⁷ and

(d) the other *subcategorization* conditions.²⁸

(2) To *generate a node* (root or daughter) means also to choose its lexical value and the values of its grammatemes (taking into account, by means of unification, the subcategorization conditions of the mother node; if there is no mother node, i.e. a root is being generated, then it is a finite verb);

²⁶ Grammatemes (delimiting feature, number, tense, etc.) are listed for every word class as a whole, and so are restrictions on the combinations on their values; only exceptions have to be listed in the lexicon, the regular possibilities being identified in the process of generation, whenever a lexical unit is being chosen.

²⁷ Free optional complementations are found in the repertoire common for the word class as a whole, whenever a lexical unit is being chosen.

²⁸ Notice that also other properties concerning a certain complementation in its relationship to a certain governor can be marked here, if necessary, e.g., a specific degree of closeness (of an 'inner object' to its verb), or a possibility to occupy a specific position in the surface word order (e.g., before the governing verb), to be deleted by shallow rules, and so on.

the just generated node is considered as node n in the next step of the procedure. If a root is generated, it is denoted either as CB (contextually bound, belonging to the topic) or as NB (non-bound, belonging to the focus).

(3) If there is a complementation listed in the frame of the node n , then it is possible to generate

(a) either a *left daughter* of n , denoted as CB and as any complementation from the frame of n ,

(b) or to generate a *right daughter* of n , denoted as NB and as a complementation chosen from the left end of the frame of n .²⁹

(4) If no complementation is present in the frame of n (see fn.16), then we turn *back to the mother* of n , which now is to be considered as node n ; if no mother is present, the procedure is *finished*.

(5) Sister nodes are generated in the left-to-right *order* (i.e. if node n has a sister, then the latter stands to the left of n).

(6) Only trees containing a *focus* are understood as underlying representations of sentences (i.e. only those whose branch going from the root to the rightmost daughter of ... of the root includes a NB node).

The difference between (3)(a) and (b) makes it possible to account for the fact that in focus CD coincides with systemic ordering, see Section 2.2.2 above. It may be seen that this approach allows even for such a strong assertion to be handled in a very economical way.

Complications not handled by these principles include coordination and apposition, agreement of relative words (and Vocative) in number, further control and focalizers; a procedure handling most of them and generating the underlying representations in the direction from the left to the right (thus modelling the processual character of the speaker's act) was presented by Petkevič (1987).

²⁹ If the chosen complementation is an inner participant, it is deleted in the frame of n ; choosing a complementation "from the left end" means that non-obligatory complementations can be skipped and deleted; if the last one is deleted, no right daughter is generated in this step, and point (4) is then carried out.

3 DISCOURSE PATTERNS: ANAPHORIC RELATIONS

In this chapter we concentrate above all on issues of coreferential and anaphoric patterns in discourse. We start with a brief discussion of the difference between how the notion of focus is understood in linguistics (i.e. in connection with the topic-focus articulation) and how a notion indicated by the same term is handled in artificial intelligence, abbreviated as AI (where it is derived from the psychological concept of focus of attention), see Section 3.1. We turn then to a characterization of the degrees of salience of the items in the stock of knowledge or information shared by the speaker and the hearer(s), which represent a basic component of a finite mechanism enabling the users of language to specify the otherwise indistinct reference of pronouns and noun groups (Section 3.2). Finally we proceed to the problem of the topic of a discourse as a whole or of parts of a discourse (Section 3.3).

3.1 Focus in Linguistics and in Artificial Intelligence

During the recent years we have witnessed a curious situation: not only that a single term has been used for two *different* notions (which is a common situation even within a single field of science), but it has been used exactly for two *opposite* notions. This is the case of the term *focus*: introduced into linguistics by Halliday (1967) and by Chomsky (1968), and employed since then by linguists of most different breedings (cf. its systematic treatment in the framework of functional generative description, or FGD, e.g. in Sgall, Hajičová and Benešová, 1973, and in Part 2 above), it was soon frequently used in the writings closely connected with the research in the domain of AI (cf., e.g., Grosz, 1977; Sidner, 1979); the latter use is said to stem from works on (cognitive) psychology.

To be able to refer to the readings of a single term, in the sequel the transparently indexed label *focus_L* is used for the former (linguistic) understanding and *focus_{AI}* for the AI interpretation. For the purpose of our discussion that follows, *focus_L* can be informally specified as that part of the (meaning of the) sentence that conveys some (irrecoverable) information predicating something about 'the given', recoverable, contextually bound part

to retain
close

(i.e. of the *topic* of the sentence, see Part 2 above). Taking (1) as a part of discourse consisting of (a) and (b) in this order, then focus_L of (b) is *had been crying nearly all the day*. In terms of the AI-oriented research, focus_{AI} of (b) refers to the baby, since the baby is one of the items 'just introduced' (namely, by (a)) and the utterer of (b) focusses his/her attention on it. In terms of linguistic analysis, however, the expression referring to the baby in (b), namely the pronoun *it*, belongs to the topic rather than to the focus_L of (b).³⁰

- (1)(a) The mother picked up the baby.
(b) It had been crying nearly all the day.

The connecting ties between focus_L and focus_{AI} immediately emerge, if one takes into account a dynamic character of the development of the discourse: at the initial point of a discourse, the interlocutors share a certain "stock of knowledge", part of which is activated by the situational context. During the discourse, the stock of knowledge the speaker assumes to share with the hearer(s) changes according to what is in the centre of attention at the given time-point, what is most salient or activated (foregrounded) in the memories, what has been just said. The speaker chooses, in a smooth discourse, only those items to be used in the topic of the sentence which he supposes to be among the most salient in the stock of knowledge of the hearer; this enables the hearer to identify relatively easily the objects referred to by the parts of the topic of the sentence.

Thus, after 'the baby' has been foregrounded by uttering (1)(a) (*the baby* constitutes (a part of) the focus_L of (1)(a)), the image of the object in the interlocutors' memory identified by the expression *the baby* becomes highly activated in the stock of knowledge shared by the speaker and by the hearer; in the sentence that follows, the expression identifying this object belongs to the focus_{AI} (of attention), while referred to by the topic of the sentence, even by means of a pronominal form (viz. *it* in (1)(b)).

However, an item is activated also after its mentioning in the topic part of the sentence, see (1)(b') as another possible continuation of (1)(a):

- (1)(b') She had been ironing all the afternoon.

³⁰ In our examples we work with a single reading of the quoted sentences. It should be emphasized, however, that most sentences allow for an ambiguity in the assignment of topic and focus which corresponds to Chomsky's notion of the range of permissible focus (see Section 2.2. above).

When uttering (1)(b'), the speaker assumes 'the mother' to belong to the items activated above a threshold making it possible to refer to it by a pronoun in the topic part of the next utterance; this activation has been achieved by mentioning the mother in the immediately preceding sentence.

While a non-activated item can be referred to *only* in the focus_L part of the sentence, an activated item can be referred to in the topic *as well as* in the focus_L part of the sentence (marginal cases concerning embedded items are left aside in this Section). In the latter case, such an item is referred to by a definite NP or an anaphoric pronoun and carries as a rule the intonation center of the sentence; see the sequence of (2)(a) through (c):

- (2)(a) John and Mary met at the railway station.
(b) She greeted him,
(c) and only then he greeted HER.

In (2)(c), *her* used in the focus_L of the sentence refers to Mary, whose image in the stock of knowledge assumed by the speaker to be shared by the hearer is activated to such an extent that the speaker can use a pronominal form; also John's image in this stock of knowledge is activated so as to make a pronominal reference possible; in our (linguistic) terms, the sentence (2)(c) is structured in such a way as to say something *about* John (*John* is in the topic part), viz. to assert that it was HER who was greeted by him.

The following three short discourses (3)(a) through (c), sometimes called by American speakers 'focussing jokes' (the jokes were selected from J. Rosenbloom, *Bigest Riddle Book in the World*, New York, 1976), can further illustrate issues of focus_L:

- (3)(a) Why do firemen wear red suspenders?
To keep their pants up.
(b) Why do we buy clothes?
Because we can't get them free.
(c) Why do we dress baby girls in pinks and babyboys in blue?
Because they can't dress themselves.

What is the source of the humorous effect of these pairs of questions and answers? An attempt to provide an explanation can be found as long back as with S. Freud, who analyzes the joke quoted here as (4) (cf. S. Freud, 1905).

- (4) The first Jew asks: "Have you taken a bath?" The second replies asking the other in return: "Why? Is there one missing?"

Freud looked for the explanation in the shift of contrastive stress: if this stress is on 'bath', then the verb and its object are interpreted in the meaning of the collocation 'to take a bath', i.e. to wash in a bath; if the stress is on 'taken', then the verb 'to take' is interpreted as 'to steal'.

Looking back at our examples in (3) from the perspectives of stress assignment, we see that the humorous effect stems from a shift in the intonation center (IC): the addressees of the jokes expect the IC's to be placed in an unmarked position, i.e. at the end of the first sentence (question) of the piece of discourse. However, the second sentence answers a different question, namely a question with the IC shifted to some other position in the sentence. In all the quoted examples, this shift can result in the IC placed on the *wh*-word 'why'; for (b) and (c), there are also the possibilities to place the IC on 'buy' and 'we', respectively. Thus, e.g., if the first sentence in (3)(a) is pronounced with the IC on 'red' or 'suspenders', the addressee of the joke expects the answer to explain why the colour of the suspenders is exactly red and he is surprised to get an explanation as if the IC were on 'why', what is the reason of having suspenders at all. A similar explanation holds for (3)(b): with an unmarked IC on 'clothes', the addressee expects to learn, e.g., that people buy them to protect themselves from cold, while the answer actually given answers a question why we buy the clothes rather than obtain them in another way. In (c), the expected situation is as if the IC were placed on 'in pinks' and 'in blue'; however, the second sentence indicates that the answerer understood the question as questioning the fact why it is us who dresses the children.

Interesting examples with different positions of IC were made by D. Wilson (1986). Her examples are quoted here as (5) and (6), where the IC is denoted by capitals.

(5) I'm sorry I'm late. My CAR broke down.

(6) I'm sorry I'm late. My car was BOOBY-trapped.

The two sentences following the apology are formulated with different relations between the recoverable and the irrecoverable information: In (5), the speaker assumes that the hearer anticipates some break-down to be the reason of the speaker's late arrival and he specifies that it was the car what broke down. In (6), the expectations of the speaker are different: here the recoverable information concerns the fact that the speaker came by a car, and the specification of the reason of coming late concerns the fact what happened with the car.

The common denominator of the distinctions in meaning illustrated up to now is a different topic-focus_L articulation of the utterances which are component parts of the pieces of discourses analyzed. In our examples, the distinction in the topic-focus_L articulation was expressed in the surface shape of the sentences by means of different positions of IC; in cases of so-called free word order, the same (semantic) distinction can be expressed by shifts in the word order; in some languages these distinctions can be expressed by specific morphological forms or syntactic structures. Let us recall that in FGD topic-focus articulation is considered to be one of the dimensions of the representation of the (literal) meaning of the sentence.

An interesting question that arises in this connection is to what extent the topic-focus_L articulation of the individual sentences is relevant for the changes of the degrees of activation (salience), which help the hearer to identify the reference of referring expressions.

(a) It is rather obvious that the items referred to by the parts of the focus_L of the immediately preceding sentence are the most activated ones at every time-point of the discourse.

(b) If an item is referred to in the topic part of the sentence, then at least two issues are to be taken into consideration:

(i) A pronominal reference seems to "strengthen" the activation of the item referred to to a lesser degree than a reference with a full (definite)-NP.

(ii) The activation of the items referred to in the topic part of the sentence seems to 'fade away' less quickly than that of the items referred to in the focus_L part of the sentence.

(c) If the degree of activation of an item *x* is being changed (lowered, or raised), then also the degree of activation of the items associated with the object referred to by *x* is being changed in the respective direction. It should be taken into consideration, however, that frequently a mentioning of a particular object brings into the foreground only a fraction of a set of objects that has been activated earlier. Also other scales or hierarchies should be considered: thus, there is a hierarchy of more or less immediate associative relationships, or that of prominence with regard to the individual sentences and their positions in the text (e.g. sentences metatextually opening a narration or one of its portions, headings, etc., are more prominent than other elements of the text, in that the objects which the former introduce retain their activation to a higher degree than objects introduced in the latter parts), etc.

(d) If an item of the stock of shared knowledge is neither referred to in the given utterance, nor included among the associated objects, then its activation lowers down; as mentioned in (b)(i) above, the drop in activation

is quicker if the item was referred to in the focus_L of the preceding utterance and slower if it was referred to in the topic part of the previous utterance.

(e) There are some specific expressions in particular languages that 'give prominence' to the items they precede in that they raise their activation more than otherwise would be the case. This holds e.g. about the English phrases *as for ...* or *concerning ...*: they function as 'thematizers' (a term suggested by G.D. Rinnan, pers. comm.) and introduce a topic that was not expected, i.e. the sentence recalls an object that is being mentioned only after an occurrence of several intervening sentences.³¹

An interesting convergence between the linguistic and the AI-oriented treatment of the dynamic aspects of discourse can be illustrated by the study of McKeown (1985). At least three points of agreement are worth mentioning:

In her discussion of a more differentiated approach to focus_{AI}, McKeown works with three graded notions:

(a) the immediate focus of a sentence (current focus, CF);

(b) the (partially ordered) potential focus list (PFL), including the elements of the sentence that are potential candidates for a change of focus;

(c) a focus stack (a stack of past immediate foci).

If we look at these notions from the point of view of the approach to the hierarchy of activation of the stock of shared knowledge, then:

(a) at a certain time-point t_n at which the sentence S_n is being uttered, the CF of S_n is that element from the activated part of the stock of shared knowledge that has been chosen by the utterer of S_n as its topic proper;

(b) the PFL after the utterance of S_n includes those items of the stock of shared knowledge that belong to the most activated layer of the stock; we doubt that it might be sufficient to work only with the elements of S_n as the possible candidates for a change of focus_{AI} in S_{n+1} , since the latter also can be chosen from elements other than those included in S_n , if they are activated to a sufficient degree for such a choice, cf. Garrod and Sanford's (1982) test examples quoted here as (7)(a) through (c):

(7)(a) The engineer repaired the TV set.

(b) It has been out of order for two weeks.

(c) The engineer/He took only five minutes to repair it.

(c) The focus stack at the time-point $t+1$ (i.e. when uttering S_{n+1}) contains the foci_{AI} of S_n , S_{n-1} , ..., S_1 , i.e. the topics proper of S_n , S_{n-1} , ..., S_1 .

³¹ For a further discussion and a tentative formulation of rules corresponding to the points (a) through (e), see Hajičová and Vrbová (1982) and here in Section 3.2.

When specifying the legal focus_{AI} moves, McKeown (1985:66f) imposes the following order of preferences:

(A) 1. change focus_{AI} to member of previous PFL if possible;

2. maintain focus if possible;³²

3. return to topic (used in its non-terminological sense, EH) of the previous discussion; more precisely, choose the CF from the focus stack. Confronting again this hierarchy of the choices of the speaker with what we said above about the degrees of activation, one arrives at an extensive coincidence, too:

(L) 1. the highest degree of activation is found with those items that are referred to explicitly in the previous utterance; the absolutely highest degree is assigned to those items that are identified by the focus_L of the immediately preceding utterance;

2. the next-to-the highest degree of activation is assigned to those items that are identified by the elements of the topic of the immediately preceding utterance (i.e. included in its focus_{AI});

3. the next lower degree of activation is assigned to those items that have been mentioned in some preceding utterance or are in some associative links with those mentioned in them.³³

Even a perfunctory look at the sets (A) and (L) shows that the strategy offering the speaker a choice on the basis of the degrees of activation (with the items which have the highest degrees being most at hand) does not contradict in any point the one proposed by McKeown; as a matter of fact, the activation hierarchy offers a more variable choice, not damaging the coherence of discourse.

The procedure of generation as formulated by McKeown starts from the so-called default focus_{AI},³⁴ each predicate is assigned a default focus, which is such a phrase that can be expressed as the surface subject of an active sentence including that predicate; the default focus_{AI} can be 'overridden' only

³² McKeown's formulation of two separate steps quoted here as (A)1. and 2. seems to suggest that CF of the last utterance is not a member of PFL of the last utterance.

³³ (L)3 differs from (A)3 in that the latter does not take into account the associated objects, which is explicitly admitted in McKeown (1985:67).

³⁴ If we understand well McKeown's treatment, 'predicate' is used here in the sense of 'rhetorical predicate' (following, e.g., Grimes), so that 'arguments' stand for very abstract cognitive roles such as feature and entity with an attributive predicate. In our approach we work with participants of verbs (deep cases, theta-roles) such as Actor/Bearer, Addressee, Objective, Origin, Effect, and adverbials (see Chapter 1).

by such a choice of focus_{AI} that stands higher than the default focus_{AI} on the hierarchy summarized here as (A)1 through 3 (in this order). In our terms, a verb is passivized if the NP in the subject position of the passive identifies an item that is activated in the stock of shared knowledge to a (considerably) higher degree than the item identified by that NP which would be in the subject position of the active sentence. Such a strategy is in accordance with Mathesius' (1915, 1929) specification of the main function of subject in English: English uses passivization for the same purpose as the languages with the so-called free word order use the word order variations, namely to start the sentence with what is the sentence about, if the latter is not the underlying subject, or Actor/Bearer.

3.2 Salience in the Stock of Shared Knowledge

Let us come back to the linguistic issues concerning communication. It is one of the fundamental aspects of the process of communication that one of the participants in this process, the speaker, attempts to cause the other participant(s), the hearer(s), on the basis of the rules of the given language, to modify some elements of the information stored in their memory. Since the system of the knowledge stored in human memory is very large and structured in a very complicated way, it is useful for the speaker to specify first those elements that are easily accessible in the hearer's memory (salient, activated), and are to be modified (or introduced into new relations with some other elements), i.e. the topic; only then does the speaker specify (by the focus) which modification or which new relations are to be achieved.

The speakers cannot simply choose any of the elements of information as parts of the topic, but only those that they believe to be activated at the given point of the discourse, that are in the foreground of attention (or in a very close associative connection with the highly activated elements). The hearers then do not need to make much effort to identify them.

The stock of shared knowledge (comprising not only knowledge in the literal sense, but a wide range of psychological phenomena including beliefs and other attitudes shared by the speaker and the hearer) is one of the critical notions in the theory of topic and focus with the framework of Functional Generative Description. It is assumed that the stock of shared knowledge has a dynamic character: not only the repertoire of items it includes is changed but also their activation (salience), in the sense of being immediately accessible in

the hearer's memory.³⁵ As was pointed out in Hajičová and Vrbová (1981), this hierarchy of salience is argued to be a basic component of the mechanism serving for the identification of reference, since the following regularities hold:

The mentioning of an object or of another item that is in some kind of relationship to it gives rise to a higher degree of activation of this object. The relationship between anaphorically connected items may be of different kinds: it may be an identity relation, as, e.g., *pupils* in the sentences (5a) and (6) in the text presented below (referred to by an identical noun), or (5b) (with a pronominal reference), or even (1) (referred to by the noun *children*, which - in the given context - functions as a more or less synonymous expression for *pupils*), or the link between concepts can be given by some associative relation such as inclusion of classes (see (3) and (4a), with *father* as a member of the class of *parents*), part of a whole (see (1) and (13), with the *ground* as a part of the *school garden*), etc., or some kind of relation given by the broader scene of the action (the notion of school introduced in (1) brings about also the notion of teachers, who are referred to in (2b) by a definite noun).³⁶

The expressions referring to the activated elements may function as contextually bound, and thus constitute the topic of the sentence, while the non-activated ones are always contextually non-bound, and thus included in the focus of the sentence. An activated element may also be referred to by a part of the focus of the sentence: if focus proper is expressed by a pronoun, it has

³⁵ We have seen in 3.1 that in AI similar reasoning has been present. Grosz (1977) in her very interesting analysis of the structure of a dialogue is rather close to the notion of hierarchy of salience, assuming (p.66) that at any point (in a dialogue), only one "focus space" (by a focus space she means a subunit of the knowledge base that "contains those items that are in the focus of attention of the dialogue participants during a particular part of the dialogue", p.5) is active, but several may be considered open (i.e. they reflect active spaces that contain some unfinished "topic" in the sense of "topic of discourse" - and hence they may become active again).

³⁶ The relations between the elements shared by (at least) two subsequent utterances in a text are discussed in great detail by Enkvist (1974); he postulates the following (rather disparate) kinds of theme identification: repetition, reference, synonymy, antonymy, comparison, contracting, hyponymy, membership in the same semantic field, sustained metaphor. Daneš (1979) distinguishes between referential identity (which may be rendered by repetition, pronominalization, ellipsis, substitution by synonyms, etc.) and referential difference (with links given by semantic similarity, e.g. inclusion or contiguity, e.g. collocation, part of a whole). Cf. also different kinds of "bridging operations" in Clark and Haviland (1977) and their discussion in Kieras (1977). From a more general perspective, these issues are discussed within a broader context of text cohesion; cf. Halliday and Hasan (1974), the studies of textual relationships by Agricola (1979) and Viehweger (1978); the notion of contextual space (Reichman, 1978; Grimes, 1980) or of focus space (Grosz, 1977).

the form of a stressed pronoun. It is more precise to speak about a contextually non-bound lexical item than about "new" information (taking into account that 'context' includes relevant factors of the situation of the discourse).

In the present Section, while illustrating some of the issues pointing to the relevance of this hierarchy on a fragment of an English text, we want to present a few points that may throw some light on the changes of the activation of the elements of the stock of shared knowledge rather than to give a systematic linguistic analysis of the given text. We restrict ourselves to objects identified by NP's or pronouns and we leave aside actions and their circumstantial qualifications.

The sample of text (for the ease of further reference the clauses are assigned serial numbers; the capital letters denote the intonation centre of each clause):

- (1) The school garden was full of CHILDREN.
- (2a) They talked NOISILY,
- (2b) but the teachers didn't REPROVE them,
- (2c) because they were so EXCITED.
- (3) Outside PARENTS were waiting.
- (4a) One of them, a father, stood in front of a MICROPHONE,
- (4b) as if he were prepared to TALK.
- (5a) The pupils got CALM
- (5b) and their teachers lined them UP.
- (6) Both pupils and teachers were in a festive MOOD.
- (7) The teachers were SERIOUS.
- (8) In fact, all ADULTS in the garden were serious.
- (9) They were dressed in evening DRESS.
- (10a) As for the pupils, they had school UNIFORMS,
- (10b) neatly washed and PRESSED.
- (11) The smallest even had snow-white COLLARS.
- (12a) One of the parents approached the biggest BOY
- (12b) and ASKED him:
- (13) "Is it allowed to sit down on the GROUND?"

In the opening sentence of the text two objects are introduced: the school garden and children. Since the latter object is mentioned in the focus of the sentence, it becomes more salient than other objects mentioned previously or activated by their presence in the broader context of the situation. Fig.1 illustrates in a very preliminary and schematic way the state of the activated

part of the stock of shared knowledge after the utterance of (1); the hierarchy of activation is represented by the vertical dimension of the diagram. The children are thus most "at hand" for the speaker to be spoken about in the immediately following utterance. This is the case in (2a): the children, as a highly salient object in the stock of knowledge shared by the speaker and the hearer, are referred to in the topic position by a pronoun, which keeps their activation at the same degree, while the activation of the school garden, not having been mentioned in this utterance, fades away. In (2b) a new object enters the scene - the teachers; however, their appearance is not completely new and surprising, because the hearer has already been introduced into the scene of school, which has teachers associated with it. This is why the teachers can be referred to by a definite NP and why the speaker, without the danger that the hearer will be misled by his choice of the topic, can refer to the teachers by a contextually bound element. An element the linguistic counterpart of which is present in the topic part of the sentence and is rendered by a definite NP retains its character as one of the more activated items of the stock of shared knowledge. The children do not leave the scene yet; they are reminded - through a pronominal reference in the topic - and their activation in the stock does not fade away, they also remain in the most active part of the stock.

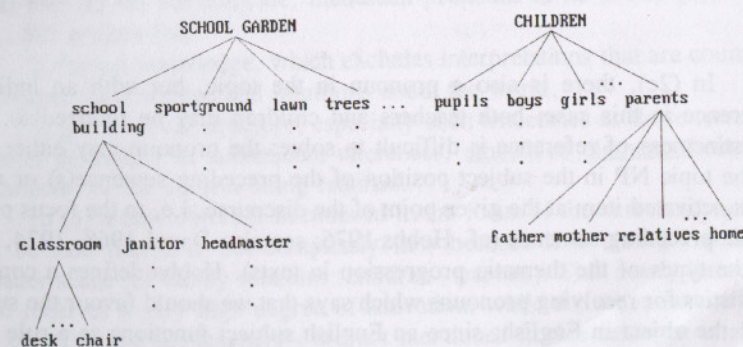


Fig.1

One comment is in order here: the pronoun *them* stands in (2b) in final position, but after the intonation centre; we assume that an NP (as well as an adverbial) following the bearer of the intonation centre belongs to the topic

part of the sentence. The resulting hierarchy of the activated elements of the stock of shared knowledge after the utterance of (2b) is illustrated in Fig.2.

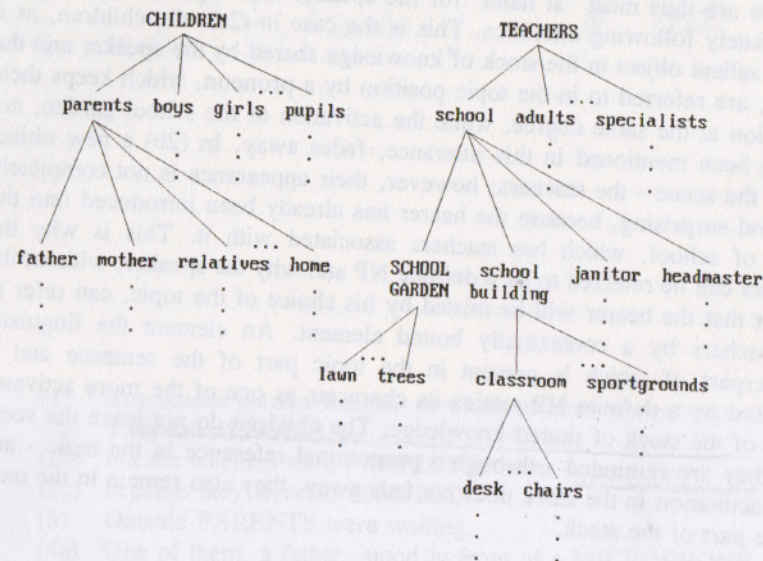


Fig.2

In (2c), there is also a pronoun in the topic, but with an indistinct reference in this case: both teachers and children may be referred to. This indistinctness of reference is difficult to solve: the pronoun may either refer to the topic NP in the subject position of the preceding sentence(s) or to the most activated item at the given point of the discourse, i.e. to the focus proper of the preceding sentence (cf. Hobbs 1976; see also Daneš 1968, 1974, 1976 on the types of the thematic progression in texts). Hobbs defines a common heuristic for resolving pronouns which says that we should favour the subject over the object in English; since an English subject functions as a rule as (a part of) the topic of the sentence, this heuristic says that the topic is preferably preserved in successive sentences. Another possible strategy includes inferencing and factual knowledge.

(14) The children got some SWEETS; they ate them immediately.

In (14) it is clear which occurrence of the pronoun refers to which object.³⁷ However, in the case of (2c), neither of the two strategies for the solution of the indistinctness of the pronominal reference helps us: the teachers as well as the children can be excited, so that both the subject and the object NP of the preceding sentences can be chosen as the referent of the pronoun. The degree of activation does not help us either, since both children and teachers are activated to the same extent at the point of the utterance of (2c). However, if the lexical setting of (2c) were changed, as in (2c') and (2c''), the indistinctness would be easy to solve, and only one of the two possible candidates of reference would be chosen, namely the teachers in (2c') and the children in (2c''):

(2c') ... because they were always kind to their pupils;

(2c'') ... because they were too small to understand the seriousness of the moment.

We may state now that, when looking for the possible referents of a pronoun, one should take into account the following aspects:

1. the salience of the elements at the given point of discourse, with (a) the most salient elements having precedence over the less activated ones, and (b) the element identified by an NP in the subject position having precedence over elements referred to by NP's in other syntactic positions in the sentence; if (a) and (b) do not coincide, then such pronouns as *he* prefer (b), while, e.g., *this* prefers (a),
2. factual knowledge, which excludes interpretations that are counter to the hearer's knowledge and intuitions about the world,
3. grammatical structure, especially such tendencies as those towards a parallel patterning of subsequent utterances, embedded elements being less prominent, or the subject being retained.

In (3) a new object is introduced in the focus of the sentence; again, it can be said that it is not completely new because it is also given by the broader scene (of family relations: children - parents). This newly introduced item receives a very high degree of activation, while the other two objects - the children and the teachers - are not mentioned in this sentence at all and thus their activation fades away (see Fig.3).

³⁷ Cf. Hobbs's (1979) use of the inferences based on the store of commonly possessed world knowledge to resolve reference ambiguities.

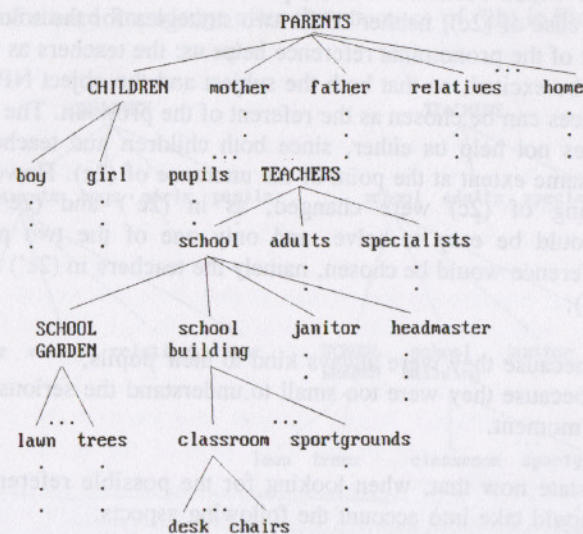


Fig.3

In (4a) the speaker chooses one element of the most activated set, namely that of the parents, and he adds some information about him; through the mentioning of this element in the topic of the sentence the activation of the whole set is preserved at the same level, while the activation of the other objects again is suppressed. A similar process occurs after uttering (4b): the most activated item is mentioned in the topic, its activation is preserved, while the activation of the rest of the stock is lowered. In (5a) and (5b) the children (mentioned as the pupils) and the teachers, respectively, are reactivated in the stock; though their activation was gradually fading away during the previous discourse, it was still higher than an assumed threshold, which made them available as possible topics of one of the next utterances. In (5b) not only the teachers but also the children are mentioned in the topic (the former by a definite NP, the latter by a pronoun), so that both the objects remain highly salient.

In a similar way, we can follow the process of activation as is reflected by the rest of the sample text; this process is sketched schematically in Fig.4, where the lines follow the activation of the three objects (namely the children, the teachers, and the parents) in the course of the discourse.

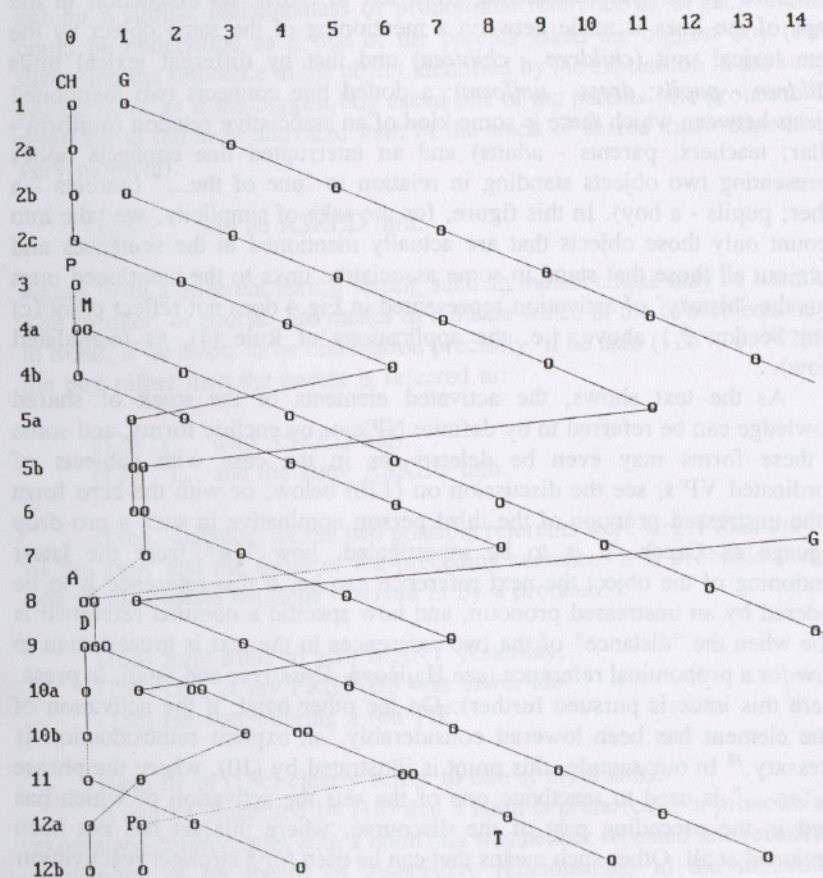


Fig.4

A schematic representation of the process of activation as reflected in the sample text.

Abbreviations: CH - children, F - father, P - parents, T - teachers, A - adults, M - microphone, G - garden, D - dress.

The lines in Fig.4 follow the changes of the activation of the objects mentioned in the text (decreasing from left to right); no distinction in the shape of the lines is made between a mentioning of the same object by the same lexical unit (*children - children*) and that by different lexical units (*children - pupils; dress - uniform*); a dotted line connects two mentioned objects between which there is some kind of an associative relation (uniform - collar; teachers, parents - adults) and an interrupted line connects nodes representing two objects standing in relation to "one of the..." (parents - a father; pupils - a boy). In this figure, for the sake of simplicity, we take into account only those objects that are actually mentioned in the sentences and leave out all those that stand in some associative links to the mentioned ones (thus the "history" of activation represented in Fig.4 does not reflect point (c) from Section 3.1 above; i.e. the applications of Rule (4), as formulated below).

As the text shows, the activated elements of the stock of shared knowledge can be referred to by definite NP's or by enclitic forms, and some of these forms may even be deleted (as in the case with subjects of coordinated VP's, see the discussion on (12b) below, or with the zero form of the unstressed pronoun of the third person nominative in such a pro-drop language as Czech. It is to be investigated, how "far" from the latest mentioning of the object the next reference can be, if this reference is to be rendered by an unstressed pronoun, and how specific a nominal reference is to be when the "distance" of the two references in the text is greater than to allow for a pronominal reference (see Hajičová, Hoskovec and Sgall, in press, where this issue is pursued further). On the other hand, if the activation of some element has been lowered considerably, an explicit reintroduction is necessary.³⁸ In our sample, this point is illustrated by (10), where the phrase "as for ..." is used to reactivate one of the sets the activation of which has faded in the preceding part of the discourse, where this set has not been mentioned at all. Other such means that can be used for a stronger reactivation of an element the salience of which has faded away are the phrases "as far as ... is concerned", "concerning ...".

In the sentence (12b) the deletion of the subject with the coordinated VP unambiguously points to the subject of the preceding sentence as being referred to (so that (12b) is interpreted by the hearer as meaning that one of the parents asked the biggest boy). However, if the speaker used a weak

³⁸ Cf. Reichman's (1977) examples of "interruption" relation between context spaces, rendered by means of such expressions as *incidentally*, *by the way*, etc., and of "return" relation, for which the expression (*but*) *anyway* is typical.

(unstressed) pronoun instead of the deletion (as in (12b')), the sentence would exhibit a similar indistinctness of pronominal reference as in (2c): either it could be understood as if one of the parents asked the biggest boy (under favouring the reference to the object identified by the expression in the subject position), or as if the biggest boy asked one of the parents (the pronoun "he" referring to the most activated item of the stock of shared knowledge at that very moment).

(12b') ... and he ASKED him:

Again, with a different lexical setting such an indistinctness may be harmless. The speaker, of course, has means to indicate which of the two objects he has in mind, if he wants to be understood precisely: if he uses (12b'') or (12b'''), the boy rather than the parent is referred to:

(12b'') ... who ASKED him.

(12b''')... and the latter ASKED him.

If the "distance" of the two possible referents were larger than only that of the topic and the focus of the preceding sentence, it is probable that just one of the objects could be referred to by a pronoun:

(15a) John came to visit MARY yesterday.

(15b) One of my FRIENDS was there, too.

(15c) He was wearing a red TIE.

Here *he* in (15c) clearly refers to *one of my friends*.

It can be illustrated by (16) that a noun is preferred to a pronoun as an expression coreferential with a noun that was neither repeated nor recalled (by a pronoun or by means of associative relationships) in the immediately preceding utterance.

(16a) The school garden was full of children.

(16b) It was grassy, green and fresh.

(16c) They/The children were in a festive MOOD.

As emerged from our discussion, the degree of fading away of the activation of elements of the stock of shared knowledge is not always the same. A very moderate fading takes place if the object, though not referred

to by direct mentioning, nevertheless still remains "on the scene" through associative links to objects mentioned in the given sentences.

To sum up our remarks, the following interrelations between the changes in activation of the elements of the stock of knowledge shared by the speaker and the hearer and the reflection of these changes in the linguistic rendering might be hypothesized and presented for further empirical investigation.

In a preliminary way, we can assign numerical values to the degrees of activation of the elements referred to by the items in underlying (tectogrammatical) representations of sentences, or TR's (see Hajičová and Vrbová, 1982; the 'rules' are reproduced from Sgall, Hajičová and Panevová, 1986:263); the flow of the discourse can be then represented by means of a scheme similar to that in Fig.4.

*Tentative rules:*³⁹

- (1) If $P(x_a)$, then $a^n \rightarrow a^n$.
- (2) If $NP(x_a)$ is in the focus of S , then $a^n \rightarrow a^0$.
- (3) If $NP_d(x_a)$ is in the topic of S , then $a^n \rightarrow a^1$.
- (4) If $a^n \rightarrow a^m$, then b^{m+2} obtains for every object b that is not itself referred to in (the TR of) S , but is immediately associated with an item present there.
- (5) If *as for* x_a or *concerning* x_a is the leftmost expression in S , then $a^n \rightarrow a^1$.
- (6) If x_a neither is included in S , nor refers to an associated object (see Rule (4) above), then $a^n \rightarrow a^{n+2}$.

Notation: x_a denotes an expression x referring to an object a ; a^n denotes that this object is salient to the degree n in the stock of shared knowledge (the maximum of salience is denoted by $n = 0$). To the left (right) of the arrow we indicate the state immediately preceding (following) the utterance of a sentence S in which x occurs; $P(x_a)$ denotes that x is expressed by a weak (unstressed) anaphoric pronoun or is deleted in S (albeit present in the TR concerned); $NP_d(x_a)$ denotes that x is a definite NP (including such expressions as *one of the ...*), and not just a weak pronoun.

Let us add that if an item is mentioned in the topic, then at least two issues are to be taken into consideration:

(i) a pronominal reference strengthens the activation of the item referred to to a lesser degree than a reference with a full (definite) noun group;

³⁹ The numerical values assigned to the individual items of the stock of knowledge are only tentative and we are fully aware that in a more definite proposal one should work with a wider scale and a more subtle differentiation on it.

(ii) the activation of the items referred to in the topic fades away less quickly than that of the items referred to (only) in the focus of the preceding utterance(s).

3.3 Topic of Discourse

In contemporary linguistics, discourse structure is often studied with specific attention concentrated on the coherence of a text, especially on coreference. However, it is a matter of high importance not to overlook the fact that the communicative function of natural language has its impact also in the structure of the sentence, viz. in the topic-focus articulation which is of primary importance for text coherence. This articulation was characterized in Part 2. We have sketched in Section 3.2 how this articulation and the coherence of the discourse interact with the degrees of activation (salience) of the items in the stocks of knowledge of the speaker and of the hearer. It should be borne in mind, of course, that human communicative activity, to which discourse belongs as a specific (though prototypical) case, is determined by much more complex issues than just the knowledge of language; discourse is influenced by factual knowledge, beliefs and other attitudes, aims and psychological motives of all kinds. Therefore, discourse should be viewed as a sequence (or even a more complex collection) of utterance tokens together with their sense (which includes reference assignment to the referring expressions contained in the utterance), rather than a sequence of sentences. A formal model of discourse thus belongs more to the domain of description of the use of language than to that of the language system.

Computational models of aspects of discourse have been often constructed in close connection with research in the experimental domain of AI; an interesting integrated approach to the structure of discourse was presented by Grosz and Sidner (1985). The authors assume the structure of discourse to be composed of three distinct but interacting constituents: (i) the structure of the actual sequence of utterances in the discourse (taken as a linguistic notion); the utterances in discourse can be grouped together into segments, the indications of the boundaries between them being mainly linguistic;⁴⁰ (ii) the structure of intentions (replacing Grosz's notion of 'task'

⁴⁰ The authors unduly assume that these linguistic means can be analyzed only on the discourse level rather than on the sentence level; they are not right in their claim that such questions as the influence of these (linguistic) elements on the truth conditions are irrelevant.

as used in her previous studies), and (iii) an attentional state. The components (ii) and (iii) are supposed to pertain to nonlinguistic notions.

The attentional state, which is most pertinent to the issues discussed in the present Section, contains information on the objects, properties and intentions that are the most salient ones in the given time point. Attentional state is supposed to be an abstraction of the so-called foci of attention of the participants of the discourse; it 'summarizes' the information presented in the preceding utterance tokens that is important for the processing of the given utterance token. It also supplies means of how to use the pieces of information supplied by the other two components for the generation and interpretation of the utterance tokens.

Some researchers - both in the fields of linguistics and of AI - claim that one should work with a special autonomous notion of a "discourse (text) topic" rather than with (or besides) a notion of a "sentence topic". One of the difficulties of such an approach is the fact that the notion of "discourse" itself is still somewhat unclear: How can discourse as a unit be identified? Should a discourse unit have a single topic or should each "discourse segment" (content, space, etc.) have a topic of its own? Is there one topic for each discourse segment or should we rather work with a set of topics for one segment?

Such questions can find answers on the basis of the salience in the stock of shared knowledge, as may be illustrated by a discussion of the segment of text presented in Section 3.2 above, and of the representation of the dynamics of salience in this segment, given in Fig.4.

Paying due regard to the changes of the activation of the elements of the stock of shared knowledge during the discourse may give us a sound basis for finding out the character of the scale (hierarchy) between the case when an item is marginally (once) mentioned in the discourse and the case in which just one item is foregrounded throughout the whole discourse, consisting of a single segment;⁴¹ only in the latter case it would appear as fully appropriate to speak about the given discourse as having a single "topic".

If the scale is found to be smooth, continuous without significant or typical groupings of some kind, then it would be possible to state that only the scale itself can be established (and analyzed, e.g., statistically). On the other hand, if it is found that there are certain prototypical configurations on the scale, which occur rather frequently, others being just marginal, then these configurations may be used as points of departure for the specifications of "the

⁴¹ In between, there may be cases of smaller or larger sets of items foregrounded for shorter or longer segments, or repeatedly, etc.

set of the topics of a segment of discourse", "...of a sequence of segments", etc., or of similar (or other) concepts. Our example⁴² seems to suggest that a spectrum on the diagram can be singled out within which certain items remain foregrounded; if the activation of these items fades away, it does not fade too far and for a long time (e.g. 'teachers' between the utterance of (2b) and its reactivation in (5b) as contrasted to 'the garden' between (1) and (8), and then fading away again). There are, of course, other items that temporarily get into the foreground ('microphone' in (4a), 'the garden' in (1) and (8)), but their activation fades away rather quickly.

The patterning of a discourse is much more varied than the structure of a sentence. This can also be illustrated by the fact that the "topic" of the sample quoted above alternatively can be seen in something like "school festival", i.e. an event that is not explicitly mentioned in the discourse and thus cannot be identified in the text itself. Human understanding of the discourse presumably proceeds from the notions anchored in the expressions of the text (such as students, teachers, parents, festive mood of dressing, in our example) to some broader and more general notions (such as school festival). Parallel to that, one may assume that the explicit mentioning is provided for the nodes lower in the frame (script, scenario, plot ...) with "superordinated" nodes being derived from these lower levels; in such a case, the frame (script, scenario, plot ...) of a school festival is invoked by filling in its (obligatory) slots for participants of the festival, their manner of dressing, its place, etc. through their activation in the stock of knowledge. Thus it can be claimed that there are "topics" of text segments which are expressed more immediately in the utterances of each segment, and "topics" of the discourse, without such a relatively direct relationship to linguistic expressions. However, it would probably be easy to find cases where the "topic" of a segment has a less immediate relationship to the linguistic expression than the "topic(s)" of the whole discourse. Much more of empirical investigations is necessary, before anything more certain can be stated on the regularities of discourse patterning, and it seems that the changes in the hierarchy of activation should be taken into account in such studies.

A segmentation of the discourse (which itself still includes many open questions)⁴³ may be viewed from a similar angle. Trying to factor out

⁴² We assume here that our sample from section 3.2 represents a whole discourse, although the sample consists just in the opening utterances of a text.

⁴³ Grosz and Sidner (1985) quote some papers which try to bring evidence for the segmentation to be possible; however, it has not yet been found out, e.g., what *criteria* can be used to distinguish

segments for our sample on the basis of changes of activation, one can (with certain hesitations and provisions) draw the following dividing lines:

A: (1) through (2) - children (pupils) are foregrounded;

B: (3) through (4) - parents are foregrounded, accompanied by a subsequent fading away of children;

C: (5) through (7) - in (5b) children are reactivated and teachers come to the foreground, too, with parents fading away;

D: (6) through (9) - from (6) on, children are fading away, teachers stay in the foreground and parents are reactivated;

E: (9) through (11) - in (9) the dressing comes into the foreground, with other items slowly fading away;

F: (12) through... - from (12) on, 'dressing' fades away.

The boundary between the above segments has been drawn at the point when the activation of (a) certain item(s) fades away in several subsequent utterances while (a) new item(s) is/are foregrounded. It would be interesting to compare the segmentation achieved in this way with those based on the considerations mentioned by Grosz and Sidner (1985).

The objective of our discussion in this Section was to show that the notion of the degrees of activation of the items in the stock of shared knowledge together with the representation of the dynamic development of the discourse by means of changes of these degrees offers a fruitful basis of the study of the interplay of factors important for such notions as "discourse topics" and "discourse segments". It should be stressed that the notion of a topic of a sentence has been relatively well established, referring to one of the parts of the representation of the meaning of the sentence. On the other hand, when speaking about "topic" of (segments of the) discourse, one rather has in mind items of the stock of knowledge the organization of which is not strictly regulated by rules or principles similar to those of grammar; the relationships of the items of the stock of knowledge to linguistic expressions in the given utterances are less immediate and less perspicuous. With some authors, especially Lötscher (1987), the notion of text topic is even more remote from the linguistic patterning of the text. The notions concerning "discourse topics" can be reliably established and fruitfully discussed only if they are anchored in a systematic analysis of the interplay between linguistic structuring of utterances and psychological factors determining the pattern of discourse.

We wanted to show that this issue is a good evidence for the necessity of a close cooperation of linguists, psychologists, specialists in AI and

between two discourses following each other and two parts (segments) of a single (entire) discourse, etc.

computer scientists, to be able to use effectively the results achieved in these domains for speeding up the investigation of a given issue.

Notes on transitivity and theme in English

089

Part 2

M. A. K. HALLIDAY

Department of General Linguistics, University College, London W.C.1

(Received 22 April 1967)

4. INFORMATION

4.1 *Transitivity, mood and theme.* Part I of this paper (sections 1-3) was an attempt to sketch some of the principal syntactic options, having the clause as point of origin, that are available to the speaker of English for the representation of processes and relations, and of objects, persons &c. as participants in them.¹ The term 'transitivity' was used as a general label for this area of grammatical selection. Part II (sections 4-7) is concerned with another range of grammatical options, also associated with the clause, for which 'theme' is being used as the cover term.

The English clause, it is suggested, can be regarded as the domain of three main areas of syntactic choice: transitivity, mood and theme. Transitivity is the set of options relating to cognitive content, the linguistic representation of extralinguistic experience, whether of the phenomena of the external world or of feelings, thoughts and perceptions. Mood represents the organization of participants in speech situations, providing options in the form of speaker roles: the speaker may inform, question or command; he may confirm, request confirmation, contradict or display any one of a wide range of postures defined by the potentialities of linguistic interaction (Halliday, 1967b). Theme is concerned with the information structure of the clause; with the status of the elements not as participants in extralinguistic processes but as components of a message; with the relation of what is being said to what has gone before in the discourse, and its internal organization into an act of communication (cf. the 'organization of utterance' as a syntactic level in Daneš, 1964). None of these areas of meaning is restricted to the clause; but for each the clause provides a significant range of options, and it is these clause options for which the terms 'transitivity', 'mood' and 'theme' are here being used: given the clause as domain, transitivity is the grammar of experience, mood is the grammar of speech function and theme is the grammar of discourse.

Each of these three sets of options specifies a number of syntactic functions, or roles, combinations of which make up structures of the clause. Some transitivity roles, such as actor, goal and range, were discussed earlier, and these will be returned to and revised in Part III (cf. also Halliday, 1967c). The

roles specified by the theme systems are of a different kind; here structural function is function in communication, and one of the functions is itself labelled 'theme' (section 5), so that the term 'theme' is being used both as a general name and as the name for a particular role in the distribution of information in the clause as message: it is hoped that the context will always make it clear in which sense the term is being used. Other functions within this area are labelled by such terms as 'given' and 'new'; 'topic' and 'comment' are however avoided because they have tended to be used in a way which conflates what are here regarded as distinct functions, with 'topic' meaning both 'given' and 'theme'.

Within the theme system complex, six distinct but related sets of options will be recognized. Three of these concern the status of single elements in the clause structure and these will be treated briefly in section 7; the other three relate to the clause as a whole or, in one case, a distinct unit of comparable extent, and these will be discussed in sections 4-6 under the headings 'information', 'thematization' and 'identification'. In general terms, options in the first set are realized by phonological features of intonation, those of thematization by the sequence of elements in the clause and those of identification by certain specific patterns of clause structure. It is the first of these, the information options, that are not strictly speaking clause systems, since they define their own domain of operation; but since the present paper is concerned primarily with the clause the discussion will be mainly limited to the distribution of information with the clause as starting point.

4.2 *Information unit.* Any text in spoken English is organized into what may be called 'information units'. The distribution of the discourse into information units is obligatory in the sense that the text must consist of a sequence of such units. But it is optional in the sense that the speaker is free to decide where each information unit begins and ends, and how it is organized internally; this is not determined for him by the constituent structure. Rather could it be said that the distribution of information specifies a distinct constituent structure on a different plane; this 'information structure' is then mapped on to the constituent structure as specified in terms of sentences, clauses and so forth, neither determining the other.

Information structure is realized phonologically by 'tonality', the distribution of the text into tone groups: one information unit is realized as one tone group. It is noticeable that in modern English there are two fairly distinct tendencies in punctuation: some writers tend to punctuate according to the information structure, others more according to the sentence structure. The distinction is sometimes referred to as 'phonological' (or 'phonetic') versus 'grammatical' punctuation; but this is perhaps misleading since the two represent rather different aspects of the grammatical structure, the former being 'phonological' in the sense that, since information structure is realized directly

in the phonological organization, it can be interpreted as a marking off of phonological units.

Since the clause is the point of origin for other thematic systems one may set up a 'marked / unmarked' form of option in the mapping of information structure on to sentence structure: in the unmarked option one information unit is one clause. More specifically, it is one non-embedded clause together with all clauses embedded within it.² But the information unit may be less than a clause or more than a clause or any combination of these, for example the whole of one clause and part of another; all these are regarded as marked. Put the other way round, a clause may be realized as a single tone group ('unmarked tonality'), or as two or more tone groups, part of a tone group &c. ('marked tonality'). So, for example, the following are all possible as variants of the (written) clause *John saw the play yesterday*, representing different options in respect of information structure:

// John saw the play yesterday //

// John // saw the play yesterday //

// John // saw the play // yesterday //

// John saw the play yesterday but said nothing about it //

// John // saw the play yesterday and is seeing it again today //

The first is unmarked; the clause is one information unit. The remainder are marked, with the clause as two information units, three information units, part of an information unit and one information unit plus part of another respectively; and other variants are also possible. The present discussion will take account only of those options where the clause is organized into a whole number of (one or more) information units; this makes it possible to consider the distribution of information within the general framework of thematic systems, taking the clause as point of origin.

The choice of 'information distribution', with the clause as point of origin, is thus in the first instance a numerical one: how many units of information? The answer will be a whole number from 1 to n , where n is the number of ultimate constituents in the clause. In the case of continuous informal discourse the value of this variable is usually very low; it rarely exceeds the total number of clause constituents – that is, of the elements of structure of the non-embedded clause and of any clauses embedded within it. If one takes the total distribution into account, including information units which extend across clause boundaries, the average number of information units per clause lies between 1 and 2. The following is an example from a recorded conversation:

// I had one of those nice old tropical houses // I was very lucky // it was about thirty years old // on stone pillars // with a long stone staircase up // and folding doors // back on to a verandah // and I came through the door from the kitchen // and a thief carrying my handbag // emerged // through my bedroom door // into the living room // at the same moment //

The distribution into information units represents the speaker's blocking out of the message into quanta of information, or message blocks. Each information unit is realized as one tone group, in the sense that the information structure specifies the boundaries of the tone group to within certain limits, its exact location being determined by considerations of phonological structure. It may be that, above the information unit, it is possible to recognize a higher unit of information structure realized in terms of patterns of tone group sequences specified by tone. This seems more clearly to be the case in loud-reading, where sequences of tone 3 or 4 followed by tone 1 seem to form a clearly marked message unit, often co-extensive with the clause; it is less obviously true in conversation, where the organization of information above the information unit may need to be conceived rather in terms of anaphoric and other cohesive relations between sentences (Hasan, 1967). For the moment we may consider the relation between information units as one of simple linear sequence; this includes the possibility of interpolation (but not embedding), as in

// John saw < // or said he was going to see // > the play yesterday //

where one tone group is enclosed within another.

The linearity of information distribution is in fact related to the internal structure of the information unit, whereby the speaker organizes the components of the message block in such a way as to specify its relation to what has preceded (see 4.3 below). The information unit is what the speaker chooses to encode as a unit of discourse; the decision is a meaningful one, and a text may be structured into such units in any number of ways all other features remaining constant. At the same time the information unit is the point of origin for further options regarding the status of its components: for the selection of points of information focus which indicate what new information is being contributed. The distribution into information units thus determines how many points of information focus are to be accommodated, and specifies the possible limits within which each may be located. It does not however fully specify its location; the assignment of information focus is a distinct option within the information unit. Thus for example (using bold type to indicate information focus)

// Mary // always goes to **town** on Saturdays //

contrasts with

// Mary // always goes to town on **Saturdays** //

the distribution into information units being unchanged. (It also contrasts with // Mary always goes to // **town** on Saturdays // where a different distribution into information units has nevertheless allowed the information focus to be located at the same points. But the interpretation of information focus depends on where it is located relative to the information unit, so that it is the distribution that partially determines the focus and not the other way round. Thus while // on **Saturdays** // Mary always goes to **town** // is normal, // on **Satur-**

days Mary always goes to // town // is unlikely, since there is an incongruence between the treatment of *on Saturdays* as theme (see section 5) and its not being assigned the status of a full information unit.)

The distribution of the discourse into information units is related to the options of thematization and identification; this will be discussed in the relevant sections below (5 and 6). It is also related to other, non-thematic options, since it defines the domain for a large number of choices of mood that are realized by tone, as well as being associated with certain features of sentence structure (of which some instances are mentioned in 4.5 below). At the same time it represents a distinct dimension of structural organization, one that is not derivable from other syntactic features.

4.3 *Information focus*. The system of information focus is thus dependent on the information structure; it involves the selection, within each information unit, of a certain element or elements as points of prominence within the message. Each information unit has either one primary point of information focus or one primary followed by one secondary. The choice is again realized in the phonological structure, by the assignment of the tonic (tonic nucleus) in the tone group.

As already noted, the tone group is a phonological unit that functions as realization of information structure. It is not co-extensive with the sentence or the clause or any other unit of sentence structure; but it is co-extensive, within limits determined by the rhythm, with the information unit. The internal structure of the tone group likewise reflects the potentialities of organization within the information unit. The tone group may be considered to consist of one obligatory component, the 'tonic segment', and one optional component, the 'pretonic segment'; as the names imply, the latter, if present, precedes the former. The tonic segment may be either simple or compound; if simple, it has one tonic component, if compound it has two. This determines the range of possible tones; a tone group with simple tonic segment has tone 1 2 3 4 or 5, one with compound tonic segment has tone 13 or 53 (thus the second, or minor, tonic always has tone 3). The initial syllable in the tonic component, the 'tonic syllable', is phonologically prominent, this prominence being primarily a matter of pitch (pitch movement, not pitch level) and secondarily one of duration and intensity. Each segment, and each component within the tonic segment, consists of at least one foot, and therefore contains at least one salient syllable (more exactly, at least one ictus, normally realized as a salient syllable but potentially also as silence).

The system of information focus specifies the structure of the tone group, determining the number and location of the tonic components. Each point of information focus is realized as a tonic component; this begins on an accented (i.e. potentially tonic) syllable, except in certain types of contrastive focus which may determine an unaccented syllable as tonic, and continues until

terminated by a new tone group or a secondary tonic component. Any material preceding the tonic segment in the tone group is pretonic. Thus in

// 4 John //13 saw the / play / yesterday //

there are two information units; the first has a simple tonic segment, focus on *John*, and no pretonic, the second has compound tonic segment, primary focus on *play* and secondary on *yesterday*, and pretonic segment *saw the*. Here the notation is phonological, with // indicating the tone group boundary, / the foot boundary and bold type the tonic syllable; by a simple convention the same symbols can be used, as in 4.2 above, to represent information structure (since the one determines the other), with // as information unit boundary, the foot boundary omitted, and bold type for the word to which information focus is assigned (and not merely its accented syllable).

A text consisting of n information units will thus have not less than n and not more than $2n$ points of information focus, and for each information unit there are two options: is there just one primary focus or are there two, one primary and one secondary, and where is the focus assigned? The first is realized as either simple or compound tonic segment, the second as the location of tonic prominence. It is not suggested, of course, that such sets of options are separated from one another in real time in the speaker's planning procedures.

Information focus reflects the speaker's decision as to where the main burden of the message lies. It is one of the many diverse phenomena referred to by speakers of English as 'emphasis'; the term is used to cover most of the types of prominence discussed in these sections. Information focus is one kind of emphasis, that whereby the speaker marks out a part (which may be the whole) of a message block as that which he wishes to be interpreted as informative. What is focal is 'new' information; not in the sense that it cannot have been previously mentioned, although it is often the case that it has not been, but in the sense that the speaker presents it as not being recoverable from the preceding discourse. The focal information may be a feature of mood, not of cognitive content, as when the speaker confirms an asserted proposition; but the confirmation is itself still 'new' in the sense intended. If we use the – admittedly rather inappropriate – term 'given' to label what is not 'new', we can say that the system of information focus assigns to the information unit a structure in terms of the two functions 'given' and 'new'.

It was very early observed that in many, perhaps a majority of, instances in English the tonic falls on the last accented syllable in the tone group. This can be interpreted in the light of the phonological structure of the tone group, with obligatory tonic segment optionally preceded by a pretonic segment, to suggest the generalization that the information unit consists of an obligatory new element, realized as tonic, optionally preceded by a given element, realized as pretonic. In the very broadest terms this generalization stands: the information unit may consist only of material under focus, as in // John // above, and where

there is also non-focal material this generally occurs as pretonic, preceding the focal. But this general picture of '(given followed by) new' is only partially valid.

Information structure is one aspect of the thematic organization of discourse; and, as brought out in the work of linguists of the Prague tradition (cf. summary in Vachek, 1966: 88 ff.), thematic organization is clearly reflected in various features of modern English syntax, including certain tendencies of word order. The sequence of elements in the clause tends to represent thematic ordering rather than ordering in transitivity of the 'actor - action (- goal)' type, and this is particularly true of the function of clause-initial position which reflects a division of the clause into 'theme' and 'rheme', with theme always preceding rheme (see section 5 below). The functions 'given' and 'new' are however not the same as those of 'theme' and 'rheme'. The two are independently variable (hence the present avoidance of the terms 'topic' and 'comment' referred to earlier). But there is a relationship between them such that in the unmarked case the focus of information will fall on something other than the theme; it will fall at least within the rheme, though not necessarily extending over the whole of it.

While therefore the given - new structure is not itself realized by the sequence of elements, and the focus of information may fall anywhere in the information unit, the partial congruence between this variable and the one which is in fact realized by the sequence of elements, that of theme - rheme, together with the partial congruence between clause and information unit, results in a tendency towards a left to right form of organization in the information unit with given, if present, preceding new. The phonological organization of the tone group into a tonic segment with optional preceding pretonic segment is thus explicable in terms of the tendency for given to precede new in information structure. But whereas in the clause theme always precedes rheme, the theme-rheme structure being in fact realized by the sequence of elements within the clause, the sequence given - new in the information unit is merely the unmarked sequence; the realization is in terms of tonicity and this sequence is far from obligatory: to cite a text example,

// I all the / G C E / papers have to be / marked out of / two / hundred //

The focus of the message, it is suggested, is that which is represented by the speaker as being new, textually (and situationally) non-derivable information. This is why in types of discourse involving much factually new material, as for example the first sentence of a new topic in a broadcast news bulletin, the speaker or loud-reader tends to opt for a large number of short information units, each with its focus of information - and why those news readers who attempt to imitate a more conversational intonation pattern, appropriate to a register with less lexical content per unit grammar and more anaphora, are often quite hard to follow. But the non-predictability of the new does

not necessarily imply factually new information; the newness may lie in the speech function, or it may be a matter of contrast with what has been said before or what might be expected. Nor does the specification of one element as new necessarily mean that all else in the information unit is fully derivable. The interpretation of 'new' and 'given' as functions in information structure, like that of any other structural functions, may vary considerably with variation in the environment. At the same time such variation is predictable from the general interpretation, the significance of which appears in the informational restrictions on anaphoric elements: what is anaphoric by reference is new only if contrastive, while what is anaphoric by substitution cannot be informationally new.

4.4 *Given and new*. In any information unit that is non-initial in a discourse, recoverable information tends to be represented anaphorically, by reference, substitution or ellipsis. Ellipsis involves systemic features having no realization in structure and therefore having no potentiality of association with information focus: what is unsaid cannot be otherwise than taken for granted. By 'reference' is meant here the anaphoric use of what are essentially items of extralinguistic, situational reference (Lyons, 1966: 231), such as pronominals and demonstratives, as in *does John rent this house? - no, he's bought it*. Substitution involves those items which are essentially text-referring like *one* and *do*: *has anyone seen the play? - I think John has done*. From the point of view of information structure WH- items are reference items when interrogative and substitutes when relative.

Anaphoric items are inherently 'given' in the sense that their interpretation depends on identification within the preceding text. Substitutes can in fact never carry information focus; they cannot be structurally new (examples such as *is John going to see the play? - I think he's already done so* are not in fact counter-examples; here it is the tense that carries focus, and *done* must be followed by the non-focal substitute *so*). Reference items however can be structurally new, not only in reference to the situation (i.e. when the deixis is non-anaphoric; for this see 6.3 below) but also when used anaphorically; in the latter case, 'new' is always to be interpreted as 'contrastive', as contrary to some predicted or stated alternative. Thus an item like *yesterday*, interpretable only by reference to 'today', is contrastive if it carries information focus: compare // John saw the play in **June** // with // John saw the **play** yesterday // - where // John saw the play **yesterday** // would imply something like 'not the day before' or 'and therefore doesn't want to see it today' (and see below, on 'unmarked focus'). Similarly // I saw **Mary** // but // I **saw** her //, // I saw **her** // being contrastive; // three months **earlier** // but // three **months** ago //. Compare also the discussion of *he felt himself* in 3.3 above.

Intermediate between reference items and lexical items in general are non-anaphoric closed system items such as verbal auxiliaries and prepositions.

Since prominence in a closed system is inherently contrastive, with such items also information focus implies contrast: // **on** the table // means 'not under, not beside, &c.', // **can** go // means 'not cannot, can but will not, &c.' Thus reference and other closed system items will not carry information focus even when final in the information unit unless they carry contrastive information; this applies even if they are polysyllabic words with an accented syllable, hence // which flag do they **sail** under //, // why don't they **play** together //, // he **hurt** himself //. This is why the rule about the location of the tonic is often formulated as 'the tonic falls on the (accented syllable of the) final lexical item in the tone group', 'lexical item' being understood to exclude closed system items, those which occur as the unique realization of a grammatical feature and thus form one-member classes. Stated in this form, the rule is still not complete, since the tonic may fall anywhere within the tone group; what it specifies is unmarked information focus.

Before explaining what is meant here by 'unmarked', however, it will be useful to consider what is the domain of focus in the information unit, since this may include more than one accented lexical item. Consider an example such as

// ^ I'm / looking for the / caretaker who / looks after / this / **block** //

The domain of focus here is the whole of the clause constituent *the caretaker who looks after this block*, but only the final accented syllable is within the tonic segment. An even clearer example is

// ^ I / find it / in /compre/**hensible** //

The tonic falls, in fact, on the last accented syllable of the item under focus, irrespective of the internal structure of this item; compare // the caretaker who looks after this **block** might know where to find them // (and also *the caretaker who looks after this block's new car*, since possessive 's is likewise assigned by position in the syntagm, not by function in the structure). The domain of focus is thus not the tonic component as such but, in general, the highest rank constituent within which the syllable that is tonic is the last accented syllable. This is often a constituent of the clause; but it may be a constituent of the group, as in // I've seen **better** plays //, where *plays* must lie outside the domain – or even of the word, in which case the tonic syllable may be one which is not accented, as in // the damage was only **external** //.

The information focus assigns the function 'new' to what is within its domain. What lies outside that domain can be said to have the function 'given'; and here the distinction arises between unmarked and marked focus. If we consider the implied questions to which the information unit could stand in answer, then

// **John** painted the shed yesterday //

// John **painted** the shed yesterday //

imply respectively 'who painted the shed yesterday?' (or 'did Mary paint . . .?'),

&c.) and 'what did John do to the shed yesterday?' (or 'did John mend . . .?', &c.); and similarly (since *yesterday* is a reference item)

// John painted the shed **yesterday** //

implies 'when did John paint the shed?' (or 'did John paint the shed this morning?' &c.). But

// John painted the **shed** yesterday //

does not necessarily imply 'what did John paint yesterday?' (or 'did John paint the wall . . .?', &c.); it may simply imply 'what happened?'. Whereas the first three are equivalent to *John (did), he painted it* and *yesterday*, in the sense that these would be the predicted forms if the question had actually been asked, the fourth is not necessarily equivalent to *the shed*. The fourth example is thus regarded as unmarked in information focus.

A specific question is derivable from any information unit except one with unmarked focus; one with unmarked focus does not imply any preceding information, and this is in fact the form appropriate to the first information unit in a discourse. Where the focus is unmarked, in other words, its domain may be the whole of the information unit. An item with unmarked focus may thus be represented as being ambiguous, as having the structure either given – new or simply new. The two tend in fact to be distinguished in informal speech; either by tone: here tone 4 would imply a specific focus on *the shed* while tone 1 would suggest the other interpretation; or by rhythm, the given-new having no salient syllable before the tonic (and therefore no pretonic): compare (*what do they do?*) // ^ they / teach / **classics** // with (*what do they teach?*) // ^ they teach / **classics** //.

A distinction may therefore be made between unmarked focus, realized as the location of the tonic on the final accented lexical item, which assigns the function 'new' to the constituent in question but does not specify the status of the remainder, and marked focus, realized as any other location of the tonic, which assigns the function 'new' to the focal constituent and that of 'given' to the rest of the information unit. Marked focus may be focus on a reference or other closed system item, whether final or not, or on a lexical item that is not final; here what is structurally new is informationally contrastive, either (as already noted) within a closed system or lexically, and what is given tends to be anaphorically recoverable (except in the special case of marked focus on an intensive such as *very*; this should perhaps be regarded as a special case of unmarked focus, since it seems not necessarily to define a given – new structure). In particular, this means that anything that is post-tonic in the tone group will in either case tend to be grammatically or lexically anaphoric; this is why no further intonation contrasts occur after the tonic syllable, so that we can talk of the 'tonic segment' extending to the end of the tone group. Pre-tonically, on the other hand, there may be both 'new' material within the leftward-extending domain of the information focus and material which,

though structurally 'given', is not recoverable by anaphora; hence the optional pretonic segment with its range of secondary intonation contrasts.

Thus the system of information focus can be thought of as introducing a binary pattern of given – new into the organization of information, although it does not impose a binary structure on every information unit, since the element 'given' is optional. Within the new there may be, as mentioned earlier, a point of secondary information focus, always realized as tone 3. This tone is characteristically associated, even as major tonic, with dependent information, incomplete, contingent or confirmatory; as a minor tonic it is particularly frequent on clause-final adjuncts, as in // he's going back up **north** on **Thursday** //, these being typical of secondary information points. It is also used to give partial prominence to an item that has been mentioned earlier, as in ('have a chocolate?')

//13 ^ no I / don't really / **like** / **chocolates** //

Thus the 'new' element may itself be a two-part structure, the second point of focus marking information that is either new but subsidiary or given but to be noted. A particular case of this structure is the thematic system of substitution, discussed in 7.2 below.

We may conclude this sub-section with a text example showing the functioning of the given – new structure in a discourse:

A: //1 ^ how / **maddening** and you //1 had to / walk from / one to the / **other** //

B: //4 not only / **that** but you //1 didn't know / where to start / **looking** for the / other and a//1 **gain** as I //1 **say** //4 since you / couldn't walk / round very / **easily** you //1 just didn't / **try** to / look for the / other //

Here the referents of the given elements *other* and *look for* are close at hand, but the point of reference may be at some distance away; the same text had //4 ^ I was a / student / **then** // related to the earlier (answer to *I thought it was half price for students*) // it is // but I'm not a **student** unfortunately //, from which it was separated by 83 information units.

4.5 *Some particular cases.* A number of specific contrasts in English grammar are derivable as special cases from the general pattern of information structure. One example is the distinction between defining and non-defining elements attached to nominals: in // his brother the **heart** surgeon //, one information unit, *the heart surgeon* is defining, while in // his **brother** // the **heart** surgeon //, two information units (with tone concord), the two nominals are in apposition. This is the same distinction as that between defining and non-defining relative clauses; here information structure determines sentence structure. But these and similar cases are essentially no different from other instances of choice in information structure, where the distinction between one information unit and two appears merely to reflect the decision as to what information is to be given prominence: for example ('what did you do yesterday evening?') // we took a

boat trip // up the **river** // as far as **Richmond** //, contrasting with // I had dinner with **Evelyn** // where having dinner is a predictable evening occupation. These will not be pursued further here; but we may mention finally one or two points relating more specifically to questions of theme.

The information unit frequently defines the domain of constituents whose status in sentence structure does not fully specify a domain for them. For example, clause-initial adjuncts normally have as their domain the whole of the information unit immediately following: either that in which the adjunct itself occurs or, if the adjunct forms an information unit on its own, the next one. Thus in

//4 ^ for / **some** / reason he's //1 gone a/way and he / hasn't / left an ad/dress //

he hasn't left an address is part of what is unexplained: it is within the domain of *for some reason*; while in

//4 ^ for / **some** / reason he's //1 gone a/way and he //1 hasn't / left an ad/dress //

only *he's gone away* is within the domain of *for some reason*. The contrast would hold whether or not *for some reason* formed a distinct information unit. The information unit has this function with respect to all adjuncts in this position including those of time, place and so on: compare *yesterday John promised to come but he didn't*, where if there is an information unit boundary after *come* the *but he didn't* is outside the domain of *yesterday* (cf. below, 5.3).

Other, non-initial items such as *only*, *either* and *too* have their domains defined in the same way: compare // Yorkshire gained twelve points and won the **championship** // **too** // where the domain of *too* is the whole of the preceding information unit and the utterance therefore presupposes a preceding one, with // Yorkshire gained twelve **points** // and won the **championship** // **too** // where *too* relates *won the championship* to *gained twelve points* and no previous utterance is presupposed. Here again the role of the information unit in specifying the domain of such items is merely a special case of its function in structuring the message; compare also its role in the specification of layering in co-ordinate structures of three or more elements.

To give an example relating to information focus, the echo question shows the role of information focus in marking a particular option, here an option of mood within the interrogative. In echo questions the WH- element retains its normal function as theme (cf. 5.1), but the focus of information is marked, falling on the WH- element instead of on the final lexical item:

//2 **what** was the / name of the / speaker //

The meaning is 'I've forgotten (didn't catch, don't believe) the answer', and this is achieved by marking the question element as contrastively new, giving it 'thematic prominence' (7.1), with the usual implication that everything else in the information unit is recoverable – that is, in this instance, that the question

NOTES ON TRANSITIVITY AND THEME IN ENGLISH

has been asked (or implied by being answered) before. Other examples are provided by systems of polarity and contrast in the verbal group, for example // he **took** it // unmarked positive, // he did **take** it // marked positive, // he **did** take it // contrastive positive.

The suggestion is, then, that a piece of discourse consists of a linear succession of message blocks, the information units, realized by tonality: that is, as a sequence of tone groups the location of whose boundaries is specified to within significant limits by the information structure. Each information unit is the point of origin for the choice of information focus, by which one element is selected as focal, optionally followed by a further, secondary point of focus; this choice is realized by tonicity, the structuring of the tone group into a tonic segment, simple or compound, optionally preceded by a pretonic segment.³ Information focus assigns the structural function 'new' to a constituent in the information unit, with, optionally, a remainder having the function 'given'. In the unmarked case the new is, or includes, the final lexical item, so that the unmarked sequence, excluding anaphoric elements, is given preceding new; but the focus can appear at any point in the information unit. The constituent specified as new is that which the speaker marks out for interpretation as non-derivable information, either cumulative to or contrastive with what has preceded; the given is offered as recoverable anaphorically or situationally. These are options on the part of the speaker, not determined by the textual or situational environment; what is new is in the last resort what the speaker chooses to present as new, and predictions from the discourse have only a high probability of being fulfilled. Nevertheless the structure of the information unit does contribute in large measure to the organization of discourse, by providing a framework within which these options are exercised.

5. THEMATIZATION

5.1 *Theme and rheme*. It was suggested in the preceding section that the information systems assign to the discourse a structure which is independent of sentence structure and through which the speaker both organizes the act of communication into a chain of message blocks, the 'information units', and specifies within each message block the value of the components in the progression of the discourse. Information is a discourse pattern in the sense that, although the speaker is operating, here as elsewhere in the grammar, with a wide range of options, the factors that he takes into account in exercising these options are those of the textual environment, the preceding discourse; information is thus closely bound up with cohesive patterns such as those of substitution and reference.

Thematization falls within the same general area of options in the grammar of communication; but it is a choice of a different nature. Its point of origin is the clause, not the information unit; and it assigns to the clause a structure in

terms of the functions 'theme' and 'rheme'. It is thus basically a form of the organization of clause constituents, although as will be shown in sections 6 and 7 these can be regrouped by other thematic systems (in the broad sense of 'theme') in various ways which are relevant to the theme - rheme structure. Basically, the theme is what comes first in the clause; and while this means that as pointed out in 4.3, there is in the unmarked case (i.e. if the information structure is unmarked) an association of the theme with the given, the two are independent options (cf. Firbas, 1964). The difference can perhaps be best summarized by the observation that, while 'given' means 'what you were talking about' (or 'what I was talking about before'), 'theme' means 'what I am talking about' (or 'what I am talking about now'); and, as any student of rhetoric knows, the two do not necessarily coincide.

The information systems, in other words, specify a structural unit and structure it in such a way as to relate it to the preceding discourse; whereas thematization takes a unit of sentence structure, the clause, and structures it in a way that is independent of what has gone before. This structuring is into two parts, a theme and a rheme, and is realized simply by the sequence of elements: the theme is assigned initial position in the clause, and all that follows is the rheme. Thus in *John saw the play yesterday*, *yesterday John saw the play* and *the play John saw yesterday* (as a complete clause) the themes are, respectively, *John*, *yesterday* and *the play*.

The theme is what is being talked about, the point of departure for the clause as a message; and the speaker has within certain limits the option of selecting any element in the clause as thematic. As often in this area of the grammar, however, one of the options is unmarked, and the identification of the unmarked option provides a useful insight into the meaning of the theme - rheme structure as a whole.

Which element in a clause would be the unmarked theme depends on the mood of the clause. Let us consider the three mood features declarative, polar ('yes/no') interrogative and non-polar ('WH-') interrogative, as in *John saw the play*, *did John see the play?* and *who saw the play?* (or *what did John see?*). These differ as regards the selection of an element as clause-initial: subject, finite element of predicator, and WH- element whatever its modal function (i.e. whether subject, complement, adjunct or any constituent thereof). In each case, however, the element occurring in first position is the natural theme of the clause.

In a non-polar interrogative, for example, the WH- item is by virtue of its being a WH- item the point of departure for the message; it is precisely what is being talked about. This is why in the unmarked case it occurs initially. The sequence of elements in an English WH- clause is entirely predictable from considerations of theme. Given that *what did John see?* means 'John saw something and I want to know the identity of that something', the theme of

the message is that there is something the speaker does not know and that he wants to know; the rest of the message is explanatory comment about this demand: '(as for) what I want to know (it) is the interpretation of the "something" that John saw'.

The same generalization is valid also for the polar interrogative. Here what is in question is the polarity: the only unknown is whether the text is positive or negative. Since it is the finite element of the verbal group which carries the realization of polarity, this element becomes the theme: in *did John see the play?* the theme of the message is the demand for a resolution of the binary option marked by the *did*. Interaction with information structure introduces many further options relevant to the interpretation of an interrogative but does not alter the thematic pattern. Thus while //2 *did John see the play* // has unmarked information focus, //2 *did John see the play* // has marked focus on *John* and implies something like 'I know Mary did'; but it is still a request for a yes/no answer. Similarly, as noted in 4.5, a non-polar question with marked focus on the WH- item, as in //2 *who saw the play* //, has the special sense of an echo question, but this is merely the result of focus on the theme (cf. //2 *did John see the play* // 'after all? - I know he was going to'), making the request for information itself the point of prominence in the information unit.

In the declarative, the subject is the unmarked theme (cf. Firbas, 1966). The function 'subject' as understood here is specified in the mood systems, not in the transitivity systems; the term therefore corresponds to the 'surface subject' of a transformational grammar, not to the 'deep subject' (which is a transitivity function). The subject is that nominal which, together with the finite verbal element, fulfils a modal role in the realization of speech function; the two together form a constituent specified by the mood systems, one that is obligatory in independent clauses, since these select for mood, but optional in dependent clauses, which do not. Since mood and theme interact here, the subject is also definable as the unmarked theme of a declarative clause.

We can therefore generalize the concept of unmarked theme as the element which the speech function would determine as the point of departure for the clause. In non-polar interrogative this is the WH- item; in polar interrogative and declarative it is the modal constituent, that containing the subject, and more specifically, within this, the subject in declarative and the finite verbal element in polar interrogative. These represent, in the unmarked case, 'what the clause is about'; and in the declarative this is often an anaphoric or deictic element (having what Firbas (1964: 272) calls 'the lowest degree of communicative dynamism'). But the selection of the theme is a meaningful option within the clause, and the speaker may select, instead of the unmarked theme, a marked theme as in *the play John saw yesterday* ('but I don't think he's seen the film'). We have suggested that in the interrogative the sequence of elements is itself to be explained by reference to the concept of theme; and this is

further borne out by the fact that a clause such as *where the play did John see?* is impossible: since *where* is already the theme the only possible motive for bringing *the play* in front of *did John see* is removed. At the same time the function of the WH- item is as realization of a modal option, so that while the introduction of a marked theme in front of it is predictably rarer than marked theme in the declarative it is by no means impossible: we may have clauses such as *the play where did you see?* or *yesterday what did you do?* Similarly in polar interrogatives; the ordering of the elements in *has John . . . ?* is basically a thematic one, so that, again, *has the play John seen?* is impossible, and it is perhaps not unreasonable to suggest that the preference for the 'inverted' interrogative structure in English, by contrast with a number of other languages which possess this resource of inversion but prefer not to use it, may be due to the relative importance assigned to thematic organization by sequence in the syntax of the English clause. At the same time the constituent so formed, of finite verbal element followed by subject, can as a whole be displaced by a marked theme as in *the play has John seen?*, *yesterday did John see the play?* In other words, while marked theme in the interrogative is infrequent, since interrogatives have a built-in unmarked theme in the form of a question, or rather of a request for information, the speaker may override this by introducing another element as his point of departure.

In the declarative the thematic pressure on the subject is much less strong, and marked themes are frequent in all registers. Marked theme represents a foregrounding of the speaker's point of departure, and its meaning appears from its tendency of association with a particular information structure. In clauses with unmarked theme there is no particular tendency for the theme to appear as a separate information unit; but such a tendency is very noticeable with marked themes, often with tone 3 (non-contrastive) or tone 4 (contrastive): // these **houses** // my grandfather **sold** //, // **that** // I don't **know** //, // **tomorrow** // John's taking me to the **theatre** //. The first information unit consists of the theme and nothing else; and while this is not uncommon with unmarked theme with marked theme it is the predominant pattern, sometimes reinforced by a silent ictus as in

//4 **that** //1 I / don't / **know** //

The theme is set apart in a way which the speaker feels may appropriately be glossed, and sometimes does gloss, by some such locution as 'as far as . . . is concerned'. This happens also with the much rarer interrogatives:

//2 this / **sandwich** does //2 nobody / **want** //

where however the theme takes the tone of the rheme. (An apparent exception is the WH- clause with declarative sequence, such as *John wants what?*, *John went where?* By the definition above these would appear as having marked theme; but they are in fact not characterized by the information structure associated with marked theme, and they are better regarded as having the

thematic structure of declarative clauses. With tone 2 they are echo questions, and take their thematic structure from the clause to which they are responding; with tone 1 they are peremptory questions, perhaps to be regarded as a blend of declarative and interrogative.) As a typical text example of marked theme in the declarative:

//4 & the / **last** pair of / shoes I / bought there I //1 wore for / ten / **years** //
5.2 *Theme and the passive*. All syntactic options occur in the environment of other options, and the discussion of any one system is likely to require frequent reference to other systems having the same point of origin. In the treatment of marked and unmarked theme reference has been made to both mood and information structure; but the relation of theme to transitivity has not so far been considered. This concerns particularly the passive, which can be regarded as an option dissociating the roles of actor and theme while leaving the theme unmarked.

It has been said that, as here defined, the subject is that element which is introduced in the realization of certain features in the system network of mood. It is the role which specifies speech function, first as between indicative and imperative and then, in its interaction with the finite verbal element, between declarative and polar interrogative; non-polar interrogative being specified by the WH-role, which may however be mapped on to that of subject. In transitivity, the subject may be actor, goal, beneficiary or range. (It will be suggested in Part 3 of this paper that 'actor' and 'goal' are not wholly appropriate as transitivity roles in English, but this does not invalidate the present discussion.) In information focus, the subject may be (included within) given or new; in the unmarked case it is within the given. In thematization, the subject may be (included within) theme or rheme; what is unmarked here depends on the mood, but if we restrict the discussion to declarative clauses the unmarked option has the subject as theme

Let us consider that each of these sets of options specifies its own constituent structure, each with its own set of structural roles. Then for example

//1 John's / seen the / **play** //

has four simultaneous constituent structures:

- (1) transitivity: actor *John*, process *has seen*, goal *the play*
- (2) mood: subject *John*, predicate *has seen the play*
(actually, rather, modal constituent *John's*, residual constituent *seen the play*)
- (3) information focus: given *John's seen*, new *the play* (alternatively, since the focus is unmarked, new *John's seen the play*)
- (4) thematization: theme *John*, rheme *has seen the play*

These roles are mapped on to one another to form complex structural elements: the element of structure is thus a complex of structural roles. Certain options specify the presence of a particular role in the structure: in transitivity, for example, the feature 'effective' specifies the (potential) presence of the roles

of actor and goal. Others have a mapping function, and these include those of 'voice': 'operative' specifies the mapping of actor on to subject and of goal on to complement (that is, on to a nominal in the residual constituent in mood structure; subject and complement are modally defined roles of nominals having the potentiality of participant roles in transitivity). In the example above, which is operative, declarative, unmarked in focus and unmarked in theme, actor = subject = given = theme.

This particular alignment of roles would probably be generally considered to represent the favourite clause type, at least in effective clauses (see however section 10); reasons have been suggested for regarding the pattern which it exemplifies as unmarked in focus and theme, and it is not unreasonable to represent declarative as 'unmarked in mood' and operative, in the environment of effective, as 'unmarked in voice'. In other words if the unmarked term is selected in each set of options the nominal to which the role of actor is assigned will also be the variable that enters into the determination of speech function and the point of departure, but not the point of information, in the message.

Variation from the unmarked results in different role combinations and constitutes the kind of foregrounding that the speaker thinks of as emphasis. Thus in // these houses were built by my **grandfather** //, which is receptive ('marked in voice'), the actor is focal and the goal thematic and the effect is to 'emphasize' the actor as the point of new information and also to 'emphasize' the goal as what the message is about. It seems appropriate to interpret the feature 'receptive' in the grammar as that option which maps goal on to subject because this is the reason for selecting the option: since the subject is the unmarked theme, the receptive allows the goal to be thematic while remaining, qua theme, unmarked – and the actor either to be absent or, if present, to carry the unmarked focus.

If the roles of actor and theme are combined, therefore, they are likely also to be combined with that of subject: *my grandfather built these houses* will be preferred to *by my grandfather these houses were built* because the reason for selecting the receptive does not obtain. But if the roles of actor and theme are separated, the expected pattern is the receptive *these houses were built by my grandfather*, which leaves the theme unmarked and in which the actor is optional. This is not the only possibility; the alternative is operative with marked theme, *these houses my grandfather built*, and this is likely to occur under either or both of two conditions. The first is if the speaker wishes to foreground the theme by marking it, by dissociating it from the subject; we have noted that a marked theme tends to be a separate information unit, and the expected form will thus be // these **houses** // my The second is if, given that the actor is to be specified, the speaker wishes to assign information focus to the process rather than to the actor yet without introducing the contrastive meaning of marked information focus: // these houses my grandfather

built // rather than with contrastive focus, // these houses were **built** by my grandfather //. The example is now unlikely because of the collocational probability of *built* in the environment of *house*; but if we change it to

// these **houses** // my grandfather **sold** //
the meaning of the choice – that is, of not choosing receptive in spite of having goal as theme – appears clearly: a marked, informationally prominent theme, and non-contrastive focus on the process. Other than under these conditions, if the goal is the theme of the clause the likely transitivity option is the receptive. This allows the actor either to be non-thematic or, in fact, not to be specified at all; and not surprisingly the great majority of receptive clauses in contemporary English texts have no agent (Svartvik, 1966: 141).

The meaning of the passive in English was said many years ago by Mathesius to be related to questions of theme, and it may be explained in such thematic terms: the speaker selects the option 'receptive' in the transitivity system in order to take as unmarked theme a nominal having a role other than that of actor (one of goal, beneficiary or range), the actor either being unspecified or having unmarked focus within the rheme. The option is that of 'receptive', and this may or may not be passive in the sense of having a passive verbal group; indeed the passivity of the verb is entirely unnecessary as a realization of the receptive, which is why the verbal distinction of active / passive now serves a different purpose, that of distinguishing between orientation to the process and orientation to the agency, as in *the houses sold*, *the houses were sold*; *the door opened*, *the door was opened*.⁴ We may accept Mathesius' view (Vachek, 1966: 91) that the high frequency of the passive in modern English, again by contrast with other languages having like resources, is related to the thematic organization of the clause and its interaction with other dimensions of structure.

Many other factors are involved in determining the use of the passive; but some of these are derivable from this general picture. For example, as suggested by the reference above to collocational probability, the receptive is more likely, other things being equal, where there is a high degree of mutual expectancy between process and goal, since it is in such cases that, if the goal is thematic, the actor will either be omitted or will carry the information focus: both // the bill's been **paid** // and // the bill was paid by **John** // are more likely than // the bill **John's paid** //. At the same time a pronominal actor, being anaphoric, is much less likely to occur as agent than is a non-pronominal one, because the agent is normally new: // the bill was paid by **him** // has marked and strongly contrastive focus.

We could list a paradigm showing the interaction of operative and receptive with the marked and unmarked options in focus and theme, restricting it to the declarative clause as one information unit:

Marked option:	Example:
(none)	my grandfather sold these houses

voice	these houses were sold by my grandfather
focus	my grandfather sold these houses
"	my grandfather sold these houses
theme	these houses my grandfather sold
voice and focus	these houses were sold by my grandfather
"	these houses were sold by my grandfather
focus and theme	these houses my grandfather sold
"	these houses my grandfather sold
voice and theme	by my grandfather these houses were sold
voice, focus and theme	by my grandfather these houses were sold
"	by my grandfather these houses were sold

The unlikelihood of the last three is explained by the observation made above, that marking for voice is in modern English a way of avoiding marking for theme, to the extent that the combination of marked voice with marked theme might perhaps be excluded as ungrammatical. Marked theme includes a number of sub-options dependent on the number of elements in the clause (compare the sub-options within marked focus exemplified here); it is only this particular type of marked theme, with theme mapped on to agent, that would be precluded by the choice of the passive. Whether or not voice is treated as fully determined by the theme systems, it seems important for the grammar to show in some way the interdependence between them.

5.3 *Some problems of theme.* Thematization is being considered here in terms of two options: is the theme unmarked (as described in 5.1) or marked, and, if marked, with which element in the clause is it associated? If the structural element is regarded as being a complex of structural roles, the latter question is asking, in effect, with which other structural roles it is associated; and as with unmarked theme so with marked theme the roles specified by speech function will serve as a basis for discrimination. We may designate the elements of the clause here by the familiar labels subject, complement, adjunct, predicator and conjunction; and so far, except in the special case of the agent which can now be ruled out, we have illustrated marked theme only with thematic complement. Other elements may also be selected as thematic.

Thematic predicators are rare (though see section 6 for thematic nominalizations including the predicator); one might however cite the two types exemplified by *standing outside the door he was* ('large as life!') and *and resign he did!* The finite verbal element, being part of the modal constituent, is not part of the predicator and therefore does not here enter into the theme; moreover in the second type it is the finite verbal element that carries the information focus – contrastively, since it is a closed system item (this being an instance of the verbal polarity system referred to in 4.5). There are two clause types in which the predicator regularly occurs in initial position, namely imperative and non-

finite dependent clauses, but in neither of these is it a marked theme. In the imperative the predicator is the unmarked theme, together with *you* or *let's* if present. Non-finite clauses, which also have no modal constituent, select for theme only in a restricted sense; they will be returned to briefly below.

The most frequent type of marked theme is the adjunct, as in *yesterday John saw the play*. Indeed it may seem questionable to group this together with *the play John saw yesterday* as marked theme by contrast with *John saw the play yesterday* as unmarked. That *yesterday* in the first example is thematic is shown by the fact that it cannot be followed by a thematic complement: *yesterday the play John saw* is as unacceptable as *the play yesterday John saw* (unless, in the last example, *yesterday* is qualifying *the play*, in which case *the play yesterday* is a single element and thus thematic as a whole). But although a marked option is usually less frequent than an unmarked one marked is not to be equated with rare; it simply contrasts with unmarked, an unmarked option being one which is in some respect less motivated than others in the same system and is therefore selected unless there is specification to the contrary, corresponding to the final term in an ordered OR relation in a stratificational grammar (Lamb, 1966). In thematization the unmarked theme is wholly derivable from speech function, from the mood system; while any other option requires positive specification by a motivated choice. In this sense *yesterday* does constitute a marked theme.

It is possible however for more than one adjunct to appear in thematic position in the clause. Such instances may be complex adjuncts with internal hypotaxis or embedding, such as *yesterday before dinner* or *in the desk in the corner*, in which case, like co-ordinate structures, they are single elements of the clause. But examples such as *the other day in Sheffield I watched an interesting new process* (or *in Sheffield the other day . . .*) show that the function of theme, restricted elsewhere to single clause elements, can in the case of adjuncts extend over two or more. Like other marked themes such items are often separated by information structure from the rest of the clause, and they may appear either as one or as two information units: // the other day in Sheffield // or // the other day // in Sheffield //.

It was pointed out in 4.5 that information structure specifies the domain of adjuncts appearing initially, and this can now be seen to be related to their function as theme. It seems to be a property of marked thematic elements that, if they occur as a separate information unit, their domain extends over the whole of the next following information unit; hence a pattern such as // these houses // my grandfather sold and the rest of his property he left to me // is unacceptable, since *these houses* has no function within the second clause. If they are not so separated their domain extends over the whole of the information unit in which they themselves occur but can be terminated by the occurrence of a contrasting item: // these he sold but those he didn't //. Thus the

theme plays a part in the bracketing function of information structure; and this may be a property of theme in general, since a theme which is a separate information unit seems, whether marked or not, to be presupposed in any clause included within the next information unit: while // John saw the play and Mary went to the concert // is regular, *Mary* displacing *John* as theme in the second clause, // John // saw the play and . . . // implies a following clause presupposing *John* as subject, such as // John // saw the play and liked it //, so that // John // saw the play and Mary went to the concert // is unacceptable.

In this sense all adjuncts are 'sentence adjuncts', whether of time / place or of cause, manner, &c., since their domain may extend over various levels of sentence structure. It is the thematic status of such adjuncts that makes this possible; and what restrictions there are are restrictions on their occurrence as theme. With time and place adjuncts there is normally a structural relation among sets of them occurring in the same clause, and this limits their thematic possibilities: we can have *tomorrow he's coming at eight* but not *at eight he's coming tomorrow*, since the relation between *tomorrow* and *at eight* is a directional, hypotactic one. But in *he moved stealthily across the lawn like a cat* any of the three adjuncts could occur thematically, there being no necessary structural relation between any pair of them.

A distinction must be made, however, between adjuncts of time, place and cause, manner, &c. on the one hand and items like *perhaps* and *however* on the other, with reference to the relation between theme and initial position in the clause. The concept of theme, like the other options under discussion, is based on the notion of choice: it represents an option on the part of the speaker, and any clause can be regarded as being in contrast with one or more others differing from it just in the selection of the theme. An item occurring obligatorily in initial position will not, in this sense, be thematic; and a corollary to this is that thematic variation in the clause is possible following such items.

This is the case with conjunctions. Co-ordinating conjunctions, both the 'pure' co-ordinators *and* and *or* and the portmanteau items *but yet so* and *then* (those that contain the component *and*, such that *a b but c* is interpreted as 'a and b, but c', &c.), can be followed by the full range of thematic variation, as in *but the play John has seen*; they are in any case best regarded on other grounds as not being constituents of the clause. Subordinating conjunctions, which also have obligatory initial position, permit at least some thematic variation in the clause: *although yesterday he denied it, . . .* (the accented *although*). But this variation is somewhat restricted, so that these items are felt to be clause constituents and there is a slight thematic flavour about their occurrence in initial position. It is as if one aspect of the theme of a dependent clause was the fact and nature of the dependence; and this is seen also in the non-finite dependent clauses, both those introduced by a preposition such as

without knowing the answer and those not, in which the occurrence of a complement or adjunct before the predicator is extremely unlikely. Probably only independent clauses, that is those which select for mood, exhibit the option of theme in its full interpretation; but this may be accounted for if one says that, while the theme system does operate in dependent clauses, the interpretation of theme in this environment requires the recognition of it as secondary to the underlying theme of such a clause, its relation of dependence to another clause. Intermediate in this respect between conjunctions and the adjuncts of time, place, manner &c. are the two classes represented by *however*, *nevertheless*, *in that case*, *therefore* and by *perhaps*, *probably*, *frankly*, *apparently*. These resemble conjunctions in that they cannot be predicated: there is no *it was however that he came*, *it is perhaps that he will come*. They favour initial position but are not restricted to it; and this suggests that they are thematic when occurring initially. They can, in addition, be followed by elements that are themselves certainly thematic, as in *perhaps tomorrow we can go out for the day*.

These two groups of items fall into the two areas of the grammar that we have called discourse and speech function respectively: those like *however* we may call 'discourse adjuncts', those like *perhaps* 'modal adjuncts'. They have, when occurring initially, the status of a theme; but it is a theme specified in terms of discourse structure or speech function, and thus does not preclude the enunciation of a further theme in the area of cognitive meaning, such as a complement or an adjunct of time or manner. The only restriction is the natural one that a modal adjunct cannot be thematic if the mood is already marked thematically; this is why *perhaps*, &c., cannot occur initially – though they can occur elsewhere – in an interrogative clause. A clause such as *perhaps after dinner we'll go to the theatre* has thus a composite theme, having both a modal part and a part functioning as theme in the general cognitive sense that we have been considering.

With modal themes we have as it were completed the circle, which began with the discussion of the thematic status of WH- items and the finite verbal element, because it is in the modal sense that 'question' is the theme of an interrogative clause. Here the underlying modal-thematic pattern has been built in to the structural realization of interrogatives in the language. At the same time a WH- or finite verb theme differs from a thematic modal adjunct in that it has not merely modal function; it is also, and simultaneously, a 'cognitive' theme in the sense that it is demanding an answer in cognitive terms. Hence a modal adjunct admits a (following) cognitive theme in addition, whereas an interrogative element can only be replaced by a (marked) cognitive theme, which then replaces it as the theme of the clause.

The sort of pattern that emerges might be represented as follows:

Rheme	Theme				Cognitive		
	Non-cognitive		Speech function	Marked	Unmarked		
	Sentence structure	Discourse			WH-	Finite verb	Subject
	Conjunction			Discourse adjunct			John
	although						saw the play yesterday ...
		however		Modal adjunct			saw the play yesterday
(and)			perhaps				saw the play yesterday
(and)					what		did John see yesterday?
(and)						did	John see the play yesterday?
(and)							saw the play yesterday
	although						John saw the play ...
		however					John saw the play
(and)			perhaps				John saw the play
(and)							what did John see?
(and)							did John see the play?
(and)							John saw the play

The modal and discourse adjuncts can be represented as being, potentially (i.e. when in initial position), themes of a different kind, here labelled 'non-cognitive', and co-occurring with, not excluding, a 'cognitive' theme. Even subordinating conjunctions may be said to have a kind of thematic status as 'structural' themes, though this is to say no more than to suggest a relation of their obligatory initial position to the meaning of clause-initial position in general. The interrogative themes are labelled 'cognitive' for the reasons given: they can be overridden by a marked cognitive theme because they are themselves 'content' themes, in the sense that they express a request for cognitive information, although it is their modal meaning of 'request' that gives them the status of unmarked themes. We may thus retain the concept of a 'marked theme' as defined in 5.1, this being any element other than that derived from the mood of the clause. The framework suggested is very tentative, and the facts are by no means as discontinuous as they may have been made to appear; there is gradience at many points, and types of interaction that would repay further study in terms of serial relationships (Quirk, 1965).

6. IDENTIFICATION

6.1 *Equative and identifying clauses.* It was suggested in the two previous sections that a text in spoken English is structured simultaneously on the two dimensions of given – new and theme – rheme, the former determining its organization into discourse units and the status of each such unit as a component in the discourse, the latter starting from its organization in sentence structure and framing each clause into the form of a message about one of its constituents, with the further possibility of an optional 'key signature' in the form of a theme relating to discourse or speech function. Of the remaining options in the clause which are related to thematization, in that they introduce further ways of selecting or highlighting a theme or of relating it to the rest of the clause, the most general is that here referred to as 'identification'.

This is the option whereby any clause may be organized into a 'cleft sentence' with equative form, and in a number of possible arrangements. The equative clause, referred to in 3.2, has the form 'x equals y', as in *the leader is John*; the 'equals' relation is an asymmetric one meaning 'is to be identified as'. Any clause can be organized in this equative form through the nominalization of one set of its elements, for example *what John saw was the play*. This can be regarded as a particular form of the organization of information in the clause.

Since it is useful to be able to distinguish terminologically between a clause of this type, with nominalization, which contrasts systemically with a non-nominalized clause, and a simple equative clause without nominalization such as *the leader is John*, the former will be referred to here as 'identifying' clauses: the clause *what John saw was the play* is an identifying clause related to the (non-identifying) clause *John saw the play*. An identifying clause has equative

form, with class 2 *be*, but differs from a simple equative clause in that it represents a particular option in the theme systems.

This is a highly favoured clause type in modern English, not least in informal conversation. Where the non-identifying clause specifies a process and its participants, the identifying clause adds the further information that one of the participants is definable by participation in the process: in *what John saw was the play*, 'the play (and nothing else)' is the exclusive goal of John's perception, as far as the communication situation is concerned. It is not surprising that the London brewer's slogan *we want Watney's*, which envisaged the possibility that we might want other things as well, was very early replaced by the identifying form *what we want is Watney's*; nor that the latter has now survived as a prominent feature of London advertizing for close on two decades.

The selection of the feature 'identifying' assigns to the clause a structure in terms of two functions defined by this relation of identification. The two functions are those of an equative clause: a 'thing to be identified' and an 'identifier', that with which it is to be identified. In an equative clause of the WH- type, the 'identifier' is the WH- item, for example *who* in *who is the leader?* In the answer to this question, *the leader is John*, *John* is the identifier. Thus the identifier, in an equative or identifying clause, is that element which corresponds to the WH- item in the WH- question presupposed by that clause. The two elements may occur in either sequence: the answer to *who is the leader?* may be either *John is the leader*, with identifier preceding identified as in the question, or *the leader is John*, with the sequence reversed.⁵

The identifying clause can thus be thought of as an equative in the systemic environment of a non-equative, the functions identified – identifier being those of the equative structure. The system of identification exploits as a thematic option the structural resources of this particular type of transitivity pattern. But there is a restriction on the distribution of functions in an identifying clause. In an equative such as *John is the leader* either *John* or *the leader* may be the element to be identified: the presupposed question may be either 'which is John?' or 'which is the leader?' In an identifying clause, it is always the nominalization which is 'to be identified'.

It is in fact the nominalization which realizes this function; and in the usual pattern the identifier consists of a single element, the remainder of the clause falling within the nominalization. Thus related to *John painted the shed last week* we may have (cited in the sequence identified – identifier):

- (PCA)~S the one who painted the shed last week was John
- (SPA)~C what John painted last week was the shed
- (SPA)~A when John painted the shed was last week
- (SCA)~P what John did to the shed last week was (to) paint it

It is possible to include two or more elements in the identifier provided the predicator is among them:

(CA)~SP what happened to the shed last week was that John painted it

(SA)~PC what John did last week was (to) paint the shed

(SC)~PA what John did to the shed was (to) paint it last week

(S)~PCA what John did was to paint the shed last week

(C)~SPA what happened to the shed was that John painted it last week

(A)~SPC what happened last week was that John painted the shed

(Ø) SPCA what happened was that John painted the shed last week

The remaining members of the paradigm can be filled out only facetiously, e.g. *the one who painted what last week was John the shed*. The identifier may be an adjunct of time, place, cause or manner, the nominalization having WH- or noun head (substitute) form: *how he did it was with a knife, the way he did it was with a knife*; nor is it necessarily a clause constituent: *what I need your help with is the wiring, you're the one whose picture I want*. If the predicator is within the identifier, the nominalization must contain a substitute verb, in addition to the finite element if present: *what John can do is (to) paint the shed, what John has done . . . not what John can, what John has*.

There is always only one identified and one identifier, so that in any given clause only one nominalization is derivable from this system. A clause such as *what I want is what John wants* is ambiguous, being the identifying clause related either to *I want what John wants* or to *John wants what I want*; so in

what do you want? (what I want) is what **John** wants

what does John want? what I want is (what John wants)

only the bracketed nominalization, which realizes the identified, is derived from the feature 'identifying'. Clauses of this type are particularly frequent where the subject is a nominalization of 'fact', which in the non-identifying clause would occur initially: *what puzzles me is why he left so early*. Since the nominalization is always the identified, in an interrogative identifying clause the nominalization cannot include the WH- item (except in the special case of second order questions such as // what **who** saw was the play //): related to *what did John see?* we may have *what was what John saw?* but not *the one that saw what was John?*

Thus while any clause containing a nominalization having the equative function of 'identified' is thematically 'identifying', and contrasts in respect of this option with a non-identifying clause, the presence of a nominalization is not by itself an indication of this feature. Not only may the structure not be equative, as in *what John saw surprised him* or *the one who painted the shed will have to do it again*; even if it is equative the nominalization may be the identifier, as in ('which is John?') *John is the one who painted the shed*, where the fact that this is not an identifying clause can be seen from the unacceptability of *John painted the shed* as an answer to *which is John?*

As in an equative clause, the sequence is free; thus either identified or identifier may be thematic. What is significant is that, whichever of the two occurs in first position, the whole of that element is thematic. In an identifying clause it is the equative structure which specifies the constituents having function in thematization, so that in *the one who painted the shed last week was John* the theme is the whole of *the one who painted the shed last week*. Likewise if the sequence is reversed: in *paint the shed was what John did last week, paint the shed* is the theme. This is a further aspect of the difference between the two versions of the slogan quoted above: in *we want Watney's* the theme is merely *we*, whereas in *what we want is Watney's* it is *what we want*.

This thematic foregrounding is reflected, predictably, in the information structure, where it regularly happens that an identifying clause is structured into two information units, the boundary between them falling, as usual in such cases, at the end of the theme: // the one who painted the **shed** last week // was **John** //, or with sequence identifier – identified // **John** // was the one who painted the **shed** last week //. Here both the identified and the identifier carry information focus. Alternatively, however, the identifying clause may be a single information unit, with only one of the two elements focal.

In this case the focus, as in equative clauses generally, normally falls on the identifier irrespective of the sequence: // the one who painted the shed last week was **John** //, // **John** was the one who painted the shed last week //; compare, in answer to 'which is the leader?', // the leader is **John** //, // **John** is the leader //. We have noted above that the 'new' can be interpreted as replacing the WH- element in a presupposed WH- question, although this may be overridden by contrastive focus as in ('I know John painted the house, but who painted the shed?') // John painted the **shed** // **too** //. Since in an equative clause the identifier is that which replaces the WH- element, this is precisely what would be expected to be the new; the equative structure may thus embody the given – new relation in its simplest form, the new information being what serves to identify the given element. But it is not possible simply to interpret identified – identifier as 'given – new in the environment equative', since the two are independently variable; the association of new with identifier may be overridden in the same way, contrastively as 'instead' ('which is the leader?') // John is the **leader** // (but *Bill's the one who does the work*) or 'in addition' (*John was the one who mended the shed*) // the one who **painted** it was John // **too** //. In fact one of the most frequent types of identifying clause, that with a demonstrative as identifier, under certain circumstances (see 6.3) normally has the focus on the identified: // that's what I **meant** //.

The congruence of identifier with new can be regarded as the unmarked information focus for equative, including identifying, clauses, focus on the identified being contrastive, as shown in the examples above. Here, as elsewhere, marked focus is associated with tone 1 if the sense is 'in addition' and tone 4 if

the sense is 'instead'; and similarly if the clause is two information units the expected pattern has tone 1 or tone 4 on the identified. It is thus necessary to modify the generalization concerning unmarked information focus (4.4), such that in the environment of an equative clause the unmarked focus will fall on (the final lexical accented syllable of) the identifier. It may seem a little farfetched to suggest that // John painted the **shed** // has unmarked focus on *shed* while // **John** was the one who painted the shed // has unmarked focus on *John*; but this does reflect the way in which the speaker will tend to read out these two sentences if they are presented to him in written form without context. The relation of identified – identifier to given – new may be regarded as another instance where in the mapping of one set of roles on to another there is a congruence between them such that one alignment will be selected in the absence of positive specification to the contrary.

There appears however to be another dimension to the structure of identifying clauses, that referred to briefly in 3.2 by the terms 'value' and 'variable'. This is relevant to their interaction with thematization and information, and it may be helpful to attempt to bring it into the picture at this point. The starting point is again the equative clause, and the discussion is extremely tentative; much more study is required of equative clauses as such, not confined to a consideration of their relevance to questions of theme.

6.2 *Identified – identifier and variable – value*. The following is a slightly expanded version, omitting the intensive form, of the table in 3.2 above (Part I, p. 69):

<i>Presupposed question</i>	<i>Coding</i>	<i>Operative</i>	<i>Receptive</i>
(2) which is John? C P S 'there's John; which one does he represent?', i.e. find a value for the variable 'John'	decoding	John's the leader ID/VR IR/VL	the leader's John IR/VL ID/VR
(3) which is John? S P C 'there are some people; which one represents John?', i.e. find a variable with the value 'John'	encoding	the leader's John IR/VR ID/VL	John's the leader ID/VL IR/VR
(4) which is the leader? C P S 'there is the leader; which one does he represent?', i.e. find a value for the variable 'the leader'	decoding	the leader's John ID/VR IR/VL	John's the leader IR/VL ID/VR
(5) which is the leader? S P C 'there are some people; which one represents the leader?', i.e. find a variable with the value 'the leader'	encoding	John's the leader IR/VR ID/VL	the leader's John ID/VL IR/VR

All forms are given with information focus unmarked, on the identifier. In (2)

and (3) *John* is the identified (ID), *the leader* the identifier (IR); in (4) and (5), these roles are reversed. In another respect, however, (2) resembles (4) and (3) resembles (5): the resemblance lies in the kind of identification that is involved. This dimension of structure is referred to here as 'coding', and an equative clause may be either decoding or encoding: either finding a value (VL) for a given variable (VR), or finding a variable with a given value. Thus one element is as it were the realization of the other. The decoding // John is the **leader** // means 'John realizes (can be decoded as) the leader', thus answering a question about John's function (pronominally *which are you?*); to use a linguistic metaphor, it is an observation about the semantics of John. The encoding // John is the **leader** // means 'John is realized by (is encoded as) the leader', answering a question about John's form (pronominally *which is you?*); it is an observation as it were about the phonetics of John. The former identifies John through the role which he occupies, the latter by providing a recognition criterion.

The coding option assigns the roles of value and variable independently of the direction of the identification, so that these roles are freely combinable with those of identifier and identified. An equative clause such as *John is the leader* thus has four possible interpretations: as decoding of John, structure ID/VR~IR/VL, as encoding of John, ID/VL~IR/VR, as decoding of the leader, IR/VL~ID/VR, or as encoding of the leader, IR/VR~ID/VL. Since the decoding of John is equivalent to the encoding of the leader but with identified – identifier roles reversed, (2) resembles (5) in that in both John 'realizes' the leader, while (3) resembles (4) in that in both John 'is realized by' the leader.

The distinction that is here labelled 'operative / receptive', and thus regarded as equivalent to the active/passive distinction in goal-directed action clauses, relates to the ordering in sequence of variable and value. In the operative, the variable is the subject; and hence also the unmarked theme. There is thus an association of variable – value with theme – rheme similar to that of identified – identifier with given – new: in the unmarked case, the identified is given, the identifier new, and the variable is theme, the value rheme. This is not unrelated to the general meaning of theme; in a sense a theme is a variable to which a value is to be assigned. But, as always, the speaker may exploit the contrastive possibility of not mapping the variable on to the theme; hence to the unmarked, operative corresponds a marked, receptive form.

Since *be* has no passive, the operative / receptive distinction in clauses of this type is realized solely by the sequence, and is thus purely a matter of thematic organization. Or rather (to avoid circularity), it is because of the view of operative / receptive as primarily a thematic choice that we are able to regard value ~ variable as the receptive corresponding to the operative variable ~ value. If this is postulated, then in terms of transitivity roles it is variable and value

(and not identified and identifier) that correspond to actor and goal: 'variable' equals 'actor' in the environment "equative". That the receptive, with value (goal) as theme, is the marked form is reflected by the fact that in decoding, where it has the sequence identifier – identified, the receptive is rare and often seems only marginally grammatical (an example would be (*which are you going to be? the king?*) // no the **king** shouldn't be me // (*it should be someone much taller*)); in the encoding type, on the other hand, where the receptive has the preferred sequence of identified – identifier, both operative and receptive are regular.

The variable would thus, like the actor, be subject if the clause is operative, given the present use of 'subject' as a modal and not a transitivity function. If 'subject' is interpreted as 'deep subject', such that *John* is subject in *the play was seen by John*, then the variable would be subject also in the receptive, which would then have the structure $C\bar{P}S$; but this analysis is not appropriate to 'subject' in the modal sense, as is shown by forms such as *is the leader John?* and *the leader is you* (not *the leader are you*). (In WH-equatives the WH-item has its normal initial position, but the subject is still clearly identifiable in forms such as *which am I?*, *who can the leader be?* (decoding operative, encoding receptive), *which is me?*, *who can be the leader?* (encoding operative, decoding receptive).) Hence the rejection of the treatment of receptive // John's the **tall** one // 'John is realized by (recognizable by his being) the tall one' as $C\bar{P}S$, referred to in 3.2; *the tall one* is 'actor' (variable) but not subject.

It might be postulated, then, that an equative clause is a two-place predication in which actor and goal are to be interpreted as variable and value; which may be decoding or encoding, and which assigns simultaneously an identified – identifier structure such that if decoding the variable is the identified and if encoding the variable is the identifier. The reason for postulating such a transitivity structure is that the information-type structure in terms of identified and identifier does not by itself account for all the facts, for example the pattern of acceptability in equative clauses of various types. It may be that only the variable can be predicated, so that // it's **John** that's the leader // can mean only 'it's John that has the role of leader', and not 'it's John that you can recognize by his being the leader'; hence the improbability of such an example as *it's the capital of France that's Paris*.

Whether the coding option, if admitted, is present in all equatives is very questionable; if the system is a general one there must be conditions under which it is neutralized, otherwise the problem of explaining why textual ambiguities arise at all – which they not infrequently do – is merely replaced by one of explaining why they do not arise more often. But the discussion is relevant to identifying clauses. These would seem in principle to have the same range of possibilities: a variable – value structure, simultaneous with that of identified – identifier, with the features 'decoding' or 'encoding' specifying the

particular combination. We have seen that the nominalization in an identifying clause is always the identified, so that there would be at most only two possibilities of interpretation for any given identifying clause; thus, related to *John broke the window*, with *John* as identifier:

Coding	Operative	Receptive
decoding	the one who broke the window was/is John	John was/is the one who broke the window
	'you see that person who broke the window; that's John'	
encoding	John was the one who broke the window	the one who broke the window was John
	'you know that someone broke the window; that was John'	

The same clause but with *the window* as identifier is related to a different set *what John broke was the window*, &c.; and likewise for any distribution of the elements of a clause into identified and identifier.

But it is doubtful whether the decoding form is to be regarded as identifying, in the sense of being agnate to a non-identifying clause: if *the one who broke the window is John* presupposes the question 'who is (what is the name of) that person who broke the window?', the form *John broke the window* is hardly acceptable as an alternative. Similarly with a clearly ambiguous clause such as *what they do not reveal is the source of the difficulty*: only the encoding interpretation is related to *they do not reveal the source of the difficulty*. Decoding clauses, in fact, lie as it were in between encoding equatives and intensive clauses. They are treated here as equative, since the sequence is clearly reversible (the above example is ambiguous in either sequence); but a decoding clause, where the identification is one of definition rather than of specification, is not directly relatable to one in non-equative form.

It seems therefore that identifying clauses should be said to be only encoding, and therefore determined as regards their value – variable structure: the nominalization is always the value. There are pairs of clauses, both identifying in form and the one distinguished from the other by coding, both of which are relatable to a non-identifying clause: *what I was reading were his novels*, decoding 'those things you saw me reading', encoding (which may have *was* instead of *were*) 'those of his things which I was reading', with *I was reading his novels* being interpretable in both senses. Compare *what they sell are/is rejects*: decoding, as in *what they sell are bargains*; encoding, as in *what they sell are/is sports clothes*. Here the non-identifying *they sell rejects* is clearly ambiguous. But in its decoding interpretation it is thematically 'odd' in the way that // **John** broke the window // is odd in answer to 'what is the name of that person who broke the window?'. Likewise in *we heard the overture*: the decoding interpretation 'that's what that was' demands (*what*) *we heard* rather than just *we* as theme – and indeed as an identified; compare *they sell bargains*

which is interpretable only in a decoding sense. As is to be expected, co-ordination between encoding and decoding forms is not possible: (*what*) *they sell (are) bargains and sports clothes*.

The tentative conclusion would be that the 'identifying' option is a way of representing any clause as an encoding equative, with the nominalization representing the function complex 'value' and 'identified'; a decoding equative, even if it has a nominalization as the identified element, not being regarded as identifying since it has no non-identifying (non-equative) equivalent – or only one that is thematically incongruous. In a decoding equative, in other words, the presupposed question is also in the equative form. The feature 'identifying' may then be said to assign a structure merely in terms of identified and identifier, since in any clause whose equative structure was derived from this option the assignment of the functions value – variable would be predictable therefrom: the identified is always the value and the identifier the variable. Clauses such as *they sell bargains, we heard the overture* (in the sense of 'that piece we heard is the overture'), may be regarded as incongruous in the sense that their underlying transitivity structure is in fact equative (or even, in some cases, intensive). They thus represent some kind of marked option in information structure, the converse, as it were, of identification, whereby the equative (identified – identifier) may take on an actor – process form if the identified embodies such a structure within it. Alternatively, decoding equatives of this type could still be regarded as identifying but with identification as the unmarked option, so that *what they sell are bargains* would be identifying but unmarked, *they sell bargains* non-identifying but marked.

6.3 *Anaphoric identifying clauses*. Probably the items which occur with greatest frequency as the identifier in an identifying clause are the demonstratives, particularly *this* and *that*. The demonstrative tends to occur in thematic position and not to carry information focus, which thus falls on the identified, as in // *that's what I thought* //.

In such clauses the item occurring as the identifier is anaphoric, and therefore cannot be new, unless contrastive. This explains the marked information focus; we have seen that the given – new structure may be incongruent with that of identified – identifier, and where the identifier is anaphoric it clearly is so. But demonstratives are not always anaphoric; they are reference items whose reference may be either situational (cf. 4.4. above) or textual, and if textual may be either backward (anaphoric) or forward (cataphoric). It is their particular reference function that determines the information focus. Since what is referred to anaphorically is 'given', while what is referred to situationally or cataphorically is 'new', demonstratives are normally non-focal when anaphoric and focal otherwise. Thus in // *that's what I thought* // *that* is anaphoric to the preceding text, whereas in // *that's what I want* // the focus shows that the *that* is

referring to something in the situation, unless it is anaphoric but contrastive.

This is a general feature of the demonstratives, not restricted to identifying clauses; compare // *I this would be the best plan* //, referring back, with // *13 this would be the best plan* // which (again unless anaphoric but contrastive) is either cataphoric – the speaker is going on to expound the plan – or referring to an object, perhaps a set of drawings, that is under consideration. The distinction in identifying clauses is merely an instance of this: // *this is what I meant* // ('what you've just said'), // *13 this is what I meant* // ('this object here' or 'what I'm just going to say'). The distinction does not of course apply to *which*, which is always non-focal except in the special types of question referred to earlier.

There is some specialization of reference between *this* and *that* (and other pairs of demonstratives) based on the proximity system of 'near/far', 'near' being speaker-oriented (inclusive of addressee; cf. *come in I'm coming to Paris next week* if the addressee will be in Paris at the time), present or future time and cataphoric, while 'far' is not speaker-oriented, past time and anaphoric; hence *there's the problem* ('I've just told you'), *here's the problem* ('I'm just going to tell you'). There is thus a twofold distinction between anaphoric // *1 there's where he went wrong* // and cataphoric // *13 here's where he went wrong* //. But in fact, although *that* is rarely cataphoric, *this* is quite unspecific (being found anaphorically also in Shakespeare); and since either may refer situationally it is information focus that marks the demonstrative as anaphoric or otherwise. Thus the frequency of marked information focus in identifying clauses having a demonstrative as identifier is accounted for by the fact that it is *this* that shows the demonstrative to be anaphoric.

It is natural that anaphora, which combines the features of referential and given, should play a large part in the organization of discourse; anaphoric reference in identifying clauses is just one instance of this, and such clauses are related in the normal way to non-identifying forms:

*Non-anaphoric (cataphoric
or situational)*

Anaphoric

// *I want that* //

// *I meant that* //

ID~IR // *what I want is that* //

// *what I meant was that* //

IR~ID // *that's what I want* //

// *that's what I meant* //

where // *what I meant was that* // is improbable, unless followed by *too*, because *that*, which is both identifier and non-theme, is nevertheless marked as given. But the identifying forms are probably at least as frequent, in dialogue, as their non-identifying equivalents; the combination of deixis with identification, particularly when the deixis is anaphoric, being highly effective as a form of communication. The speaker represents one part of the message as to be identified, and then identifies it with something that is shown deictically to be recoverable from the preceding discourse. Furthermore since the demon-

stratives may have extended text reference the identifier is not restricted to an element functioning in the clause; any stretch of discourse may participate in the identifying relation in this way.

Identification involving time, place, cause and manner has been mentioned above; extended text is particularly prone to be adduced anaphorically as cause or manner, with // that's why I **wanted** it // tending to be preferred to // I **wanted** it for that reason //, and so on. Here, especially with cause, situational reference is less likely, though cataphora is normal, hence // why I wanted it was **this** // but rarely // why I wanted it was **that** // (in // (so) **that's** why you wanted it // *that* is contrastively anaphoric). With place identification both situation and text reference are normal; the demonstrative may be either *here* / *there* or (except finally) *this* / *that*, the former being also used for extended text reference. With time, where reference is situational if 'now' and textual if 'then', the normal form, again except in final position, is *this is when*, *that was when*; here *now* and *then* occur only contrastively, as in *now is when he's supposed to be here*.

The demonstratives *this* and *that* thus have a distinct range of functions when they occur anaphorically as a thematic identifier, in an identifying clause. Their referent may be any element in the preceding text, or any extended text; and the identified may be a nominalization of any kind. It is only in this function that *this* and *that* can refer pronominally to time and place; and also only in this function can they refer pronominally to a human, as in *that's who I'm looking for*. Reciprocally, it is only as the identified in an identifying clause with *this* or *that* as identifier that *who* can occur, except archaically, in head plus relative function, as 'the one who', corresponding to *what* as 'the one which': *that's who/whose it is* but not *John's who/whose it is*. Probably the TH-WH- pattern is felt to be so closely bonded as to be in effect one element, the systemic relation of *that's what I want* to *I want that* giving *that's what* the appearance of a single constituent, with *that's who* as a parallel form. At any rate pronominal *this* and *that* occur with human reference only in such environments where the humanness is simultaneously specified: obligatorily before *who*, optionally before *the one* (but more readily if the 'human' element is explicit: *that's the person that . . .*, *that's the one who . . .*, *among all those boys that's the one that . . .*); and similarly with place, &c., reference as in *that's where I live* – but not *I met that* ('John') or *I live in that* ('London').

6.4 *Other aspects of identification.* The head of the nominalization in an identifying clause is either a general noun, always with definite article, *the thing* (*that . . .*), &c., or the corresponding WH- item *what*, &c. For the adverbial elements there is a straightforward correspondence *the time* (*when/that . . .*) to *when*; *the place*, *the reason*, *the way* to *where*, *why*, *how*. With the nominals, only *what* occurs among the WH- items, apart from *who* in the restricted environment

already referred to, following a demonstrative identifier; *what* corresponds to *the thing*. But the general nouns fall into two sets, with *thing* appearing in both: (1) *thing*, *person*, *kind* &c., (2) *thing*, *one* (only). The former are the generic members of the major noun classes, and this set includes *time*, *place*, *reason* and *way*; the latter are 'pro-' forms for the nominal group classes of definite (*one*) and indefinite (*thing*).

Either type may occur in the context of an identifying clause. With the generic nouns the pattern is *the thing we need is a/the new dictionary*, *the person we need is a/the driver*, *the kind I like is the Jaguar*, &c. This class is open-ended and it is here that it is difficult to delimit the range of identifying clauses; perhaps any noun that dominates the identifier in the lexical taxonomy should be admitted, for example *the train I usually catch is the 8.30*, *the car I like is the Jaguar*, since a noun in this relation is cohesive in discourse: compare // John drives a **Jaguar** // he practically **lives** in the car //, with *car* obligatorily given. With the 'pro-nouns' on the other hand the pattern is *the thing we need is a new dictionary* / *a driver*, *the one we need is the new dictionary* / *the driver*. Thus *thing*, and the corresponding *what*, may be used with non-human nouns whether definite or indefinite and with indefinite but not with definite human nouns (and therefore not with proper names); compare *what she needs most is a daughter* but not *what she needs most is her daughter* / *Mary*. With definite human nouns, including human collectives, where the appropriate WH- item would be *who*, there is no WH- form of the identifying clause corresponding to the form with ('pro-noun') *the one*, (generic noun) *the person*, &c.; *the one I want is John*, *the ones who rejected it were the committee*. This follows from the general restriction whereby *who* and *which* do not occur as the head of a nominalization; being themselves definite they do not accept defining modifiers.

There appears to be little difference in meaning, in those instances where both forms are possible, between the two forms of the nominalization. Where the identifier is anaphoric the distinction is that between text reference and object reference, as in *that's what I meant*, *that's the thing I meant*; but elsewhere the two seem interchangeable: *the thing* / *what I'm worried about is the interview*. One might expect *thing* to imply some measure of concreteness or discreteness, but there is little sign of this in usage; it is regularly used where the identifier is an abstract or a mass noun. What is common to both forms is the definiteness of the nominalization; this is a feature of all identifying clauses, since it is what relates them to the non-identifying equivalent, and hence the requirement of the definite article if the nominalization has a noun as head. The definite article is obligatory here because it is the only member of the class of specific determiners that is 'non-selective'; whereas the others, the demonstratives and possessives, are 'selective' in that they contain within themselves the specificity required to define the noun head, *the* indicates that such

specificity is to be found elsewhere in the environment. In general the reference may be anaphoric (previous mention), situational (including generalized situational specificity as in *the truth*, *the moon*) or cataphoric (a defining modifier); but in identifying clauses *the* is always cataphoric, signalling that, in *the one who saw the play was John*, *who saw the play* must be interpreted as a defining attribute. Thus the identification of *John* with an entity defined solely by participation in the process in question (the noun head, being generic, acting merely as carrier for the defining modifier) is equivalent to its non-identifying correspondent // **John** saw the play // in respect of all features except the selection of this option; whereas the latter is already marked by information focus as being an answer to 'who saw the play?' the identifying form adds the information that this status is shared by no-one else under consideration, and this is achieved by the cataphoric *the*. A clause such as *that big fellow who broke the window is John* is not identifying, since *fellow* carries other modifying elements. (In some contexts *that* occurs non-selectively, either pronominally (especially in the plural), with *that* / *those* for *the one(s)*, or less commonly as determiner: *that one who broke the window was John* is in fact ambiguous, being an identifying clause only if *that* is not here a demonstrative.)

Deriving from the feature 'identifying' is a polarity option that is independent of the polarity of the clause: positive *the one who saw* / *didn't see the play was John*, negative *the one who saw* / *didn't see the play wasn't John*. Thus the identification, while definite, may be positive or negative; the negative denies the identification, so that the positive represents a deliberate option to assert it, and is interpreted as such. In the non-identifying clause the domain of the negative is realized by tone: //1 **John** didn't see the play // relates to *the one who didn't see the play was John*, //4 **John** didn't see the play // to *the one who saw the play wasn't John*. Compare, again, the negative identifying *the one who broke the window wasn't John*, related to //4 **John** didn't break the window //, with the non-identifying *that big fellow who broke the window isn't John*, where the difference in meaning is clear. Likewise in modality there are options in both the matrix and the constituent clause: *the one who can tell us must be John*. In general the distribution corresponds to the two types of modality, the cognitive (personal, participant-oriented) and the modal (impersonal, speaker-oriented): *John could have done it*, cognitive 'would have been able to' *the one who could have done it is John*, modal 'it is possible that' *the one who did it could have been John* (the former can be interpreted in the latter sense but not vice versa). Identification does not however present an independent choice of speech function; the mood is that of the clause as a whole, though realized in the identifying (matrix) clause: *was John the one who broke the window?*, &c.

Thus identification provides the environment for further options in polarity and impersonal modality, as well as the operative / receptive distinction

realized in the sequence of identified – identifier.⁸ It imposes a binary information pattern in which the clause takes the form of an element 'to be identified' being equated with an 'identifier', the former being a value for which the latter is the variable. The identified, which usually but by no means always includes all the elements of the clause except one, is set apart structurally by nominalization and thus operates as a single component of the message: if initial it is thematic as a whole and regularly constitutes a separate information unit. Although the form is equative, the option is one of theme (in the wider sense), being part of the organization of information rather than a cognitive choice; and equative clauses can themselves take this option, as in *the one that's the leader is John*.

7. PREDICATION, SUBSTITUTION AND REFERENCE

7.1 *Predication*. In sections 4–6 we have discussed three systems concerned with the organization of discourse: information, which specifies an information unit with given – new structure; thematization, which assigns a theme – rheme structure to the clause; and identification, which optionally assigns an identified – identifier structure to the clause. In this section we shall make brief reference to three systems which assign partial structures within the clause, providing further options within the same general area. All three relate in one way or another to the choice of theme.

Predication may involve any cognitive theme (cf. 5.4 above) and is exemplified by *it was John who broke the window*; it is thus realized as an equative structure, with *it . . . who broke the window* as identified, *John* as identifier, the relator being again the class 2 *be*. The meaning is thus very close to that of an identifying clause with the sequence identifier – identified, *John was the one who broke the window*, both being related to // **John** broke the window // and differing from it in respect of only one feature. Structurally predication maps the function of identifier on to that of theme, giving explicit prominence to the theme by exclusion: 'John and nobody else' is under consideration. There is however a difference between a clause with predicated theme and an identifying clause, in the meaning of the highlighting involved. In identification the prominence is cognitive: 'John and nobody else broke the window'; whereas in predication it is thematic: 'John and nobody else is the topic of the sentence' (hence the alternative form of predication with *there*; see below). In most instances the two will appear identical, but the difference emerges in such examples as *it was in spite of the cold that he went swimming*, which has no identifying equivalent (the absence of a WH- form shows that it does not make sense to highlight *in spite of the cold* in a coding relation, though it makes perfectly good sense to highlight it as a theme), and in the frequency of predicated theme in WH- clauses and equatives, as in *what was it you wanted, it's John that's the leader* (beside identifying *what was what you wanted, John is*

the one that's the leader where again the coding presents difficulties of interpretation).

Predictably, since thematic prominence is a form of 'new' information, the predicated element carries the unmarked information focus. Again, however, as in identifying clauses, the focus does not normally fall on anaphoric demonstratives or on WH- items: // it's that that I can't **understand** //, // what is it you **want** //; on the other hand it is precisely with echo questions, where the WH- item is focal, that WH- interrogative themes tend most regularly to be predicated, as in //2 **who** was it you were looking for //, the echo question itself being a good example of the meaning of this kind of prominence. Otherwise, marked focus occurs in such contexts as (*have you told John that the window got broken?*) // it was John who **broke** it //, where the discourse yields an incongruence between the new and the thematically prominent comparable to that which arises between new and identifier in equative and identifying clauses. There is the usual pattern of unmarked association: a prominent theme will normally be new, but it may in any instance be given, including all instances where it is anaphoric unless also contrastive.

Any cognitive theme, marked or unmarked, may be predicated, the least likely being anaphoric unmarked themes, the most likely being marked themes of any kind. The difference between *his earlier novels I've read* and *it's his earlier novels I've read* is again one of the type of prominence: the former implies the contrast 'but his later ones I know nothing about' and thus is likely to be two information units with the contrastive tone 4 on the first, whereas the latter is not cognitively contrastive and means simply 'these are the ones I'm talking about', being more probably one information unit with tone 1 or 13. The distinction appears clearly in the interrogative, which in predicated theme clauses questions the identity of the theme and not the cognitive content of the message: *is it his earlier novels you've read?* by contrast with *his earlier novels have you read?* There is only one selection for mood; there is no *was it the play did John see?* (except by assimilation from *was it the play John saw?*).

In polarity, however, as in identifying clauses, both the (constituent) clause and the (matrix) predication select independently: *it is / isn't John who has / hasn't seen the play*. With this dependent system of positive or negative predication the full range of verbal polarity systems is introduced into theme predication; and from it derives the possibility of what looks like theme predication without the theme – where in fact the predication is itself the theme, as in *it isn't that I don't want to, it must be that he's out of town*; here the theme is simply 'positive' or 'negative' together with whatever mood, tense and modality may be incorporated in it. Again, the predication selects independently for modality, *it may have been John who was given a prize* being related to a form with thematic modal adjunct *perhaps it was John who ...* (it probably does not, however, select independently for tense: there seems little

if any difference between *it was going to have been John who was given a prize* and *it's John who was going to have been given a prize*, though there is often some tense assimilation in colloquial speech.)

Two further options arise in association with predication: that between *it was John who ...* and *there was John who ...*, and that between *it was John who ...* and *John it was who ...*. The first concerns the specificity of the predication, and was referred to above as showing the difference between predication and identification. With *it* the theme is defined (uniquely specified), with *there* it is described (non-uniquely specified): 'John and no others' as opposed to 'John, possibly among others', *it* and *there* being the cataphoric forms corresponding respectively to the definite and indefinite article. The second would appear to add little more than rhythmic variation, as in *the dog it was that died*. The form *John it was who ...* is however used in speech in a way which suggests that it may be explicitly asserting the thematic status of *John*, the structural mechanism of the predication otherwise making the *it* appear thematic. In fact this *it*, which contrasts only with *there*, is non-anaphoric and never can be thematic; but the anaphoric *it* (that which contrasts with the personal pronouns) is thematic when clause initial, so that the use of *John it was who ...* avoids even the temporary ambiguity that an initial *it* would yield. Be that as it may, 'marked thematic' predications such as *the other one it was I really wanted* are regular in conversation; and when declarative they do not combine with a negative predication, which perhaps further indicates that this option relates to the explicit thematic status of the predicated theme.

The possibility of clauses such as *yesterday it was John who was given a prize*, *that one it was John that wanted*, shows however that predication is not restricted to the element designated as theme in section 5. Any element may take on the status of a predicated theme, and such clauses may reasonably be regarded as having two themes one of which is specified as an identifier; if a clause such as *it was only yesterday that it was that one you wanted* is considered to be grammatical then the option must be available recursively, the constituent outside the predication being the point of origin for a further selection. Apart perhaps from conditional attributes (although even *it's alive that I'm scared of them* seems acceptable), the element that cannot normally be predicated is the verb. The Celtic dialects of English, no doubt (as has often been pointed out) because of the regularly initial position of the verb in Celtic languages, regularly accept verbal 'themes' and also accept their 'predication', but these do not match for tone and are hardly interpretable in the same sense; as was pointed out above (5.3), genuine instances of verb themes are highly restricted.

The other restriction relates to equative clauses. It appears to be impossible to predicate the value in an equative relation, so that *it's the leader that's John* can only be interpreted as 'this is how John can be recognized'. This is

NOTES ON TRANSITIVITY AND THEME IN ENGLISH

related to the alignment of functions in identifying clauses, and means that the identified element can never be predicated; but this is predictable from the fact that what is predicated has the role of an identifier within the predication. The identifier itself can be predicated, as in *it was the window that was what John broke*, and there can be predication within a nominalization, always in the 'marked thematic' form determined by the obligatory position of the relative: *what it was that John broke . . .* But in a form such as *it was what John broke that was the window*, the *window* can only be (most improbably) the value; and the related clause without the predication is therefore not an identifying one.

7.2 *Substitution*. Substitution is also associated with the theme, being an option whereby the speaker can assign to clause-final position an element which would otherwise appear as unmarked theme, as in *they don't seem to match, these colours*. The substitute form has three variants: *he's always late, John*; *he's always late, John is*; and *he's always late is John*. West Riding speakers will recognize this last as a favourite clause type (a recorded example is *he hardly moves his body at all doesn't that conductor*); other dialects tend to favour the other variants and to use the pattern much less frequently, but it is recognizable as a regular form of organization of the clause in connected discourse.

If we compare two clauses in which a place adjunct varies between initial and final position, a typical intonation pattern is:

//4 in England //1 they drive on the left //

(or //1 in England they drive on the left //)

//13 they drive on the left in England //

with, in the latter case, the adjunct appearing as a secondary point of information focus. A similar pair is formed by //1 *these colours don't seem to match* // and //13 *they don't seem to match these colours* //, the difference being merely that *in England* is, as we have regarded it, a marked theme (and hence is more likely to appear as a separate information unit) whereas *these colours* is an unmarked theme. The substitute form almost always occurs with tone 13, with the minor tonic on the 'delayed' element; other tones are possible, but it is not possible for such a clause to occur as tone 1 with the delayed element carrying the only information focus.

The information structure shows the significance of this pattern. The substituted element is as it were a delayed theme; like the clause-final adjunct it is a secondary information point, but whereas this is the normal value for the adjunct, its appearance as theme being marked, for the subject it is the marked value. In other words, with the line between marked and unmarked theme being drawn at this point, *they don't seem to match, these colours* is to *these colours don't seem to match as they drive on the left in England* is to *in England they drive on the left* with the rider that in the latter pair it is the first which is thematically unmarked while in the former pair it is the second. It is notice-

able that the elements which normally occur as secondary information points are precisely those which also occur regularly as marked or unmarked themes, including modal adjuncts as in //13 *you'll meet him probably* //.

Substitution thus reverses the normal sequence of theme – rheme and introduces a delayed theme after the remainder of the message. The theme in this case is the subject, which is substituted in the modal constituent by a concord pronoun; this refers cataphorically, although since the typical context for a substitute clause is one in which the subject is partially recoverable, from the discourse or the situation, while still requiring to be specified as secondary information, it appears that the function of the pronouns as general reference items is not irrelevant to the interpretation. The meaning is, as it were, 'first I'll say what I have to say and then I'll remind you what I'm talking about'.

There are some instances, however, in which the substitute form is the unmarked option, as in *it does interest me how memory works, it's quite helpful to have taken that course, it's very amusing what you told me*. That this is the same option is again suggested by the intonation pattern. It might seem that the structural shape, or even simply the length, determines the preference here for the substitute form; possibly these factors play some part, but the main factor is not the presence of a nominalization but rather its structural role. If the nominalization is of the class 'thing', and thus functioning as a participant in the transitivity structure of the clause, the substitute form is still the marked one, as in *it excited him, what he saw* beside unmarked *what he saw excited him* (cf. *what he was sitting on collapsed*). Clauses in which the nominalization is derived from the feature 'identifying' are of this type. But if the nominalization is of the class 'fact', having the structural role of information, the substitute form is the unmarked one: *it worries me to see him so overworked*. (Two apparently similar types are left out here as requiring separate treatment: those involving a nominalization of 'condition', such as *it hurts me when you get angry*, which is substituted even when complement (*I like it when the clouds gather*); and those involving 'report', where the constituent clause functions structurally as text, as in *it was rumoured that he might resign*. In the former, substitution is obligatory; the latter are not in fact substitute forms – or indeed nominalizations – at all.) It may be suggested that when the message contains an element whose structural role is that of 'fact' such an element is likely either, if fully recoverable, to be referred to by an anaphoric demonstrative or, if not, to be delayed, as partially recoverable (otherwise it would not have the status of fact), until after the cognitive content of the message. Such substitution is not obligatory; but if the theme is a nominalization of this type non-substitution appears to be a marked option.

Substitution yields many familiar ambiguities, such as *it's the truth that he's confessed*: substitute theme 'that he's confessed is true', predicated theme 'what he's confessed is true', both of which regularly have tone 13 (a predicated

theme cannot itself be substituted, the two options being opposed in meaning); together with other more obvious ones involving *it* in anaphoric use, such as the last example in the unlikely sense of 'this is the (particular) truth which he's confessed'. There may also be ambiguity arising from the two functions of the nominalization referred to above: *it amazed me what he had in that cupboard*, where the one that is in the marked form ('the thing that...') would usually be written with a comma after *me*, corresponding to an optional silent ictus (not obligatory; the two would normally be identical in speech). A substitute clause is in fact very rarely more than one information unit, so that substitution is not a device for segmenting information but rather a means of distributing it into a particular thematic pattern.

7.3 *Reference*. This is a form of pronominal anaphora within the clause, even less acceptable than marked substitution in formal uses of language but nevertheless fulfilling a communicative function in informal discourse; a text example is *Britain it's all roads*. It is a favourite in ballad and mock ballad styles. It is restricted to declarative clauses with a nominal theme, marked or unmarked.

In some instances the use of reference is clearly relatable to length; it is a form of reprise for a long theme, especially one that is not subject, showing its function in the structure of the clause: another recorded example is *the sound that came floating out on the air I didn't know I had it in me*. But its use is by no means limited to such instances; in general it serves as a means of isolating the theme from the remainder of the clause, since the theme is then not required as a participant in the clause structure, and thus to emphasize its thematic status. For this reason it tends to be associated with a theme which is a separate information unit, one whose role in the cognitive structure of the clause is subordinated to its primary function as introducing and providing the setting for the message.

Both reference and marked substitution might be left out of consideration as representing the speaker's afterthoughts, though they are afterthoughts of very different, more or less opposing kinds. But in fact both are fully integrated into the information structure, quite unlike the various interpolations and repetitions which involve hesitation and unfinished or interrupted tone groups. They are in no way distinguished by pause or rhythmic irregularity, and it seems that they belong in the area of speech planning in the same way as do the other more familiar options brought together for consideration here.

7.4 *Summary of section 4-7*. The discussion in sections 4-7 embodies the notion that the grammar of the English clause includes a set of options whereby the speaker organizes his act of communication as a component of a discourse. It is

this set of options that is referred to in the title of this paper as 'theme', in the general sense in which it is being contrasted with two other sets of clause options, those of transitivity and mood.

The speaker assigns to the clause a two-part structure of theme-rheme, the theme taking initial position in the sequence. In addition to optional non-cognitive thematic elements, those of structure, discourse or speech function, there will be a cognitive theme which is either unmarked (subject, WH- item or finite verbal element, according to mood) or marked (any other element), the latter being thereby foregrounded as a point of departure for the message. The theme may be an item which is recoverable from the preceding discourse but is not necessarily so; the selection is independent of the context. Optionally the cognitive theme, whether marked or unmarked, may be given further prominence by positive or negative predication; this makes explicit the assertion that the rheme is (or is not) valid for this particular theme and, if the predication is specific, for this theme only, and regularly though not obligatorily accompanies the marking of the theme by information focus as new or contrastive information. Alternatively, the theme may be given prominence of a different kind by being 'picked up' by an anaphoric pronoun later in the clause, this first isolating it as a point of departure and then specifying separately its transitivity role in the clause. Or, if the theme is not itself a pronoun and thus textually or situationally given, it may be shown to be partially recoverable from the preceding discourse by being substituted by a cataphoric pronoun and delayed to the end of the clause as a secondary information point; this is the normal pattern with themes that are nominalizations of fact.

Optionally, the clause may be organized into a two-part 'identifying' structure with equative form, in terms of the paired functions identified – identifier and, perhaps, value – variable. This asserts that something 'to be identified' is interpretable by reference to, and more specifically as a decoding of, an 'identifier'. The identified is represented by a nominalization which regularly, though not obligatorily, includes all elements in the clause except one; and one whole term in the equation takes on the function of the theme, appearing in first position. This structure is frequently associated with an identifier which functions anaphorically, particularly a demonstrative, thus integrating the clause into the discourse through the identification of the defined participant with one that has been mentioned before.

Simultaneously the speaker maps on to the clause, as defined in sentence structure, a structure of a different kind in terms of information units, by which he organizes the discourse into message blocks and specifies the status of the components of the message as new information or otherwise. In the unmarked case (in informal conversation) the information unit will be mapped on to the clause, but the speaker has the option of making it coincide with any constituent specified in the sentence structure. In particular he may isolate the theme as a

separate information unit, especially if it is a marked theme or if the clause is structured in the identifying equative form.

Within each information unit the speaker selects one, or at most two, points of information focus; phonologically the information unit is realized as a tone group and the information focus as the tonic component. This assigns a structure in terms of an obligatory new element, defined as that which is within the domain of the information focus, optionally accompanied by an element with the function 'given'. In the unmarked case the focus of information falls on the final element in the information unit other than any that are inherently anaphoric; any preceding elements, which will include the theme, are then non-specific since the domain of the focus may extend over the whole of the information unit. Alternatively some other element, one that is anaphoric or non-final, may carry the information focus, in which case it is contrastively new and the remainder of the information unit has the status of given; the effect is to give to the message the implication of being a response to a specific question.

For any clause of average length, therefore, there is a very large paradigm of thematic options. The thematic systems by no means exhaust the resources of discourse organization in English; they are merely those options of discourse organization that have their point of origin in the clause, or in a unit which does not correspond to a unit of sentence structure but which is regularly associated with the clause. Much of discourse structure involves patterns of reference, ellipsis and the like which lie outside the more restricted conception of linguistic structure and whose range extends across the boundaries of recognized structural units (cf. Hasan, 1967); and while some of these can be stated as options associated with constituents in sentence structure not all are derived from the clause, for example systems of deixis in the nominal group. The clause is of interest because it provides, perhaps in all languages, a point of intersection of three sets of options, referred to at the beginning of section 4, associated with experiential meaning, speech function and discourse organization. These three are interrelated in complex ways, and each of them may be found to shed light on the other two.

- [1] I would again like to thank those acknowledged at the beginning of Part I (cf. *JL* 3 (1967). 37-81); and also, with particular reference to the present sections, K. H. Albrow, Ruqaiya Hasan and J. McH. Sinclair.
- [2] I use 'embedded' in preference to my own earlier term 'rankshifted'. The term excludes clauses in hypotactic relation in the clause complex, so that it requires to be interpreted in the sense of rankshifted. Non-defining relative clauses, for example, are not embedded.
- [3] With regard to English intonation as a whole, in general the phonological structure (tonality and tonicity) realizes thematic options, while tone realizes modal options. But some options are on the borderline of theme and mood, and some systems assigned to mood in Halliday (1967b) should perhaps be regarded as thematic rather than modal.
- [4] Orientation to the agency does not mean that the agent (actor) must be specified; the

majority of Svartvik's examples are 'agentless agentives'. The infrequency of the agent reinforces its high information content as a non-thematic (and usually 'new') actor.

[5] I had for a time (e.g. in 3.2 above, and in Halliday (1967a)) used the terms 'known - unknown' for identified (known) and identifier (unknown). The present terms, while more cumbersome, are I hope less confusing in their interpretation in this context.

REFERENCES

- Daneš, F. (1964). A three-level approach to syntax. *TLP* 1. 225-240.
- Firbas, J. (1964). On defining the theme in Functional Sentence Analysis. *TLP* 1. 267-280.
- Firbas, J. (1966). Non-thematic subjects in contemporary English. *TLP* 2. 239-256.
- Halliday, M. A. K. (1967a). *Some aspects of the thematic organization of the English clause*. Santa Monica: The RAND Corporation (Memorandum RM-5224-PR).
- Halliday, M. A. K. (1967b). *Intonation and grammar in British English*. The Hague: Mouton (Janua Linguarum Series Practica 48).
- Halliday, M. A. K. (1967c). *Grammar, society and the noun*. London: University College.
- Hasan, R. (1967). *Grammatical cohesion in spoken and written English, Part I*. London: Nuffield Programme in Linguistics and English Teaching (Papers 7).
- Lamb, S. M. (1966). *Outline of stratificational grammar*. Washington, D.C.: Georgetown U.P.
- Lyons, J. (1966). Towards a 'notional' theory of the 'parts of speech'. *JL* 2. 209-236.
- Quirk, R. (1965). Descriptive statement and serial relationship. *Lg* 41. 205-217.
- Svartvik, J. (1966). *On voice in the English verb*. The Hague: Mouton (Janua Linguarum Series Practica 63).
- Vachek, J. (1966). *The linguistic school of Prague*. Bloomington, Indiana: Indiana U.P.

Focus and Presupposition in Dynamic Interpretation

MANFRED KRIFKA
University of Texas at Austin

Abstract

Structured meanings have evolved as a well-suited tool to describe the semantics of focus constructions (cf. von Stechow 1990; Jacobs 1991; Krifka 1992). In this paper, I will show how structured meanings can be combined with a framework of dynamic interpretation that allows for a cogent expression of anaphoric relations and presuppositions. I will concentrate in particular on the semantics of the focusing particle *only* and discuss several phenomena that have gone unnoticed or unsolved so far, for example the introduction of discourse markers in the scope of *only* and alternatives that are anaphorically related to quantifiers. In particular, I will show that the proposed representation format can handle sentences with multiple occurrences of focusing particles. The paper also includes a discussion of the behavior of negation with respect to presuppositions, and of principles that govern the interpretation of focus on quantified NPs.

1 INTRODUCTION

This paper is a sequel to Krifka (1992a), where a semantic framework was developed to handle expressions with focusing operators, including complex cases with multiple focusing operators. There I elaborated on a representation format developed independently by von Stechow and Jacobs—structured meanings—and showed how the construction in question can have a compositional treatment. However, I suppressed the fact that focusing operators typically introduce presuppositions, and treated all semantic contributions of an operator as assertional. In this paper I show that structured meanings can be combined with a representation format that can express the distinction between assertions and presuppositions as well as anaphoric relations.¹

2 FOCUS-BACKGROUND STRUCTURES

One of the basic assumptions of formal semantics for natural language is that interpretation is compositional, that is, the meaning of a complex expression $\llbracket \phi \psi \rrbracket$ is given in terms of the meanings of its immediate syntactic parts, $\llbracket \phi \rrbracket$ and

[[ψ]]. There is an interesting set of constructions that potentially challenge this assumption, namely, focus-sensitive operators. Take *only* in the following examples, where capitalization symbolizes phonological stress.

- (1) a. John only kissed MARY.
b. John only KISSED Mary.

In both cases the phrase structure is arguably the same; *only* forms a constituent with the verb phrase *kissed Mary*. However, the meaning of the sentences, and hence the meanings of the complex verb phrases containing *only*, clearly differ: (a) has a reading (i) saying that the only person John kissed was Mary, and a reading (ii) saying that the only thing John did was kiss Mary. (b), in contrast, has a reading saying that the only thing John did to Mary was that he kissed her. Obviously, the stress location plays a role in these different readings. When we adhere to the principle of compositionality, and furthermore agree that the syntactic structures of (a) and (b) are essentially the same, then we must accept that the meanings of *kissed MARY* and *KISSED Mary* are different.

There are several ways to express this meaning difference. Here, I will assume that stress marks that certain constituents are in focus, and that this focus marking induces a partition of semantic material into a 'focus' part and a 'background' part. This analysis, which has its roots in Jackendoff (1972: chapter 6) and Dahl (1974), was developed by Jacobs (1983, 1991) and von Stechow (1982). See von Stechow (1990) for a comparison with an alternative approach, Rooth (1985, 1992).

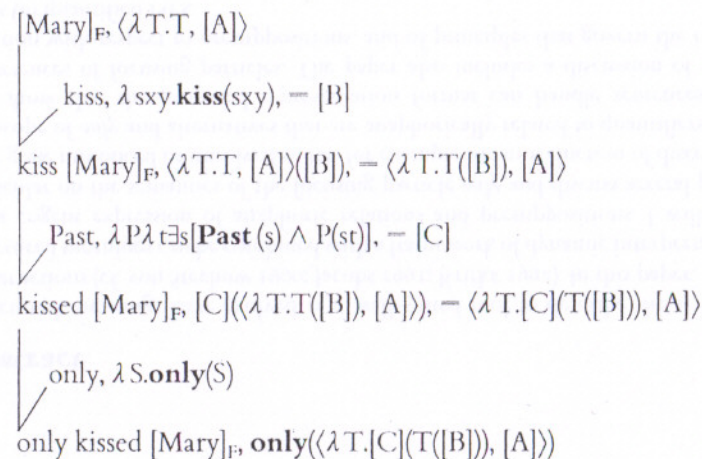
Stress on *Mary* in our example either means that the object NP is in focus or that the whole VP, *kissed Mary*, is in focus (see von Stechow & Uhmann 1986 and Jacobs 1991 for the ambiguities of stress marking). Stress on *kissed* means that the verb is in focus (or, alternatively, just the past tense morpheme, a possibility that is not dealt with here). We can see focus as a feature that marks a constituent and we can assume that the different readings of (1) are due to the position in which that feature appears. The semantic effect of the focus feature is that it introduces a split of the semantic representation into a background part and a focus part. As this split is different for the interpretations of (1a, b), the meanings of the verb phrases will differ. Many expressions will disregard the focus-background split, but operators like *only* are sensitive to it and will produce different results when combined with expressions that differ in their background-focus articulation.

In Krifka (1992a) I developed a framework in which the creation, propagation and utilization of background-focus structures are formally captured. Background-focus structures are represented as pairs of semantic representations $\langle B, F \rangle$, where B can be applied to F , yielding the standard representation $B(F)$. The semantic contribution of focus is to create such

structures by putting the semantic representation of the constituent with focus feature into the focus position and an identity function for entities that are of the type of the focus into the background position. If a background-focus structure $\langle B, F \rangle$ is combined with a semantic representation A that would normally be combined with the standard meaning $B(F)$, then the background-focus structure is propagated. More specifically, if the semantic combination rule calls for a functional application of A to $\langle B, F \rangle$, then the result will be $\langle \lambda X[A(B(X))], F \rangle$, and if it calls for a functional application of $\langle B, F \rangle$ to A , then the result will be $\langle \lambda X[B(X)(A)], F \rangle$. This ensures that the focus constituent remains identifiable even in larger semantic representations. A focus-sensitive operator then takes background-focus structures as arguments and, using the additional structure they provide, yields a standard expression.

To see how things work let us have a look at the treatment of one reading of example (1a). Here, I use x and y as variables standing for individuals, s as a variable for situations (which are considered to be a special sort of individuals), and t as a variable for tuples of individuals of arbitrary length, including length 0 (this simplifies certain semantic rules). P is a predicate over tuples of individuals, T is a second-order predicate variable, and S is a variable over structured meanings. I specify both the syntactic structure and the incremental semantic representation in one tree. Capital letters in brackets, like $[A]$, will be used as abbreviations. Subscript F stands for a focus feature.

- (2) Mary, $\lambda P \lambda t.P(\mathbf{tm})$, $= [A]$



Let us assume that *only*, applied to a background-focus structure, indicates that the background applies to the focus, and that there is no alternative to the focus such that the background applies to it. Let ALT be a function that maps a representation F to the set of its alternatives, $\text{ALT}(F)$. The alternative set contains representations of the same type as F and typically is contextually restricted, and

the focus content F itself is an element of $ALT(F)$. The alternatives are context-dependent; in the case at hand, we may be talking about a specific set of persons. Furthermore, the alternatives depend on the background (cf. Jacobs 1983); this is suppressed in the current notation. The elements of the alternative set are partially ordered, and **only** excludes just those alternatives that do not rank lower than the focus itself. For example, a predicate like *only kissed* [*Mary and Sue*]_F does not exclude that Mary was kissed. I will write $ALT_q(F)$ for the set of alternatives to F that do not rank lower than F itself. Then the following meaning rule holds for **only** as an operator on verbal predicates:

$$(3) \text{ only}(\langle B, F \rangle) = \lambda t [B(F)(t) \wedge \neg \exists T [T \in ALT_q(F) \wedge B(T)(t)]]$$

When we spell out **only** in (2) along these lines, we obtain the following result:

$$(4) \text{ only}(\langle \lambda T. [C](T([B])), [A] \rangle) \\ = \lambda t [[C]([A]([B]))(t) \wedge \neg \exists T [T \in ALT_q([A]) \wedge [C](T([B]))(t)]] \\ = \lambda t [[C](\lambda P \lambda t. P(\text{tm})(\lambda sxy. \text{kiss}(sxy)))(t) \wedge \dots] \\ = \lambda t [[C](\lambda sx. \text{kiss}(sxm))(t) \wedge \dots] \\ = \lambda t [\lambda P \lambda t \exists s [\text{Past}(s) \wedge P(st)] (\lambda sx. \text{kiss}(sxm))(t) \wedge \dots] \\ = \lambda t [\lambda x \exists s [\text{Past}(s) \wedge \text{kiss}(sxm)] (t) \wedge \dots] \\ = \lambda x [\exists s [\text{Past}(s) \wedge \text{kiss}(sxm) \wedge \neg \exists T [T \in ALT_q([A]) \wedge [C](T([B]))(x)]]]$$

This predicate applies to entities x such that there was a past event s in which x kissed Mary, and there is no proper alternative T to $[A]$, the quantifier that corresponds to Mary, such that there was an event s in which x kissed T .

This representation expresses the intended meaning only if the alternative set contains the right kind of objects. In particular, it cannot contain just any quantifier, as a predicate like *only kiss* [*Mary*]_F does not exclude that a predicate like *kiss a woman* yields a true sentence as well. Here I will assume that the set of alternatives of a quantifier that is generated by an individual (a so-called 'maximal ultrafilter') are again quantifiers that are generated by an individual. That is, whenever we have it that $T \in ALT(\lambda P \lambda t. P(tx))$, for some x , then T can be given by $\lambda P \lambda t. P(ty)$, where y denotes some individual. This allows us to reduce the above description as follows:

$$= \lambda x [\exists s [\text{Past}(s) \wedge \text{kiss}(sxm)] \wedge \\ \neg \exists y [y \in ALT_q(m) \wedge \exists s [\text{Past}(s) \wedge \text{kiss}(sxy)]]], = [D]$$

When we apply this predicate to an argument, like j (for John), we arrive at a semantic representation which states that there was a situation s in the past such that John kissed Mary in s , and there is no proper alternative y to Mary such that there is a situation s in the past where John kissed y in s .

With focus on *kissed*, we would have arrived at the following result:

$$(5) \text{ John only } [\text{kissed}]_F \text{ Mary} \\ \text{only}(\langle \lambda R \exists s [\text{Past}(s) \wedge R(sjm)], \text{kiss} \rangle) \\ = \exists s [\text{Past}(s) \wedge \text{kiss}(sjm)] \wedge \\ \neg \exists R [R \in ALT_q(\text{kiss}) \wedge \exists s [\text{Past}(s) \wedge R(sjm)]]$$

That is, there was a situation s in the past such that John kissed Mary in s , and there is no alternative R to kissing such that there is a situation in the past where John R 'ed Mary. Note that R has to be suitably restricted by $ALT(\text{kiss})$, for example to predicates denoting types of amiable bodily contact. And again the ranking may play a role; for example, as every kissing involves touching, the predicate **touch** should not be considered an element of $ALT_q(\text{kiss})$.

Finally, with focus on *kissed Mary* we would get the following interpretation, assuming that focusation takes place before the binding of the situation variable:

$$(6) \text{ John only } [\text{kissed Mary}]_F \\ \text{only}(\langle \lambda P \exists s [\text{Past}(s) \wedge P(sj)], \lambda sx [\text{kiss}(sxm)] \rangle) \\ = \exists s [\text{Past}(s) \wedge \text{kiss}(sjm)] \wedge \\ \neg \exists P [P \in ALT_q(\lambda sx [\text{kiss}(sxm)]) \wedge \exists s [\text{Past}(s) \wedge P(sj)]]$$

That is, John kissed Mary, and there is no alternative P to kissing Mary such that John performed it. Again, P has to be suitably restricted, for example to social activities of a certain kind.

The representation is flexible enough to treat sentences with multiple focus, like the following ones where the relation between focusing operators and focus is indicated:

- (7) a. Even [*John*]_F only kissed [*Mary*]_F
 b. John even [*only kissed* [*Mary*]]_F
 c. John even [*only*]_F kissed [*Mary*]_F

See Krifka (1992a) and below, section 9, for details concerning these analyses.

3 FOCUS ON NOUN PHRASES

So far we have looked only at one type of NPs in focus, namely names. They are particularly simple, as they can be analyzed as being of type e . However, we also may focus on indefinite NPs and certain quantified NPs, which have to be analyzed as being of a higher type:

- (8) a. John only are [*an apple*]_F.
 b. John only are [*every apple*]_F.

The issue of focus on NPs, including quantificational NPs, has not been addressed in sufficient detail so far. Above, as well as in Krifka (1992a), I have assumed that NPs of the type of second-order predicates, type $\langle\langle e, t \rangle, t\rangle$, can be focused, and that the function ALT would reduce things to type e in case of names. It is unclear, however, how the alternative sets of indefinite NPs or quantified NPs should be construed.

Let us first discuss indefinite NPs. It seems that sentences like (8a) can be interpreted in two ways:

- (8) a'. What John ate was only an apple and nothing more substantial.
 a". There is an apple x which John ate, and John didn't eat anything but x .

Reading (a') can be generated by focusing on the quantifier *an apple*. We have to retrieve the generating predicate, *apple*, from this quantifier, and take as alternatives those existential quantifiers that are generated by predicates that rank higher than *apple* on some order, e.g. because they denote entities that are more nutritious, more expensive, more damaging to one's health, etc. Note that we cannot simply assume that the noun *apple* is focused in this reading, as the number indicated by the definite article may play a role in determining the alternatives: for example, the properties 'two apples', or 'one apple and one pear', may count as alternatives.

For reading (a"), on the other hand, we are concerned just with the alternatives of x itself; x is treated as if it were a name. One plausible analysis of this case is that the indefinite NP is analyzed as having wide scope, and that the focus is on the trace left behind:²

- (8') a'. John only₁ ate [an apple]_F
 a". an apple_i [John only ate [e_i]_F]

What about the readings of (8b)? There are two candidates to consider:

- (8) b'. John ate every apple, and John didn't eat anything else.
 c. John ate every apple, and there is no P other than 'apple' such that John ate every P .

I think that (8b') is the prominent reading of (8b), with focus on the NP *every apple*, and that (8c) results from a narrow focus on the noun *apple*. Note that focus on *every apple* and focus on *apple* itself are phonologically indistinguishable, as in both cases the main noun will receive focal stress. Reading (8b') is captured by the structure (8'b'), whereas reading (8c) is due to a different focus assignment, (8'c):

- (8') b'. John only ate [every apple]_F.
 c. John only ate every [apple]_F.

We may ask whether we also should assume a structure in which the quantifier has wide scope, similar to the indefinite NP in (8a"). The underlying structure would be as follows:

- (8') b'. every apple_i [John only ate [e_i]_F]

I would like to argue that this reading indeed exists, but that it is contradictory as soon as there is more than one apple in our model, and hence is irrelevant. It says that if e_i is instantiated by some apple, then we arrive at the fact that *John only ate* [e_i] is true, that is, John ate this apple and nothing else. This reading excludes that John ate other apples, and in particular that he ate every apple if there were more than one apple in the domain.

Now the task is to provide a general rule as to how alternatives of focused NPs can be constructed. To illustrate the problem, let us look at the following three sentences:

- (9) a. John only kissed [Mary]_F.
 b. John only ate [an apple]_F.
 c. John only ate [every apple]_F.

Sentence (9a) could not be denied by pointing out that John also kissed *a woman* (namely, Mary). Similarly, (9b) cannot be denied by saying that John also ate *a fruit*, or *a green apple*, and (9c) cannot be denied by saying that John also ate *an apple*, or *every green apple*. These NP meanings obviously should not count as proper alternatives to *Mary*, *an apple* and *every apple*, respectively.

We have to find rules that allow us to construct the right alternatives for NP meanings. The following principles will give us the intuitively adequate results:

- (a) If a term T denotes a filter, that is, a set of sets $\{X \mid P \subseteq X\}$, then the elements in the set of alternatives $ALT(T)$ denote filters, too. The filter-terms include names and universal quantifiers; for example, *Mary* is represented by $\{X \mid \{m\} \subseteq X\}$, and *every apple* as $\{X \mid \text{apple} \subseteq X\}$. Note that this rule is a generalization of the rule for names given in the previous section.
 (b) If a term T is indefinite, that is, denotes a set of sets $\{X \mid P \cap X \neq \emptyset\}$, then the elements in the set of alternatives $ALT(T)$ are indefinites as well.

Note that we can determine whether a determiner T belongs to the filters or to the indefinites: if $\cap \llbracket T \rrbracket = P$, where $P \neq \emptyset$, and for all X with $P \subseteq X$, $X \in \llbracket T \rrbracket$, then T is a filter. If T is not a filter, but there is a minimal set P , where $P \neq \emptyset$, such that for all $X \in \llbracket T \rrbracket$, $X \cap P \neq \emptyset$, then T is indefinite. The condition that T is not a filter excludes names, and the condition that $X \cap P \neq \emptyset$ excludes negative terms, such as *no apple*.

- (c) The set of proper alternatives $ALT_q(T)$ is defined as $\{T' \in ALT(T) \mid T \not\subseteq T'\}$. That is, if a term T includes in its meaning the term T' , then T' cannot be a proper alternative of T .

The following examples should illustrate how principles (a), (b) and (c) work:

- (10) a. ALT_4 [*John*]
 includes [*Mary*], [*every boy*], excludes [*a boy*], [*no girl*] (a).
 b. ALT_4 [*a boy*]
 includes [*a girl*],
 excludes [*John*], [*every boy*], [*no girl*] (b), [*a person*] (c).
 c. ALT_4 [*every boy*]
 includes [*Mary*], [*every girl*], [*every person*],
 excludes [*a boy*], [*no girl*] (a), [*every tall boy*] (c).

With these principles we will get the readings discussed above. For the case of indefinites one should keep in mind that for the more prominent reading (8'a*), where the focus is on a variable, we should expect a filter behavior, as focus is on the maximal filter related to the variable:

The rules given above give similar results as the theory of Lerner & Zimmermann (1983), which is based on German data. However, I do not follow their assumption that focus on quantificational NPs is impossible, and that the relevant cases have to be analyzed as focus on the head noun of a quantified NP. Sentences like the following one are perfectly possible and preclude an analysis in terms of noun focus:

- (11) John even ate [everything]_F

Summarizing this section, it seems possible that quantificational NPs are focused. I have specified the principles that help to determine the alternative sets in two important cases, namely focus on NPs with the filter property, and focus on indefinite NPs. It seems that focus on other NPs is impossible, like focus on negative quantifiers.³

4 PROBLEMS WITH ANAPHORIC RELATIONS AND PRESUPPOSITIONS

The representations I have developed here so far are deficient in certain respects: they do not allow expression of anaphoric relations, and they do not make any distinction between presuppositional and assertional material.

As for anaphoric relations, we should be able to take care of examples like the following ones:

- (12) Every girl_i only liked [her_i own painting]_F
 (13) — Did every gentleman talk to his left partner and to his right partner?
 — Every gentleman_i only talked to [his_i left partner]_F.

In (12), the focus contains an possessive pronoun, *her*, that is anaphorically related to a quantifier, *every girl*. In (13), the alternatives are dependent on the

preceding quantifier; for different choices *i* for a gentleman, we will get *it's* left partner and *it's* right partner as alternatives.

Of course there are theories around that do a good job in treating anaphoric relationships—Discourse Representation Theory (Kamp 1981), File Change Semantics (Heim 1982), or some other model of Dynamic Interpretation (e.g. Groenendijk & Stokhof 1990, 1991). However, we will have to check whether we can combine them with the background-focus structures that I have assumed for the treatment of focus information.

As for the presupposition/assertion distinction, it is well known since the work of Horn (1969) that this distinction is crucial for the adequate semantic analysis of particles like *even* and *only*. We have the following situation, illustrated with simple examples:

- (14) a. John only kissed [Mary]_F
 Assertion: John didn't kiss anyone else.
 Presupposition: John kissed Mary.
 b. John even kissed [Mary]_F
 Assertion: John kissed Mary.
 Presupposition: It was more likely that John kissed someone else.

The known tests for presuppositions (cf. e.g. van der Sandt 1988) verify this analysis. For example, a text where the assertion is followed by the presupposition is pragmatically deviant, in contrast to a text where the presupposition precedes the assertion:

- (15) a. John kissed Mary, and he only kissed HER.
 b. *John only kissed MARY, and he kissed her.
 (16) a. *John even kissed MARY, although it was unlikely that he would have kissed her, out of all people.
 b. It was unlikely that John would have kissed Mary out of all people, but he even kissed HER.

Furthermore, the presupposition survives under negation and the possibility operator:

- (17) a. It is not the case that John only kissed Mary.
 It is possible that John only kissed Mary.
 (entails that John kissed Mary)
 b. It is not the case that John even kissed Mary.
 It is possible that John even kissed Mary.
 (entails that Mary was an unlikely person for John to kiss).

Anaphoric reference and presuppositions interact in interesting ways. We find cases where discourse referents seem to be introduced within the presupposition of a sentence:

(18) John only met [a woman]_{i,F}. She_i was pretty.

If the first sentence has the presupposition that John met a woman, and asserts that John didn't meet anyone else, then it seems that the presupposition part is responsible for creating a discourse entity for that woman that can be referred to later pronouns.

In Krifka (1992b) I have proposed a way to combine background-focus structures with dynamic interpretation. In this article I will in addition deal with the distinction between presuppositions and assertions. We will see that dynamic interpretation is an appropriate setting for a theory of presupposition, which has been argued for by Stalnaker (1974), Karttunen (1974), Heim (1983a) and most recently Beaver (1992).

For example, certain problems with a static representation of presuppositions are eliminated as soon as we change to a dynamic framework. One such problem is that we must allow for variable bindings across presuppositions and assertion. Any theory that treats these two meaning components as independent, like Karttunen & Peters (1979), faces problems with sentences like the following one:

(19) A man only kissed [Mary]_F

Presupposition: $\exists x[\mathbf{man}(x) \wedge \mathbf{kissed}(x, m)]$

Assertion: $\exists x[\mathbf{man}(x) \wedge \neg \exists y[y \in \text{ALT}_q(m) \wedge \mathbf{kissed}(x, y)]]$

In a two-level representation, we would arrive at the indicated analysis. But this certainly doesn't capture the meaning of (19): it presupposes that some man kissed Mary, and it asserts that some man (possibly another one) kissed no other person than Mary. Karttunen & Peters (1979) acknowledged this as a serious problem, and Beaver (1992) showed how it can be eliminated within dynamic interpretation.

5 DYNAMIC INTERPRETATION AND PRESUPPOSITIONS

In this section I will introduce a framework for dynamic interpretation and show that it allows for a straightforward treatment of presuppositions. The framework is most closely related to Heim (1982: chapter III), Heim (1983b), and Rooth (1987). The treatment of presuppositions follows Beaver (1992) in certain respects.

Let us assume that *A* is a universe of discourse, *W* is a set of possible worlds, *D* is a countable set of discourse markers (I take *D* to be the set of natural numbers), and *G* is the set of discourse marker assignments, that is, the set of

partial functions from *D* to *A*. If α is a constant of the semantic representation language, then α_w should denote the extension of α with respect to world *w*. I will use *w*, *u*, *v* as variables over possible worlds, and *g*, *h*, *k*, *f* as variables over assignments.

I will use the following notations to talk about assignments. If $g \in G$ and $d \in \text{Dom}(g)$, I will write g_d for $g(d)$. If $g, h \in G$, then I will write $g \leq h$ iff $\text{Dom}(g) \subseteq \text{Dom}(h)$ and $g = h$ restricted to g ; that is, *g* and *h* are identical for their shared domain, and *h* is an extension of *g*. If $x \in A$, $d \in D$, we will write $g \leq_{d/x} h$ for $h = g \cup \{(d, x)\}$, provided that $d \notin \text{Dom}(g)$; that is, *h* extends *g* in so far as it maps *d* to *x*. I will write $g \leq_d h$ iff there is an $x \in A$ such that $g \leq_{d/x} h$. This notation is recursive; for example, I will write $g \leq_{d,d} h$ iff there are $x, y \in A$ and a *k* such that $g \leq_{d/x} k$ and $k \leq_{d/y} h$.

An information state σ is a set of world-assignment pairs $\langle w, g \rangle$. The world component *w* captures the factual information, whereas the assignment component *g* captures the accessible discourse markers. Sentences, and in general texts, are interpreted as functions from information states to information states, or from 'input states' to 'output states'. In this paper, such functions are rendered by expressions of the form $\lambda \sigma. \{wg \mid \dots\}$, where σ is used as state variable.

Instead of giving a fragment with explicit interpretation rules, I will work through an example that illustrates the intended semantic rules.

(20) a man arrived.

arrive, $\lambda s x \lambda \sigma. \{wg \in \sigma' \mathbf{arrive}_w(sx)\}, - [A]$
 $\mid$
 $\mid a_1, \lambda Q \lambda P \lambda t \lambda \sigma. \{wg \mid \exists x [wg \in P(tx)(Q(x)(\{uh \mid \exists k [uk \in \sigma \wedge k \leq_{1/x} h]\})])\},$
 $\mid - [B]$
 $\mid \mid$
 $\mid \mid \text{man}, \lambda x \lambda \sigma. \{wg \in \sigma' \mathbf{man}_w(x)\}, - [C]$
 $\mid \mid$
 $\mid \mid a_1 \text{ man}, [B]([C]),$
 $\mid \mid \lambda P \lambda t \lambda \sigma. \{wg \mid \exists x [wg \in P(tx)(\{uh \mid \exists k [uk \in \sigma \wedge k \leq_{1/x} h \wedge \mathbf{man}_u(x)]\})]\},$
 $\mid \mid - [D]$
 $\mid \mid$
 $\mid \mid a_1 \text{ man arrive}, [D]([A])$
 $\mid \mid \lambda t \lambda \sigma. \{wg \mid \exists x [wg \in [A](tx)(\{uh \mid \exists k [uk \in \sigma \wedge k \leq_{1/x} h \wedge \mathbf{man}_u(x)]\})]\}$
 $\mid \mid - \lambda s \lambda \sigma. \{wg \mid \exists h [wh \in \sigma \wedge h \leq_{1g} \mathbf{man}_w(g_1) \wedge \mathbf{arrive}_w(sg_1)]\}, - [E]$
 $\mid \mid$
 $\mid \mid \text{Past}_2,$
 $\mid \mid \lambda P \lambda t \lambda \sigma. \{wg \mid \exists s [wg \in P(st)(\{uh \mid \exists k [\sim uk \in \sigma \wedge k \leq_{2s} h \wedge \mathbf{Past}_u(s)]\})]\}, - [F]$
 $\mid \mid$
 $\mid \mid a_1 \text{ man arrived}_2, [F]([E])$
 $\mid \mid - \lambda \sigma. \{wg \mid \exists h [wh \in \sigma \wedge h \leq_{1,2g} \mathbf{man}_w(g_1) \wedge \mathbf{arrive}_w(g_2g_1) \wedge \mathbf{Past}_w(g_2)]\}, - [G]$

This example illustrates that indefinite NPs introduce new discourse markers. Episodic predicates behave similar to indefinite NPs in so far as they also introduce a new discourse marker, which is anchored to a situation. This discourse marker is related to the tense operator, and may be identified with the category I^0 of extended X-bar theory. Note that in both cases I assume that the information as to which discourse marker is introduced is derived from some syntactic index. However, we could set up things in such a way that indefinites and episodic verbs take the next available discourse marker that is not in the domain of the input state; note that this rule will pick out a uniquely determined discourse marker, as the set of discourse markers is countable.

The next example illustrates the treatment of anaphoric expressions and presuppositions. Anaphoric expressions, like pronouns or temporal anaphora, pick up a discourse marker that is already in the domain of the input state. Normal pronouns simply refer to such an accessible discourse marker; possessive pronouns and episodic verbs that are temporally related to preceding expressions relate a new discourse marker to an existing one. For simplicity's sake, I assume that possessive pronouns are based on a relation **own**, and that the temporal relationship between two situations is expressed by a relation **TRel** (see Partee 1984 for a more detailed treatment of the temporal relationship).

Presuppositions are formulas that have to be true throughout the input state. This reconstruction of speaker's presuppositions is inspired by the work of Karttunen (1974) and Stalnaker (1974) and has been implemented by Heim (1983a) and Beaver (1992). Here I assume that presuppositions either do not change the input state at all (if they are satisfied), or they reduce it to the empty state (in case they are not satisfied). Let us have a look at one presupposition-carrying example:

(21) He₁ was_{2,3} pushing his_{1,4} bike.

his_{1,4} bike,
 $\lambda P \lambda t . \{wg : \forall uh [uh \in \sigma \rightarrow \exists y [bike_u(y) \wedge own_u(h_1y)]] \wedge$ (Presupposition, [H](σ))
 $\exists k [wk \in \sigma \wedge k \leq_{3,4} g \wedge bike_w(g_4) \wedge own_w(g_1g_4) \wedge$ (Introduction DM)
 $\wedge wg \in P(tg_4)(\sigma)]$ (Assertion)
 push, $\lambda sxy \lambda \sigma . \{wg \in \sigma : push_w(sxy)\}$
 push his_{1,4} bike, $\lambda sx \lambda \sigma . \{wg \in \sigma : [H](\sigma) \wedge$
 $\exists k [wk \in \sigma \wedge k \leq_{3,4} g \wedge bike_w(g_4) \wedge own_w(g_1g_4) \wedge push_w(sxg_4)]\} = [I]$
 $Past_{2,3} \lambda P \lambda t \sigma . \{wg : \exists s [wg \in P(st)(\{vh : \exists k [kv \in \sigma \wedge k \leq_{3,4} h \wedge$
 $Past_v(s) \wedge TRel_v(k_2s)]\})]\} = [J]$

was_{2,3} pushing his_{1,4} bike, $[J]([I])$
 $= \lambda t \lambda \sigma . \{wg : \exists s [wg \in [I](st)(\{vh : \exists k [kv \in \sigma \wedge k \leq_{3,4} h \wedge Past_w(s) \wedge$
 $TRel_w(k_2s)]\})]\}$
 $= \lambda x \lambda \sigma . \{wg : [H](\sigma) \wedge \exists k [wk \in \sigma \wedge k \leq_{3,4} g \wedge Past_w(g_3) \wedge TRel_w(g_2g_3) \wedge$
 $bike_w(g_4) \wedge own_w(g_1g_4) \wedge push_w(g_3xg_4)]\}$
 $= [K]$
 $\lambda \sigma . \{wg : \lambda P \lambda t \lambda \sigma . \{wg \in \sigma : P(tg_4)(\sigma)\} = [L]$
 $he_1 was_{2,3} pushing his_{1,4} bike, [L]([K])$
 $= \lambda \sigma . \{wg : [H](\sigma) \wedge \exists k [wk \in \sigma \wedge k \leq_{3,4} g \wedge Past_w(g_3) \wedge TRel_w(g_2g_3) \wedge$
 $bike_w(g_4)$
 $\wedge own_w(g_1g_4) \wedge push_w(g_3g_1g_4)]\}$
 $= [M]$

The representation [M] imposes certain requirements on the input state. First, the assertional part requires that the input assignment k is defined for the indices 1 and 2, and undefined for the indices 3 and 4. Second, the presuppositional part $[H](\sigma)$ requires that for all world-assignment pairs uh in the input state σ , h_1 is defined, and there is a unique y such that $bike_u(y)$ and $own_u(h_1y)$ hold. The requirements concerning the indices 1 and 2 are satisfied when we interpret [M] with respect to an output state of the representation [G] (given that its assignments are undefined for 3 and 4), as [G] explicitly introduces the indices 1 and 2 into the output assignment. To be more specific, we can combine [G] and [M] to form a text, using functional composition.

(22) Λ_1 man arrived₂, [G]
 $\lambda \sigma . [M]([G](\sigma))$
 $= \lambda \sigma . \{wg : [H]([G](\sigma)) \wedge \exists k [wk \in [G](\sigma) \wedge k \leq_{3,4} g \wedge Past_w(g_3) \wedge$
 $TRel_w(g_2g_3) \wedge bike_w(g_4) \wedge own_w(g_1g_4) \wedge push_w(g_3g_1g_4)]\} = [N]$

Note that for every σ for which $[G](\sigma)$ is defined, the assignments of $[G](\sigma)$ will be defined for the indices 1 and 2. Furthermore, the requirement $[H]([G](\sigma))$ ensures that [N] is defined only for those input states for which it holds that there is a unique bike that g_1 has. Note that in order to satisfy this condition, the input state σ (the input state for the whole text) must already meet certain requirements. This captures the fact that the presupposition that the man chosen by the first sentence owns a bike is projected from the second sentence to the whole text. Also, due to the universal condition on the input state introduced by *his_{1,4} bike*, g_4 in [N] will pick out the bike of g_1 .⁴

What happens if a state σ does not satisfy the presuppositions of a sentence ϕ ? Then the output state $\llbracket \phi \rrbracket(\sigma)$ should be the empty set.⁵ But we can understand a text like (22), even without being acquainted with the man the speaker is talking about, or his bike.

This well-known phenomenon of accommodation (cf. Stalnaker 1974; Karttunen 1974; Lewis 1979) is treated in a novel way by Beaver (1992). Instead of seeing accommodation as a revision of the input states, that is, as an essentially non-monotonic repair strategy, Beaver analyzes it as a filter on a set of input states, the 'epistemic alternatives'. This set of epistemic alternatives represents the set of information states that are compatible with the text (and perhaps the shared background information of speaker and hearer). Let us assume that a text ϕ is interpreted with respect to a set of epistemic alternatives Σ , for which we write $\Sigma[\phi]$; then we can claim that those states in Σ that do not satisfy the presupposition of ϕ are simply filtered out. This is accomplished by the following rule for updating epistemic states:

$$(23) \Sigma[\phi] = \{\llbracket \phi \rrbracket(\sigma) : \sigma \in \Sigma\} - \{\emptyset\}$$

That is, updating a set of epistemic alternatives Σ involves updating every element in Σ , and eliminating the empty set. If a particular state σ does not satisfy the presuppositions in $\llbracket \phi \rrbracket$, then $\llbracket \phi \rrbracket(\sigma)$ will be the empty set, and hence the state σ does not survive in the resulting set of epistemic alternatives. Presupposition and assertion are treated in a complementary fashion: presuppositions filter out certain states in a set of epistemic alternatives Σ , whereas assertions add information to the individual information states in Σ . Thus, accommodation of presuppositions appear as another way of conveying information, and in particular is a monotonic, restrictive operation.

Let us put this theory of accommodation to the test and see how we can treat negation as a presupposition-preserving operator in this setting. I will write $\text{NEG}(\phi)$ for the negation of the sentence ϕ , which will be interpreted compositionally as $\llbracket \text{NEG} \rrbracket(\llbracket \phi \rrbracket)$. We expect the following properties of this representation. First, the presuppositions of ϕ must become presuppositions of $\text{NEG}(\phi)$. That is, if an input state σ does not satisfy the presupposition of ϕ then it is mapped to the empty set by $\text{NEG}(\phi)$. Second, if the presuppositions are satisfied then the input state σ is reduced to the set of those world-assignment pairs wg that cannot be extended to pairs wh that are in $\llbracket \phi \rrbracket$ when applied to σ . This suggests the following interpretation rule:

$$(24) \llbracket \text{NEG} \rrbracket(\llbracket \phi \rrbracket) = \lambda\alpha\{\text{wg} \in \sigma : \llbracket \phi \rrbracket(\sigma) \neq \emptyset \wedge \neg\exists h[\text{wh} \in \llbracket \phi \rrbracket((\text{wg}))]\}$$

The presupposition part $\llbracket \phi \rrbracket(\sigma) \neq \emptyset$ can be seen as pragmatically motivated: it must be possible to interpret ϕ with respect to σ , otherwise $\text{NEG}(\phi)$ would not be informative.⁶ The following example illustrates our analysis:

(25) He₁ did₂ not see his_{1,3} bike.

did₂ see his_{1,3} bike.

$\lambda x\lambda\sigma.\{\text{wg} :$

$$\begin{aligned} & \forall u h[uh \in \sigma \rightarrow \exists y[\mathbf{bike}_u(y) \wedge \mathbf{own}_u(h_1y)] \\ & \wedge \exists k[\text{wk} \in \sigma \wedge k \leq_{2,3} g \wedge \mathbf{bike}_w(g_3) \wedge \mathbf{own}_w(g_1g_3) \wedge \mathbf{see}_w(g_2xg_3)] \\ & - [P] \end{aligned} \quad (-[O](\sigma))$$

$$\text{NEG}, \lambda P\lambda t\lambda\sigma\{\text{wg} \in \sigma : P(t)(\sigma) \neq \emptyset \wedge \neg\exists h[\text{wh} \in P(t)((\text{wg}))]\}, - [Q]$$

did₂ not see his_{1,3} bike, $[Q]([P])$

$$= \lambda x\lambda\sigma\{\text{wg} \in \sigma : [P](x)(\sigma) \neq \emptyset \wedge \neg\exists h[\text{wh} \in [P](x)((\text{wg}))]\}, - [R]$$

$$\text{he}_1 \lambda P\lambda t\lambda\sigma.\{\text{wg} \in \sigma : P(\text{tg}_1)(\sigma), - [S]$$

He₁ did₂ not see his_{1,3} bike, $[S]([R])$

$\lambda t\lambda\sigma.\{\text{wg} \in \sigma : [R](\text{tg}_1)(\sigma)\}$

$$= \lambda\sigma\{\text{wg} \in \sigma : [P](g_1)(\sigma) \neq \emptyset \wedge \neg\exists h[\text{wh} \in [P](g_1)((\text{wg}))]\}$$

$$= \lambda\sigma\{\text{wg} \in \sigma :$$

$$\begin{aligned} & [O](\sigma) \wedge \exists k\exists l[\text{wk} \in \sigma \wedge k \leq_{2,3} l \wedge \mathbf{bike}_w(l_3) \wedge \mathbf{own}_w(l_1l_3) \wedge \mathbf{see}_w(l_2xl_3)] \wedge \\ & [O]((\text{wg})) \wedge \neg\exists h[g \leq_{2,3} h \wedge \mathbf{bike}_w(h_3) \wedge \mathbf{own}_w(h_1h_3) \wedge \mathbf{see}_w(h_2xh_3)] \end{aligned}$$

Here I have used $[O]$ as an abbreviation for the presupposition. Assume first that the presupposition is not satisfied in σ . That is, the entity referred to by the discourse marker 1 does not own a unique bike throughout σ , which means that $[O](\sigma)$ is false. Then the set $\{\text{wg} : [O](\sigma)\}$ will be empty and the sentence meaning will result in the empty state when applied to σ . Assume now that the presupposition is satisfied in σ , that is, $[O](\sigma)$ is true. When we apply the sentence meaning to σ , we will get that subset of σ for which it does not hold that entity 1 saw his bike. More formally, we subtract from σ those world-assignment pairs wg that would satisfy $\exists h[g \leq_{2,3} h \wedge \mathbf{bike}_w(h_3) \wedge \mathbf{own}_w(h_1h_3) \wedge \mathbf{see}_w(h_2xh_3)]$. Thus, the interpretation of (25) with respect to a state σ will either reduce σ to the empty set, if the presuppositions are not satisfied, or will reduce it to the set of worlds and assignments for which the corresponding non-negated sentence does not hold. In this way the presupposition of the object NP is projected through the negation to the whole sentence.⁷

We have seen that in our reconstruction presuppositions are indeed preserved under negation. However, it is well known that negated sentences do not always preserve presuppositions (cf. Seuren 1988):

- (26) It is not the case that John saw his bike. (He doesn't have one in the first place!)

Examples like (26) are typical for a situation where the speaker protests, against certain presuppositions of other participants of the conversation. How should such cases be treated? We may assume two distinct types of negation. However, this is problematic, as there is hardly any evidence for that; for example, no language seems to distinguish lexically between a presupposition-preserving and a presupposition-rejecting negation.

Van der Sandt (1991) has proposed a theory of 'denial' that seems to give us what we want. The crucial part of this theory can be rephrased in our framework as follows.

Assume that at a given point in conversation, Σ is the set of epistemic alternatives shared by speaker and hearer. Now speaker A utters a statement ϕ . That is, A proposes to restrict Σ to $\Sigma[\phi]$. At this point, speaker B has a choice: if he doesn't give any sign of protest and utters some sentence ψ , where $\Sigma[\phi][\psi] \neq \emptyset$, then he proposes to make $\Sigma[\phi][\psi]$ the new set of epistemic alternatives. On the other hand, B can reject ϕ by uttering some sentence ψ , where $\Sigma[\phi][\psi] = \emptyset$, and B has reasons to believe that this will be immediately obvious to A. A good candidate for ψ is the negation of ϕ , as $\Sigma[\phi][\text{NEG}(\phi)]$ obviously reduces to $\emptyset$. Often, ψ is followed by another sentence γ that indicates why B does not accept ϕ . In particular, B proposes to A to make $\Sigma[\gamma]$ the new common ground.

To see how things work, let us look at the following text:

- (27) A: John arrived on his bike. (ϕ)
 B: John didn't arrive on his bike; (ψ , $=$ $\text{NEG}(\phi)$)
 John doesn't have a bike. (γ)

With sentence ϕ , speaker A proposes to B to add to the common ground that John arrived on his bike. With sentence ψ , B rejects A's proposal, as accepting ψ after ϕ has been accepted would yield an empty set of alternatives. Instead, B proposes to add γ to the common ground, which explains why he rejected ϕ : accepting γ would violate the presuppositions of ϕ .

This explains why negation sometimes seems to affect presuppositions. Note that it is not the semantics of a special type of negation that does that, but the peculiar discourse setting in which the negated sentence is used—namely, a setting in which accepting the sentence would yield an empty set of epistemic alternatives. This explains why presupposition-affecting negations occur only as reactions to previous utterances by another speaker. Furthermore, it explains why we find only one semantic type of negation.

The proposed treatment differs from van der Sandt (1991), who analyzed presupposition-affecting negation as slightly different from normal negation in

so far as presupposition-affecting negation applies to the 'echo' of a previous sentence, where the echo of a sentence is a conjunction of its assertional meaning, its presuppositional meaning, and its implicatures, with respect to the context at which it is evaluated. van der Sandt follows Horn's (1985) theory of metalinguistic negation in this point, assuming that there is no distinction between presupposition-affecting negation and implicature-affecting negation. However, it is doubtful that these types of negation can be identified. Metalinguistic negation clearly identifies a certain expression whose applicability is denied by focal stress (cf. 28a, b), and this feature is lacking in presupposition-affecting negation (29a,b):

- (28) a. It is not *possible*, it is *necessary* that the church is right.
 b. Grandma did not *kick the bucket*—she *passed away*.
 (29) a. The king of France is not bald—France does not have a king.
 b. John did not regret that the Longhorns lost—the Longhorns didn't lose.

Hence the position I am taking is that there are two types of negation, normal and metalinguistic, but that both presupposition-preserving and presupposition-affecting negations are instances of normal negation, and that these two cases differ only in so far as presupposition-affecting negation results from the special denial pattern discussed above.

7 FOCUS-BACKGROUND STRUCTURES AND DYNAMIC INTERPRETATION COMBINED

After having introduced structured meanings to cover the relevance of focus and dynamic interpretation to express anaphoric relation and presupposition, a natural way to proceed is to combine both representation frameworks. This was done in Krifka (1992b) with the objective of capturing the focus-sensitivity of sentences containing adverbial quantifiers, like in the following cases:

- (30) a. Usually, a frog catches [a FLY]_F
 (— If frogs catch something, it is usually a fly)
 b. Usually, a FROG catches a fly.
 (— If something catches a fly, it is usually a frog)
 (31) a. If a painter [lives in a VILLAGE]_F, it is usually nice.
 (— Most painters who live in a village live in a nice one.)
 b. If [a PAINTER]_F lives in a village, it is usually nice.
 (— Most villages in which there lives a painter are nice.)

In this paper, I will focus on the semantics of particles like *only*. We have seen that they typically induce presuppositions, and that there are interesting

phenomena relating to anaphoric reference. This calls for a dynamic interpretation like the one we developed above.

We have seen in section 4 above that in a sentence with *only* the sentence in which *only* is omitted is presupposed, but it can introduce new discourse markers (cf. (18)). This suggests the following analysis of *only* as a VP-operator in a dynamic setting:

- (32) *only*(⟨B, F⟩)
 $= \lambda t \lambda \sigma \{wg! \mid$
 $\forall uk \in \sigma \exists h [uh \in B(F)(t)([uk])] \wedge$ (Presupposition)
 $wg \in B(F)(t)(\sigma) \wedge$ (Introduction of DM)
 $\neg \exists X \exists k [X \in ALT_q(F) \wedge wk \in B(X)(t)(\sigma)]$ (Assertion)

In this formula, the first conjunct expresses the presupposition. The second conjunct introduces the indices of the expression in the scope of *only* into the output state, making it possible to refer to them later. The third conjunct is the assertion in the narrow sense; it excludes alternatives of the item in focus.

Let us work through a few examples. We start with one that has the whole VP in focus:

- (33) *only* [ate₂ an₃ apple]_F
 $ate_2 an_3 apple;$
 $\lambda x \lambda \sigma \{wg! \exists k [wk \in \sigma \wedge k \leq_{2,3} g \wedge eat_w(g_2 x g_3) \wedge apple_w(g_3) \wedge Past_w(g_2)]\}, - [A]$
 $[ate_2 an_3 apple]_F; \langle \lambda P.P, [A] \rangle$
 $\mid$
 $\mid$ *only*, $\lambda S.only(S)$
 $\mid$
 $only [ate_2 an_3 apple]_F, only(\langle \lambda P.P, [A] \rangle)$
 $= \lambda t \lambda \sigma \{wg! \forall uh \in \sigma \exists k [uk \in [A](t)([uh])] \wedge wg \in [A](t)(\sigma) \wedge$
 $\neg \exists X \exists k [X \in ALT_q([A]) \wedge wk \in [A](t)(\sigma)]$
 $= \lambda x \lambda \sigma \{wg!$
 $\forall uh \in \sigma \exists k [h \leq_{2,3} k \wedge eat_u(k_2 x k_3) \wedge apple_u(k_3) \wedge Past_u(k_2)] \wedge$
 $\exists [wk \in \sigma \wedge k \leq_{2,3} g \wedge eat_w(g_2 x g_3) \wedge apple_w(g_3) \wedge Past_w(g_2)] \wedge$
 $\neg \exists X \exists k [X \in ALT_q([A]) \wedge wk \in X(x)(\sigma)]$

The resulting predicate maps individuals *x* to functions from input states σ to output states that satisfy the following requirements: the first conjunct, expressing the presupposition, ensures that in every world *u* in σ , *x* ate an apple. The second conjunct updates the assignment *k* in every pair *wk* of the input state to a *g* such that *g*₂ is an event where *x* ate an apple *g*₃ in *w*. This just introduces the event *g*₂ and the apple *g*₃ into the assignments of the output state, but does not restrict its set of possible worlds, given the propositional

information of the first conjunct. The third conjunct, expressing the assertion, says that there is no alternative *X* to the focus meaning *[A]* such that *X* is true of *x*. This restricts the possible worlds of the output state, but does not change the assignments, which reflects the fact that alternatives do not introduce their own binding possibilities.

In the following expression, *only* focuses on the transitive verb:

- (34) *only* [ate₂]_F an₃ apple
 $an_3 apple,$
 $\lambda P \lambda t \lambda \sigma \{wg! \exists x [wg \in P(tx)([uh! \exists k [uk \in \sigma \wedge k \leq_{3/x} \wedge apple_u(x)])]\}, = [B]$
 $\mid$
 $\mid$ *eat*, $\lambda sxy \lambda \sigma \{wg \in \sigma! eat_w(sxy)\}, - [C]$
 $\mid$
 $\mid$ [eat]_F, $\langle \lambda P.P, [C] \rangle$
 $\mid$
 $[eat]_F an_3 apple, [B](\langle \lambda P.P, [C] \rangle), = \langle \lambda P[B](P), [C] \rangle$
 $\mid$
 $Past_2, \lambda P \lambda t \lambda \sigma \{wg! \exists s [wg \in P(st)([uh! \exists k [uk \in \sigma \wedge k \leq_{2/s} h \wedge$
 $Past_u(s)])]\}, - [D]$
 $\mid$
 $[ate_2]_F an_3 apple, [C](\langle \lambda P[B](P), [C] \rangle), = \langle \lambda P[D](P), [C] \rangle$
 $\mid$
 $\mid$ *only*, $\lambda S.only(S)$
 $\mid$
 $only [ate_2]_F an_3 apple, only(\langle \lambda P[D](P), [C] \rangle)$
 $= \lambda t \lambda \sigma \{wg! \forall uh \in \sigma \exists k [uk \in [D](P)([C])](t)([uh]) \wedge$
 $wg \in [D](P)([C])(t)(\sigma) \wedge$
 $\neg \exists X \exists k [X \in ALT_q([C]) \wedge wk \in [D](P)(X)(t)(\sigma)]$
 $= \lambda x \lambda \sigma \{wg!$
 $\forall uh \in \sigma \exists k [h \leq_{2,3} k \wedge eat_u(k_2 x k_3) \wedge apple_u(k_3) \wedge Past_u(k_2)] \wedge$
 $\exists k [wk \in \sigma \wedge k \leq_{2,3} g \wedge eat_w(g_2 x g_3) \wedge apple_w(g_3) \wedge Past_w(g_2)] \wedge$
 $\neg \exists X \exists k [X \in ALT_q([C]) \wedge \exists s \exists y [wk \in X(sxy)([uh! \exists f [uf \in \sigma \wedge f \leq_{2/s,3/y} u \wedge$
 $Past_u(s) \wedge apple_u(y)])]]$

We get a predicate that maps entities *x* to a function from input states σ to output states such that it holds throughout σ that *x* ate an apple, the assignments of the output state map 3 to an apple and 2 to a situation in which *x* ate an apple (these two conditions are identical to the first conditions of (33)), and for the worlds of the output state there is no alternative *X* to eating such that *x* 'Xed' an apple.

The next example shows a case in which the item in focus is a NP.

(35) only ate₂ [an₃ apple]_F

an₃ apple,
 $\lambda P \lambda t \lambda \sigma. \{wg : \exists x [wg \in P(tx) ((uh : \exists k [uk \in \sigma \wedge k \leq_{3/x} h \wedge \mathbf{apple}_u(x)])]\},$
 $= [E]$
 $[an_3 \text{ apple}]_F, \langle \lambda T.T, [E] \rangle$
 $\lambda cat, \lambda sxy \lambda \sigma. \{wg \in \sigma : \mathbf{eat}_w(sxy)\}, = [F]$
 $cat [an_3 \text{ apple}]_F, \langle \lambda T.T([F]), [E] \rangle$
 $Past_2 \lambda P \lambda t \lambda \sigma. \{wg : \exists s [wg \in P(st) ((uh : \exists k [uk \in \sigma \wedge k \leq_{2/s} h \wedge$
 $\mathbf{Past}_u(s)])]\}, = [G]$
 $ate_2 [an_3 \text{ apple}]_F, \langle \lambda T.[G](T([F])), [E] \rangle$
 $only, \lambda S.\mathbf{only}(S)$
 $only \text{ ate}_2 [an_3 \text{ apple}]_F, \mathbf{only}(\langle \lambda T.[G](T([F])), [E] \rangle)$
 $= \lambda x \lambda \sigma \{wg :$
 $\forall uh \in \sigma \exists k [h \leq_{2,3} k \wedge \mathbf{eat}_u(k_2 x k_3) \wedge \mathbf{apple}_u(k_3) \wedge \mathbf{Past}_u(k_2)] \wedge$
 $\exists k [wk \in \sigma \wedge k \leq_{2,3} g \wedge \mathbf{eat}_w(g_2 x g_3) \wedge \mathbf{apple}_w(g_3) \wedge \mathbf{Past}_w(g_2)] \wedge$
 $\neg \exists X \exists k [X \in ALT_4([E]) \wedge \exists s [wk \in X (\lambda sxy \lambda \sigma. \{wg \in \sigma : \mathbf{eat}_w(sxy)\})$
 $(sx) ((uh : \exists k [ui \in \sigma \wedge i \leq_{2/s} h \wedge \mathbf{Past}_u(s)])]\}]$

The first two conjuncts of that formula are the same as in the two preceding examples. The third conjunct says that for the worlds of the output state there is no proper alternative X to the meaning of the item in focus, *an apple*, such that there was an event s in the past and x ate an X . Assuming that the proper alternatives to the meaning of *an apple* are those term meanings T that are generated by predicates that denote something more substantial than the predicate *apple* (see section 3), this says that x didn't eat anything more substantial than an apple.

In section 3 we argued that although this may be one meaning of the example at hand, a more plausible meaning is that there was an apple y , and x ate y and nothing else. This reading can be generated by assuming that *an apple* is quantified in. There are various ways to implement this idea, e.g. assumption of a representation level of logical form, or operator storage. The crucial properties of this reading are given in the following derivation:

(36) [an₃ apple] only ate₂ [c₃]

$c_3, \lambda P \lambda t \lambda \sigma. \{wg \in \sigma : P(tg_3)(\sigma)\}, = [H]$
 $[c_3]_F, \langle \lambda T.T, [H] \rangle$
 $\lambda cat, \lambda sxy \lambda \sigma. \{wg \in \sigma : \mathbf{eat}_w(sxy)\}, = [I]$
 $cat [c_3]_F, \langle \lambda T.T([I]), [H] \rangle$
 $Past_2,$
 $\lambda P \lambda t \lambda \sigma. \{wg : \exists s [wg \in P(st) ((uh : \exists k [uk \in \sigma \wedge k \leq_{2/s} h \wedge \mathbf{Past}_u(s)])]\}, = [K]$
 $ate_2 [c_3]_F, \langle \lambda T.[K](T([I])), [H] \rangle$
 $only, \lambda S.\mathbf{only}(S)$
 $only \text{ ate}_2 [c_3]_F, \mathbf{only}(\langle \lambda T.[K](T(\lambda sxy \lambda \sigma. \{wg \in \sigma : \mathbf{eat}_w(sxy)\})), [H] \rangle)$
 $= \lambda x \lambda \sigma \{wg : \forall uk \in \sigma \exists h [uh \in [K]([H]([I]))(x)(\{uk\})] \wedge wg \in [K]([H]([I]))(x)(\sigma) \wedge$
 $\neg \exists X \exists k [X \in ALT_4([H]) \wedge wk \in [K](X([I]))(x)(\sigma)]$
 $= [L]$
 $an_3 \text{ apple},$
 $\lambda P \lambda t \lambda \sigma. \{wg : \exists y [wg \in P(t) ((uh : \exists k [uk \in \sigma \wedge k \leq_{3/y} h \wedge \mathbf{apple}_u(y)])]\}, = [M]$
 $an_3 \text{ apple } [only \text{ ate}_2 [c_3]], = \lambda t \lambda \sigma [[M]([L])(t)(\sigma)]$

The wide scope reading of *an₃ apple* is achieved by first specifying the argument place with an empty element c_3 that is semantically interpreted as a pronoun related to the object denoted by g_3 . Then the indefinite term *an₃ apple* is quantified in. Contrary to earlier representations of this term, its representation does not fill any argument place of the predicate, but fixes the referent of g_3 as referring to a particular apple. This shows up formally in so far as the description of the term contains an application $P(t)$ instead of $P(ty)$. This dual role of a quantificational NP should follow from slightly different derivations for argument-filling terms and terms that are quantified in.

Let us now compute the result we have gotten so far:

$\lambda t \lambda \sigma [[M]([L])(t)(\sigma)]$
 $= \lambda x \lambda \sigma. \{wg : \exists y [wg \in [L](x) ((uh : \exists k [uk \in \sigma \wedge k \leq_{3/y} h \wedge \mathbf{apple}_u(y)])]\}$
 $= \lambda x \lambda \sigma. \{wg : \exists y [$
 $\forall uk [\exists [ul \in \sigma \wedge l \leq_{3/y} k \wedge \mathbf{apple}_u(y)] \rightarrow \exists h [k \leq_{2/h} l \wedge \mathbf{Past}_w(h_2) \wedge \mathbf{eat}_w(h_2 x h_3)]$
 $\wedge \exists [wl \in \sigma \wedge l \leq_{3/y, 2} k \wedge \mathbf{apple}_w(y) \wedge \mathbf{Past}_w(g_2) \wedge \mathbf{eat}_w(g_2 x g_3)]$

$$\wedge \neg \exists T \exists k [T \in \text{ALT}_4 ([H]) \wedge \exists s [wk \in T(\lambda sxy \lambda \sigma. \{wg \in \sigma' \text{eat}_w(sxy)\})(sx) \\ ((uh! \exists! [ul \in \sigma \wedge l \leq_{3/y,2} h \wedge \text{apple}_u(y) \wedge \text{Past}_u(h_2))]]))]]]$$

Let us assume again that the alternatives to terms like [H] that are generated by an individual are terms that are generated by an individual. That is, the alternatives to [H] have the form $\lambda P \lambda t \lambda \sigma. \{wg \in \sigma' P(tz)(\sigma)\}$, where z ranges over individuals. Then the last part of the formula above can be reduced as follows:

$$\neg \exists z \exists k [z \in \text{ALT}_4 (g_3) \wedge \\ \exists! [wl \in \sigma \wedge l \leq_{3/y,2} k \wedge \text{apple}_w(y) \wedge \text{Past}_w(k_2) \wedge \text{eat}_w(k_2xz)]]]$$

We end up with a predicate that applies to entities x and changes input states σ in the following way. There is some object y , and the following three conditions hold: (i) it is presupposed throughout σ that if σ is extended in such a way that index 3 is mapped to y and y is an apple, then x ate y ; (ii) the input state σ is extended in such a way that index 3 is mapped to y , y is an apple, and index z is mapped to a past event in which x ate y ; (iii) a final condition for the output state is that there is no alternative z to g_3 ($-y$) such that x ate z . Hence we get the interpretation that x ate a particular object y , which is an apple and nothing else.

In the examples analyzed so far the focus particle occurred as a VP operator. But it may also be an operator on other categories, for example an NP. In this case we have to assume a slightly different meaning rule for *only* in order to adjust to the different type of the scope. I propose the following rule:

$$(37) \text{ only}(\langle B, F \rangle) \\ = \lambda Q \lambda t \lambda \sigma [wg! \forall uh \in \sigma \exists k [uk \in B(F)(Q)(t)([uh])] \wedge \\ wg \in B(F)(Q)(t)(\sigma) \wedge \\ \neg \exists X \exists k [X \in \text{ALT}_4 (F) \wedge wk \in B(X)(Q)(t)(\sigma)]]]$$

The only difference to definition (32) consists in the introduction of a predicate variable Q which stands for the argument of the term in the scope of *only*. Hence (37) can be seen as a generalization of (32) to a different type.

Let us see how things work out with an example. In the following, I derive the reading of *eat only [an apple]*_F:

$$(38) \\ \text{an}_3 \text{ apple}, \\ \lambda P \lambda t \lambda \sigma. \{wg! \exists x [wg \in P(tx)([uh! \exists k [uk \in \sigma \wedge k \leq_{3/x} h \wedge \text{apple}_u(x)]]]]], \\ = [N]$$

$$[\text{an}_3 \text{ apple}]_F, \langle \lambda T.T, [N] \rangle$$

$$\text{only}, \lambda S.\text{only}(S)$$

$$\text{only} [\text{an}_3 \text{ apple}]_F, \text{only} (\lambda T.T, [N]), \\ = \lambda Q \lambda t \lambda \sigma [wg! \forall uh \in \sigma \exists k [uk \in [M](Q)(t)([uh]) \wedge wg \in [M](Q)(t)(\sigma) \wedge \\ \neg \exists X \exists k [X \in \text{ALT}_4 ([M]) \wedge wk \in X(Q)(t)(\sigma)]]], = [O]$$

$$\text{eat}_2, \lambda sxy \lambda \sigma. \{wg \in \sigma' \text{eat}_w(sxy)\}, = [P]$$

$$\text{eat}_2 \text{ only} [\text{an}_3 \text{ apple}]_F, [O]([P]), \\ = \lambda t \lambda \sigma [wg! \forall uh \in \sigma \exists k [uk \in [N]([P])(t)([uh]) \wedge wg \in [N]([P])(t)(\sigma) \wedge \\ \neg \exists X \exists k [X \in \text{ALT}_4 ([N]) \wedge wk \in X([P])(t)(\sigma)]]] \\ = \lambda sx \lambda \sigma [wg! \forall uh \in \sigma \exists k [h \leq_{3/k} k \wedge \text{apple}_u(k_3) \wedge \text{eat}_u(sxk_3)] \wedge \\ \exists k [wk \in \sigma \wedge k \leq_{3/g} g \wedge \text{apple}_w(g_3) \wedge \text{eat}_w(sxk_3)] \wedge \\ \neg \exists X \exists k [X \in \text{ALT}_4 ([N]) \wedge wk \in X([P])(t)(\sigma)]]]$$

This is a relation between situations s and entities x that maps input states σ to output states with assignments g that presuppose that throughout σ , x ate an apple in s , furthermore introduce a new index 3 such that g_3 is an apple that is eaten by x in s , and finally exclude that any alternative X to an apple was eaten.

Note that another way to derive the same expression is by quantifying in *an₃ apple* into *eat only [e₃]*. The result is then a relation between entities x and situations s that map input states σ to output states with assignment g such that there is an object y , where it is presupposed that x ate y in s , a new index 3 is introduced that is mapped to y , and it is excluded that x ate any alternative to y .

In the derivation I have given in (38) for *eat only [an apple]*_F, *only* has narrow scope with respect to a past operator that binds the situation argument. This differs from the derivation given in (35) for *only ate [an apple]*_F. Note that for this latter case we also have an alternative derivation where the Past operator has scope over *only*, which yields the same reading as the one given in (38). On the other hand, there is evidence that NPs like *only an apple* can get a wide-scope interpretation (cf. Taglicht 1984, who discusses examples like *We must study only physics*), which would yield an interpretation similar to (35) for sentence (38). That such reading differences indeed exist can be shown with examples like the following. Imagine a lottery with three draws each day, and that John participates in each draw.

- (39) a. Yesterday, John (only) won (only) a rose.
b. In the first draw, John won a teddy bear. Then he won a bottle of champagne. Finally, he (only) won (only) a rose.

In (a), *yesterday* arguably specifies the reference time, and the sentence has to be interpreted as implying that within the reference time there was no event of John winning something other than a rose. In (b), the temporal adverbials arguably refer to the draw events. But then the last sentence has to be interpreted as: there was an event in which John didn't win anything but a rose.

It seems that such scope differences indeed exist, but that the position of *only* does not predetermine the availability of possible readings.

8 FOCUS AND ANAPHORIC REFERENCE

We have seen with cases like (13) that focus items can contain anaphoric elements, and that the set of alternatives can vary with the input assignments. Let us check how such cases work out in our formalism. The question of (13) constructs the following alternatives:

(40) Did₂ every₁ gentleman talk to his_{1,3} left partner and his_{1,4} right partner?

Set of alternatives:

$$\begin{aligned} & \{\lambda P \lambda t \lambda \sigma. \{wg: \forall uh [uh \in \sigma \rightarrow \exists! y [\text{left-partner}_u(yh_1)] \wedge \\ & \quad \exists k [wk \in \sigma \wedge k \leq_{3,g} g \wedge \text{left-partner}_w(g_3g_1) \wedge wg \in P(g_3t)(\sigma)]], \\ & \lambda P \lambda t \lambda \sigma. \{wg: \forall uh [uh \in \sigma \rightarrow \exists! y [\text{right-partner}_u(yh_1)] \wedge \\ & \quad \exists k [wk \in \sigma \wedge k \leq_{4,g} g \wedge \text{right-partner}_w(g_4g_1) \wedge wg \in P(g_4t)(\sigma)]], \\ & - \{[A_1], [A_2]\} \end{aligned}$$

Here I am assuming that **left-partner** and **right-partner** are relations that map a person to his or her left partner and right partner, respectively. As with other definite descriptions, it is presupposed that there is a unique element that satisfies descriptive content, and a new index for this element is introduced. The answer to the question can be analyzed as follows. I assume that the answer uses the same index for *every gentleman* as the question, and that it takes the set of alternatives indicated above.

(41) Every₁ gentleman only talked₂ to [his_{1,3} left partner]_F.

[his_{1,3} left partner]_F $\langle \lambda T.T.[A_1] \rangle$

talk to, $\lambda sxy \lambda \sigma \{wg \in \sigma: \text{talk-to}_w(sxy)\}$, = [B]

talk to [his_{1,3} left partner]_F = $\langle \lambda T.T.([B]), [A_1] \rangle$

Past₂, $\lambda P \lambda t \lambda \sigma. \{wg: \exists s [wg \in P(st)((uh: \exists k [uk \in \sigma \wedge k \leq_{2,s} h \wedge \text{Past}_u(s)]))\}$, = [C]

talked₂ to [his_{1,3} left partner]_F $\langle \lambda T.[C](T([B])), [A_1] \rangle$

only talked₂ to [his_{1,3} left partner]_F, **only** $\langle \lambda T.[C](T([B])), [A_1] \rangle$

$$\begin{aligned} & - \lambda t \lambda \sigma \{wg: \forall uh_1 \in \sigma \exists k [uk \in [C]([A_1]([B]))(t)(uh)] \wedge \\ & \quad wg \in [C]([A_1]([B]))(t)(\sigma) \wedge \\ & \quad - \exists X \exists f [X \in \text{ALT}_4([A_1]) \wedge wf \in [C](X([B]))(t)(\sigma)] \} \end{aligned}$$

With $X = [A_2]$ as the only alternative of $[A_1]$, this reduces to the following, slightly abbreviated formula:

$$\begin{aligned} & - \lambda x \lambda \sigma \{wg: \\ & \quad \forall uh \in \sigma [\exists! y [\text{left-partner}_u(yh_1)] \wedge \exists k [uk \in \sigma \wedge h \leq_{2,3} k \wedge \text{left-partner}_u(g_3g_1) \wedge \\ & \quad \quad \text{talk-to}_u(k_2xk_3) \wedge \text{Past}_u(k_2)] \wedge \\ & \quad \exists k [wk \in \sigma \wedge k \leq_{2,3} g \wedge \text{talk-to}_w(g_2xg_3) \wedge \text{Past}_w(g_2)] \wedge \\ & \quad - \exists f \exists k [wk \in \sigma \wedge k \leq_{2,4} f \wedge \forall uh \in \sigma \exists! y [\text{right-partner}_u(yh_1)] \wedge \text{right-} \\ & \quad \quad \text{partner}_w(f_4f_1) \text{talk-to}_w(f_2xf_4) \wedge \text{Past}_w(f_2)] \} \\ & - [D] \end{aligned}$$

We arrive at a function that maps objects x to functions from input states σ with assignment k to output states such that (i) it is presupposed throughout σ that k_1 (= x) has a unique left partner and that x talked to this person, (ii) an index for the left partner of k_1 and an index 2 for the talking event are introduced, and (iii) it is expressed that x didn't talk to any alternative. In particular, as the only alternative is k_1 's right partner, it is expressed that x did not talk to k_1 's right partner, where again it is presupposed that k_1 has a unique right partner. The sentence is completed as follows:

(41')

$$\begin{aligned} & \text{every}_1 \text{ gentleman}, \lambda P \lambda t \lambda \sigma. \{wg \in \sigma: \forall k [g \leq_1 k \wedge \text{gentleman}_w(k_1) \rightarrow \\ & \quad \exists h [wh \in P(tk_1)((wk))]\}, = [E] \\ & \text{every}_1 \text{ gentleman only talked to [his}_{1,3} \text{ left partner}]_F, \\ & [E]([D]) \\ & - \lambda \sigma. \{wg \in \sigma: \forall k [g \leq_1 k \wedge \text{gentleman}_w(k_1) \rightarrow \exists h [wh \in [D](k_1)((wk))]\} \} \end{aligned}$$

We arrive at a function that restricts input states σ to output states for which every extension k of an input assignment g to an index 1 such that k_1 is a gentleman can be extended to an assignment h that satisfies [D] applied to k_1 . According to our previous calculations, this means that it is presupposed throughout σ that for every k , k_1 talked to k_1 's left partner; furthermore, we introduce a situation g_2 such that k_1 talked to k_1 's left partner, and didn't talk to k_1 's right partner.⁸

9 CASES WITH MULTIPLE FOCUS

In this section, I will discuss cases where more than one focusing operator must be assumed. In particular, I will have a look at the derivations of examples like (7). In the examples we are going to consider, the second focus operator is the particle *even*. For our discussion the following meaning rule for **even** is sufficient.⁹

$$(42) \text{ even}(\langle B, F \rangle) \\ = \lambda t \lambda \sigma \{ \text{wg} \mid \text{wg} \in B(F)(t)(\sigma) \wedge \\ \forall X \in \text{ALT}_4(F)[B(F)(t)(\sigma) <_p B(X)(t)(\sigma)] \} \quad \begin{array}{l} \text{(assertion)} \\ \text{(presupposition)} \end{array}$$

The first conjunct simply asserts $B(F)$ with respect to the input state σ . The second conjunct says that for each alternative X to F , it is less probable in σ that $B(F)$ holds than that $B(X)$ holds. This probability measure holds throughout σ , making it a presupposition.

The rule just given covers *even* as a VP-operator. If it is an NP operator we have to adapt the translation of *even* to the new type, where the variable Q takes care of the VP argument:

$$(43) \text{ even}(\langle B, F \rangle) \\ = \lambda Q \lambda t \lambda \sigma \{ \text{wg} \mid \text{wg} \in B(F)(Q)(t)(\sigma) \wedge \\ \forall X \in \text{ALT}_4(F)[B(F)(Q)(t)(\sigma) <_p B(X)(Q)(t)(\sigma)] \}$$

Let us first have a look at an example with disjoint foci. I assume that $[G]$, $[F]$ and $[E]$ stand for the same objects as in (35) above.

$$(44) \text{ only ate}_2 [\text{an}_3 \text{ apple}]_F, \text{ only}(\langle \lambda T.[G](T([F])), [E] \rangle), -[A]$$

$$\begin{array}{l} \text{John}_1, \lambda P \lambda t \lambda \sigma \{ \text{wg} \mid \text{wg} \in P(\text{tx})((\text{uh} \mid \exists k [\text{uk} \in \sigma \wedge k \leq_{1,2} h \wedge h_1 = j_w])) \}, \\ = [B] \\ \text{[John]}_1, \langle \lambda T.T, [B] \rangle \\ \text{even, } \lambda S.\text{even}(S) \\ \text{even [John]}_1, \text{ even}(\langle \lambda T.T, [B] \rangle) \\ \text{even [John]}_1, \text{ only ate}_2 [\text{an}_3 \text{ apple}]_F, \text{ even}(\langle \lambda T.T, [B] \rangle)([A]) \end{array}$$

Spelling out the meaning rules of **even** and **only** and performing lambda-reductions, we get the following result:

$$\lambda Q \lambda t \lambda \sigma \{ \text{wg} \mid \text{wg} \in [B](Q)(t)(\sigma) \wedge \\ \forall X \in \text{ALT}_4([B])[B](Q)(t)(\sigma) <_p X(Q)(t)(\sigma)]([A]) \\ = \lambda \sigma \{ \text{wg} \mid \text{wg} \in [B]([A])(\sigma) \wedge \forall X \in \text{ALT}_4([B])[B]([A])(\sigma) <_p X([A])(\sigma)] \}$$

The first conjunct reduces to the representation of *John only ate [an apple]*_F. Here it is presupposed that John ate an apple, the indices for this event, the apple, and John are introduced, and it is asserted that John didn't eat any alternative to an apple (see above (35)):

$$\forall \text{uh} \in \sigma \exists k [h \leq_{1,2,3} k \wedge \text{eat}_u(k_2 k_1 k_3) \wedge k_1 = j_w \wedge \text{apple}_u(k_3) \wedge \text{Past}_u(k_2)] \\ \wedge \exists k [\text{wk} \in \sigma \wedge k \leq_{1,2,3} g \wedge \text{eat}_w(g_2 g_1 g_3) \wedge g_1 = j_w \wedge \text{apple}_w(g_3) \wedge \text{Past}_w(g_2)] \\ \wedge \neg \exists X \exists k [X \in \text{ALT}_4([E]) \wedge \\ \exists s [\text{wk} \in X (\lambda sxy \lambda \sigma \{ \text{wg} \in \sigma \mid \text{eat}_w(sxy) \}) (sx) ((\text{uh} \mid \exists k [\text{uk} \in \sigma \wedge k \leq_{1,2,3} h \wedge \\ \text{Past}_u(s) \wedge h_1 = j_w]))]]]$$

The second conjunct expresses that for every alternative X to John it holds throughout the input state σ that it is less probable that John only ate an apple than that X only ate an apple.

$$\forall X \in \text{ALT}_4([B]) \\ \{ \text{uk} \in \sigma \mid \exists h [k \leq_{1,2,3} h \wedge \text{eat}_w(h_2 h_1 h_3) \wedge h_1 = j_w \wedge \text{apple}_w(h_3) \wedge \text{Past}_w(h_2)] \wedge \\ \neg \exists X \exists k [X \in \text{ALT}_4([E]) \wedge \\ \exists s [\text{wk} \in X (\lambda sxy \lambda \sigma \{ \text{wg} \in \sigma \mid \text{eat}_w(sxy) \}) (sx) ((\text{uh} \mid \exists k [\text{uk} \in \sigma \wedge k \leq_{1,2,3} h \wedge \\ \text{Past}_u(s) \wedge h_1 = j_w]))]]] \\ <_p X([A])(\sigma) \}$$

in summary, (44) has the following meaning: it is asserted that John didn't eat any alternative to an apple. It is presupposed that John ate an apple, and that it is less likely for John that he didn't eat any alternative to an apple than it would be for an alternative to John. Furthermore, discourse entities for John, an eating event by John and an apple that is eaten in the event are introduced. This seems to be the correct representation for a sentence like (44). For example, when the sentence is negated by *it is not the case that*, or dialogically by *no*, only the assertion part will be negated, but not the presuppositions.

Other cases with multiple focusing operators can be analyzed in a similar way. Let us have a look at a derivation with overlapping foci:

$$(45) \text{ even [only ate}_2 [\text{an}_{1,2} \text{ apple}]_F]_F \\ \text{only ate}_2 [\text{an}_3 \text{ apple}]_F, \text{ only}(\langle \lambda T.[G](T([F])), [E] \rangle), -[A] \\ \text{[only ate}_2 [\text{an}_3 \text{ apple}]_F], \langle \lambda P.P, [A] \rangle \\ \text{even, } \lambda S.\text{even}(S)$$

even [$\text{only } \text{ate}_2 [\text{an}_3 \text{ apple}]_F$], **even**($\langle \lambda P.P, [A] \rangle$)
 $\neg \lambda x \lambda \sigma \{ \text{wg} : \text{wg} \in [P](x)(\sigma) \wedge \forall X \in \text{ALT}_q ([A])([A](x)(\sigma) <_p X(x)(\sigma)) \}$

The first conjunct reduces to the following formula, which says that it is presupposed in σ that the individual x ate an apple in σ , which asserts that x didn't eat any alternative to an apple, and which introduces discourse entities for an apple and an eating event:

$\forall u h \in \sigma \exists k [h \leq_{2,3} k \wedge \text{eat}_u(k, x k_3) \wedge \text{apple}_u(k_3) \wedge \text{Past}_u(k_2)] \wedge$
 $\exists k [\text{wk} \in \sigma \wedge k \leq_{2,3} g \wedge \text{eat}_w(g_2 x g_3) \wedge \text{apple}_w(g_3) \wedge \text{Past}_w(g_2)] \wedge$
 $\neg \exists X \exists k [X \in \text{ALT}_q ([E]) \wedge$
 $\exists s [\text{wk} \in X(\lambda s x y \sigma. \{ \text{wg} \in s : \text{eat}_w(s x y) \}) (s x) (u h : \exists k [\text{uk} \in \sigma \wedge k \leq_{2,3} h \wedge$
 $\text{Past}_u(s)])]]]$

The second conjunct expresses that it is presupposed in σ that it is less likely that x only ate an apple than that x did some alternative to only eating an apple.

Finally, let us analyze a case in which one focusing operator is in the focus of another operator:

(46)

$\text{ate}_2 [\text{an}_3 \text{ apple}]_F, \langle \lambda T. [G](T([F])), [E] \rangle$
 $\text{only}, \lambda S. \text{only}(S)$
 $[\text{only}]_F, \langle \lambda R.R, \lambda S. \text{only}(S) \rangle$
 $[\text{only}]_F \text{ate}_2 [\text{an}_3 \text{ apple}]_F,$
 $\langle \lambda R.R, \lambda S. \text{only}(S) \rangle (\langle \lambda T. [G](T([F])), [E] \rangle)$
 $\neg \langle \lambda R.R (\langle \lambda T. [G](T([F])), [E] \rangle), \lambda S. \text{only}(S) \rangle$
 $\text{even}, \lambda S. \text{even}(S)$
 $\text{even} [\text{only}]_F \text{ate}_2 [\text{an}_3 \text{ apple}]_F,$
 $\text{even} (\langle \lambda R.R (\langle \lambda T. [G](T([F])), [E] \rangle), \lambda S. \text{only}(S) \rangle)$
 $= \lambda x \lambda \sigma \{ \text{wg} : \text{wg} \in \text{only} (\langle \lambda T. [G](T([F])), [E] \rangle) (x)(\sigma) \wedge$
 $\forall X \in \text{ALT}_q (\text{only}) [\text{only} (\langle \lambda T. [G](T([F])), [E] \rangle) (x)(\sigma) <_p$
 $X(\text{only} (\langle \lambda T. [G](T([F])), [E] \rangle) (x)(\sigma)) \}$

The first conjunct reduces to the same formula as the first conjunct in the preceding derivation: it presupposes that x ate an apple, and asserts that x didn't eat any alternative to an apple. As for the second conjunct, we have to know what the possible alternatives to **only** are. In Krifka (1992a) I suggested that the only alternative to **only** is the meaning of the focusing operator *also*. One piece

of evidence for this is the common locution *not only X, but also Y*. Let us assume the following meaning for *also* as a VP operator:

(47) **also**($\langle B, F \rangle$) =
 $\lambda t \lambda \sigma \{ \text{wg} : \text{wg} \in B(F)(t)(\sigma) \wedge$
 $\forall u k \in \sigma \exists X \exists h [X \in \text{ALT}_q (F) \wedge u h \in B(X)(t)(\{u k\})] \}$
 (assertion)
 (presupp.)

That is, it is asserted that $B(F)$ holds, and it is presupposed that for some alternative X to F , $B(X)$ holds. If **also** is the only element in ALT_q (**only**), then we get the following interpretation of the second conjunct of (46):

$\{u k \in \sigma : \exists h [u h \in \text{only} (\langle \lambda T. [G](T([F])), [E] \rangle) (x)(\sigma)] \} <_p$
 $\{u k \in \sigma : \exists h [u h \in \text{also} (\langle \lambda T. [G](T([F])), [E] \rangle) (x)(\sigma)] \}$

After the meaning postulates for **only** and **also** are spelled out, we get the presupposition that throughout the input state σ it is less likely that x ate an apple and no alternative to an apple, than that x ate an apple and some alternative to an apple. This captures the meaning of expressions like (46) correctly.

10 CONCLUSION

In this article I have shown that structured meanings can be incorporated in a dynamic setting, and that the resulting framework allows for a sophisticated treatment of focusing operators. In particular, we have seen that we can distinguish between presuppositional content and assertional content, and that we can deal with discourse markers that are introduced within the scope of such operators.

MANFRED KRIFKA
 Dept. of Linguistics
 Calhoun Hall 501
 University of Texas at Austin
 Austin, Texas 78712-1196
 USA

Received: 14.12.92
 Revised version received: 25.05.93

NOTES

¹ I thank two anonymous reviewers for helpful comments and criticism. The paper is a substantially revised version of a talk I gave at the Fourth Symposium on Logic and Language, Budapest, 1992. A preliminary version was published in the proceedings of this conference, Krifka

(1993). I thank the organizers and participants of this conference for the opportunity to present this paper and discuss its issues.

² This analysis was suggested to me by Arnim von Stechow.

³ There is one interesting difference

between German and English: Contrary to English, focus on negative terms is possible in German:

- (1) a. Nur kein Mädchen hat geweint.
[only no girl cried]
'Everybody who is not a girl cried but no girl cried.'
a. Wir haben nur keine Giraffen gesehen.
[we have only no giraffes seen]
'We saw everything except giraffes.'

This difference is due to the fact that the German negative quantifier has to be decomposed into a negation part and an indefinite part (cf. also Jacobs 1983). This was shown by Jacobs (1980) with examples like the following:

- (2) Jeder Arzt fährt kein Auto.
[every doctor drives no car]
One reading: 'Not every doctor drives a car.'

If *kein(e)* has to be decomposed in this fashion, then the above examples would obtain the following interpretations:

- (3) a. ... nur [Mädchen]_F NEG geweint hat.
[... only girls didn't cry.]
a. ... wir nur NEG [Giraffen]_F gesehen haben.
[... we only didn't see [(any) giraffes]_F]

4 The present analysis differs from the one given in Krifka (1993), where I assumed that it is presupposed throughout the input state that g_4 is defined and refers to g_1 's bike. A problem with that analysis is that it cannot handle quantified sentences as the following one, as the discourse marker 4 cannot be fixed to a particular object:

Every boy₁ who likes his_{1,4} bike keeps it₄ clean.

Noun phrases like *his bike* are analyzed as 'weakly familiar' in the terminology of Condoravdi (1992). That is, although their index is not present in the input state yet, their descriptive content is presupposed.

- 5 This differs from the treatment in Beaver (1992), for whom $[\phi](\sigma)$ would be undefined in such a case. Consequently, Beaver has to employ a semantic metalanguage that allows for truth-value gaps. This complication is unnecessary, I think. As the empty information state does not serve any essential function, we might make use of it to express presupposition failure.

- 6 This analysis of negation differs from the one given in Heim (1983a) and Beaver (1992). According to their analysis, a negated sentence $\neg\phi$ restricts an input state σ to those world-assignment pairs whose assignments cannot be extended to satisfy ϕ :

$$[\neg\phi](\sigma) = \sigma - \{wf \in \sigma : \exists g \geq f \mid wg \in [\phi](\sigma)\}$$

The problem with this representation is that if ϕ expresses a presupposition that is not satisfied throughout σ , then the subtracted set will be reduced to $\emptyset$, and $\sigma - \emptyset$ is σ again. So we would predict that a negated sentence containing a presupposition that is not satisfied simply does not change the input state but otherwise does no harm. Note that the result is different in Beaver's theory, where in such a case $[\phi](\sigma)$ will be undefined, and consequently $[\neg\phi](\sigma)$ will be undefined.

- 7 There is one problem of the proposed analysis, illustrated by the following sentence:

He₁ did not see [his_{1,3} bike]_i. He₁ suspected that it_i was stolen.

Note that *it* can be anaphorically related to *his bike*, even though this NP occurs within the scope of a negation, and hence its index should be inaccessible. A way out is the following. Note that the negation does not affect the presupposition that 1 has a unique bike. Assuming that *it* picks up the description *his bike*, it follows that *it* refers to the same entity as its antecedent. In Krifka (1993) I assumed that the index 3 itself is presupposed; however, this creates

problems in quantificational cases, as indicated in note 4.

- 8 This treatment of foci containing anaphoric elements differs from the one given in Krifka (1992b), where I assume that the alternatives directly refer to the partners, and as those entities differ for different gentlemen under consideration, the set of alternatives is dependent on input assign-

ments. The present treatment, where the alternatives are something like Skolem functions (for each gentleman x , they give x 's left partner and x 's right partner), allows us to give considerably simplified semantic rules for *only*.

- 9 But see Jacobs (1983), who points out problems with an analysis of *even* in terms of probability.

REFERENCES

- Beaver, D. I. (1992), *The Kinematics of Presupposition*, ITLI Prepublication Series LP-92-05, University of Amsterdam. Also in the *Proceedings of the 8th Amsterdam Colloquium*.
- Condoravdi, C. (1992), 'Strong and weak novelty and familiarity', in *SALT II, Proceedings from the Second Conference on Semantics and Linguistic Theory*, Working Papers in Linguistics 40, Ohio State University, Department of Linguistics, 17-38.
- Dahl, Ö. (1974), 'Topic-comment structure revisited', in *Topic and Comment, Contextual Boundness and Focus*, Buske, Hamburg, 1-24.
- Groenendijk, J. & Stokhof, M. (1990), 'Dynamic Montague Grammar', in L. Kálmán & L. Polos (eds), *Papers from the Second Symposium on Logic and Language, Hajdúszoboszló, Hungary*, Akadémiai Kiadó, Budapest, 3-48.
- Groenendijk, J. & Stokhof, M. (1991), 'Dynamic predicate logic', *Linguistics and Philosophy*, 14, 39-101.
- Heim, I. (1982), 'The semantics of definite and indefinite noun phrases PR', Ph.D. Dissertation, University of Massachusetts at Amherst, and University of Konstanz, SFB-Papier 73.
- Heim, I. (1983a), 'On the projection problem for presuppositions', in *West Coast Conference on Formal Linguistics* 2, 114-26.
- Heim, I. (1983b), 'File change semantics and the familiarity theory of definiteness', in *Meaning, Use and the Interpretation of Language*, Berlin, Walter de Gruyter, 164-90.
- Horn, L. (1969), 'A presuppositional analysis of *only* and *even*' in *Papers from the fifth regional meeting, Chicago Linguistic Society*, 318-27.
- Horn, L. (1985), 'Metalinguistic negation and pragmatic ambiguity', *Language*, 61, 121-74.
- Jackendoff, R. (1972), *Semantic Interpretation in Generative Grammar*, MIT Press, Cambridge, Mass.
- Jacobs, J. (1980), 'Lexical decomposition in Montague Grammar', *Theoretical Linguistics*, 7, 121-36.
- Jacobs, J. (1983), *Fokus und Skalen, Zur Syntax und Semantik von Gradpartikeln im Deutschen*, Niemeyer, Tübingen.
- Jacobs, J. (1991), 'Focus ambiguities', *Journal of Semantics*, 8, 1-36.
- Kamp, H. (1984), 'A theory of truth and semantic representation', in J. Groenendijk, T. Janssen & M. Stokhof (eds), *Truth, Interpretation and Information*, Foris, Dordrecht.
- Karttunen, L. (1974), 'Presuppositions and linguistic context', *Theoretical Linguistics*, 1, 181-94.
- Karttunen, L. & Peters, S. (1979), 'Conventional implicature', in C.-K. Oh & D. Dinneen (eds), *Syntax and Semantics 3: Presupposition*, Academic Press, New York, 1-56.